# REPRESENTING THE COMPLEXITY, DIVERSITY AND PARTICULARITY OF THE DOCTORAL ENTERPRISE IN AUSTRALIA

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## Declaration

This thesis was produced as part of the ARC Linkage Project entitled *Reconceptualising the Doctoral Experience* with Professor Terry Evans, Ms Margot Pearson and Dr Peter Macauley as Chief Investigators. As part of the project a national online survey was administered in collaboration with Mr Kevin Ryland a fellow PhD candidate and project member. While the survey data is common to both of our doctoral theses, I am responsible for the analysis and interpretation of all material contained in the body of this thesis.

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## Abstract

This thesis addresses the need to reconceptualise the doctoral experience at a time when the boundaries between education, training, research, work and career development are becoming increasingly blurred. It does so by means of a detailed analysis of what candidates do and how they operate in a variety of disciplinary, employment and other contexts.

In order to synthesise and interpret the outcomes of that analysis a broader concept of the doctoral enterprise is developed within which the lived experience is embedded. It is argued that effective representation of the doctoral enterprise is as important as its reconceptualisation, and that both processes are required to generate in-depth understanding of the complexity, diversity and particularity of this phenomenon.

Case narratives incorporating the perspectives of candidates—as well as those whom they deem to be influencing their research and learning—are employed to portray distinctive elements of doctoral work and its associated outcomes. Quantitative data and analysis derived from a national survey of doctoral candidates are combined subsequently with this qualitative material in order to generate further insight regarding doctoral activities and the entities that are integral to their enactment.

Drawing on theories of practice, an integrative model of the doctoral enterprise is then presented. This comprises two basic components, one of which is a set of doctoral practices classified in terms of curriculum, pedagogy, research and work. The other is a set of doctoral arrangements that reflect configurations of entities inclusive of the participants, the academy and the community.

The purpose of the model is to increase understanding of the dynamic and evolving nature of the doctoral enterprise and the interrelationships involving practices and arrangements. This model has implications for candidates and others involved directly in the doctoral enterprise, regardless of their sector, role or status.

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## Acronyms

| | |
|---|---|
| ACER | Australian Council for Educational Research |
| AERA | American Educational Research Association |
| ANU | Australian National University |
| AOU | Academic Organisational Unit |
| APA | Australian Postgraduate Award |
| APAI | Australian Postgraduate Award Industry |
| APAIs | Australian Postgraduate Award Industry candidates |
| ARC | Australian Research Council |
| AVCC | Australian Vice Chancellors' Committee (Universities Australia from 2007) |
| BERA | British Educational Research Association |
| CAPA | Council of Australian Postgraduate Associations |
| CEDAM | Centre for Educational Development and Academic Methods |
| CI | Chief Investigator |
| CRC | Cooperative Research Centre |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| DCA | Doctor of Creative Arts |
| DEST | Department of Education, Science and Training (formerly Department of Education, Training and Youth Affairs) |
| DDOGS | Deans and Directors of Graduate Schools |
| DU | Deakin University |
| DUSA | Deakin University Students' Association |
| GCA | Graduate Careers Australia |
| GRDC | Grains Research and Development Corporation |
| HDR | Higher Degree by Research |
| HECS | Higher Education Contribution Scheme |
| ICT | Information and Communication Technologies |
| IP | Industry Partner |
| IPRS | International Postgraduate Research Scholarship |
| ISI | Institute for Scientific Information |
| IT | Information Technology |
| NASA | National Aeronautics and Space Administration |
| NGO | Non-Government Organisation |
| NHMRC | National Health and Medical Research Council |
| OH&S | Occupational Health and Safety |
| PARSA | Postgraduate and Research Students' Association |
| PGSA | Postgraduate Student Association |
| PRAT | Postgraduate Research Administrators' Taskforce |
| PREQ | Postgraduate Research Experience Questionnaire |
| QANGO | Quasi Autonomous Non-Government Organisation |
| RFCD | Research Fields, Courses and Disciplines |
| RPL | Recognition of Prior Learning |
| SPSS | Statistical Package for the Social Sciences |
| TAFE | Technical and Further Education |

# 1. Clarifying the focus

## 1.1 Introduction

Doing a PhD is one thing. Doing a PhD on those enrolled in doctoral programs is another thing altogether. As a mature-age candidate with a career in continuous professional learning, that was my lot during the period 2004-2007. The assigned research task was to produce an accurate and comprehensive picture of the full-time doctoral experience in Australia at that time. Initially, the lived experience of candidates filled the frame of my investigative viewfinder. However, I adjusted the lens subsequently in order to take in additional players, activities and influences. One reason for refocusing was to get a better shot of what turned out to be a moving target. Another was to capture doctoral work in multiple settings, from various angles and through different filters. Eventually I abandoned my quest for the quintessential snapshot, turning instead to the medium of collage as a more effective way of representing this complex phenomenon, namely, the doctoral enterprise within which the doctoral experience is embedded.

Since the mid-1990s there have been repeated calls in Australia and elsewhere for in-depth studies to investigate key aspects of the doctoral experience. These have included recommendations to probe inside the 'black box of doctoral programs' (Haworth, 1996, p. 406); to reveal the 'stubbornly invisible' features of student work and training (Delamont, Atkinson et al., 2000, p. 134); and to conduct "careful empirical investigation into how students construe and experience their environment" (Boud & Lee, 2005, p. 514). One researcher has heralded the direction of new research in this field in the following terms: "[it] might usefully include more complementary macro- and micro-level studies, more critical analysis grounded in empirical data, more fine grained analysis of local activity and human agency, and more recognition of the broad range of stakeholder interests" (Pearson, 2005, p.130).

Situated within that research context, this thesis addresses the problem of inexactitude with regard to the realities and subtleties of contemporary doctoral work. Despite the existence of an expanding knowledge base in doctoral education, surprisingly little is known about the micro-worlds of those engaged in this endeavour. Much published research has been focused on a broad range of topics such as supervision and the institutional context. If the voice of candidates is registered at all, it is invariably subdued. Another aspect of the research problem is the extent to which activities integral to the undertaking of a doctorate remain under-theorised. Consequently, the objectives of the thesis are to theorise the contemporary doctoral enterprise on the one hand, while communicating its complexity, diversity and particularity on the other. The primary purposes of this opening chapter include locating the thesis in a national project; positioning it in the literature; and outlining the way in which the research problem was operationalised in the first instance.

## 1.2 Locating the thesis in a national project

As Chief Investigators (CIs), Evans, Pearson and Macauley were funded as part of an Australian Research Council (ARC) Linkage Project in 2004-2006 entitled 'Working Students: Reconceptualising the doctoral experience'. The Council of Australian Postgraduate Associations (CAPA), the Postgraduate and Research Students' Association (PARSA) at the Australian National University (ANU), and the Deakin University Students' Association were involved in the project as Industry Partners (IPs). Subsequently, two Australian Postgraduate Award Industry (APAI) candidates were appointed—one at the ANU with a focus on full-time candidates (Cumming), while the other at Deakin was concerned primarily with part-time candidates (Ryland).

Central to the Linkage Project's rationale was evidence demonstrating that many doctoral candidates no longer conformed to the 'traditional' model of research students. The CIs described this model as one "imported from the UK [that] stereotypically posits doctoral students as 'good honours' graduates, usually young, male, full-time and on-campus, undertaking their doctoral candidature in discipline based departments where students are inducted into disciplinary and academic communities prior to seeking employment within these or a related community"[1].

Drawing on a range of sources (Pearson & Ford, 1997; Trigwell, Shannon et al., 1997; Evans & Pearson, 1999; Evans, 2002; Neumann, 2002; Usher, 2002), the CIs demonstrated that the number and diversity of candidates and doctoral degrees in Australia grew enormously during the 1990s. They pointed to the changing demographics of candidates, in terms of gender, age, enrolment status, mode of attendance and employment destination for example, as well as changes to PhD programs identifying similar trends in other countries (Haworth, 1996; LaPidus, 1997; Green, 2002). Citing the work of other researchers (Bazeley, Kemp et al., 1996; Powles, 1996; Jacob & Hellstrom, 2000; Shove, 2000; Harman, 2001; Barnacle, 2002), the CIs demonstrated the impact of changes in research practice and the research environment, by highlighting closer links between universities, industry, government and other agencies, as well as greater complexity with regard to the working lives of candidates.

However, citing other research (Powles, 1984; Siddle, 1997; Ross, 2001) the CIs also distinguished between undergraduate and postgraduate perceptions of the interrelationship and significance of their lived experience as students, their research and the world of work. For example, they observed that while undergraduates generally see themselves as preparing for the workplace, postgraduates' self-perception is one of actively contributing to the research enterprise. Hence, the CIs concurred with the research finding that for postgraduates "conceptualising the final stage of student life as transition to work or graduate employment is deeply flawed" (Ross, 2001, p. 21).

From a theoretical perspective, the CIs were keen to ensure that the research was not limited to the specialised higher education literature on doctoral education and supervision, and in their proposal included reference to situated, work-based and social theories of learning, as well as career management (Lave & Wenger, 1991; Delamont, Atkinson et al., 1997; Wenger, 1998; Bowden, 2000; Thompson, Pearson et al., 2001). As a result, there was considerable interest in exploring the potential to position doctoral candidates as 'workers', 'researchers' and 'producers', rather than students (i.e. similar to undergraduates).

On the basis of this rationale, therefore, the CIs determined that the common focus for the two project components would be "the interrelationship and significance of doctoral candidates' workforce participation, work training and career development". New knowledge to be generated from the project was described in the following terms:

- an understanding of the dynamics of doctoral student interaction with their workplaces, community and university
- a detailed analysis of the nature of the doctoral student candidature, the activity doctoral students engage in, and how their work contributes to their research training and career development
- how they, their supervisors and their workplaces perceive their involvement in research, and
- the impact of government and institutional policies and funding arrangements on doctoral student activity.

[1] Extract from the project description of the ARC Submission "Working Students: Reconceptualising the doctoral experience", LPO 348413, 2003.

The articulation of these intended outcomes provided the basis for the initial planning and implementation of my research. They acted as a set of goalposts towards which my efforts—as well as those of the research team—were to be directed. If I were to extend this sporting metaphor, the CIs had named the game 'Working Students' and in their role as playing coaches had determined that the best chance of scoring would be to target candidates themselves. Playing by well established rules, the proposed strategy was to find out among other things in which sites they operated, to which communities they belonged, and to which influences they were being subjected. Once that knowledge had been obtained, I—along with other team members—would be in a better position to make practical and theoretical connections between the education, training, research, work and career development of doctoral candidates. That was the game plan. However, before taking the field I needed to participate in some pre-match exercises. The most important of these was to analyse the tactics and results involving prior games of doctoral experience—as well as those from any related codes that might yield pertinent information. What follows is an analysis of some of the material uncovered during those exercises.

## 1.3 Positioning the thesis in the literature

This section discusses four themes identified as part of an initial review of the literature. The first is concerned with the doctoral experience in general and builds on the work of the CIs undertaken as part of the original grant application. This led me to identify three themes that could be described as insufficiently explored in relation to the doctoral experience, namely, learning environments, socialisation and knowledge production. It is important to emphasise that this constitutes an initial review of the literature, which is augmented significantly in subsequent chapters of the thesis. For example, a review of narrative theory is included as part of Chapter 2, and a discussion of practice theory forms part of Chapter 7. The literature is also used in the analysis of data and the interpretation of research findings.

### The doctoral experience

Efforts to investigate aspects of the doctoral experience intensified in the early 1990s in Australia and elsewhere with a number of studies focused primarily on supervision (Salmon, 1992; Cullen, Pearson et al., 1994; Parry & Hayden, 1994). A notable feature was the inclusion of student as well as supervisor perspectives, although most were on a relatively small scale. For example, the Salmon study involved one supervisor and a group of her students, and the Cullen et al and Parry studies involved a sample of candidates from single institutions. Later studies on a similar scale have had an even more explicit focus on the perspectives of individual candidates, groups and cohorts (Morton & Thornley, 2001; Glaze, 2002; Vilkinas, 2005). However, larger scale research projects have also been published involving candidates and supervisors from several institutions (Delamont, Atkinson et al., 2000; Golde & Dore, 2001; Neumann, 2003b).

Select examples of empirical research on the doctoral experience published during 1992-2005 are provided in Table 1.1. Twenty studies conducted across several continents including Australia, New Zealand, North America, United Kingdom and Scandinavia are classified in this table according to various criteria including the methodology and focus of the research. In classifying research on the doctoral experience in this way it is important to be cognisant of variation between systems. Structural and financial arrangements for doctoral education differ from country to country. That said, however, it is possible to identify some significant themes and issues emerging from published studies on the doctoral experience.

Supervision certainly constitutes a dominant theme in the literature. The importance of an effective working relationship between candidate and supervisor is widely acknowledged, and various strategies have been identified for establishing and maintaining a productive arrangement (Pearson & Kayrooz, 2004; Zhao, Golde et al., 2007). The impact of negative supervisory experiences has been documented to a lesser extent (Riemer, 1998; Lee &

Williams, 1999; Golde, 2005). While considerable emphasis has been placed on the knowledge, expertise and attributes of the principal supervisor, a small number of researchers has noted that individuals other than supervisors need to be included in the frame of the doctoral experience. For example, a study conducted in the early 1990s concluded that "supervision should be conceptualised to encompass a broad view of PhD education—which is more than a one-to-one interaction with a supervisor" (Cullen, Pearson et al., 1994, p. 102). Given that such limited attention had been paid to individuals other than supervisors engaged in the doctoral experience I considered this to be an avenue worth pursuing as part of my research.

**Table 1.1—Select examples of empirical research studies on the doctoral experience, 1992-2005**

| Type | No. | Study | Focus |
|---|---|---|---|
| Quantitative | 1 | (Ainley, 2001)—Aust. | Postgraduate research experience |
| | 2 | (Golde & Dore, 2001)—USA | Doctoral experience |
| | 3 | (National Association of Graduate and Professional Students, 2001)—USA and Canada | Educational practices in graduate school |
| | 4 | (Morton & Thornley, 2001)—New Zealand | Mathematics PhD students' experience |
| Qualitative [interview] | 5 | (Parry & Hayden, 1994)—Aust. | Supervision of HDR students |
| | 6 | (Nyquist & Woodford, 2000)—USA | Concerns about the PhD |
| | 7 | (Crawford, 2003)—Aust. | PhD journey—shared experiences |
| | 8 | (Neumann, 2003b)—Aust. | Doctoral experience |
| Qualitative [collaborative] | 9 | (Feldman, Alibrandi et al., 1996)—USA | PhD student roles—teacher education |
| | 10 | (Heinrich, 2000)—USA | Female, mid-life experience |
| | 11 | (Gonzalez, Figueroa et al., 2001)—USA | Latina/o PhD student experience |
| | 12 | (Malfroy & Yates, 2003)—Aust. | Two doctoral programs linking the academy and workplace |
| Qualitative [narrative] | 13 | (Salmon, 1992)—UK | Achieving a PhD |
| | 14 | (Kerlin, 1998)—USA and Canada | Women doctoral students and health |
| | 15 | (Glaze, 2002)—UK | Dialogue with self—PhD candidate, nursing education |
| | 16 | (Vilkinas, 2005)—Aust. | The thesis journey |
| Mixed | 17 | (Cullen, Pearson et al., 1994)—Aust. | Effective PhD supervision |
| | 18 | (Wellcome Trust, 2000)—UK | Biomedical PhD awardees |
| | 19 | (Appel & Dahlgren, 2003)—Scandinavia | Working conditions of PhD students—especially females |
| | 20 | (Maher, Ford et al., 2004)—USA | Degree progress of female PhD students |

The institutional context in which candidates operate—the epistemological setting, the organisational climate and the availability of physical and human resources, for example—has also been identified as an important factor in the doctoral experience. Several studies have focused on the impact of disciplinary contexts and cultures, with some comparing and contrasting particular groups, for example, hard/soft, pure/applied, mono/interdisciplinary (Cullen, Pearson et al., 1994; Parry & Hayden, 1994; Neumann, 2003b). Others have explored the impact of gender and cultural factors on candidates across the academy in general (Kerlin, 1998; Gonzalez, Figueroa et al., 2001). While the institutional context is clearly important, limited consideration has been given to the possibility that candidates might be subject to influences in a range of other work and community-related settings. From my perspective this constituted a sizeable gap in the literature and one that might be explored further. For example, what type of cultures and resources beyond the walls of the university might be impacting on the doctoral experience?

Student satisfaction in relation to their research and program experience has also been explored in considerable depth in the literature. Significantly, the findings from these studies are remarkably consistent. Although differences exist in relation to target populations (e.g. alumni, recently completed and currently enrolled candidates), it is interesting to observe that these quantitative studies reveal that the overwhelming majority of higher degree candidates is highly

satisfied. For example, studies in Australia have reported overall satisfaction ratings exceeding 80 per cent (Ainley, 2001; Graduate Careers Australia and Australian Council for Educational Research, 2001, 2003, 2005). Two large-scale doctoral studies conducted in the USA reported similar ratings. One of these reported over 80 per cent respondent satisfaction with programs and advisers (National Association of Graduate and Professional Students, 2001), while another reported that "overwhelmingly students have the adviser they want" [91 per cent], although it was also found that "many students are not satisfied with the quality of their relationship with their adviser", and disciplinary differences were also noted (Golde & Dore, 2001, p. 37). However, at issue in these studies is the extent of variation regarding satisfaction and concern across a range of institutional and research contexts.

A characteristic feature of the accounts of the doctoral student experience is reference to the metaphorical 'journey' (Appel & Dahlgren, 2003; Crawford, 2003; Vilkinas, 2005). Many of these are peppered with stories of voyages, crossings, ascents and expeditions, replete with colourful anecdotes regarding various trials and tribulations. The Vilkanis collection, entitled The Thesis Journey', carries the subtitle 'Tales of Personal Triumph', and highlights the emotional highs and lows of ten individuals in their role as a doctoral candidate. For example, the headings used by one candidate to describe her journey include 'pre-plunge jitters', 'the blind adrenalin rush', 'almost drowning' and 'surfacing and finding the railing: learning the rules of a different ball game' (Perera, 2005). While the lives of candidates whose journeys have ended in neither triumph nor satisfactory completion have also been recorded (Lovitts, 2001), these are in the minority.

The more I began to encounter the journey metaphor as a primary organiser of the doctoral experience, however, the more I came to realise its limited scope. From my perspective it has now outlived its usefulness. Three main limitations can be identified: it tends to focus on one individual—the candidate; one domain—the affective; and one setting—the academy. Consequently it negates or obscures the existence of other factors, thereby inhibiting the development of more broadly-based conceptualisations of the doctoral experience.

A recent review of the literature on the postgraduate research student learning experience (Leonard, Metcalfe et al., 2006) is a timely and welcome addition to the existing knowledge base. It also confirms some of my initial conclusions. Although concerned primarily with the student experience in the UK, three findings are significant. One is that "research on the doctorate has usually noted the disciplinary area(s), but tended to focus disproportionately on the social sciences" (p. 4). Another is that "there has been very little research done on the students' perspective and giving student views of the doctoral experience" (p. 5). There is also a finding that "the majority of studies were not based on any discernible theoretical framework, and the majority presented mainly qualitative data" (p. 20). Indeed, I have used these findings to construct a rationale for two refereed publications about contemporary doctoral practices in the natural and physical sciences (Cumming, 2007a, forthcoming). The main argument advanced in these publications is that more effective ways of conceptualising and representing doctoral work in the sciences are urgently required.

To summarise, a striking feature of the literature is the relatively narrow and insular construction of the doctoral experience. In general, the experience appears to be confined to the academy, with a focus on candidates and supervisors—although with some acknowledgment that other institutional players may be involved. The general impression gained is a relatively self-contained exercise sequestered from the outside world. Where reference is made to the world of work and career development it is invariably focused on academic pathways and positions. Training is conceptualised primarily in terms of preparation to conduct advanced research—usually in disciplinary settings and contexts.

As I navigated across the rapidly expanding field of doctoral education, three themes emerged in relation to perceived gaps in the literature pertaining to the doctoral experience. The first of these was concerned with learning environments. In contrast to the concept of the institutional

context—which suggests a degree of structure or organisation in relation to learning and training—learning environments reflects a more open and flexible set of arrangements. The second theme dealt with the socialisation of candidates. In a similar vein, while much of the literature on the doctoral experience dealt with academic socialisation, I was interested to explore other processes of acculturation and significant influences acting on candidates. The third theme of knowledge production focused on how, where and by whom knowledge is deemed to be generated—once again embracing settings and contexts that exist beyond the academy.

In the material that follows, each theme is discussed briefly. In order to present a distilled analysis of the literature reviewed, a common schema is employed for each theme. In an effort to reflect a continuum of development over time, 'conventional' and 'emergent' frames of reference are constructed. The former is designed to reflect key features of the established orthodoxy, while the latter picks up on contemporary trends and developments. A major purpose of the schema is to enable the reader to appreciate not only the range of concepts and ideas canvassed, but also the evolutionary nature of the academic discourse.

**Learning environments**

Work-based and social theories of learning provide a useful starting point for a review of the literature on learning environments (Collins, Brown et al., 1989; Lave & Wenger, 1991; Trigwell & Reid, 1998; Wenger, 1998; Delamont, Atkinson et al., 2000; Beckett & Hager, 2002; Hager, 2004; Boud & Lee, 2005). These theories portray learning as occurring in a variety of settings, with emphasis placed on a variety of informal and contextual elements. In other words learning is not confined to lecture theatres, libraries, laboratories and other institutional settings. It is possible to identify three themes that assist in generating an understanding of learning environments relevant to the doctoral experience. First, the operational context in which candidates work; second, the type of activity in which they are engaged; and third, the dominant mode of interaction which is employed [see Table 1.2].

**Table 1.2—Learning environments**

| | **Conventional frame** | → | **Emergent frame** |
|---|---|---|---|
| **Context** | compartmentalised | → | open |
| | on campus | → | flexible |
| **Activity** | individualised | → | collaborative |
| | bounded | → | distributed |
| **Interaction** | papers and reports | → | e-learning |
| | conferences | → | networking |

Within the conventional frame doctoral students are not only enrolled in a university department, but also spend most of their candidature within its physical environs. They are frequently depicted as learners whose discipline-based research will contribute over time to the established knowledge base in their chosen field. Interaction is invariably formal and structured, with the principal means of communication occurring via refereed publications and academic conferences. Hager (2004), for example, has highlighted the "privileged status" that "learning in formal education settings" occupies in today's society (pp. 4-5).

A key feature of the emergent frame is the diversity of settings in which candidates are working (Pearson & Ford, 1997; Harman, G. 2002; Harman, K. 2002). Candidates work in industry as well as organisations in the public and private sectors. Examples include Cooperative Research Centres, specialist laboratories and hospitals. Collaboration and cooperation is common, along with the capacity to engage in a level of boundary crossing—across fields of study,

organisations and sectors. The critical importance of social, historical and cultural contexts in the learning on the part of groups as well as individuals has been outlined in a number of related theories. One is cognitive apprenticeship (Collins, Brown et al., 1989) where apprentices learn by externalising their higher order processes such as problem-solving. Another is legitimate peripheral participation (Lave & Wenger, 1991) that involves sponsors (or 'masters') providing apprentices with opportunities to participate in a community of practice (Wenger, 1998). There is also peer learning (Boud & Lee, 2005) which highlights the reciprocal and symbiotic nature of that process—where partners in learning derive mutual benefit.

Rapid growth and diversification of Information and Communication Technologies (ICTs)—websites, wikis, online discussion groups and so on—reflects a move from material to virtual learning environments. E-learning, e-networking, e-portfolios and e-publishing mean that living in a virtual doctoral world is becoming a reality for an increasing number of candidates. An interesting development has been a steady growth in the practice of blogging, whereby the experiences of doctoral candidates are documented and publicly accessible. For example, 'phdweblogs' is a website containing around 500 registered PhD blogs compiled by candidates across the globe [see http://phdweblogs.net/index.php.]. While an increase in the number of blogs registered on the phdweblogs site has been recorded during the period 2004-2007, it would appear that the use of these ICTs in doctoral research remains limited to this point in time. It is worth noting that aspects of my own doctoral activities have been recorded continuously by means of a blog—http://doctoralpractices.blogspot.com/.

While my blog does not constitute a formal component of this thesis, it does provide an additional point of reference, as well as a potential data source for those researching in the field of doctoral education in years to come. A development that occurred during my candidature was the advent of "Web 2.0" technologies[2]. This refers to the development of a second generation of web-based communities and services designed to facilitate collaboration and cooperation among users. Contemporary examples include 'You Tube' and 'MySpace'. Despite this comparatively recent development, it is noteworthy that my online search of these sites using descriptors like 'PhD/doctoral' with 'student/candidate' revealed that doctoral candidates are active in this new learning landscape[3].

**Socialisation**

Various forms of socialisation have been identified including adult (Miller & Wager, 1971), professional (Green, 1991), academic (Becher & Trowler, 2001), organisational (Tierney, 1997b), and doctoral student (Antony, 2002). Socialisation is generally conceived as a process of acculturation whereby individuals prepare to enter the communities in which they plan to make a contribution during their adult or working lives. As illustrated in Table 1.3 it is possible to identify conventional and emergent frames of reference within the literature.

Congruence, compliance and assimilation tend to constitute basic tenets of theories of socialisation within a conventional frame. Writers in this frame often conceptualise novices as passing through various 'stages' of development as part of the socialisation process (Cogswell, 1968; Green, 1991; Weidman, Twale et al., 2001; Weidman & Stein, 2003). Aspiring to fulfil the roles and functions of experts in their chosen field, candidates are depicted as adopting the norms of, and conforming to, the expectations and requirements of identified experts and authorities. Establishing a close working relationship with a supervisor and being immersed in a disciplinary culture are seen as enabling candidates to absorb commonly held beliefs and ways of operating. Hence, socialisation in the conventional frame is conceptualised as a rational and

[2] This phrase was coined by Tim O'Reilly—a supporter of the free software and open source movements—suggesting an extension of the World Wide Web [Source: Accessed May 2007 from http://en.wikipedia.org/wiki/Tim_O'Reilly]

[3] Over 1,000 sites on MySpace and more than 200 sites on YouTube contain information about doctoral candidates, along with their activities and experiences [Accessed May 2007].

linear process that commences during research training and is extended during the induction period, culminating in the recognition of professional competence by the academy.

**Table 1.3—Socialisation**

| | **Conventional frame** | → | **Emergent frame** |
|---|---|---|---|
| **Relationship** | dyadic | → | multiple |
| | sequential | → | dynamic |
| **Setting** | disciplinary | → | trans-disciplinary |
| | formal | → | multi-faceted |
| **Role** | definitive | → | negotiated |
| | static/circumscribed | → | transformative |

In an emergent frame, however, descriptors such as 'negotiated', 'reciprocal' and 'transformative' are used to characterise the socialisation process. The pro-active role of candidates is a key feature, especially with regard to their demonstrated capacity to mediate the established processes and outcomes of socialisation. Novices are seen to influence the community they are seeking to gain formal entry and acceptance, while simultaneously being shaped by aspects of that community's culture (Antony, 2002; Lee & Roth, 2003). One concept that has been developed recently is intellectual individuality (Antony, 2002), which reflects a person's capacity to understand the values and beliefs of the discipline in which s/he is working, without necessarily endorsing them wholeheartedly. For example, in the context of doctoral education, Antony has argued that a candidate can gain "an awareness of a field's values and norms without expecting … to accept those values and norms as one's own" (p. 373). Related concepts such as becoming and belonging (Lee & Roth, 2003) are used to demonstrate the way in which a person can exercise a degree of choice with regard to which aspects of the dominant culture s/he is prepared to subscribe.

**Knowledge production**

Understanding and capability, along with intellectual and other forms of capital are of significance in explaining the role of knowledge production in the doctoral experience [see Table 1.4]. Within the conventional frame, understanding or knowledge is generally conceived in terms of content that is depicted variously as mono-disciplinary, cognitive, hierarchical and scientific. Candidates are measured against standards that reflect their capacity to act as independent researchers and teachers within an academic context. Human and intellectual capital is generally deemed to be primary forms of advantage or benefit that are derived from the doctoral experience. In the words of one writer, "in order to acquire professional licence to profess the discipline at large, one must become expert in one very small domain" (Delamont, Atkinson et al., 2000, p. 52).

However, the nature of the knowledge being produced is a question that needs to be addressed. Some maintain that a distinction exists or remains between Mode 1 and Mode 2 research (Gibbons, Limoges et al., 1994), where conventional forms of abstract knowledge are contrasted with practical, trans-disciplinary, and reflexive approaches. However, the limitations of this dichotomy have been identified by a number of authors (Etzkowitz & Leydesdorff, 2000; Jacob, 2000; Shove, 2000; Usher & Edwards, 2000; Tennant, 2004), and there is increasing recognition that the two modes are interdependent forms of knowledge production (Jacob, 2000, p. 25). One team of writers working in the context of professional doctorates has gone further and identified no less than four modes of knowledge—disciplinary knowledge, technical rationality, dispositional and transdisciplinary knowledge and critical knowledge (Scott, Brown et al., 2004).

**Table 1.4—Knowledge production**

| | Conventional frame → | Emergent frame |
|---|---|---|
| **Understanding** | academic, abstract knowledge → | knowledgeability |
| | culturally concentrated → | socially distributed |
| **Capability** | academic researcher → | knowledge worker |
| | autonomous scholar → | 'enterprising self' |
| **Capital** | human → | social |
| | intellectual → | creative |

When the literature in the emergent frame is considered, understanding is conceptualised more in terms of knowledgeability (Giddens, 1982, p. 9; Lave, 1993, p. 17; Wenger, 1998, p. 246) and working knowledge (Tennant, 2004). A prime focus is on the practical construction of knowledge whereby skill forms an integral component. In terms of capability, therefore, there is frequent reference in the literature to the emergence of the 'knowledge worker' who is seen as a flexible and multiskilled individual with an openness to learning (Usher, 2002, p. 145). More significantly, one researcher has argued that "the knowledge economy promotes a view of knowledge and knowledge workers that fundamentally challenges the idea of a university as a community of autonomous scholars transmitting and adding to society's stock of knowledge" (Tennant, 2004, p. 431). A number of writers have begun to conceptualise the doctoral candidate in terms of 'skilful performer' (Pearson & Brew, 2002), 'symbolic analyst' (Beckett & Hager, 2002), 'enterprising self' (Tennant, 2004, p. 438), and 'self-organising agent' (Boud & Lee, 2005, p. 514). For example, Pearson and Brew refer to a skilful performer as "someone who not only knows about what to do, but knows how to apply that in practice" (Pearson & Brew, 2002, p. 137).

There is also a trend in the literature towards discussion about the potential value of social capital (Beckett & Hager, 2002) and creative capital (Florida, 2002, 2005). Here the emphasis is on the pooling of expertise; the creation of synergies; and the sharing of outcomes across multiple groups. One writer has recently developed a guide for developing collective thinking and action on the premise that this "is the major challenge of our time" (Brown, 2007). In the specific context of doctoral education, other writers have also referred to the need for "new forms of contextualized collective" and the need to bring researchers and students together "in new forms of engagement" (Boud & Lee, 2005, p. 515).

## 1.4 Operationalising the research problem

My initial review of the literature provided a firm foundation for operationalising the problem of how to produce an accurate and comprehensive picture of the doctoral experience in Australia. Although general aspects of the doctorate such as supervision, the institutional context and student satisfaction had been explored in some depth, limited attention had been paid to specific elements associated with learning environments, socialisation and knowledge production. Concepts such as peer learning, becoming and belonging and the enterprising self, for example, offered new ways of thinking about the doctoral experience—especially in the context of contemporary links with activities beyond the academy in the world of work.

The key question that my research was designed to answer, therefore, was stated in the following terms: *"What do PhD candidates do, and how do they operate?"* This in turn led to a set of second-order questions, namely:

- What are the essential characteristics of the everyday practices of doctoral candidates? e.g. work routines, procedures, customs, responsibilities …

- From whom do candidates learn most effectively and what is the nature, extent and significance of working relationships established during the course of their candidature?
  e.g. with academics, peers, professionals, industry-based personnel, 'significant others' …
- What forms of socialisation take place in the lives of candidates?
  e.g. as students, researchers, professionals, workers, academics; as well as its impact on their identity, status, attitudes, aspirations …
- How do candidates learn most productively?
  e.g. the types of learning environments, technologies, pedagogical practices and support mechanisms that are having greatest impact on doctoral candidates in terms of generating new knowledge, research capability …
- How do candidates connect core elements of their study, research, training, work and career trajectories in effective ways?
  e.g. the types of strategy and technique that they are using to balance high-level/competing demands
- What are some of the most significant products and outcomes generated during the doctoral experience for candidates and key stakeholders?
- To what extent do contemporary theories help to explain or illuminate the contemporary activities of candidates?
  e.g. learning environments, socialisation, knowledge production.

## 1.5 Outlining the thesis structure

Chapter 2 details the research methodology employed in this study. The following four chapters are in the form of narrative and interpretation providing detailed and nuanced accounts of the doctoral enterprise across a range of disciplines. The fields of study discussed include Molecular Biology (Chapter 3); Astronomy (Chapter 4); Cultural Studies (Chapter 5); and the Creative Arts (Chapter 6). Each narrative account integrates the perspectives of candidate, supervisor and 'significant other'. One objective is to provide a stand alone account that can be used by readers to derive their own meaning. Another is to provide a solid foundation for interpretation in which emerging themes and issues are examined and informed by the literature.

Chapters 7 and 8 are designed to integrate the data and analysis derived from qualitative and quantitative methods using practice theory as a framing device. Chapter 7 is concerned with doctoral activities, with the spotlight firmly on what candidates and significant individuals actually do. Chapter 8 explores entities that are central to those activities. These include key individuals, academic institutions and external agencies. Activities and entities are deemed to constitute the basic elements of doctoral work.

Chapter 9 incorporates a further level of analysis and initial theorising that provides new perspectives and insight. It is in this chapter that the integrative model of doctoral enterprise is advanced and justified. Key elements of the model include 'doctoral practices'—the actions and behaviours of those directly involved—and 'doctoral arrangements'—the juxtaposition or coalescing of the participants, the academy and the community. The thesis concludes with Chapter 10 which substantiates the main argument, demonstrates one application of the model, and considers the potential impact of this research on contemporary discourse.

# 2. Outlining the mixed methods approach

This chapter discusses the use of a mixed methods approach to investigate fundamental aspects of doctoral work. It addresses issues concerned with the collection and analysis of data when qualitative and quantitative methods are combined. These include target populations, sampling and data gathering techniques on the one hand, along with matters concerned with the analysis, interpretation and synthesis of data on the other. The chapter begins with an explication of the research design developed for this study and then explores the dimensions of qualitative and quantitative method as core components. Reference is made to a number of ethical considerations that emerged during the course of the study, and differences between case data, case record and case study are clarified. The final section of the chapter is devoted to a review of the literature on narrative theory which I have labelled 'the narrative turn', given its significance in the development of this thesis.

## 2.1 Research design

An advantage of a mixed methods approach is that it enables the researcher to utilise the strengths of quantitative and qualitative methods with a view to minimising potential weaknesses. A common strategy is to combine different types of data and levels of analysis. For example, statistics derived from a large scale survey are frequently complemented by extracts from interview transcripts. By mixing methods, it is possible to reduce the risks of convolution on the one hand, or oversimplification on the other. Integration enables a broader range of perspectives to be incorporated.

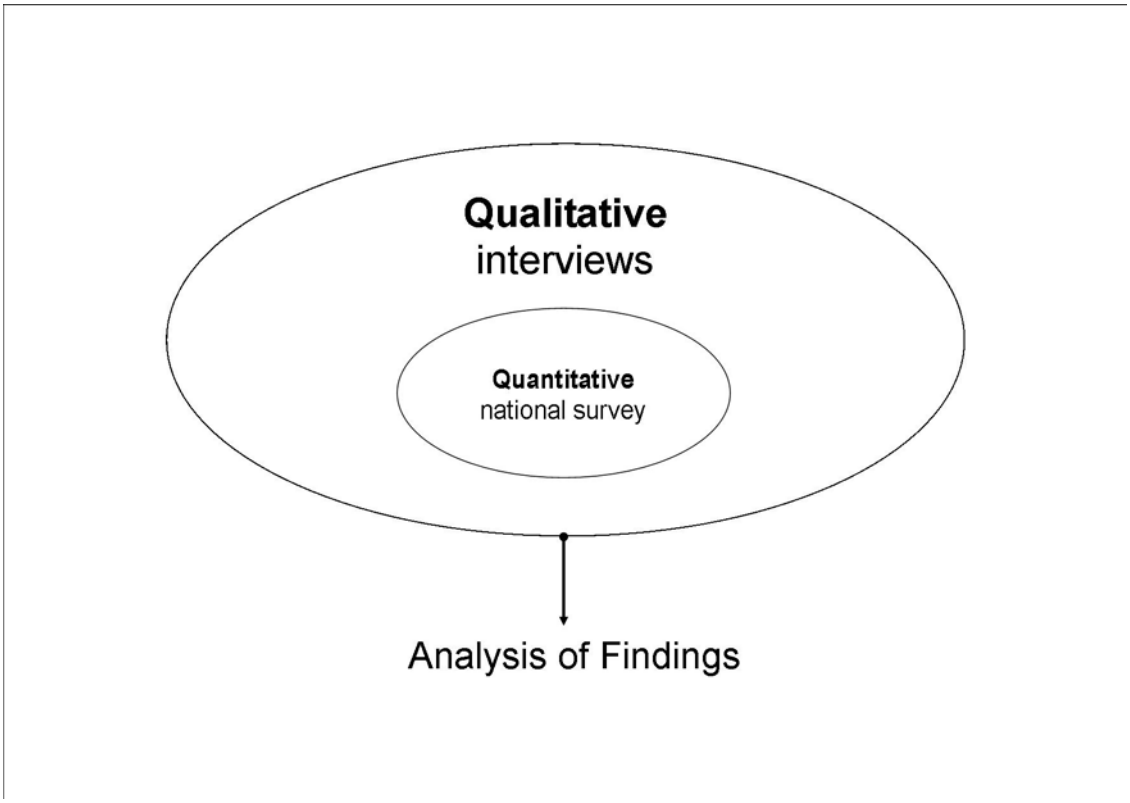
Drawing on Cresswell (2003, p. 16) 'concurrent procedures' were employed in my study to combine quantitative and qualitative data in order to provide a comprehensive analysis of the research findings. In other words, both forms of data were collected at the same time with a view to integrating the information in the interpretation of the overall results. Significantly, however, the concurrent procedures involved a 'nested strategy', whereby a predominant method guided the project. Qualitative methods were paramount in my research [see Figure 2.1].

Qualitative methods were used to generate data from a sample of informants at one university, while simultaneously employing quantitative methods to generate data from a larger population of doctoral candidates. Qualitative data were derived from a structured sample of ten full-time doctoral candidates, as well as two individuals identified by each of them as playing a significant role in their research and learning. Quantitative data were obtained from a national online survey of doctoral candidates enrolled in over 30 universities in 2005. Three points need to be made in relation to the survey. First, the instrument was designed and implemented in collaboration with the other PhD researcher (Ryland), under the supervision of the CIs (Evans, Pearson and Macauley). Second, the data generated from the survey were of interest to all parties engaged in the project—the APAIs, the CIs and the IPs. Third, I am solely responsible for the collation and analysis of survey data contained in the body of this thesis.

The qualitative dimension of the research embraces a phenomenological approach to the extent that it aims to generate a representation of doctoral enterprise at one research-intensive University in Australia in 2005—referred to subsequently in this thesis as 'the University'. Several writers with expertise in qualitative research identify the strengths of phenomenology in terms of the 'emergence' of research findings, as distinct from them being controlled or imposed by an investigator (Braud & Anderson, 1998; Denzin & Lincoln, 2000; Patton, 2002; Silverman, 2004; Somekh & Lewin, 2005). There is also reference to the perceived value of a gradual approach that is seen as evolving in response to challenges and unexpected

developments, rather than be controlled or constrained by the parameters of a pre-determined research design. At the same time, the limitations of this approach are acknowledged, which include the tendency to provide detailed accounts that are under-theorised, and to draw conclusions that may not always be applicable beyond the lived experiences of the participants selected for investigation. One writer has summarised the nub of the problem succinctly: “we often get thick description but thin explanation” (Maton, 2006, p. 11).

**Figure 2.1—The ‘concurrent nested strategy’ in mixed methods research**
Adapted from Cresswell (2003, p. 214)




Consistent with the phenomenological approach, the case study method (Stake, 2000) was employed as a means of analysing, interpreting and reporting the material that had been generated. This method was considered a useful way of documenting the particularity of doctoral enterprise through thick description (Geertz, 1973), with a view to teasing out meanings of three kinds, namely, local, foreshadowed and consequential (Stake, 2000, p. 445). In other words, the intention was to be as reflective as possible, by interpreting and re-interpreting the data from a variety of perspectives. The national survey was viewed as a strategic and powerful way of complementing and strengthening the analysis of qualitative data, given that it would incorporate information gathered from a very large population of doctoral candidates Australia-wide. A more detailed explication of qualitative methods is contained in Section 2.2, and will be followed by a discussion of quantitative methods in Section 2.3.

## 2.2 Qualitative methods

The qualitative methods that formed part of my research commenced with an informal familiarisation pilot in April 2004, a few weeks after enrolling as a PhD candidate. The objective was to gain some degree of familiarity with the nature of doctoral activity from those engaged at strategic points during their candidature (e.g. beginning, middle and end). A brief paper about the broad parameters of my research was prepared and circulated to persons with responsibility for postgraduate research students at the University. This was accompanied by a request for details of any doctoral candidates who might be willing to talk to me off the record about their doctoral settings, activities and experiences. As a result I managed to talk informally

to 25 candidates across a range of disciplines over a two-month period. The information gained was useful in terms of familiarising me with local customs, the use of language, terminology and so on.

I began to pay considerable attention to the issue of sampling at this early stage of candidature, given my intention to identify a group of full-time candidates for in-depth interviewing about their doctoral work. The 'purposeful' method of sampling (Patton, 2002, p. 243) was chosen in order to reflect maximum variation among candidates enrolled at the University. With the support of the University's postgraduate student association (PGSA) and graduate school, the next step involved emailing all doctoral candidates in May 2005 seeking volunteers who would be willing to participate in a semi-structured interview of around one hour's duration on their current doctoral activities. A total of 62 candidates responded positively, who were then emailed with a note of thanks containing a request for their demographic details (e.g. age group, field of study, year of commencement). From the information received, brief profiles were then developed and classified according to field of study and gender (see Appendix 1). Rather than construct a representative sample of candidates the intention was to reflect as a high a level of variation as possible, so to that end a 'diversity grid' was constructed with select criteria which formed the basis from which ten candidates were ultimately selected (see Table 2.1). The purpose of the grid was to avoid the inadvertent 'clustering' of potential interviewees around any of the criteria specified.

My initial review of the literature had revealed the potential importance of candidates interacting with a range of individuals in addition to their principal supervisor. On the basis of this information an initial objective was to determine the extent to which this 'constellation of others' (Cullen, Pearson et al., 1994, p. 41) could be identified in the context of doctoral activity. The intention was to identify the individuals and groups who were deemed to be exerting influence on a candidate's doctoral research, and the ways in which they did so. To that end, during the course of the ten interviews with the primary informants, each candidate was invited to identify two individuals who had played highly significant roles in their doctoral research to that point in their candidature. Given that the significance of the supervisor had been highlighted in the literature on doctoral education, it was resolved that at least one of those nominated should be someone acting in a formal supervisory role (e.g. principal supervisor, co-supervisor, adviser).

There are three points worth noting with regard to the process of identifying the 'secondary' informants. First, each primary informant (i.e. ten doctoral candidates in total) was willing and able to identify two individuals—in most cases on the spot, although one or two provided names on reflection shortly after the interview. Second, following a request each candidate willingly agreed to assist in approaching their two nominees in the first instance to ascertain if they would be willing to receive a written request from me for an interview. Once confirmation from the primary informants had been received, the secondary informants were emailed with a formal request seeking an interview of around 30 minutes' duration on issues pertaining to contemporary doctoral practice. Third, a total of twenty secondary informants proved willing to be interviewed—although in one case more than twelve months elapsed between the initial request and the actual interview, given overseas and other commitments on the part of that informant.

Even though the primary and secondary interviews were of different duration—60 and 30 minutes respectively—similar strategies were employed. At the commencement of each interview the purposes and objectives that had been circulated previously were summarised, and the interviewee was requested to sign the consent form indicating, for example, that their confidentiality would be maintained, but that data from the interview might be published in academic publications (see Appendix 2). The interviews were semi-structured to the extent that a set of open-ended questions or discussion starters around learning environments, socialisation and knowledge production was prepared in advance, but the objective was to allow the discussion to flow as naturally as possible.

A variety of strategies was employed including 'the active interview' (Holstein & Gubrium, 2004), a 'reflexive approach to interviews' (Alvesson, 2003) and 'creative interviewing' (Douglas, 1985). An overriding objective was to "carefully consider what is said in relation to how, where, when, and by whom experiential information is conveyed and to what end" (Holstein & Gubrium, 2004, p. 158). As indicated previously, the interviews were semi-structured and were flexible enough for the interviewer to follow up a pertinent issue raised by an interviewee. An outline of the interview schedules for candidates is at Appendix 3, and for significant individuals at Appendix 4. Each interview was transcribed, edited and verified in collaboration with the relevant informant.

**Table 2.1—Diversity grid to assist in the selection of interviewees**

| **Criteria** | **01** | **02** | **03** | **04** | **05** | **06** | **07** | **08** | **09** | **10** |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| Natural and physical science | X | | X | X | | | | | | |
| Society and culture | | X | | | X | | | | | X |
| Engineering | | | | | | | X | | | |
| Agriculture and environment | | | | | | X | | | | |
| Management and commerce | | | | | | | | X | | |
| Creative arts | | | | | | | | | X | |
| Year 2 candidate | | | | | | X | | X | X | |
| Year 3 candidate | X | | X | X | | | | | | X |
| Year 4 or more candidate | | X | | | X | | X | | | |
| Continuing (hons 1; no career) | X | X | X | X | | | | | | |
| Continuing (mature age) | | | | | | | X | | X | |
| Returning (work; career) | | | | | X | X | | X | | X |
| APA—Aust Post-Grad Award | | X | | | | | X | | | |
| APAI—Aust P-G Award Industry | | | | | | | | | | X |
| University scholarship | X | | | | | X | | | X | |
| Other (e.g. industry, CRC) | | | X | X | | | | | | |
| No scholarship | | | | | X | | | X | | |
| Male | | X | | | X | X | X | | X | |
| Female | X | | X | X | | | | X | | X |
| Age: 20-29 | X | X | X | X | | | | | | |
| Age: 30-39 | | | | | | X | | | X | |
| Age: 40-49 | | | | | X | | | X | | |
| Age: 50-59 | | | | | | | | | | X |
| Age: 60-69 | | | | | | | X | | | |
| Domestic student (Aust/NZ) | | X | X | X | X | X | X | X | X | X |
| International student | X | | | | | | | | | |
| Internal/on campus | X | X | X | | X | | X | X | X | |
| External/off campus | | | | | | X | | | | |
| Both on and off campus | | | | X | | | | | | X |
| Employment—part-time | | X | | | X | | | | X | |
| Employment—casual | | | X | X | | | X | | | |
| Consultancy work | | | | | | X | | | | |
| No employment | X | | | | | | | X | | X |
| Dependants | | | | | 3 | | 3 | 1 | | |
| No dependants | X | X | X | X | | X | | | X | X |
| Academic staff member | | | | | | | | X | | |
| Not an academic staff member | X | X | X | X | X | X | X | | X | X |
| Indigenous | | | | | | | | | | |
| Disability | | | | | | | | | | |

Note. Numbers 01-10 represent doctoral candidates selected for interview.

## 2.3 Quantitative methods

National quantitative studies inclusive of doctoral candidates are conducted periodically by groups such as the Department of Education, Science and Training (DEST), Graduate Careers

Australia (GCA), and the Australian Council for Educational Research (ACER). Outputs include the Selected Higher Education Student Statistics Series [DEST] and the Postgraduate Research Experience Questionnaire (PREQ) [GCA & ACER]. While surveys conducted by these groups have generated useful data, the possibility of conducting a national survey of doctoral candidates was considered in the very early stages of the ARC Linkage Project team's work. A major reason was that existing national surveys rarely penetrated below the surface of doctoral demographics, enrolments and satisfaction ratings. A clear objective of the proposed survey was to develop a detailed and comprehensive database (e.g. the types of activity in which candidates are involved).

The decision to proceed with a national online survey was made by the project team, and it was agreed that the process would be a collaborative effort involving Kevin Ryland and myself as the principal researchers. Importantly, the CIs were to maintain key roles in terms of guidance, monitoring and evaluation. One of the consequences of such a collective endeavour is that a number of documents pertaining to the survey have involved joint authorship. As a result of common understandings and protocols developed during the course of the project, published material to do with the survey acknowledges the contributions of team members where appropriate.

It is important, therefore, to emphasise that information about the survey methodology contained in this thesis is a product of ongoing collaboration and cooperation. As part of these arrangements an account of processes involved with the survey is included as Appendix 5. This covers ethical considerations, initial design, trialling and piloting of the survey, website development, as well as the clean up and storage of data. I have prepared this account as the basis for a common document for use by any ARC project team member in relation to any additional analysis and/or publications that might be produced subsequently.

What follows in this section is a brief summary of strategies employed in this collaborative exercise. Planning associated with the design, trial and pilot of the instrument took place during the period March 2004 to May 2005. The final version of the survey comprised three sections:

- A—"About you" (16 items on demographics)
- B—"A week in your life as a doctoral candidate" (3 items designed to record time spent on a range of specified activities)
- C—"Aspects of your candidature since your initial enrolment" (22 items on particular processes and outcomes).

The contents of the national online survey—comprising 41 items—can be found at Appendix 6.

While the APAIs and CIs designed and implemented the survey as a joint venture, it is acknowledged that all technical aspects associated with the web-based survey associated with the trial and the pilot were managed by Kevin Ryland and refined by an ICT specialist from CAPA in the final stage. A strategy was devised collaboratively for inviting candidates to participate in the survey that were in accordance with established ethical principles and procedures. The CIs wrote to the Australian Vice Chancellors' Committee [AVCC] in the first instance, advising members of the aims and objectives of the ARC Linkage Project and offering to keep the Committee informed of developments. The Deans and Directors of Graduate Schools (DDOGS), the Postgraduate Research Administrators' Taskforce (PRAT), and many affiliates of CAPA (i.e. postgraduate student associations at the local level) also became actively involved by facilitating access to a very large and dispersed population of doctoral candidates.

An arrangement was struck whereby universities circulated advice about the survey to enrolled candidates, inviting them to access the online questionnaire via the CAPA website. At the local level, CAPA affiliates and a representative of DDOGS generally worked collaboratively in order to email candidates directly or raise awareness via a postgraduate newsletter or website at

each university. Information and questions about the impending survey were raised at regular meetings of DDOGS and CAPA with a view to raising awareness in the target population. CAPA's role in the whole exercise was critical given that in addition to locating the survey on its website, the Council enabled the researchers to collect, store and retrieve information in a way that did not comprise either the data or the parties involved. Although data were gathered on the CAPA server, this material was not accessible by CAPA staff and was subsequently transferred and backed up at the universities where the APAIs were based for access by the project team.

The final version of the survey was launched on 15 July 2005, remaining on the CAPA website until 5 August when the survey was officially closed. In order to maintain anonymity of respondents and the confidentiality of institutions, various safeguards were instituted such as the vetting of enrolled candidates, the non-release of data regarding respondents' institution, along with a plain language statement and consent form that required endorsement prior to be linked to the survey instrument. With just under a 15 per cent response rate (N=5,395), a data file and journal was established that recorded initial amendments to the SPSS file (e.g. minor recoding in the light of errors and anomalies identified subsequently) and the recoding of nominal data into numerical values with labels. The final data file was signed off in December 2005, with copies stored securely in the offices of ARC project team members.

## 2.4 Quantitative analysis

In order to avoid diverting attention from the main argument advanced in subsequent chapters, an outline of the main strategies employed to analyse the quantitative data will be included at this point in the thesis. Using SPSS software I conducted a preliminary analysis of the survey with a view to determining the kinds of doctoral activity in which candidates were involved, along with the characteristics of those with whom they were working. Twenty-four tables that form part of this analysis are included as Appendix 7. These tables have been selected with a view to providing information about the doctoral experience from the candidates' perspective in relation to key aspects of doctoral work. For example they include details of doctoral activities undertaken during the past seven days (Appendix 7, Table 20.7); individuals identified as influencing candidates' learning and research (Appendix 7, Table 20.13); and the type and providers of doctoral support activities (Appendix 7, Table 20.16).

My preliminary analysis also involved an investigation of two items on the survey that were in the form of open-ended questions inviting respondents to describe in up to a maximum of 100 words "what has worked well" (Q40) and "sources of frustration" (Q41) to this point in their candidature. A number of strategies were employed that included determining a random sample of respondents and using NVivo software to assist in the analysis of the data through the identification of key words, categories and themes. Part of the process involved some initial theorising and included a matrix designed to reflect the dimensions of candidates' perceptions of their doctoral experience. Further information about this preliminary analysis of the two survey items can be found at Appendix 8.

Reference to Appendices 7 and 8 is included here with a view to highlighting some of advantages and disadvantages associated with the exclusive use of quantitative data and analysis. On the one hand, the crunching of numeric data provides an effective mechanism for establishing general patterns and relationships. Knowing how many doctoral candidates (together with their key characteristics) have undertaken 'academic' activities during their candidature, for example, is very useful in helping to determine what candidates do and how they operate (see Appendix 7, Table 20.8). However, efforts to transform qualitative data into a quantifiable form (or vice versa), along with the zealous use of reductionist approaches can yield matrices and schemas that are neat and tidy at best, or banal at worst. I point to the perceived limitations of my own matrix depicting the dimensions of candidate perceptions of their doctoral experience as an example (see Appendix 8). While the quantitative approach to

analysis was useful as a means of identifying a series of categories, themes and sub-themes, the matrix was less so. As a discrete or final outcome of the analysis it constituted an oversimplification that obscured an inherent level of complexity.

## 2.5 Ethical considerations

Given that my research involved gaining information from candidates and other individuals, there was a need to comply with established procedures. This meant obtaining approval from the Human Ethics Committee at my own university. However, the embedding of the research in the ARC Linkage Project—which included a proposal that the APAIs collaborate in the administration of a national online survey of doctoral candidates enrolled in Australian universities—required approval from the Human Ethics committee at Kevin Ryland's university as well. Detailed applications were duly prepared, submitted and approved in the first quarter of 2005. Reference to the ethical protocols and procedures adopted in relation to the survey has been made in the above section on quantitative methods, with supplementary information recorded in Appendix 5.

With regard to the interviews conducted at the University, ethical protocols and procedures were outlined on the consent form that each informant was required to sign prior to the commencement of any dialogue (see Appendix 2). A key feature of the arrangement negotiated with informants was engaging them in the process of the editing and verifying of transcripts, given that some of their material might be incorporated in conference papers and journal articles. While the issue of confidentiality has been important in the field of social science, it is becoming critical in the light of greater complexity and more advanced technologies (Haggerty, 2004; Israel & Hay, 2006). This certainly emerged as an issue in the context of the ten data sets that began to be compiled (i.e. verified transcripts of the candidate, the principal supervisor and one significant other).

Informants had verified their transcripts in the knowledge that confidentiality would be maintained (e.g. in academic publications). Despite established strategies such as the creation of pseudonyms and other means of concealing the identity of informants, it became apparent that these would be inadequate for the informants in each data set, given the integrated narratives that were in the process of construction. In order to avoid breaching confidentiality (i.e. within each data set), a process was established whereby the approval of each informant was obtained in order to share select extracts of his or her transcript with the other two informants in the set. As two writers have argued recently, rather than being limited to the beginning of a research project consent should be a 'dynamic and continuous' process (Israel & Hay, 2006, p. 64). Hence, even though interview transcripts had been edited and verified with individual informants, a further level of consent was required among other parties in each data set for the release of certain extracts.

Particular care has been taken in the construction of the case narratives to maintain the confidentiality of informants. In all cases, pseudonyms are used for the main characters and in some instances certain details are modified in order to avoid revealing external organisations, other universities or research agencies. For example, in the Molecular Biology case (see Chapter 3), the 'Chicken Consortium' and the 'Fowl Foundation' are fictitious names used to conceal the identity of the external agencies involved in the funding of the candidate's doctoral research. Similarly, the 'Trentham Institute' is used to conceal the identity of a research agency from where specialist expertise was sought.

## 2.6 Case data, case records and case studies

Given the dominance of qualitative method in this study it is important to briefly outline the way in which the data were managed by drawing on the literature once again. During the 1970s, a curriculum researcher distinguished between case data, case records and case studies

(Stenhouse, 1978, 1980). One of his main arguments was that a formal stage needed to be established between fieldwork and reporting of research findings. Stenhouse conceived of qualitative research as a staged process:

- generation of case data—raw material assembled by a field worker studying a case
- preparation of a case record—an edited version without comment by a researcher
- construction of a case study—data together with the researcher's interpretation
- presentation of case analysis—retrospective generalisation across cases.

As a researcher and colleague who has continued to maintain the Stenhouse legacy twenty years on, Rob Walker has argued that "while many of us were primarily concerned with how to *write* case studies, Stenhouse's first question was how to *read* them" (Walker, 2002, p. 114). Hence, the essential value of the case record is seen in its capacity to enable others to assess the validity or otherwise of case studies and meta analysis, rather than take these at face value.

Stenhouse's staged process of qualitative research had a significant impact on my approach to the data generated from thirty interviews conducted as part of this study. Given the voluminous nature of the qualitative I had produced—thirty edited and verified transcripts comprising 150,000 words in total—a practical strategy for managing this material proved very attractive indeed. Specific information on the development and application of the case study method was also instructive (Merriam, 1998; Stake, 2000). As a consequence, I resolved to use this method as a means of analysing, interpreting and reporting my qualitative data.

However, while contemplating the wealth of information available in the literature on qualitative research in general (Frost, 1992; Braud & Anderson, 1998; Denzin & Lincoln, 2000; Patton, 2002; Silverman, 2004; Somekh & Lewin, 2005) and qualitative data analysis in particular (Miles & Huberman, 1994), I began to experience a level of creative tension around the analysis, interpretation and presentation of qualitative material. This led me to an in-depth review of the literature on narrative theory, the outcomes of which are expounded in the next section.

## 2.7 The narrative turn

The concept of narrative involves an account that incorporates a sequence of events in a logical framework (Richardson, L. 1997; Richardson, B. 2000, Thornborrow, 2005; Bruner, 2002). One researcher has summarised the three key features of narrative in terms of being 'temporal', 'meaningful' and 'social' (Elliott, 2005, p. 4). Others, however, have focused on the tale, the teller and the telling (Van Maanen, 1988; Blum-Kulka, 2005). In a similar vein, Clandinin and Connelly refer to the multilayered and many stranded aspects associated with narrative: "we are all characters with multiple plot lines who speak from within these multiple plot lines" (Clandinin & Connelly, 2000, p. 146).

When combined, these features provide a comprehensive framework for coming to grips with the concept of narrative, especially some of the challenges that continue to confront social and qualitative researchers. One of these concerns the capacity to construct a version of events, people or phenomena in terms other than those of the teller. For example, Van Maanen (1988) has identified three different types of tale—realist, confessional and impressionist. Another concern relates to the issue of representation, which has been reflected in the adoption of first- and second-order accounts. The former are concerned primarily with individual accounts—often of a person's lived experience, while the latter deal with another person's representation of an account.

While I was reviewing the literature on narrative theory, I was invited by UNESCO to prepare a chapter for a book in honour of Professor Phillip Hughes, an eminent Australian educator with

whom I had worked periodically for twenty years. Given that I was becoming increasingly convinced of the potential that narrative offered in relation to the presentation and analysis of data, I used this opportunity to apply narrative theory in an authentic context. The chapter is entitled “The power of narrative to enhance quality in teaching, learning and research” (Cumming, 2007b). The point of the reference in this thesis is that it contains a rationale for the use of narrative methodology based on my review of the literature. The chapter identifies three indicators that help to explain why storying can have a positive impact on writers and their audiences. First, narrative is primarily about meaning making—it can help make sense of our own experiences. Second, narrative facilitates the process of connecting with others—it enables us to relate to and empathise with people and their situations or circumstances as well as to bring together individuals and groups involved in related endeavours. Third, narrative contributes to the process of knowledge production—providing new perspectives and insights, especially with regard to contemporary issues and challenges.

As a result of my review of the literature on narrative and the writing of the chapter for UNESCO, I began to experiment further with the use narrative for writing about aspects of my qualitative data on doctoral work. This involved an extended process of development in the form of copious drafting and redrafting of narratives in which the integration of perspectives around what candidates were doing and how they were operating. A pair of researchers faced with the challenge of combining characters, themes, plots and settings from a series of interviews has referred to the need to present ‘one take’ on the issue under investigation (Rhodes & Brown, 2005, p. 473). By the end of 2005, it had becoming increasingly clear to me that the narratives I was creating constituted *my* take on doctoral enterprise, but that this take incorporated multiple perspectives.

Building on the work of Stenhouse, I have developed a modification of one stage of his qualitative research process. The ‘case narrative’ constitutes a variation of the concept of the ‘case record’ and provides a cornerstone for this thesis. The case narrative differs from the case record in a number of respects. One is that there is significant degree of preliminary analysis, especially in terms of staging of the text. When reducing one data set (i.e. the transcripts of a candidate and two significant individuals in one field of study) comprising around 20,000 words in total, it is inevitable that a substantial amount of raw data will be lost. In my role as narrator I am responsible for content that is omitted or obscured, as well as that which is included.

Another difference is that the case narratives are polyvocal and include the authentic voices of the candidate and the two individuals identified as significant in his or research and learning. The distinction between ‘individual’ and ‘collective’ narratives has been made by a number of authors (Richardson, 1997; Elliott, 2005). These authors also highlight the capacity of the narrator to embed a story in a broader context. Perhaps the most significant difference of all is that the case narratives are designed to engage the reader by reflecting fundamental elements of a purposeful and compelling story. Like a case record, however, they contain no direct commentary on my part.

The way in which verified statements from the informants are located in the contents of the thesis is worthy of comment. In the initial drafting of the case narratives, I followed the convention of indented and italicised quotations with a view to highlighting the informant’s voice. However, as my reading of the literature on narrative expanded, and dialogue with experts in the field of doctoral writing intensified, I experimented with a variety of alternative formats. In the end, however, I opted for a journalistic style that involved integrating quotations as part of the text. This was based on a desire to avoid the risk of privileging of one voice (e.g. researcher) over another (e.g. informant).

One further influence on my approach to research needs to be mentioned briefly at this point given the nature of their methodological impact on this study. The concept of ‘reflexive interpretation’ provided very useful in terms of making explicit my own position in relation to the analysis and interpretation of data. The following quotation reveals four aspects of reflexive

interpretation that are of central importance: “creativity in the sense of ability to see various aspects; theoretical sophistication; theoretical breadth and variation; and ability to reflect at a metatheoretical level” (Alvesson & Skoldberg, 2000, p. 250). Demonstrating a capacity to locate my interpretations of the doctoral enterprise in accordance with these principles has been critical to this study in general and the narratives in particular.

An issue around the politics of text and commentary—especially with regard to the role of the researcher—has been explored in the literature (Hodge & McHoul, 1992; Lee, 2000; Rhodes, 2001; Rhodes & Brown, 2005). There is a common view among these authors that there is considerable value in researchers exploring the ‘ridge’ between text and commentary through the use of self-reflexivity. I presented a paper at the American Educational Research Association Conference in 2007 entitled “Using narrative, interpretation and reflexivity to reconceptualise the doctoral experience”, in order to explore the ridge between a doctoral narrative and its interpretation (Cumming, 2007c). In this paper I give a detailed account of one episode of doctoral practice in the field of Anthropology and show how a sequence of events can be interpreted from different perspectives. Once again, I reference it here because it contains a review of the literature on narrative and interpretation.

As a means of drawing this chapter to close, it is worth emphasising two points. First, although qualitative methods are dominant in the mixed methods approach employed in this study, the nesting of quantitative methods within them is perceived to be an effective mechanism for strengthening my analysis and interpretation of qualitative material. Second, the case study method and narrative theory are highly significant in the development of the ‘case narrative’ given that they facilitate the process of portraying the doctoral enterprise from multiple perspectives. The purpose of the next chapter is to introduce the case studies that I have produced with a view to revealing aspects of their diversity and particularity.

# 3. Introducing the case studies

This chapter is designed to open a window on the contemporary doctoral enterprise at one institution. It does so in the first part by introducing ten case studies constructed from the qualitative data generated at the University. Vignettes are used to identify the key players involved as well as emergent episodes and themes in their particular field of study. It is important to note that each case incorporates three data sets—the edited and verified transcripts of the candidate, the supervisor and one other significant individual. An overview of the ten cases is provided in Table 3.1. In the second part of the chapter, one case from the natural and physical sciences—Molecular Biology—is illuminated in more detail. It comprises a case narrative of around 2,500 words followed by a reflexive interpretation. Readers are invited to derive their own meanings from the narrative in the first instance, with a view to considering them in the light of the analysis provided subsequently.

## 3.1 Vignettes of ten cases

**Anthropology**

As head of a national studies centre on campus, Janet reads Sam's PhD application and recommends that he be accepted into the doctoral program. He arrives from interstate and begins developing his proposal, initiating a literature review and enrolling in a language course—given that he is keen to conduct fieldwork in a developing country. He comes across a few stumbling blocks during his first year, one of which is the Ethics Committee's rejection of his proposal to conduct research. With Janet's support he changes his topic and approach and with the Committee's subsequent approval heads off to 'Nandinaland' at the end of his first year. His plans include doing some additional language training and a stint of fieldwork. However, on arrival he encounters more problems around visa timelines, external supervision and research permits. Overcoming a range of setbacks he manages to initiate an internship with an international Non-Government Organisation (NGO) which turns out to be productive and rewarding. Out of Australia for an uninterrupted period of fifteen months, he returns to the national centre where he begins drafting thesis chapters. He arranges immediately for Clark—an academic in another centre—to become a member of his supervisory panel. Sam finds interacting with Clark to be of immense value during his fourth year.

**Astronomy**

Lisa is completing an honours degree in Europe when she successfully negotiates a period of work experience in the Astronomy department at the University. She is attached to a number of research projects for 12 months or so, and then with the support of Phillip—a senior staff member—gains entry to the PhD program. Phillip is involved in an international project in which Stefan—a researcher based in Europe—is a partner and becomes one of Lisa's advisers. Building on outcomes generated from her work experience, Lisa conducts research that is embedded in the work of Phillip and Stefan. Through various arrangements, she spends about three months in any given year of her candidature at observatories and research centres in the Americas, Europe, Asia and the Pacific. Midway through her candidature Lisa makes a discovery of some merit that warrants the writing of refereed articles for scientific journals. However, because her research has involved the use of facilities and collaboration with research teams in centres spanning the globe, a number of issues arise around co-authorship. Both Phillip and Stefan take steps to ensure that the originality of Lisa's research that is part of her thesis is not jeopardised by joint authorship, which has some unanticipated consequences.

**Table 3.1—Overview of ten case studies by field, significant individual and episode/theme**

| Field of Study | Candidate | Significant Individuals | Select episodes and themes |
|---|---|---|---|
| Anthropology | Age—20s<br>Year 4<br>'Sam' | Supervisor<br>—'Janet'<br>Adviser<br>—'Clark' | —defending an ethics proposal that has been rejected<br>—experiencing fieldwork problems in a foreign country<br>—setting up and implementing an internship |
| Astronomy | Age—20s<br>Year 3<br>'Lisa' | Supervisor<br>—'Phillip'<br>Adviser*<br>—'Stefan' | —gaining entry to a PhD program via work experience<br>—accessing research facilities in several countries<br>—wrestling with the co-authorship of refereed papers |
| Business Management | Age—40s<br>Year 2<br>'Krystiana' | Supervisor<br>—'Dennis'<br>Academic*<br>—'Henry' | —operating as a member of an international network<br>—approaching writing as a form of apprenticeship<br>—questioning the value of a PhD re academic teaching |
| Creative Arts | Age—30s<br>Year 2<br>'Justin' | Supervisor<br>—'Clive'<br>Supervisor<br>—'Claire' | —combining work, training and study in one department<br>—learning collaboratively in structured settings<br>—taking up a three-month residency in Paris |
| Cultural Studies | Age—50s<br>Year 3<br>'Pamela' | Supervisor<br>—'Charles'<br>Peer<br>—'Douglas' | —co-authoring an ARC Linkage Project application<br>—accessing specialist expertise to meet identified needs<br>—reflecting on the education-training nexus |
| Earth Sciences | Age—20s<br>Year 3<br>'Brenda' | Supervisor<br>—'Jack'<br>Supervisor<br>—'David' | —making the most of CRC resources and opportunities<br>—forming identities in the context of cultural hierarchies<br>—working as a volunteer on an international project |
| Engineering | Age—60s<br>Year 4+<br>'Bruce' | Supervisor<br>—'Leonard'<br>Technician<br>—'Michael' | —adapting to a new disciplinary culture<br>—capitalising on the expertise of technicians<br>—addressing commercialisation issues |
| Human Sciences | Age—30s<br>Year 2<br>'Trevor' | Supervisor<br>—'Gwen'<br>Peer<br>—'Naomi' | —managing the transition from consultancy to a PhD<br>—utilising local and online specialist networks<br>—changing supervisors on more than one occasion |
| Molecular Biology | Age—20s<br>Year 3<br>'Jane' | Supervisor<br>—'Trish'<br>Peer<br>—'Scott' | —contributing to the collective endeavour of the lab<br>—maintaining liaison with an industry partner<br>—acquiring a credential to enhance academic teaching |
| Regional Studies | Age—40s<br>Year 4<br>'Stuart' | Supervisor<br>—'Graeme'<br>Peer<br>—'Amir' | —building community with fellow candidates<br>—applying the principles of project management<br>—gaining support to secure an academic position |

* International—a supervisor or academic located in another country

**Business Management**

Employed as an academic staff member in another academic institution, Krystiana enrols in a PhD program at the University with a view to enhancing her promotional prospects. She has a breadth of experience across the sectors of industry, TAFE and tertiary education, and teaches short courses periodically in countries across South East Asia. On her own initiative she has gained access to an international online network of professors led by Henry—an academic in another country. He has provided Krystiana with customised training for his method of online research, with the result that she has conducted research as a member of his international projects. A few months after enrolment, Krystiana encounters problems when her supervisor departs suddenly from the University. Things pick up again however when Stephen agrees to take her on as his student shortly after she has commenced a twelve-month sabbatical in order work full-time on her PhD. Stephen's hands-on approach to doctoral education involves embarking without delay on a co-authored paper with Krystiana. She responds well to what is

regarded mutually as a form of apprenticeship in academic writing. Working on a PhD leads Krystiana subsequently to question the value of the doctorate in relation to university teaching and academic publishing.

**Creative Arts**

After working in the magazine industry for seven years, Justin returns to study as a mature-age student. He completes an honours degree and continues on to a PhD with Clive and Claire as his co-supervisors. Like Justin, both are practising artists in their own right, and for most of their careers have worked outside the academy. Maintaining liaison with the arts industry is part of the philosophy of the department in which they are located, and Justin is employed there part time in two capacities—one as a teacher of undergraduates. The other is as a member of a team that runs an advanced technology facility on a commercial basis that is accessed by students, staff and the wider community. Although candidates in the Creative Arts span a range of specialist fields, a set of structured arrangements is in place to promote collaboration and cooperation. Activities include ‘workshop crits’, ‘open forums’ and ‘postgraduate meetings’. Justin receives a surprise in his second year of candidature when he is awarded a scholarship in the form of a three-month residency in Paris in a community of practising artists. Grabbing the opportunity with both hands he not only pursues his own creative artwork, but interacts with professionals in many artistic fields from around the world.

**Cultural Studies**

This case involves Pamela, a mature-age candidate who has nominated Charles, her principal supervisor, and Douglas, a fellow candidate, as the two individuals who have exerted the greatest influence on her doctoral research to this point—the second year of candidature. Pamela has spent most of her working life as a curator in museums and galleries, and through an interesting set of circumstances finds herself in a Cultural Studies department funded initially by a philanthropic trust and then by the department head to conduct research on a collection of artefacts. Two years later her supervisor invites her to co-author an ARC Linkage Project application with a view to extending the research on which she has been engaged. The application is approved and Pamela commences as a PhD candidate where she meets Douglas—a part-time candidate who is employed as an IT specialist. A process of collaborative learning emerges whereby Douglas provides assistance in creating a database in return for insights to the collection of artefacts that is the centrepiece of Pamela’s research. An interesting feature of this case is a set of independent reflections on the education-training nexus provided by these three individuals engaged in the doctoral enterprise.

**Earth Sciences**

At the suggestion of her honours supervisor, Brenda approaches Jack, a researcher at the University with expertise in her area of interest. Jack has connections with a Cooperative Research Centre (CRC) and on his advice she submits and is subsequently awarded a CRC fellowship. This entitles her not only to a generous technical budget and stipend, but also to a wealth of industry contacts and training programs. At the same time, however, she encounters a form of cultural hierarchy that is reflected as much in the CRC as it is in the university where she is based. While Jack and David—her co-supervisors—are specialists in the narrow disciplinary field in which she is engaged, this tends to be perceived by some in the broader field as lower in status. This raises some interesting issues for Brenda in terms of academic and personal identity. In addition to extensive periods of fieldwork in outback Australia, Brenda avails herself of two project opportunities that enable her to apply some of the knowledge and skills she has acquired. One emerged as a result of a CRC contact, while the other involved taking six months leave to participate as a volunteer researcher in an international project that involved a farming community in an arid environment in the Northern Hemisphere.

**Engineering**

Bruce is a practising ceramic artist and experienced academic who by choice enrols in a doctoral program in the engineering faculty. In his sixties and still supporting children he decides to undertake a PhD immediately after completing a Masters degree. The clash of cultures—Creative Arts and engineering—is a recurring theme in Bruce's transcript. His supervisor—Leonard—supports his entry to the program, and allows him a degree of freedom to pursue his interest in ceramic structures. It is the technical staff, especially Michael however, whom Bruce also nominates as highly significant players in his PhD. In what is generally described as a spin-off from his research, Bruce makes a discovery that generates media coverage nationally and internationally, given its potential to assist with water purification strategies in developing countries. Towards the end of his research he becomes conscious of intellectual property and commercialisation issues associated with the main focus of his research—which unlike the spin-off does not have a humanitarian component. Exploring possibilities for taking out a patent on outcomes associated with his research proves to be rather more complex than Bruce envisages in the first instance.

**Human Sciences**

In his thirties, Trevor has been working as a consultant for some years, with the core of his work involving the preparation of commissioned reports for governments and environmental groups. He submits an application to do a PhD and attributes his success in part to his demonstrated capacity to deliver outcomes. He decides to work from home given that he finds the shared office space at the university to be noisy and distracting. Well connected to local environmental groups, he embarks on a mapping exercise of international developments using a range of websites and online networks. Naomi is a fellow candidate who provides expert advice with regard to research methodology and encourages him to participate in a seminar group that meets on a weekly basis. After a falling out with his original supervisor, Gwendolyn agrees to take him on as a student in his second year. She is a highly experienced supervisor as well as a pioneer in the interdisciplinary field in which Trevor is working. Trevor refines his topic and continues with the research process, however, he continues to experience difficulty, identifying academic culture as highly problematic. After twelve months Trevor decides to change supervisors and arranges for an academic at another university to assume responsibility for this task.

**Molecular Biology**

After completing an honours degree in Science Jane accepts a full-time position as a Research Assistant in the lab headed by Trish—her supervisor. Twelve months later Trish encourages her to apply for a scholarship with an industry group that funded much of the lab's research for many years. With a technical budget and a top-up to her stipend, Jane commences a project that is embedded in Trish's research and designed to feed into the lab's primary area of investigation—parasitology. She nominates Scott, a peer whose path she has followed since her honours year—as significantly influencing her learning and research. While Jane prepares regular reports and attends meetings and seminars organised by the industry partner, she experiences little interference regarding the direction of, or the approach to her research. The IP's bottom line is the anticipated knowledge to be delivered at the end of the project. Jane is also employed as a tutor and demonstrator to first and third-year undergraduates by the department under whose auspices the lab operates. She enjoys the work and undertakes a teacher training course available for postgraduate students, although she is still undecided with regard to the pursuit of an academic career.

**Regional Studies**

Stuart, a candidate now in his forties, dropped out of a PhD program in his youth. He reveals that this has acted as a 'primary driver' in terms of motivation, and also encouraged him to build

a greater sense of community among other candidates in his department. He assumes a lead role in promoting intellectual and social interaction inside the demountable 'Annex' in which they are located, for example, by coordinating a reading group that meets on a weekly basis. Stuart also derives enormous benefit from these arrangements by developing a scholarly and mutually beneficial relationship with Amir, an international candidate from a different social and cultural background. At the same time, he employs a project management approach to his doctorate that matches that of his supervisor Graeme, who is also a believer in constructing each day into "doable chunks". Towards the end of his candidature Stuart sees the possibility of a career in the academy as increasingly remote given the highly specialised nature of his field. By chance, an academic post is re-classified and re-advertised in a local university. Graeme is instrumental in providing hands-on support that involves "repackaging" Stuart to foreground his generic skills, attributes and knowledge.

The preceding vignettes have provided an overview of the ten case studies that constitute the qualitative dimension of this study. A notable feature is the range of 'significant others' in terms of role and location. Candidates have nominated peers, advisors, academics and technicians as playing a key role. These included two academics (one of whom was in a supervisory role) who were located in universities in countries other than Australia (i.e. in the cases of Astronomy and Business Studies). It is important to note that only four of the case studies will be discussed at length in this thesis, namely Molecular Biology, Astronomy, Cultural Studies and Creative Arts. Drawn from the natural sciences, physical sciences, social sciences and humanities, these cases have been selected with a view to reflecting the diversity and complexity, as well as the particularity of the doctoral enterprise. However, aspects of two other cases—Anthropology and Earth Sciences—have been presented in the form of refereed papers at international conferences (Cumming, 2007a, 2007c). Planning is in process to publish material that will include details of other cases. The second half of this chapter is designed to illuminate doctoral enterprise in the field of Molecular Biology case by combining case narrative with reflexive interpretation.

## 3.2 "Working together to solve problems"—Molecular Biology

### 3.2.1 Case narrative

As a third-year doctoral candidate Jane is conducting research on a type of parasite with a view to limiting its negative impact on poultry in the longer term. She knows the molecular science laboratory on campus like the back of her hand given that's where she completed her honours year, and was then employed for twelve months as a research assistant. Awarded a 'junior research fellowship' by the Chicken Consortium at the end of 2002, Jane receives an annual stipend of $25,000 and a technical budget of $6,000 per annum for the triennium 2003-2006.

Trish is Jane's principal supervisor and heads up the lab where Jane is conducting her doctoral research. Trish has been on staff for around thirty years during which time she has traversed the fields of zoology, biochemistry and genetics on her way to becoming an acknowledged expert in the field of parasitology. The advent of gene technology in the 1990s inspired her to undertake a five-year period of self-directed professional development in order to investigate this technology and apply it to her research on parasites. With a string of research grants, publications and a commercial patent to her credit, Trish's laboratory is recognised internationally as a site of best practice. One of her current research projects is funded jointly by the Fowl Foundation and the Chicken Consortium to the value of $450,000 over three years.

Another member of the lab with whom Jane interacts on a regular basis is Scott, a PhD candidate who is employed as a research assistant for twelve months while he completes his

dissertation[4]. Prior to this Scott was an off-campus student located at the Trentham Institute—an external research agency—for four years. With Trish as his principal supervisor, Scott was co-supervised by a researcher at Trentham for most of his time there. He maintained contact with Jane by attending lab meetings on campus, and acted as a form of mentor given that she had followed up an aspect of his honours thesis on joining the lab. Like Trish and Jane, Scott's research has been in the field of parasitology, and although he specialises in a different aspect of biology, many of the approaches, methods and techniques used are very similar.

Trish has been collaborating with industry for most of her career. Her involvement began in the early 1980s when she was negotiating a patent for a new drug to be used on parasites. Recalling the episode with a smile she says, "we managed to get a large pharmaceutical company interested in our research—we met with them over breakfast at a conference—this is how things work". Many research projects have followed over the years, invariably commissioned and funded by external agencies. She describes the arrangement associated with one her current projects in the following statement: "They [the Chicken Consortium and the Fowl Foundation] told us that they were prepared to invest so much money in our project, and requested us to determine a process to achieve the objectives we had identified".

One of Trish's strategies is to establish as many links as possible between the research that is conducted under the auspices of her lab. She works from the premise that "all lab members need to work together to solve problems". Even though the lab's research has "an applied focus", in her view it also "contributes to biological knowledge". In this context, Trish frames the topic and general approach to Jane's doctoral research based on the outcomes of prior lab-based projects. She also negotiates an arrangement whereby the outcomes of Jane's research will feed directly into the larger co-funded industry project. By the time Jane starts on her research project, a set of targets and milestones reflecting these arrangements have been endorsed by the University and the industry partners in various forms of contractual agreement.

A set of benches variously adorned with scientific apparatus occupies a central position in the lab, with refrigeration units, random pieces of equipment, shelves and cupboards jostling for space around the walled edges. The benches are where most of the action takes place—experiments, trials, record keeping, analysis and so on—and where researchers, students (PhD, Masters and honours), and technical staff work in close proximity. All up the lab houses seven full-time members. Trish has an 'office', although this is squeezed into one corner of the lab with barely enough room to house her desk, computer and visitor's chair.

Like many other members of the lab, Jane puts in the hard yards in terms of time on task. As she explains, "I normally work from about 8.00am to 6.00pm during the week, and then most weekends I'll come in and do a few hours and … for example, continue with an experiment or something like that and then leave". Her research involves screening around 20 genes initially with a view to identifying a set of validated targets—possibly two or three—that ideally will form a launching pad for the next stage of an ongoing process. The objective is to find molecules that will interact with these targets and possibly inhibit them, so that strategies for developing treatments for drug-resistant parasites might be developed subsequently.

Together with Trish, two advisers from related departments constitute a supervisory panel designed to monitor Jane's progress and provide support. She also attends meetings and seminars with the Chicken Consortium periodically, to present progress reports and exchange information. The level of collegiality in the lab is such that she is able to pick the brains of lab members on the spot, or discuss an innovative technique she might be using. According to Jane, "Scott is a really good person to talk to and I am really glad he has moved into this lab. I now talk to him about my project and some ideas that I have had, and he usually has some good ideas

[4] Scott was also a recipient of an industry-funded scholarship, albeit from a different organisation to those referred to in this narrative. One of the reasons for his accepting the position of Research Assistant was to secure financial remuneration given that funding from the original scholarship had expired.

too". Although he has not yet submitted his thesis, Scott perceives himself to be "doing the work of a post-doc". For example, he includes in his list of current tasks "supervising students, writing papers, thinking about the research that is needed and driving that".

There are times when Scott utilises his external contacts to help resolve an issue Jane is wrestling with, often getting his own hands dirty in the process. He recounts an instance when he co-opted a colleague at Trentham with expertise in microscopy to provide such input. "Sometimes, I have actually gone and done the work with Jane, in a collaborative way. So there is a hands-on methodology help, and there's also general concepts and ideas, and that's just in a day-to-day discussion basis". Jane is highly competent at the bench, so many of her discussions with Scott, Trish and others in the lab tend to be about theorising. As she explains, "in my [doctoral] project, I have been one of the first to do some of the technical things, so it has been more a case of talking to other people elsewhere who have been working in this area and trying to adapt their experiences to what I am trying to do. So it's definitely not technical, but more conceptual and to do with ideas".

Gradually aspects of Jane's project begin to generate interest in the lab with the result that other members become involved in what is considered to be part of the lab's ongoing work. After Jane's initial screening and selection, the remaining genes are then "farmed out" to other students to work on. For example, Scott is analysing five, while others will be offered to honours students to investigate as they come on stream. Scott describes the situation in the following way. "Everyone knows the names of the genes; where people are up to; and everyone is making a contribution … It's nice to have everyone on the same page with a common interest".

A number of structured opportunities exist for lab members to exchange information on current research—both within and beyond the University. One is a fortnightly lab meeting organised by Trish who encourages candidates "to make a presentation on a paper they have read—not necessarily on what they are working on, but what they think might be of interest". Another is a weekly "progress seminar between labs" where candidates present and discuss aspects of their doctoral research. Given the international standing of the lab, Trish actively supports regular participation in conferences and seminars as a means of keeping up to date with the latest developments in the field. After presenting a number of poster sessions in the early stages of her candidature, Jane is invited to speak at an international audience of 120 experienced scientists in early 2005. She admits to being "a bit apprehensive about it at first", and "a bit intimidated". However, continuing more assertively she adds, "but then you go along to these things and you meet and interact with them and you think, well they have just got a lot more experience than I have … Once you realise that, then you feel a bit better about interacting with them, and are not as intimidated as you normally would be".

Jane is also building up a personal network of academics and specialists who work in a diverse range of settings and contexts. In her words, "I will read a paper and see that they have used a particular technique and then write and ask them about it, and see if I could use strains or things that they have used. Generally, I have found in my area that people are really friendly and happy to help out, and give you things for your project … A lot are university-based researchers, but also people who are associated with hospitals, as well as industry too. Other students too, of course". This strategy is strongly supported by Trish who encourages all of her students to assume a proactive role in the networking process. "When I don't know an answer I tell them to find out who might know, and then email them. In other words, they need to make the contacts—and most of them do. Especially in this day and age, with communications they way they are, and the level of competition as high as it is in this country, you really need people who can get out there and fend for themselves".

Jane works as a part-time tutor in the lab and decides to undertake a teacher training program offered free of charge at the University with a view to enhancing her skills in this area. Typically she is responsible for two courses each semester, which involved around six hours per

week, plus marking. One is with first-years where “basically you look after a bench in the lab”, while the other involves group projects in which third-year students are engaged where “it’s more of a supervisory role”. As Jane elaborates, “I think it is a worthwhile experience to do as a student. It keeps you up to date with the things that undergraduates are learning and refreshes things that you tend to forget. If you want to go on later and do some teaching, then it gives you some really good experience in terms of how to interact with students. You learn certain skills that you wouldn’t otherwise do, if you locked yourself away in your lab for like 24 hours a day so to speak”.

Even though Scott is closer to submitting his thesis than Jane, both view their initial career trajectories in terms of post-docs—hopefully at the University—although the opportunity to work in a prestige lab overseas is considered an ideal outcome. Jane’s general strategy involves “taking steps to towards my own future by being proactive in teaching, going to conferences and putting myself out there to meet other local and international researchers”. Scott, however, sees his future in terms of “know[ing] exactly what I want to do—it’s a question of whether I can. I want to go overseas for a few years, to one of the serious … big-time labs … Cementing my position as an academic is my objective”. While neither has ruled out the possibility of working in industry, the prospect does not appear to be high on their personal agendas.

Jane, Scott and Trish have some personal reflections on the doctoral practices being implemented in their lab on campus. Jane sums up her situation as follows: “for the most part, my experience has been really positive, and there have been no negatives associated with my project”. However, she acknowledges that despite her achievements to date, gaining acceptance as a fully-fledged researcher is still some distance away. As she confides, “I am still a student … I don’t really feel like I’m part of that community yet”. Comparing the Trentham and University labs, Scott highlights a major difference regarding the role and status of doctoral candidates. In the former, students are “expendable … and not really core business or that important”, whereas in the latter they are “valued and an important part of working of the school”. He is adamant that in the case of the University “without the students, no [research] work would be done at all”.

Trish’s extensive experience as a supervisor provides her with an opportunity to reflect critically on the issue of doctoral pedagogy. “Twenty years ago a student may have taken five years to tackle a particularly ambitious problem, this is no longer possible. Today, we make sure that a PhD student has a problem that we know will generate sufficient material for their thesis. We probably go for slightly less ambitious projects, and certainly supervise them much more closely than we used to, in order to make sure things are going in the right direction”. By the same token, Trish is averse to “mollycoddling them all the time”, especially given her assessment that “science is now moving much faster than it used to—at least in the area of molecular biology”.

As a postscript to this narrative Jane completed her research and submitted her thesis in March 2007. She took up a postdoc position later in the year as part of a new three-year project to be funded by Chicken Consortium and the Fowl Foundation that will involve two laboratories in addition to the one at the University. The genes that Jane investigated as part of her doctoral research will not be followed up as targets, however, the new project will pursue a target uncovered in a similar screening process. Scott is in a similar position in the lab and investigating future overseas positions in the UK and Western Europe.

### 3.1.2 Reflexive interpretation

#### Narrator’s background

Jane was the twenty-fifth volunteer to respond to my request for interviewees. On the basis of the demographic details recorded on my diversity grid (see Table 2.1), I arranged to conduct an interview with her on 19 May 2005. A degree of flexibility had been built purposefully into my research strategy with regard to the interview location. The two main possibilities included the

primary site of a candidate's work or a neutral venue on or off campus. In this case, however, I was keen to meet in the vicinity of Jane's department which she was happy to do. Stimulated by the literature on communities of practice (Lave & Wenger, 1991; Wenger, 1998) and pedagogical continuity (Delamont, Atkinson et al., 1997), I was keen to catch a glimpse of an authentic laboratory setting. With limited experience in the natural and physical sciences, I was on the lookout for indicators of a scientific or laboratory culture—both overt and covert. What follows is a brief description of the interview process from a personal perspective.

Having kindly suggested that I meet her at the foot of the stairs in her building, Jane whisks me up a couple flights and through a maze of wide corridors. All the while I am telling her a little more about myself and my project—endeavouring to put Jane at ease but acknowledging that it is probably more a case of quelling my initial anxiety—all the while peering into window panels of passing doors. It reminds me of a hospital as we pad quickly across the grey linoleum floors, turning another corner past a trolley with some precariously balanced containers, and come to a wide opening on one of the side walls. There are no doors or signs—simply an entrance to what I assume is the lab, although it is screened from direct view by what looks like the rear of storage space. Jane ushers me in with a smile and we do a quick tour of the main features which I have outlined in the narrative. She gestures that we sit down at a bench-type table which is virtually on one side of corridor to the main lab, asking if this will be OK. I fumble for the consent form, outlining the protocols as I do so in a way that doesn't scare her witless, but makes it clear that what she says will constitute a formal record of our dialogue. As I explain the tape recording process, Jane seems reassured when I tell her that she is free to withdraw her consent at any time.

The interview goes reasonably well. Some good data are generated, together with the names of two significant individuals whom Jane nominates as the greatest influences on her research and learning. She agrees to approach Trish and Scott to see if they would be willing to receive a request from me for a shorter interview with them. An email on the following day—20 May—confirms that they are happy for me to contact them, so I arrange an interview subsequently with Scott. As it turns out, this is conducted in another building given that the lab is noisy on the day—7 June. Given Trish's busy schedule, it takes a further seven weeks until I can arrange a meeting in her office on 29 July. Transcribing, editing and verifying the three interviews is a lengthy process—four months exactly—before I receive final clearance from Trish on 19 September.

In the latter half of 2005 I begin experimenting with different approaches to 'writing up' some of the case studies. I am excited by the prospect of polyvocal narrative as a means of incorporating the perspectives of candidate, supervisor, peer and me as researcher. At the same time, however, I struggle with a number of issues especially interpretation and authorship. Two questions dominate: whose story is it (e.g. Jane's, a community of practice, or mine), and how should the interpretation be orchestrated (e.g. separate, parallel, integrated)? On 4 October 2005 I produce a first draft of the Molecular Biology case narrative. It is designed to push the boundaries, and following an introductory section is in a two-column format—'characters and events' on the left, and 'researcher/narrator' commentary on the right—10,000 words in total. I circulate a confidential draft to a few academic confidants for feedback, all the while pressing on with the other nine cases and my extended literature review. Over eighteen months pass before I return to the original case narrative to consider a re-write. An invitation to write a chapter for a book on changing practices in doctoral education (Boud & Lee, forthcoming) inspires me to consider using this case as an example. My initial thought is to explore the extent to which this science-based doctorate constitutes a change, or merely a continuation of established doctoral practices (Cumming, forthcoming). What follows, therefore, is an interpretation of the narrative that has been continuously evolving over time.

**Typical expectations of lab-based science practice**

Several writers have explored aspects of doctoral experience in the sciences (Gumport, 1993; Parry & Hayden, 1994; Delamont, Atkinson et al., 1997; Pole, Sprokkereef et al., 1997; Knorr-Cetina, 1999; Delamont, Atkinson et al., 2000; Wellcome Trust, 2000; Becher & Trowler, 2001; Chiang, 2003; Lee & Roth, 2003). By analysing this select literature it is possible to identify a set of descriptors that characterise the doctoral student experience in this domain. Typically, a candidate in the sciences could be expected to:

- participate as a member of a research team (e.g. under the auspices of the group leader or principal supervisor)
- work on problems common to the research group
- access shared knowledge, resources and expertise of the research group
- conduct laboratory work or fieldwork
- derive benefit from pre-established industry links (e.g. negotiated by the laboratory leader or head of department).

Given that supervision has been a central issue in research on doctoral education, joint and team based approaches to this activity are recognised as the norm in the sciences. There is an expectation that supervisors in this domain will be proactive in the early stages of candidature. Examples include determining the focus of, and setting up approaches to, doctoral research. Over time they tend to adopt more of a back seat role as other researchers and postdocs assume greater (hands-on) responsibility. In this process candidates are socialised and gradually adopt aspects of scientific culture—principles, beliefs and ways of operating—and begin to determine their position in relation to departmental hierarchies and possible career pathways (Delamont, Atkinson et al., 2000; Becher & Trowler, 2001). A recent study in environmental science, however, has challenged the one-way process of acculturation and identified ‘particular sites for struggle’ where both candidate and supervisor change their modus operandi as part of the interactive process (Lee & Roth, 2003). Another interesting aspect of that study is the candidate’s entry to two communities simultaneously—the researchers (academics) and the researched (environmentalists).

Following these accounts it is possible to see how far this case meets expectations in relation to the operation of a lab-based science area. At first glance it appears to be a typical case of a doctoral program in the sciences. There is clear evidence of Jane’s active membership of a team that is engaged in a common set of problems around parasitology. She is building on a wealth of specialised knowledge about parasites, gene technologies and biological techniques that has been established over an extended period. The laboratory culture is indicative of high-level collaboration, cooperation and support. Trish is working from the premise that “all lab members need to work together to solve problems”, which is reflected in a level of collegiality that enables Jane to pick the brains of other lab members whenever the need arises. This candidate’s research is clearly embedded in that of her supervisor, and is linked directly to the Chicken Consortium and indirectly to the Fowl Foundation. At the same time, however, Jane has established ownership of her research by taking responsibility for identifying a set of validated targets. Various forms of doctoral pedagogy are operating in this case. One is panel supervision—involving a group of academic researchers who are monitoring and supporting the candidate’s research. Another is pedagogic continuity—where the candidate is learning in the context of a jointly-funded research program involving other members of the lab. There is also peer learning where two candidates are both deriving benefit from their interaction. Scott’s willingness to assume a mentoring role that includes a hands-on focus is clearly illustrated, along with his desire to strengthen his capacity to pursue an academic career.

When I began to probe this case more deeply, however, two dimensions of variation emerged. One was concerned with matters of degree—subtleties and nuances associated with the

stereotypical model of the science-based doctorate. The other was about variation in kind—features of the case that did not sit squarely with the model. In terms of knowledge, a subtle difference is the impact of Trish's five years of self-initiated professional development, which led to the introduction of new methods and techniques in the lab[5]. Even though Molecular Biology can be regarded as cross-disciplinary to a certain extent, Trish's attitudes and behaviour with regard to promoting this in the lab are significant. They suggest a more flexible approach to knowledge and the means by which is produced than is represented in the conventional model—especially in a field acknowledged by Trish to be "moving much faster than it used to".

With her stamp of authority clearly imprinted on the lab Trish can be seen to be exercising firm control over its program, membership and linkages. At the same time, however, there are aspects of a democratic culture and mentoring that are most clearly reflected in her encouragement of candidates to participate in international conferences and to establish their own networks beyond the lab. This is in contrast to the conventional culture of laboratory leadership reported in the literature. When comparing labs in molecular biology with those in high energy physics, one researcher has argued that cooperation is impossible in the former, because "the things that unite individual units in molecular biology tend also to be the things that divide—that create tension, conflicts, resistance and feelings of exploitation" (Knorr-Cetina, 1999). Knorr-Cetina points to a 'logic of exchange' whereby lab members expect something in return for a service that they provide (e.g. research results, techniques, materials), noting that this can lead to conflict in situations where visibility, credibility and power are accrued by the leader of the lab (i.e. at the expense of members who have rendered particular services). Reading this literature some time after the interviews led me to wonder whether conflict may have been present in Trish's lab and that I failed to detect it, or that my informants possibly concealed it (e.g. either deliberately or inadvertently).

It is also interesting to observe cultural differences identified by Scott in relation to the external and on-campus labs. From his perspective, the Trentham lab is driven by commercial interests and is quite instrumental in its approach—especially in terms of intellectual property and patents. For example in the transcript he states that "they [Trentham] get their funding from drug companies, the government and other people, and they employ people with quite explicit tasks, and they do the work". Comparing it to his own department he continues, "if you removed all the PhD students from [the University], the place would shut down". Claims regarding the value of the contribution that PhD students make (e.g. to the academy, the economy, the community and so on) are supported by research evidence. The CIs of my project state, for example, that "in Australia it is estimated that research students contribute some 65 per cent of university research output" (Pearson, Evans et al., 2004), noting the claim that in Germany that doctoral candidates carry out two-thirds of research activity in universities (Enders, 2002).

There are also nuanced aspects to research in this lab, for example, in Trish's eyes all members are engaged in a process that includes not just applied research but 'pure' forms as well. Her belief is that the lab's work on parasites is as much about solving a biological puzzle as contributing to the development of a practical solution to the problems caused by parasites in animals. Hence, although the lab is funded by industry to generate knowledge that will have commercial applications, it is not limited to a Mode 2 approach (Gibbons, Limoges et al., 1994). A distinction can also be made with regard to accountability—an industry-based project panel running alongside a supervisory panel. Both are concerned with monitoring the research, however, the focus of the former is focused on outcomes and with limited interest in the research process. A striking feature of the narrative, however, is the range of agencies connected to the lab. As well as industry links, Jane is interacting with representatives from hospitals and agencies like Trentham, as well as researchers and students from universities in Australia and other countries. Trish also includes veterinary schools in her register of external agencies. In

[5] For example, when the data for this study were gathered, the use of free-living models was a feature of Trish's lab. Previously, research on parasites was conducted while they were attached to their hosts.

addition to the combining of human resources, there is evidence to suggest a sharing of materials as well. For example, both Jane and Trish refer to the willingness of other researchers to contribute or exchange various scientific elements such as ‘strains’, ‘molecules’ and ‘proteins’.

Scott’s role as a de facto post-doc is significant given that rather than remaining confined to the lab, he ventures into the wider community in order to acquire specialist expertise to strengthen Jane’s research. This is more than simply lending a hand at the bench, but a more structured approach to peer learning on his part. Participation in inter-lab meetings along with Trish’s efforts to create independent researchers (e.g. strategic support as distinct from “mollycoddling”) reflects an open and flexible approach to learning and teaching. Jane’s search for conceptual rather than the technical support in her learning is also an important distinction, and signals an identified area of need on the part of laboratory-based candidates that might well be heeded not only in the domain of science.

**Reflections**

An interesting array of links between education, training, research work and career can be discerned in this narrative. One is the nature and extent of paid employment undertaken by both candidate and peer. Jane and Scott’s acceptance of research assistant positions in Trish’s lab can be interpreted simply as a means of constituting and/or supplementing student income. For example, in the transcript of Scott’s interview he describes his 12-month appointment in terms of “employment paying the mortgage while I finish writing up my PhD”. Alternatively, this work can be seen as an opportunity for candidates to acquire new knowledge and skills or to apply existing knowledge and skills in an authentic context. For example, Jane remarked in her interview that she accepted the research officer position because “it was totally different from what I had been doing”.

Another way in which paid employment might be interpreted is a clever strategy on the part of Trish to enhance the capacity and reach of her lab. One study of Molecular Biology refers to the building of a “bank of technical expertise” (Knorr-Cetina, 1999). This researcher found not only that a period of time spent in a laboratory forms part of a member’s “career track”, but more significantly that doctoral candidates are “better risk takers”. One of the reasons given is that compared with postdocs and senior researchers candidates are “under less pressure to publish quickly, copiously, and in good journals”. Knorr Cetina also highlights the fact that leaders of molecular biology labs “distribute risks over a variety of topics”, pointing up the difference between leaders in high energy physics labs who are able to determine the outcomes of their projects to a much greater extent. Significant aspects of this case narrative are not so much that the leader of the lab is employing potential and enrolled candidates, but that these candidates are moving in and out of paid employment as they continue with their education, training and career-related activities. In other words, rather than viewing employment as sequential or end-on (i.e. work follows education and training), these candidates view work as an integral part of their personal and professional development.

Another noteworthy feature of the narrative is Jane’s teacher training and employment as a tutor, which constitutes a further example of the doctoral interface—points at which education, training, work and career intersect. Of interest here is the multifaceted nature of these intersections. Once again, Jane is integrating activities—teacher training is conducted while she is tutoring and demonstrating. She perceives that teaching in her department has multiple benefits that far outweigh the remuneration she receives. For instance, interacting with first and third-year undergraduates provides her with opportunities to “refresh things you tend to forget”; develop additional generic skills; and strengthen her CV. Documented experience in the world of work is likely to enhance her prospects not only in academia should that be her choice, but in other careers as well. This provides further evidence in support of the claim that “students are demanding socialisation and career development that acknowledges their diverse needs” (Pearson, 2005).

This blurring of the boundaries around education, training and career development can also be seen in the context of conference, seminar and meeting participation. In contributing to academic discourse by addressing an international audience Jane is engaged in training (e.g. furthering her communication skills); learning (e.g. gaining expert feedback); and career development (e.g. in her words "putting myself out there" in the scientific community). Jane also comments that by her third-year of candidature, "I don't really feel that I am part of that [scientific] community yet". This statement can be interpreted as recognition of her provisional and liminal status underpinning Lave and Wenger's (1991) theory of legitimate peripheral participation. Jane has been provided with opportunities to participate in lab-based research, to present at a conference, to establish her own networks and so on, but formal endorsement is required by the scientific community (i.e. a thesis examined by peers) before membership is granted.

An interesting feature that warrants further comment is the link between the University and industry. This case reflects the orthodox model to a large extent given that Trish has procured external funding over a significant period of time to conduct much of the lab's research. The industry partner does not appear to be actively engaged in either the practicalities of the research or grooming Jane for a possible career trajectory in the poultry industry. This is in contrast to other models of industry linkage like CRCs and APAIs that are designed to forge closer links between industry-based researchers and doctoral candidates (Powles, 1996; Harman, K. 2002). Scott's supervisory experience, however, contains elements of the emerging model given that he had an industry-based supervisor when he was located at the Trentham Institute. This reflects a more open and flexible approach, examples of which have been documented by Pearson and Ford (1997). For example, these authors cite cases of off-campus laboratory-based contexts in which of joint supervision was employed with varying degrees of success (pp. 54-58).

It is worth noting at this point that the Earth Sciences case in my study provides a powerful example of science-based program reflecting a different model of industry linkage. The nature and extent of support provided by the CRC to the candidate in that case is substantial, and goes far beyond the provision of external funding. For example, doctoral candidates under the auspices of this CRC not only have access to a network of 155 research scientists, but also structured training and other forms of practical support. In a refereed paper presented at the British Educational Research Association conference (Cumming, 2007a), I outline the role played by the CRC in a candidate's doctoral research and learning. One interesting example of training provided by the CRC is a 'writers co-op' established to support candidates in publishing their research. One specific strategy involved arranging for a journal editor to discuss contemporary issues and processes with research students.

This chapter has conveyed some initial impressions of the contemporary doctoral enterprise gained from qualitative data generated by candidates enrolled at one research-intensive university. Vignettes of ten cases have reflected its diversity and particularity, especially in terms of the significant individuals involved, along with particular episodes and emergent themes. Case narrative and reflexive interpretation have been used to illuminate doctoral work in the field of Molecular Biology. It has been argued that while aspects of the orthodox model of science-based doctorates—or the prevailing stereotypical image—can be identified, this model does not cater adequately for the nature and extent of variation found in this case. There is a lot more going on here than meets the eye. In order to investigate the doctoral enterprise in greater depth, the next chapter will investigate a case in the field of Astronomy employing extended forms of narrative and interpretation.

# 4. Operating “in the international arena”—Astronomy

## 4.1 Case narrative

Having reached the final year of her BSc honours degree in physics at a university in Europe, Lisa’s frustration with what she perceived to be excessively “theoretical” and “passive” approaches to learning was palpable. Yearning “to do something different”, she began to explore possibilities with a view to gaining some practical experience in her long-standing passion—Astronomy. Following up a lead provided by friends studying at another European university, she contacted Bjorn, a local researcher who at that time was working in the Astronomy department at the University. Responding to a motivated student’s request, he arranges for Lisa to participate in a program of work experience down-under.

Supported financially by her father, Lisa arrives in August 2002, and becomes actively involved in one of Bjorn’s research projects. In December, she meets Stefan, a visiting European scholar, who has come to the University to conduct research as part of an international project. Phillip, a senior researcher, has been instrumental in setting up that project which is investigating a particular type of star. Based on the quality of the work generated with Bjorn, Lisa is approached by Phillip to see if she would be interested in working with Stefan on the international project. Grabbing the opportunity with both hands, Lisa negotiates an extension of her work experience whereby the Astronomy department continues to provide her with access to physical and human resources—as well as a small contribution towards her living expenses that will not contravene her visa arrangements—while she continues to receive funds from her family.

Lisa relishes the environment and work, but after eight months is cognisant of the need to gain recognition for the experience and expertise she has acquired. With Phillip’s support, she begins preparing a detailed application to undertake a PhD in Astronomy at the University, emphasising her work experience and strong academic background in physics and maths. The final proposal is subsequently accepted and supported by a student scholarship. Commencing in July 2003, her research is supervised by a team of four researchers that includes Phillip as principal supervisor and Stefan—who has since returned to Europe—as an external collaborator. Lisa’s description highlights the process involved. “While staff at the University knew me and what they were getting, I also knew them and what to expect ... I am certainly happy with my supervisor which could have got off on the wrong foot, given that I came here as a bit of an unusual case. I knew who my supervisor would be and was free to choose if I wanted to become involved in this project or not”.

The first year of doctoral study in Astronomy at the University is highly structured, with a number of in-built support mechanisms for students. This is partly because of the increasing number of commencing PhD candidates, as well as the explicit expectation that a doctorate should be completed in three to three and a half years. There is also a historical component, given that this approach has been operating for a number of years. From Phillip’s perspective, “economic and other pressures have forced us to reduce the period of candidature to less than it should be, so in the first year, we group PhD students together. They tend to work in a common computing area … [and] do at least one research project as opposed to starting on their thesis”. Anecdotal evidence reveals that candidates were required previously to complete two projects.

Various strategies have been introduced with a view to promoting collegiality and interaction among the 30 staff and 30 postgraduate research students who comprise the Astronomy department in 2005. For example, every Friday afternoon, a seminar is conducted which typically comprises a presentation and discussion of a paper by a candidate, staff member or international visitor. In addition, special morning teas, barbecues and a range of other social

events are arranged on a regular basis. When describing departmental life at the University, Lisa makes reference to “a family”, “a tight community”, and “knowing everyone personally”.

At the same time, however, a strict monitoring regime of candidates is in operation. Phillip aims to meet with Lisa and other PhD candidates whom he supervises on a weekly basis to discuss specific tasks and proposals. In addition, there are mid-term reviews, annual reports and supervisory panel meetings for individual students, as well as a collective monitoring by two staff members who have a specified role as student convenors. While entry to the department is highly competitive—with first class honours as the norm—and expectations on the part of staff are high, these strategies have been employed to minimise the risk of a student becoming isolated, veering off course, or—in the worst case scenario—becoming derailed.

There is evidence to suggest that each of the players involved in research training in Astronomy is under a degree of pressure. From Phillip’s perspective, there is a sense of being expected to do more with less. “For me what has changed [in my 30 years’ experience as a supervisor] is the increased pressure to train students in better ways, and in shorter periods of time. Essentially, this means that I can’t put as much time into the students as I would like to, given the accelerated process and the fact that I am accepting additional students. While the Government is trying to increase the number of students that we train, the result is that they are not being trained as well they should be. So I see that as a shortcoming of the current system”.

Stefan finds the initial stages of candidature are the most intense. “In general, my experience is that in the first year or so one has to invest quite a lot of time into the training of the candidate, but after that it starts to pay back. That is, then the candidate starts to be able to work more or less independently, and is getting scientifically productive. I also see supervision of PhD students as an investment into the future, that is, some of them might be interested in continuing to work with me as a postdoc, and as a postdoc they are usually *very* productive” [Stefan’s emphasis].

Not surprisingly, Lisa sees herself being drawn into a relatively intense and high-stakes environment. “In general we are encouraged to learn and work here for at least eight hours a day—but usually I work much longer. We are encouraged to meet often with our supervisor to ensure that we finish on time. We all get a top-up scholarship to the value of $5,000 a year. There is also an ‘on-notice’ concept, so that if a supervisor thinks you are off-track, or not working hard enough, they can withdraw that part of the scholarship. You have to constantly prove yourself”.

**Conducting research**

The extent to which Lisa’s doctoral research is embedded in Phillip and Stefan’s work is reflected in a history of continuous development. Phillip has been working on this type of star for over thirty years. He began researching with a colleague at the University in the early 1970s with a view to finding out more about stars that were formed very early in the life of the Galaxy. Getting close to the material that came out of the Big Bang, in order to learn more about the very first stars that created the heavy elements, has been a major objective. In the 1980s, these two researchers were successful in discovering a star whose metal content was “down by ten thousand rather than a few hundred”.

Over time, however, they—like many of their counterparts—recognised that in order to remain competitive they needed to establish links with fellow researchers in other countries. As Phillip explains, “Circumstances in Australia, at least in my experience, have changed considerably. In the 1970s, the largest telescopes in the world were of the order of 4-5 metres in diameter. Even in the 1980s a student of mine undertook a survey that resulted in significant findings using telescopes in Australia. However, with the passage of time, other countries began to build 8-10 metre class telescopes, and that’s where the action is today. It is very difficult to remain

competitive in that environment, so by necessity, we have broadened our horizons as it were, in order to access these telescopes".

The upshot was that Phillip began working collaboratively with astronomers from around the globe during the 1990s. By the end of the decade, he was involved in the development of international projects—such as the one in which Lisa's research is part. As Phillip recounts, "When applying for funding from the Australian Research Council (ARC) for this project, we identified a few colleagues overseas who had an interest in what we were doing with a view to increasing the viability of the exercise. These included astronomers in [Asia, the Americas and Europe]—who I might add were also making submissions to research agencies in their own countries. This is all part of an increased internationalisation of research, which strengthens individual funding proposals. We each had particular strengths which tended to reinforce each other in order to find these interesting objects, and use the largest telescopes to provide the required resolution to make accurate measurements that would enable us to interpret and come up with accurate chemical abundances".

While Stefan echoes Phillip on the issue of global collaboration, he highlights an emerging interdependence. He argues, "Astronomy is perhaps the most international of all sciences, and researchers are much more mutually dependent on each other than in other sciences. Only through international collaborations one can have access to all necessary resources—like the largest telescopes, the best theoretical calculations, the most important databases—for carrying out cutting-edge research".

A key component of Lisa's doctoral research is the observation of 1,777 stars in the southern sky. She spends a considerable amount of time observing the existing database of stars from various locations, involving different modes of operation. In the initial eighteen months of her candidature she spends "more than thirty nights by herself" using university resources for the most part that are located a few hundred kilometres from the main campus. As she reveals, "it depends on the telescope—if I'm using the University telescopes that I have used before, then I just sit there all by myself all night long. Once I was there for twelve nights and that can get really boring", she says with a laugh. Given the requirement that a supervisor is present when students access more advanced facilities, Phillip accompanies her on visits to a larger telescope located a day's drive from the University, where they can spend up to four nights observing.

However, Lisa's research also involves travelling to the Americas, Europe, Asia and the Pacific. Effectively, she is away from the University for up to three months in any given year of her candidature. In some cases this involves observation and data analysis, whereas in others, conferences, meetings and collaborative activities constitute the main activities. For example, in 2003 Lisa spends two and a half months in Europe conducting research at the centre where Stefan is located. This is followed by seven weeks at an Asian university in 2004 where Stefan has been offered a visiting professorship. In mid-2005 she works closely with a stellar astrophysics group elsewhere in Europe for five weeks.

There appears to be high degree of strategic intention associated with these visits, whereby multi-tasking, collaboration and networking are the order of the day. Being part of an ARC project means that funding is available to support international travel, although Lisa remains conscious of the importance of remaining focused and on-task. For example, aspects of her hands-on approach are reflected in the following account. "I have a laptop because I travel so much. So usually I get set up, get a desk and an Internet plug, and pretty much start working. Because life is going on where you are visiting, you just arrange meetings in the time frame that's available—usually on a daily basis if you want to look together at the screens or plots, for example. Otherwise you meet every couple of days".

Phillip acknowledges the importance of international collaboration and cooperation for Lisa's research as well as her future employment prospects. While keen to ensure that Lisa's off-shore visits don't become excessive, he acknowledges that "she has taken full advantage of the system

and has managed to travel extensively and meet lots of people". As a leader of "large international collaborations involving about fifty scientists from fourteen different countries", Stefan also acknowledges the importance of establishing and maintaining "contacts with experts on different fields [which] are quite helpful for the quick advancement and success of Lisa's thesis".

Given that the demand for advanced technology is very high—especially in terms of access to international telescopes—a process of peer review is in place. As Lisa explains,"For a specific telescope there are usually two application deadlines per year, and you have to write an application of between three and five pages to actually get the observing time. It's very competitive and often you get rejected, and then you may have to wait for another year, because the stars are only observable for three to four months".

Despite the extensive travel, much of Lisa's work can be repetitive and isolated, with considerable emphasis placed on precision and attention to detail. For example, in one case different results were yielded from two of her measurements on the velocity of stars, which meant retracing each step to "find the bug". There is also evidence that being meticulous about one's observations and data analysis is as much about establishing and maintaining one's reputation, as conducting good scientific research. As Lisa says, "there are people in the scientific community who will expose any shortcomings in your work".

Modes of communication are also significant. Given the international context, virtually all of Lisa's oral and written communication around Astronomy is conducted in English—even though this is not her first language. With Stefan and other colleagues scattered across the globe at any given time, email provides the communication lifeline, although face-to-face meetings are viewed as an essential work practice. As Stefan explains, "we usually communicate by e-mail or phone, but in certain phases one just has to be at the same place to work on specific problems, or to discuss certain issues. For example, at times one just has to sit together at a table and discuss graphs or numbers".

**Communicating research findings**

During her work experience with Stefan, Lisa observed many and varied constellations across the southern sky. At one point she noticed a phenomenon that looked unusual, but in her words "I wasn't quite confident given my limited experience, and this just slipped into the drawer and sat there". Some months later when she was in the Americas she showed the star to Stefan who responded, "Oh my God, you'll have to follow that up". In doing so, she sets in train a series of events that results in the making of a significant contribution to scientific knowledge.

Having established that the phenomenon is demonstrating abnormalities, Lisa's first task is to observe the object again through a more powerful telescope than exists in Australia at this time. Given that submitting an application for individual observation is such a lengthy process, a decision is made to explore the possibility of working collaboratively with researchers who have access to a more advanced facility. In May 2004, a researcher in Asia who is part of the international syndicate to which Phillip and Stefan belong, and who happens to have time scheduled on a larger telescope, agrees to observe the object. Subsequent observations conducted by this researcher and his team confirm Lisa's discovery of a stellar phenomenon.

Common practice in scientific research is to release information in two stages—an initial paper heralding the discovery, followed by a second paper with explanatory material. Although the procedure is followed in this case, there are aspects associated with authorship that are worthy of illumination. For example, Phillip reveals that "fairly careful judgments have to be made, and one needs to consult widely in order to get something that is acceptable to all parties. It is usually clear who will become the senior authors, and who will play junior roles, on the basis of the contribution made. In this case, it was made clear that the [phenomenon] had been discovered as part of Lisa's thesis, following a process that had been established previously.

While Lisa had been working a little to the side of our existing research, her discovery became central to it, so we sought to bring that into the international arena and the [Asian researchers] were very pleased to do that".

He continues, "After some careful discussion with them, we came to an arrangement whereby Lisa would be the first author of the discovery paper, to be followed by a second paper whose first author would be the [Asian] astronomer. There would be a footnote to indicate that, as the second author, the PhD candidate, had contributed equally to this piece of work. This has to be handled with care in this case because doctoral theses at the University require a statement pertaining to the candidate's own work, with the capacity to acknowledge other contributions, so that examiners are aware of the particular circumstances or arrangements".

Stefan's take on these arrangements confirms the sensitivities involved. "Authorship of papers is always a very difficult issue; sometimes it is even more difficult than writing the paper. There exist certain guidelines in the scientific community as to who should be first author or co-author of a paper. The first author is the person who has invested the largest amount of work into producing the results which are presented; usually this person also writes the paper, and he/she has a couple of duties, like dealing with the editor of the journal, responding to the referee report, taking care of the page proofs, and so on".

Noting that the issue of joint authorship is "a bit more difficult", Stefan goes on to explain that in this case, "a decision has to be made as to who has made important contributions and, therefore, needs to be awarded co-authorship, and who made only minor contributions, which is compensated by an acknowledgement. All these issues have to be decided on a case-by-case basis by means of an open discussion with all people involved. A difficult question is sometimes also to decide who will be offered the *chance* [Stefan's emphasis] to work on a problem so intensively that it will later result in being the first author of the relevant paper".

"One also has to take into account that there exist cultural differences between [e.g. the Americas, Europe and Asia]", he adds. In [one Asian country] there is a much stronger sense for the identity of research groups, which basically means that once a major part of a research group is awarded co-authorship, the rest of the group has to be offered co-authorship, too, even if these persons have contributed only marginally. We have to respect these cultural differences, and it is also important to note that one sometimes has to make compromises for the sake of a healthy collaboration."

Lisa's perspective on authorship, however, differs from her supervisors. With a noticeable change in tone she volunteers, "Stefan took this [phenomenon] and said to his [Asian] colleague, '*Here, please observe it*'. And he went ahead and made all these observations and I wasn't really consulted when the [Asian] researcher kept observing the [phenomenon] because it was so interesting. Apparently there is a rule that if something interesting pops up, then you just do it—for the sake of the community, or something like that. I wasn't happy at all, because as a new and inexperienced researcher in the discipline I wasn't told all those details. I am very particular about things like that. You can do anything with my material as long as you ask me for permission before it is published. Because the [Asian] researcher observed it, it wasn't clear to me that there would be fifteen other people included as authors of any papers resulting from these observations. Essentially a deal had been struck by a group to which I had not yet been admitted as a member."

The outcome of these events is that the discovery paper is published as a refereed article in a scientific journal in April 2005 citing Lisa as first author, the [Asian] researcher as second, Stefan as third, followed by 16 others—including Phillip—who are listed in alphabetical order (i.e. a total of 19 authors). It is a short article of less than three pages, that includes around half a page of endnotes (30), and a paragraph of acknowledgements.

**Measuring impact**

In the short term, the publication of the discovery paper is followed by a wave of publicity. Lisa and other team members are interviewed, resulting in multiple accounts of the discovery in local, national and international media reports. As Lisa recounts at the University, “I tried to ensure that I maintained a low profile because I didn’t want anyone to feel intimidated”. While a small number of senior staff offered personal congratulations, the general reaction was muted. “A few referred to my celebrity status, employing a bit of humour to deal with the situation”, she reveals with a laugh.

Meanwhile, Lisa and Stefan’s working relationship becomes less intense in the light of the authorship issue. From Lisa’s perspective, “even though the discovery paper has higher scientific impact, and he [Stefan] tried to sort things out on my behalf for the best possible outcome for me and my career, I was still very upset in a highly personal way”. Summing up the situation she adds, “while I’m still very good friends with Stefan, I just felt that this was too much”. Acknowledging the sensitivity of the issue, Stefan is optimistic that a resolution has been reached. “It resulted in a major conflict between us. However, this is resolved now—I hope”, he says. For Lisa, it is a case of becoming wise after the event. By her own admission she is now “extremely cautious with everything”, especially in terms “sorting out the issue of authorship” before any new research involving her is initiated. She also reveals with a degree of hindsight that the incident “encouraged me to work more independently”.

Picking up Lisa’s point about career prospects, it is interesting to juxtapose this with Phillip’s view regarding the intended outcomes of doctoral training. “My role has been to train someone with the potential to do first-class research in Astronomy”, he says. “However, the reality is that they will not all be able to that. If they are not able to do so, then we would also want them to be trained in a way that would make them employable in other areas. For example, our students get good training in computing, modelling and thinking. Some have gained positions in scientific establishments which take advantage of their skills in problem solving. Others have gone into the world of business. A major objective is to produce students who are able to think on their feet, to analyse situations and to be able to conduct research in other areas”.

As a postscript to this narrative, an explanatory paper of 35 pages was published subsequently in a different refereed scientific journal in March 2006. As anticipated, the Asian researcher is cited as first author and Lisa second, followed by Stefan and Phillip. There are twenty authors in total that are not listed in alphabetical order. There is also a footnote indicating that the first two authors have contributed equally to the results presented in the paper. Subsequent to her lead authorship of the discovery paper, Lisa’s career takes off with the offer a postdoctoral fellowship in the Americas which she accepts in June, prior to submitting her thesis in September 2006.

## 4.2 Reflexive interpretation

**Gaining entry to the doctoral program via work experience**

There are three features associated with Lisa’s entry to the doctoral program at the University that are noteworthy. First, she did not complete all of the formal requirements of an honours degree at her alma mater in Europe. Second, she undertook an extended period of self-initiated work experience at the University’s Astronomy department. Third, her supervisor-to-be agreed to play an active role in support of her application. In contrast to what might be regarded as a stereotypical pathway—from first class honours degree to PhD program—this candidate has effectively managed to integrate aspects of education, training, research and work, as a way of prefiguring her doctoral studies. In addition, there has been a blend of personal and institutional resourcing associated with this period of transition from undergraduate to postgraduate.

As a candidate, Lisa has demonstrated a set of attributes (e.g. initiative, motivation, enthusiasm); knowledge (e.g. physics and mathematics); and generic skills (e.g. initiating a stint of work experience in a foreign country). However, the academy is represented in two locations and portrayed in quite different ways. Lisa has obviously become frustrated at what she perceives to be a conventional, didactic approach to science teaching in her country of origin, and finds what is on offer at the University much more to her liking. Key features of the community component include supportive friends and family, as well as the Australian government (e.g. visa regulations, higher education policies and funding arrangements). There are established rules associated with entry to a program in the field of Astronomy that include the submission of a formal application where proof of a meritorious honours degree and an indication of an intended research focus.

Concepts associated with workplace learning are useful as a means of interpreting Lisa's entry to the doctoral program. For example, recognition of prior learning (RPL) is reflected in her concern to ensure that the knowledge, skills and expertise she has gained during her extended period of work experience are acknowledged. This was duly achieved with the support and guidance of Phillip who was willing and able to fulfil the role of principal supervisor. The capacity for these key players to assess their mutual compatibility and capacity to work together, is also significant. In many ways, Lisa's work experience constitutes a form of provisional placement, similar to the situation in the world of work where an offer of permanent employment is made subject to the satisfactory completion of a probationary period.

While the relationship between the candidate and the academy is significant, it cannot be seen in isolation from developments in the wider community. The issue of resourcing is a case in point, and is reflected in the extent to which Lisa draws on friends and family in order to set up and sustain her work experience initiative. While the University sees itself as providing access to human and physical resources in exchange for an additional pair of eyes in the observatory, along with two extra hands in the department, this is all needs to be implemented in ways that comply with rules and regulations determined by the Australian government with regard to entry visas, work permits, training programs and so on.

Another strategy for understanding these processes is to compare Lisa's entry to the program with that of Jane's in Molecular Biology. Although the significance of work experience is a common factor, there are subtle variations involved. While Lisa can be portrayed as using her work experience as a 'lever' (e.g. to gain entry), Jane uses it as an 'experiment' (e.g. to try something new in her chosen field). The way in which the research topic is determined provides another basis for comparison. In the Molecular Biology case Jane's research topic was determined largely by her supervisor as an integral part of the lab's overall research program. Lisa's topic is embedded in her supervisor's research but remains open to negotiation.

**Accessing research facilities in several countries**

The substantial content to be addressed in this section concerns two key aspects of research in the field of Astronomy—observation and analysis. While the former is essentially an individual and isolated activity, it is significant that Phillip is required to accompany Lisa whenever she has the opportunity to access one of Australia's most powerful telescopes. A feature of the latter, however, is that the conduct of analysis within a social, historical and cultural context is more readily apparent. Another striking feature of this theme is the broadly-based nature of Lisa's training and development. In contrast to a stereotypical view of candidates who are located in a university department for the duration of the candidature, Lisa spends three months of each year in research centres spanning four continents, arranged primarily through the support of her external supervisor.

Specific doctoral activities that can be identified in this theme include the submission of formal applications for observation time that are subject to peer review; the undertaking of extensive travel—both national and international; the making of detailed astrophysical observations and

measurements; and the conduct of sophisticated data analysis. Aspects associated with the candidate that differ from the first theme include personal attributes such as flexibility and strategic intent; interpersonal, language and analytical skills (e.g. attention to detail); and knowledge of the field of Astronomy. Notable features concerning available support include networking and collaborating with other researchers, the dispersed location of advanced technologies, funds and other resources, as well as the incidence of joint ventures.

The dynamics of this theme place accomplished astronomers within and beyond the academy in highly expert roles, with the candidate cast as an apprentice. This is most clearly demonstrated in situations where Lisa is not permitted to observe at an advanced facility in Australia without being accompanied by her supervisor. This incident has an interesting parallel with apprentice quartermasters in the USA endeavouring to achieve mastery with regard to the manouvering of large vessels in harbours and ports. In reporting on this model of apprenticeship, Chaiklin uses the concept of 'competent performance' to highlight the common objective of both masters and apprentices (Chaiklin & Lave, 1993). That is, in situations where highly expensive equipment or materials are being used by apprentices, experienced supervisors need to be on hand, not only to provide guidance and support, but also to ensure that valuable infrastructure is not placed at risk by an individual with limited experience.

Another finding to emerge from this narrative theme is concerned with the dynamics operating at the international level. Rather than a process of passing on tacit knowledge and understandings to neophytes within the confines of a university department (e.g. with access to observatories, equipment and so on), there appears to be a much more dynamic process at work and, in a wider context, where astronomers, researchers and candidates are interacting globally. A key feature of the international dynamics is the concept of 'interdependence' that involves physical as well as human resources. Both Phillip and Stefan comment on the extent to which researchers at the cutting edge, large telescopes, theoretical calculations, important databases and funding agencies all need to be brought together in ways that will foster advances in the field of Astronomy. Despite advances in information and communications technology, there is no substitute for face-to-face meetings. As Stefan states in relation to collaborative analysis at an international level, "at times one just has to sit together at a table and discuss graphs and numbers".

Central to these international dynamics of operation are joint ventures in which collaborative research and development are core elements. This theme reveals that Phillip became involved in international projects during the 1990s, and that as much collaboration is involved in preparation (e.g. identifying potential partners, strengths, funding), as in the implementation of projects (e.g. sharing equipment, technologies, databases, theories and so on). Rather than being implemented within the confines of the academy, these joint ventures involve governments, research agencies, funding bodies that span a number of different countries.

When the international links in Molecular Biology are compared with those in the Astronomy case, they are of different order of magnitude. While Jane contributes to international conferences and meetings, she does not appear to be operating at the same level of interdependence that Lisa is experiencing. Significantly, however, there is clear evidence to suggest that Trish—Jane's supervisor—is interacting with colleagues in a global context and is at the cutting edge of new technology internationally.

**Wrestling with the co-authorship of refereed papers**

The narrative theme of co-authorship explores academic publishing as an established component of doctoral activity. It positions the academy as the dominant player with the community in a supporting role, while the candidate comes to grips with established procedures and protocols—some of which are more explicit than others. It highlights a variety of operational dynamics that reflect negotiation, conflict and compromise.

A number of characteristics associated with the publishing of research findings in the natural sciences that include a distinction between discovery and explanatory papers; a process of peer review; and an hierarchy of scientific journals. Most of these journals have publishing guidelines that focus mainly on editorial aspects such as word length, referencing and formatting. What this narrative theme highlights, however, is not only that various conventions appear to have been developed over time and internalised by experienced researchers, but that there are matters of judgement which are much more difficult to articulate. Rather than a routine process, academic publishing involves a myriad of intellectual and ethical issues that require further explication.

The most powerful or significant dynamic involves the conflict between Lisa and Stefan that carried with it considerable potential to destroy their strong and productive working relationship. While both Stefan and Phillip perceived themselves to be working in Lisa's best interests (e.g. by negotiating publication arrangements that will protect her thesis as well as advance her prospects), Lisa believes that they concocted a deal without adequate consultation with her. The concept of legitimate peripheral participation (Lave & Wenger, 1991), for example, highlights the extent to which newcomers are invited to join more experienced practitioners with a view to developing their expertise in a common enterprise. In the words of the authors, "to become a member of a community of practice requires access to a wide range of ongoing activity, old-timers, and other members of the community; and to information, resources, and opportunities for participation" (p.101). As a doctoral candidate, there is evidence to suggest that Lisa has been provided with access to all these things, however, has been denied—and perceives herself as being denied—access to full participation in this community of practising astronomers. While legitimate, Lisa's participation in the community of expert astronomers remains peripheral.

While co-authorship of articles by supervisors and their doctoral candidates is far from unusual—especially in the natural and physical sciences—the practice continues to court controversy. For many years researchers have identified a distinction between those who view supervisors as 'giving the student a leg up' in this context, in contrast to those who see them as exploiting the situation by using the student as a form of 'slave labour or cannon fodder' (Becher & Trowler, 2001, p. 136). However, the situation in Lisa's case is more complex, and given that it extends beyond a dyadic relationship to include additional researchers, supervisors, institutions and countries, the political dimension is highlighted.

Some of the political issues around co-authorship revealed in the narrative include identifying who is in charge of the task and how it is implemented. While determining the lead author and the ranking of co-authors are important, as Stefan points out, there is a prior political question of "who will be offered the chance to work on a problem?" From a supervisory perspective the need "to make compromises for the sake of healthy collaboration" is paramount, however this is viewed by the candidate as being very much at her expense. While previous accounts of the doctoral experience in the natural sciences have considered patterns and relationships between candidate and the environments in which they work (e.g. laboratories, observatories), they have rarely embraced settings beyond the university. Each of the three narrative themes highlights the extent to which groups such as international researchers, syndicates and facilities; the policies and practices of Australian and foreign governments; as well as family and friends mediate doctoral activities. The term 'interdependence' is used by one of the informants to illustrate how Astronomy is viewed internally as the most international of all sciences.

This narrative and interpretation have highlighted new aspects of doctoral activity in the sciences. Rather than a neophyte apprenticed to an expert in a university department, this chapter has portrayed the candidate as an active participant in an international community of astronomers and researchers. There is a significant level of integration in relation to education, training, research, work and career development, along with insights not only to the opportunities, but also the challenges that this provides. In order to build the argument in terms of the increasing diversity and particularity of doctoral activity, the next chapter will explore

what transpires in another case in a field of a different domain—Cultural Studies. The case of Cultural Studies has been selected for closer examination because it illuminates the doctoral enterprise in ways that reveal not just its complexity but also its distinctiveness. It provides an inside view of doctoral activity in the social sciences—but as with all cases in this study the inside view constitutes a synthesis of three perspectives.

# 5. Walking “a two-way street”—Cultural Studies

## 5.1 Case narrative

Beginning her career as tutor and lecturer, and then working for twenty years as a senior curator in museums and galleries, Pamela is now in her fifties and a doctoral candidate in the culture and aesthetics unit at the University. Passionate about artefacts—as well as their historical, geographical and cultural contexts—and with one book to her credit, she captures the essence of her career to date in two sentences. “Throughout my working life, I have been in fairly unique positions, with a requirement to make things happen that otherwise would not happen. That is partly through my own endeavours, but also assisting other people to achieve things”.

Her entry to the doctoral program at the University is a case in point—although it was three years in the making. Back in 1999, while Pamela was preparing one of her large-scale exhibition and publication initiatives, discussions ensued in different settings around the potential for additional research on that particular collection. A small number of individuals in positions of influence at the University, a philanthropic trust and the community where the collection originated “shared a common belief in its multi-faceted significance”. One thing led to another whereby Charles—head of the culture and aesthetics unit at the University—submitted an application to the philanthropic trust for a visiting fellowship to explore the collection in greater depth. Some months later, Pamela received “a phone call out of the blue” offering her a two-year fellowship to continue her work. The wider context and interdisciplinary potential of this preliminary research then motivated Charles to offer Pamela a departmental fellowship in the following year that enabled her to continue her academic research while providing educational services around the country for the Antiquities Museum who toured the exhibition. Significantly, Pamela’s decision to pursue her passion rather than return to her position as a full-time curator during this three-year period meant drawing on private reserves to keep her head above water financially.

Not having worked in a university for twenty-five years, Pamela finds the academic environment “isolating” and “alienating” at first, but quickly begins to appreciate the value of the interdisciplinary approach that Charles has instigated in his unit. As she explains, staff members are encouraged “to relate to specialists from outside the narrowly based discourse of their discipline”. While there is no doubt that passion for her subject remains a motivating factor, a clear distinction exists in Pamela’s mind between passion per se, and tangible outcomes that are produced as a result of its application. As she says, “I think it is really bad if you think of doctoral research as just an ongoing passion. Ultimately, you need to be doing it for a specific purpose, in a given timeframe. It’s not a hobby. I suspect that mature age students may have a greater sense of product or outcome, as distinct from continuing students. There is probably an element of training involved in ensuring that research is conducted for a particular outcome”.

During her fellowship, Pamela works in collaboration with Charles to develop an ARC Linkage Grant application that, among other things, would enable her growing body of research on the collection to be extended even further. Given her established networks she is able to readily identify a community organisation with an interest in the collection who agrees to become an industry partner for the project. After a lengthy process that involves considerable negotiation around the contractual arrangements, all parties—the ARC, the university and the community organisation [as an IP]—agree and Pamela commences as the project’s doctoral researcher late in 2003. Charles is to fulfil two roles—her principal supervisor and chief investigator of the project—and an academic at a university interstate is recruited to provide Pamela with additional advice and support.

The unique characteristics and locations of the collection determine that Pamela spends considerable periods of time away from the University. For the first two years of her

candidature she manages to combine the status of an on- and off-campus student, straddling two homes and a variety of workplaces. She has a share in two houses—one in a suburb close to the University, and the other thousands of kilometres away in a city that constitutes a focal point for the artefacts in the collection. “I could be two months away then one month back … one month away and four back … or I might be away for just a fortnight”, she says routinely. Living and working in such a fashion demands high levels of flexibility, opportunism and organisation—“essentially, I have to go with the flow”, she says summing up the situation. In addition to the project’s industry partner, a variety of institutions, individuals and groups become part of her investigative research, which means that she ends up working across quite different cultural, commercial and academic contexts. For example, “much of my work involves maintaining relationships and interacting with people who may not necessarily contribute directly to my research,” she divulges.

Pamela enjoys the intellectual and operational environment of the culture and aesthetics unit which she describes as “extremely stimulating, very supportive and very constructive”. She regards interacting with peers, contributing to in-house seminars and meeting visiting researchers as critically important, and endeavours to participate in as many unit activities as possible when she is on campus. Pamela intends to join the “chapter writing group”—whose members are committed to sharing and critiquing parts of their thesis—when she is a little further down the track. In the meantime, however, she is happy to develop and maintain relationships in the unit experiencing the inevitable ebb and flow of candidates associated with fieldwork, internships and exchange programs. “In my experience, a lot of the most meaningful conversations are held around the photocopier. I suspect that everyone [in this unit] is working on completely different topics, and there isn’t that petty jealousy, or refusal to share information, associated with some disciplines”, she says.

A significant part of her work involves the building of trust among a variety of individuals and groups—members of her project and supervisory panels, peers, family and community groups associated with the collection, and business and industry representatives to mention just a few. Pamela describes what trust means and how it is established in this context in the following commentary. “When you are working with valuable [artefacts], and there are questions of security and confidentiality, trust is imperative. You cannot even assume that a conversation you have had with one member of the family, will complement a conversation with another member. I suppose to a certain extent, the fact that I worked at the Museum of Antiquities, and that I set up travelling exhibitions, helps build credibility. It’s the professional experience that I have behind me that helps build trust. Certainly since I managed the exhibitions, and my book was published, it has been easier. It’s an area in which a lot of people have expertise in small components, and they are very territorial. Once they talk to me, they do become aware that I do know something about what they know, but that I know other things as well.”

**Accessing advanced technical and intellectual support**

At the commencement of her initial fellowship Pamela meets Douglas, whose account of his project, and response to her own, confirms her instincts that the incorporation of a strand of research, from a discipline that is new to her, is essential. Douglas has unique expertise in aspects of electronic research which bridge the conceptual and the technical. Having enrolled as a part-time doctoral candidate in 2000, he is employed as a full-time IT officer in another department on campus, and researcher in an externally funded project located in one of the University’s centres of excellence.

For Pamela, the development of the database becomes a major focus of her research directions, not only as a means of addressing a problem about which she has become increasingly concerned—the magnitude and complexity of her data—but also “as a means of generating conceptual insights, the central core of my endeavour”. Pamela becomes “indebted to Douglas for this realisation”, which is derived “as much from informal discussion and demonstration, listening to his response in seminars provided by others, as it is from formal presentations”.

Although an electronic database was identified as an intended outcome of the Linkage Project in the first instance, Pamela conceives of this "not only as a research tool, but also as a subject for analysis". She concludes, "Douglas's continued support in terms of introducing me to intellectual frameworks, conceptual ideas and seminal texts, drawn from disciplines other than art history is essential not only to the development of the database, but also the thesis".

Douglas recalls the general thrust of their initial meeting. "I was interested in maps and mapping, and a key part of her research [was] … locating artefacts in the landscape. So our conversation started from there. She described to me in broad terms what she wanted to do, and I began in an informal way to outline the possibilities. Students often ask me for advice—and even if they don't ask me, and I see them doing something that could end in tears I'll step in", he adds with a smile. Douglas is an experienced operator of information and communication technologies, having developed an interest in interactive media work back in the early 1990s. "This was all before the Web which sounds like the Stone Age today"—he says with a chuckle—which led subsequently to a career as a "manager in strategic IT initiatives".

Drawing on his background in software engineering, Douglas uses the term "requirements gathering" to describe aspects of his initial interaction with Pamela, outlining the process involved in some detail. "The first step is understanding what the client needs—in terms of an information system. The challenge for someone like Pamela—who has a very good understanding of the content and has worked in museums and understands registry systems—is that she doesn't understand the language of making databases. For many researchers, this is often regarded as magic, and I am some kind of magician. All too often there is a tendency for them to want to simply hand it all over, so that someone else can solve the problem. That's not the way to proceed."

In describing an interactive approach that involves assisting candidates and other clients to identify and clarify their needs, Douglas employs the use of metaphor. "It's a craft—it's part of my craft—talking to people. In terms of Pamela, at some stage I offered my assistance to organise her data more thoroughly. I could see that she was in a bit of a pickle with data management—given the masses of information she had acquired. She was relying on methods that were primarily manual—but as I explained to her, this is a common dilemma. Because of their lack of IT skills, people often feel inadequate, or they feel stupid—especially when there are other people around—so I try to make people feel comfortable. They have to develop a system that they can manage and use, which does not involve the issue of dependency."

Pamela's interest in Douglas's expertise and knowledge, however, is matched by Douglas's preoccupation with the artefacts that make up the collection. A collegial relationship developed that Douglas describes as a "two-way street" with the result that he is "always picking her brains as well … learning from her". Expanding on these comments he reveals that "the quid pro quo in all this is that I prefer not to do it for money, so someone will teach me or I will learn something new that I couldn't learn through a conventional experience". Summing up he says, "it's a bit of a barter system, although I don't like being in a position where colleagues feel obligated". Given their common interest in the history of artefacts, they spend many hours discussing questions of a philosophical nature—"particularly about conceptual issues"—to do with knowledge, society and culture.

**Capitalising on a supportive environment**

While there may appear to be a degree of serendipity surrounding Pamela and Douglas's peer learning, advanced training and intellectual exchanges, there is evidence to suggest that a set of pre-conditions facilitated these developments. Over the years, Charles has been developing a package of integrated doctoral strategies that includes the creation of "intellectually strong" support networks. He is able to fire off a barrage of initiatives such as "a thesis writing workshop; an annual conference for first-year doctoral students where they have to present a paper; and a visiting scholar program—an initiative of my predecessor. This program involves

addressing research topics of interest to [the unit], but is also of benefit to graduate students in general, implemented every two or three weeks. We also have a program called 'challenges to perform', which is conducted annually by an emeritus professor, and is designed to show how postgraduate students can produce outcomes from their research in different formats, genres and media".

While Charles regards the provision of intellectual support as important, he places even greater emphasis on a candidate's capacity to be proactive, grabbing as many opportunities as possible with enthusiasm. For example, he argues that "it is important that doctoral students see themselves as an equal part of the academic enterprise overall", and that "they should not see themselves as being part of some sort of PhD ghetto that is attached to a department". However, expanding on this point he laments a marked decline over time in candidates' capacity to engage in—as well as contribute to—the intellectual and social life of the academy.

Charles gained his PhD in Anthropology and has supervised around eighty candidates in three universities—one in Australia, and two in the UK where he worked for ten years during the 1980s and 90s. The fact that not one of these candidates has slipped through the net makes for a highly impressive record. He has also been responsible for introducing new courses for masters and doctoral candidates at each of these institutions, implementing single discipline (e.g. Anthropology), and inter-disciplinary (e.g. multicultural) approaches. He urges students to get started as quickly as possible, and strives to imbue them with "a sense of urgency". From his perspective, "getting on with as much serious, preliminary research as possible, and engaging with the data, is very important". For example, to avoid the potential for candidates' procrastination, "the task of preliminary reading and finding a topic should be completed as quickly as possible, and not take a period of six to twelve months", he adds pointedly.

There are four additional features of Charles' PhD program at the University that are worthy of note. First, candidates of a mature age, with extensive professional experience, and motivated by factors other than career entry or advancement, are welcomed with enthusiasm. Second, the use of genres other than conventional academic text is encouraged in the construction of doctoral theses (e.g. poetry, music and visual art). Third, an 'outreach' approach to research is promoted, whereby candidates conduct a good deal of their investigations with groups in the field, and/or 'collections' of artefacts. Fourth, opportunities to conduct joint research ventures are actively pursued (e.g. in association with agencies beyond the academy).

**Contrasting two doctoral candidatures**

In this context, it is interesting to contrast briefly the doctoral candidatures of Pamela and Douglas. As candidates, they share a number of characteristics that include age group, established careers and doctoral expectations. In addition, both have succumbed to serious health issues that continue to impact significantly on their work. In terms of expectations, Pamela views the doctorate "as a funded opportunity to research and create what I want to research and create". With a view to clarifying the point she adds, "creativity may be later communicated more widely in the form of exhibitions, books or whatever, but at this stage it will be at a level and in a format appropriate for a PhD. I do see it as an opportunity to engage with a series of intellects around important issues". Douglas sees it as a point of departure from an established professional position in the IT industry. "I really wasn't doing the PhD for reasons of career—indeed quite the opposite. I was seeing it as a break or a change of direction", he says philosophically.

However, there is considerable variation regarding their individual candidatures, for example, in terms of entry, scholarship and enrolment status. Although protracted, Pamela's transition to her program involves various forms of structured support. For example, Charles fulfils the twin roles of sponsor and mentor by facilitating her visiting fellowships, then subsequently submitting an application for a Linkage Grant to the ARC. The recruitment of candidates to participate as doctoral researchers in education-industry linkage projects tends to be by either

nomination or application. As Charles explains, “you may have a project proposal approved, but you may not have anyone in mind, in which case you advertise. Or, it happens the other way, where you have someone in mind, and you encourage them to apply. If you are doing it the second away, and unless you are insane, you will only do it if you know that the student is of good quality and likely to achieve the project’s objectives. That was certainly the case with Pamela, and some other students in that category. With two other Linkage Grants, we had to advertise for students.”

Unfortunately for Douglas, however, the initial stages of his candidature proved to be highly problematic. After moving interstate in mid-career to undertake a masters degree at the University, he performed very well and was invited to join the doctoral program, although was placed in a conventional academic department. He stuck it out for a year or so, but then decided to cut and run—arranging a transfer to Charles’s culture and aesthetics unit. “My solution to the negative socialisation of the [mono-disciplinary] department was simply to leave”, he remarks succinctly. His feels much more at home in this new academic home which he describes as “an almost perfect research environment for mature age students, or people who are interested in spreading their wings. It is very collegiate and very open—the antithesis of research in a single discipline in many respects”.

**Preparing for the challenges of research**

Drawing on their experience in doctoral education and research training, Charles, Pamela and Douglas tend to emphasise the importance of two points in common. First, each supports a collaborative approach to learning—one that is relatively informal, unstructured and located in particular contexts. For example, Charles is keen to create and sustain intellectually strong support networks for candidates, while as part of their collegial relationship Pamela and Douglas are actively engaged in peer learning. Second, each has a view of training that provides candidates with opportunities to participate in formal, structured activities designed to develop specific skills and hands-on expertise. However, they also identify the critical need for candidates to be proactive in terms of identifying their own training needs, and for providers to embrace flexible modes of delivery.

Given his extensive experience as a supervisor, Charles has the advantage of being able to identify trends and developments over time—at national and international levels. As a consequence, he is adamant that training must be individualised and self-directed, rather than in the form of generic programs to be completed as a requirement of the PhD. As he explains, “in Britain, and there are signs of it happening here, the doctoral thesis has become part of what is called research training, so the dissertation has taken up a smaller part of their work, which I think on the whole is nothing short of disastrous. I think that research training is something that should be directed to the individual student, who should be aware of their own training needs, and willing to address them”. He emphasises this point by adding, “There is no question in my mind that if a doctoral student is doing research that requires a survey, he or she should be trained in that particular methodology. It should not be treated as a general method to be studied by every student”.

Pamela’s participation in a ‘how-to’ course regarding the Endnote software package illustrates his point to a certain extent. The University offers a suite of internal generic training programs for postgraduate students each semester free of charge, thereby enabling Pamela to addresses an acknowledged gap in her computerised referencing skills when the need arose. Reflecting on this experience, however, she reveals that “while useful in certain contexts, the provision of centralised training remote from the research context nevertheless proves inadequate and inappropriate for the diagnosis and design of e-research resources and training which address the particular complexity and conceptual potential of my project”. However, Pamela is quick to acknowledge the invaluable support she gained from one of the unit’s visiting scholar programs on the theory and practice of documentary film-making.

While Douglas supports the idea of needs-based training, he has become convinced over time that training at the doctoral level needs to be more than a “haphazard” or “informal arrangement”, and that some level of “intervention” is necessary. His rationale is based on the ever-changing nature of knowledge production and the need for a more strategic approach to information management—on the part of institutions, supervisors and candidates. He articulates the nub of problem succinctly when he says, “I think candidates particularly are way under-prepared to deal with the challenges of the digital domain”. Clarifying this statement he adds, “even though the unit in which I am enrolled could be described almost as a heaven for postgraduate students, there is an alarming gap of support for students like Pamela in the area that I call informatics”.

Douglas argues that the shortfall needs to be addressed by developing expertise that will incorporate “content knowledge—the ‘what’, as well as methodology—the ‘how’. He goes on by explaining that “when you combine those two things, then you can say to any candidate—especially when data or knowledge management issues are becoming so complex—you can do so in a way that purely technical people just don’t understand. So what is lacking—not just in the unit where I am enrolled, but throughout higher education—is people who are multidisciplinary in that regard, namely, informatics practitioners who can really give advice to the contemporary generation of PhD students and other researchers who are trying to manage extremely complex data gathering and knowledge management issues. This lack adds not only a high level of stress, but also risk in actual fact, for many postgraduates.”

In terms of a final snapshot taken in August 2006, Charles is currently responsible for the supervision of fourteen candidates and several collaborative research projects. Douglas is “very busy and happy” having “pulled out of the PhD and working again in my professional role as an IT specialist” [not at the University]. Pamela is still developing the digital database originally conceived with the support of Douglas to map and analyse key aspects of the artefacts in the collections. She observes, “the lack of IT support impedes my progress and a serious health issue is also inhibiting my capacity to cope with certain physical tasks”. However, “the structure of my thesis outline has been approved and I anticipate joining the unit’s chapter writing group and submitting my thesis towards the end of 2007”, she concludes resolutely.

## 5.2 Reflexive interpretation

**Co-authoring a submission for funding**

There are a number of critical incidents associated with the episode concerned with co-authorship. In terms of a chronological sequence these include the response to Pamela’s original exhibition (the museum); the granting of the first fellowship (the trust); the granting of the second fellowship (the University); and the co-writing of the linkage grant application (the ARC). Specific doctoral activities that can be identified are submission writing (e.g. articulating objectives, outcomes, methodology); project organisation (e.g. determining chief investigators, project partners, partners’ responsibilities); and researcher recruitment (e.g. selecting an appropriate doctoral candidate).

The dynamics associated with this episode reflect an intricate blend of interactions and relationships. To begin with, Pamela’s original exhibition invokes positive responses among individuals from diverse settings who share a common interest in cultural artefacts (e.g. Charles from the academy, a senior member of the philanthropic trust, and members of the family and community from where the artefacts originated). There is evidence to suggest that these representatives “shared a common belief in its [the original exhibition’s] multi-faceted significance”. In other words, they could see the potential for further research and development from the perspective of its own area of interest or specialisation.

When viewed collectively, these individuals can be seen as constituting a community of practice (Wenger, 1998), given the informal nature of their original formation, which is followed in turn

by collaboration resulting in two fellowships and a research grant. Wenger uses this concept as a 'thinking tool' to explore a social theory of learning. Hence, when applied to the Cultural Studies narrative, it provides an opportunity to explore the links he has identified as existing between learning, meaning, practice, community and identity. Those involved in furthering Pamela's original research share a common interest and are interested in collaborating in ways that will not only enhance individual understanding and sense of self, but also contribute to community and social development through the pursuit of a shared enterprise. One of the most significant features of this episode, therefore, is that the primary thrust of Pamela's proposed research topic has not only been embraced, but also endorsed formally by groups both internal and external to the academy. This constitutes a major point of departure from the commonly held view of a PhD candidate in the social sciences and humanities who identifies a topic with little or no interaction with anyone other than a supervisor, who invariably takes a back seat role in the process (Burgess, 1994; Parry & Hayden, 1994; Delamont, Atkinson et al., 2000).

A second feature worthy of note is the collaborative process involved in the preparation of the ARC Linkage Grant application. Co-authorship of the proposal reflects Charles' experience and status given his authority to submit a formal submission for external funding on the one hand, together with Pamela's familiarity with the research topic and the arts community on the other. For example, it is Pamela who identifies the industry partner by means of her established network of practitioners. While there is evidence in the literature [and the national survey] to suggest that submission writing is a practice in which a proportion of doctoral candidates in the social sciences participate, this tends to be portrayed in terms of the need to attract funding for projects of significance as determined by their departments or supervisors. Hence, working on a submission the focus of which will be one's own doctoral research topic would appear to be of quite a different order, and one that reflects an outcome generated by a community of practice.

A third aspect is concerned with the philosophy that underpins the ARC Linkage Grant, namely, the development of links between the academy, industry and government. From a theoretical perspective, this aligns with the concept of the triple helix (Etzkowitz & Leydesdorff, 2000), which highlights the importance of generating outcomes that will benefit audiences beyond universities. In this case the government is represented by the ARC, with a community organisation representing the project's industry partner. Although there are economic components to the project (e.g. funds contributes by the community organisation, the commercial value of the artefacts), the emphasis appears to be on the social benefits to be derived from the new knowledge that will be produced as a result of this research.

In summary, this episode depicts a candidate in the social sciences and humanities who creates a doctoral proposal in collaboration with her principal supervisor, but in a context that implicates other players and organisations. In contrast to many accounts of doctoral experience in the social sciences that draw attention to the plight of candidates who engage in highly personal and individualised research initiatives (Delamont, Atkinson et al., 1997) and who can spend a year or more identifying a suitable topic, Pamela works collaboratively over a three-year lead-up period with support from various sources, with the result that she is able to hit the ground running when the application to the ARC is finally approved.

**Accessing specialist expertise to meet identified needs**

Pamela's capacity to access advanced levels of technical and intellectual support during the course of her candidature constitutes the focus of this section. Specific activities include clarifying the nature of a problem; seeking sources of potential advice and practical support; and negotiating the roles and responsibilities of those involved in the exercise. There are also other contextual factors such as the structure of the PhD program in place in the culture and aesthetics unit; the experience and expertise of a fellow PhD candidate; and developments associated with information and communication technologies. There is evidence to suggest that Charles' dual strategy of generating "intellectually strong" support networks, while encouraging candidates to

assume a proactive role in their own learning and development, is an important factor in the unfolding of events.

The working relationship established between Pamela and Douglas is central to this specific episode as well as the narrative in general. It characterises a mutually beneficial arrangement whereby two candidates draw on each other's expertise to enhance their own learning and development. While it is possible to depict Douglas as 'teacher' and Pamela as 'learner' in this episode—especially in relation to the construction of an electronic database—it can also be represented as co-learning, when coupled with their extended theoretical conversations to do with knowledge, society and culture. The strategies employed by both candidates are noteworthy in that they reflect a capacity to initiate and respond to new learning situations in ways that are mutually constituted.

Specific to this episode is the integration of the conceptual with the technical. For example, not only is Douglas familiar with various intellectual frameworks and in possession of highly developed IT skills, but he also has the ability to make these available in ways that can be accessed and developed further by Pamela. Part of his 'craft' as an IT specialist is establishing an initial rapport, employing a 'requirements gathering' technique, and building capacity to move forward with increasing levels of independence. What is critical here is the embodiment of knowledge and skill. In other words, Pamela is not seeking—or receiving—a purely technical solution that will enable her to construct an electronic database. Rather, she is working with an individual with specialist expertise who understands her identified needs and is able to provide strategies designed that will avoid the creation of long-term dependence on her part.

The idea that doctoral candidates learn from each other has been acknowledged in the literature on doctoral education for some time. One Australian study conceptualised candidates as 'self-organising agents' who were continually looking for a range of resources beyond their supervisor that included "technical staff, other students or academics with particular expertise" (Cullen, Pearson et al., 1994, p. 41). More recently studies have explored the concept of peer learning, especially in the context of doctoral pedagogy (Boud & Lee, 2005). These authors define peer learning in terms of networks of learning relationships among students and significant others (p. 503), and highlight its reciprocal nature where "peers can and do learn from each other" (p. 511). What this narrative demonstrates is the way in which this learning takes place in one instance of doctoral practice in the social sciences. It illuminates the nature and extent of the learning and the contribution that each candidate makes to that process.

Another form of learning comes from what Delamont et al call 'pedagogical continuity' and 'sequential continuity' (Delamont, Atkinson et al., 1997). In contrast to the natural sciences where the focus is on handing down of skills, strategies and equipment within a research group, in the social sciences there is a the PhD is frequently staged and developmental. Building on the aforementioned constructs to do with peer learning, the narrative in the social sciences provides the opportunity to reconceptualise the relationship and interaction between Pamela and Douglas as *pedagogical alignment*. This initial theorising is designed to capture the sense in which candidates are continually in search of people with embodied knowledge and skill who are able to provide high-level and strategic support at specific points during their candidature in ways that are mutually beneficial. Hence, this is more than 'just-in-time learning'—defined as a short course, practical advice or a technical solution—and incorporates a more sophisticated approach whereby a close affinity between peers is established and the potential for significant learning outcomes is enhanced.

**Exploring the education-training nexus**

While this theme emerges from the narrative as a whole, it is most clearly demonstrated in the narrative episode on advanced-level support analysed in the preceding section. As a theme, the education-training nexus is of a different order to the narrative episodes, and has more in common with a process rather than an event. Hence, by drawing on theoretical frameworks

identified from the literature, the objective is to see if these might generate additional meaning with regard to how training is represented within the course of the narrative.

Central to the theme is the form of training deemed to be necessary for doctoral candidates in the social sciences. Pertinent issues include the purpose and substance of training, the mode and person(s) associated with its provision, the time and place of implementation, sources of funding and so on. The narrative reveals a high degree of consensus with regard to the value of collaborative approaches to learning and access to training by specialists. However, there is dissension with regard to how training is organised and delivered most effectively. As an experienced supervisor, Charles believes that training must be individualised and self-directed, and is opposed to [mandated] generic methodology courses at the doctoral level. Douglas, an experienced IT specialist has identified the need for some form of [structured] intervention to address the challenges of the digital domain. Pamela appears to be positioned between these two extremes, acknowledging the benefit of having gained access to specialist training, but on reflection reveals that the lack of [structured] IT support continues to impede her progress.

The literature on doctoral education generally, and in the social sciences and humanities in particular, provides some useful strategies for exploring this theme in greater depth. For example, two writers have developed the concept of 'skilful performer' to highlight the significance of embodied skills (Pearson & Brew, 2002). In defining this individual as "someone who not only knows how about what to do but knows how to apply that in practice" (p. 137), they capture what Douglas appears to be demonstrating through his approach to database development with Pamela. Rather than imparting or developing technical skills (e.g. how to construct and operate an electronic database), he is applying these to Pamela's situation while embracing broader conceptual and intellectual frameworks. A measure of success will be the extent to which Pamela is able to establish and maintain her database without resorting to Douglas for guidance and support in the medium to long term.

Pearson and Brew (2002) share Charles' concern with regard to the narrowing focus on skills and the move towards reductionist forms of competency-based training at the doctoral level. In their words, "where skills are presented in short courses or modules, particularly if credentialled, this problem [the danger of seeing skills as 'extras'] could be exacerbated" (p. 137). Hence, they argue for a comprehensive and integrated approach to training whereby candidates "learn not only current practice but how to address the problematic and unknown" (p. 140). The question of who should drive specialist training at the doctoral level, however, remains unanswered. For example, should it be the candidate, the academy (e.g. supervisor, academic organisational unit, graduate school) or the community (e.g. private provider, industry, government)? Given the main thrust of their paper, Pearson and Brew (2002) tend to cast the supervisor in a lead role, although they clearly acknowledge that peers, postdocs, technicians and other significant individuals can assist and support students in this regard.

Much of the literature on doctoral education and research training in the social sciences reveals that the development of research methods and skills in doctoral candidates is problematic. Put simply, there is a division of opinion as to whether these are best caught or taught. For example, one group of researchers found that in the social sciences generally, and Anthropology in particular, "qualitative methods did not really lend themselves to formal instruction because their principles defied translation into teaching formula (Parry, 1994, p. 46). In other words, there is something of an entrenched view among some social scientists in the academy that the most effective way of gaining research skills is by means of experiential learning. References to learning to play musical instruments and to ride bikes populate accounts where this argument is advanced.

On the other hand, there is evidence—particularly from the USA and more recently the UK—that the provision of structured training courses has become more common in the social sciences. One researcher in Britain has revealed that "candidates [in the social sciences were] spending 60 per cent of their first year of study engaged in taught programs of research methods

training" (Hockey, 1997, p. 64). One writer has argued that the introduction of such training courses increases the risk that "students' capacity to generate original thought will be severely compromised" (Collinson, 1998, p. 64), which provides a foundation for the views expressed subsequently by Charles and other researchers.

Implications associated with the knowledge society in general, and advances in information and communication technology in particular, however, do not always feature as prominently in the literature on doctoral education and postgraduate research training as one might expect. Hence, the identification by Douglas to the challenges of "the digital domain" and "informatics" in the social sciences is significant in that it brings into focus a new set of factors that further complicates the contemporary context in which the doctorate is operating. It is important to restate the purpose of the case narrative and reflective interpretation at this point, namely, to provide a more accurate picture of what is currently happening, rather than to recommend what should happen in future. Hence, it is the emergence of an issue such as informatics that is significant, rather than how candidates, the academy or the community should respond to it.

### 5.3 Reflections

As a means of beginning this section, it is instructive to establish a link with Chapter 3 and the case of Molecular Biology. Just as an orthodox model of a doctoral program or experience exists in the sciences, there are stereotypical views of what goes on in the social sciences and humanities. In contrast to science candidates who tend to be regarded as team members who are engaged on common problems and share resources, candidates in the social sciences and humanities are often conceptualised as solitary and isolated (Delamont, Atkinson et al., 1997). Occasional rather than frequent meetings with their supervisor with whom they are seen to be in a dyadic relationship are regarded as the norm. One report identified five issues confronting postgraduate education and training in the social sciences, namely, supervision, training, disciplines and departments, quality, and completion and labour markets (Burgess, 1994, pp. 6-9). These and further issues in the social sciences (e.g. doctoral writing) have been explored by other writers (Torrance, Thomas et al., 1992; Hockey, 1997; Collinson, 1998; Hockey, 2004; Harman, 2005).

Combining narrative and interpretation around contemporary practice in the field of Cultural Studies tends to confirm the orthodox model of doctoral activity in the social sciences and humanities. For example, it highlights the importance of an effective supervisor, the value of a supportive learning environment, and the capacity of individuals other than supervisors to contribute to a candidate's learning. It also reflects findings from previous studies in this domain that conceptualise doctoral candidate as operating within a dyadic relationship, but at the same time being relatively independent and isolated (e.g. with regard to being off-campus in order to participate in extensive fieldwork).

Just as this case can be used to lend weight to such interpretations, it also signals significant points of departure. For example, the candidate's research has its origins in a community of practice, and her study is implemented in the context of a linkage project that includes the academy, government and industry as viable partners. This involves the candidate in working across a range of "cultural, commercial and academic contexts", which demonstrates the multi-faceted nature and interconnectedness of her work. Another significant point of departure is the type and depth of working relationship that the candidate established with a fellow candidate that can be conceptualised as an advanced form of peer learning.

A dominant theme to emerge from this case is the education-training nexus and the importance of developing skills in context. In the current economic and political climate in which doctoral education is being implemented—in Australia and elsewhere—the strategy of learning-by-doing in order to acquire research skills might be seen as risky at best and irresponsible at worst. However, there are clearly risks associated with implementing mandated courses (e.g. in research methodology), particularly given their potential to impact negatively on a candidate's

creative and potentially ground-breaking research capacities. Rather than cast this problem in terms of an 'either/or' scenario, my argument is to search for a middle path whereby a level of structured support that can be accesses at strategic points judged by the candidate and those playing a significant role in their research. Hence, the concept of pedagogical alignment is proposed a possible way forward.

In terms of the narrative, it is important to note that any account is a representation and can only provide partial knowledge. Put simply, it can never capture the 'whole truth'. However, a major advantage is that it enables the reader to form his or her own interpretation and to evaluate the one I have provided. It also encourages the reader to raise questions that are neither addressed or remain submerged in the text. For example, it is interesting to ponder what factors might have led Douglas to withdraw from his doctorate. Both candidates in this narrative have benefited from the supportive environment provided by the culture and aesthetics unit as well as the level of peer learning achieved, yet one decides not to complete.

Another strategy is to identify any examples of variation associated with this narrative and interpretation. Given that socialisation formed part of the original conceptual framework for this study, it is noteworthy that while there is some evidence of its existence, it is in a different form to that portrayed in the social sciences. For example, a number of writers use socialisation and the process of acculturation to the discipline as a major part of their conceptual frameworks (Parry & Hayden, 1994; Delamont, Atkinson et al., 1997; Hockey, 1997; Parry, 1998; Delamont, Atkinson et al., 2000). The fundamental assumption of a contemporary book on the doctoral experience is that "novices are socialised into their respective academic disciplines and cultures"(Delamont, Atkinson et al., 2000, p. 1). In this case, however, there is a more flexible approach especially in relation to cross- and inter-disciplinary approaches.

Given that Pamela is located in an academic organisational unit where the academic approach and culture are unequivocally inter-disciplinary, it is possible to detect a range of disciplinary influences around the foundational disciplines such as Anthropology, History and Sociology, as well as more practically-oriented subjects like the creative arts, language studies and media studies. Although there is little or no evidence to indicate that Pamela is being acculturated into any one individual discipline, Douglas's initial experience with the mono-disciplinary department suggest that socialisation was in evidence—albeit in a negative way. If we focus on socialisation in relation to Pamela specifically, it is possible to make three points. First, on arrival at the culture and aesthetics unit Pamela came with an established professional identity with its origins in art history. Although she found the general academic culture at the University isolating and alienating at first, she quickly came to appreciate the interdisciplinary approach promoted by Charles. Rather than inculcating the system of values, beliefs and methodologies of any one discipline, Pamela appears to be open to a broad range of philosophies and approaches. There is a sense that her allegiance is more towards her collection and the members of her unit than to a discipline per se.

This chapter has extended my argument by demonstrating that the deeper one probes the doctoral enterprise the greater capacity there is to understand and appreciate its irreducibility. The limitations of stereotypical images of candidates in the social sciences and the humanities have been exposed by illuminating the micro-worlds of those working in the field of Cultural Studies. By placing peer learning under the spotlight, it has been possible to move beyond superficial statements about candidates working together and towards more comprehensive understandings of the circumstances in which this takes place, how candidates learn and what kinds of structures and approaches are required to make it work. It is now time to investigate a case in the humanities where there is a focus on more practical forms of knowledge. The doctoral enterprise in the field of Creative Arts is the subject of Chapter 6.

# 6. Realising “everything is related”—Creative Arts

## 6.1 Case narrative

Justin is employed by his department for two days a week during semester time. On Wednesdays he assists with the operation of an advanced technology facility that has been established to support students, staff and artists from the local community. On Fridays he fulfils a teaching role with a group of third-year undergraduates. His employer is the innovative media department in the Creative Arts faculty at the University, where he is enrolled as a doctoral candidate in his second year of full-time study.

Rather than a supplementary activity, Justin regards his part-time work as an integral part of his candidature. “The one thing that I have realised with the PhD is that everything is related—somehow”, he says laughing. He particularly values the opportunity to develop specialist expertise in the technology facility where he works as part of a small team. This includes two academic members of staff who are responsible for managing the printing enterprise. As Justin explains, “we have two strands—standard printing jobs where we do prints for students and other customers, and what we call a research area where we may look at printing out on different surfaces—metal, silk, satin or whatever—so we will go through a whole testing process using different inks, dyes and materials”. Organised on a cost-recovery basis, clients pay for the paper, ink and other materials that they use.

However, the connections between work and study become clearer when Justin begins to outline some of the operational arrangements. “I’m paid for a certain number of hours, but am there for more than that quite often. That also feeds into my PhD in other ways, because I also work with [printing] output and scanning in my own work”, he elucidates. Given that students from across the faculty access the advanced technology facility from time to time, Justin invariably becomes involved in outlining possibilities, procedures and specialist techniques. He continues with his account of an established routine: “Students will also come in if they have a particular job in mind. We’ll sit with them and go through things, so there is a kind of training aspect to it as well”.

Meanwhile, a boisterous group of third-year undergraduates presents very different kinds of rewards and challenges—given that Justin has not worked in a formal teaching capacity before. His main task this semester is to assist students to construct a personal website that will enable them to exhibit a selection of their creative artwork in a virtual domain. As part of his teaching duties he arranges “a professional kind of activity” that involves field trips to galleries and other artistic locations, the details of which a number of students decide to include on their websites. He thoroughly enjoys working with undergraduates—“just being there, listening and helping students reach their goals”—but acknowledges with a grin that his eighteen charges all have “rather strong personalities”, as well as vastly differing levels of expertise with regard to digital media.

Given a self-identified gap in the area of direct instruction, Justin enrolled in a registered course that is conducted each semester at the University with a view to supporting postgraduate students who are keen to enhance their skills in teaching, tutoring or demonstrating. Expecting a conventional curriculum of sequential units with recipe-style content and methods, he embarked on this training exercise at the commencement of his teaching duties. To his surprise, the process and outcomes of the course had greater impact than he had imagined in the first instance.

“I was glad I did it at the same time—things kind of opened up. For example, issues that I had were able to be discussed while they were fresh. So that was terrific. Also, getting feedback

from other students—other PhD students—who were doing the same course. That was very helpful. I guess when I joined up I was expecting something else—and it wasn't that. It was quite different. At first, I wasn't sure whether it was going to be useful, but certainly within three or four weeks it was more useful than I anticipated. It was a great experience", he concludes resolutely. A quick scan of the University website reveals that this is "a program of reflection, discussion and practical activity rather than a reading program", organised around a weekly seminar or workshop on some aspect of university teaching.

Periodically, Justin takes on a small amount of freelance work in his area of specialist expertise in the visual arts, maintaining contact with a few of his industry contacts—a gallery director, a graphic designer, a writer and a documentary film maker—who provide useful sounding boards for both his professional and doctoral work. He also exhibits his own creative art whenever he can as a means of maintaining visibility in the artistic community. As he observes, " it's a very competitive environment, so you just have to keep having shows and getting your work out there, and making sure people know who you are".

Currently in his early thirties, Justin is something of a late starter in the education stakes. After leaving school and living overseas for four years, he returned home to work in the magazine industry for another seven before enrolling in an honours degree at the University in 2000. He gained entry to the faculty's PhD program in 2004 where his work is monitored by a supervisory panel who among other things, conduct six-monthly reviews in order to ensure that his doctoral studies remain on track. The panel is chaired by Clive, the head of the innovative media department, and includes Claire, a specialist in the theory of art who works across several departments. The associate head of the faculty acts in an advisory capacity on this three-member panel.

Photosculpture constitutes one key thrust of Justin's doctoral work, the foundations of which were laid during the completion of his honours degree. Central to this endeavour is "physical art-making and installation" which features collections of artefacts; individual portraits of key individuals involved with these artefacts; his own artefacts; and a film documenting aspects of the research process. This is complemented by theoretical constructs established to situate his work in a context of technological, social and other developments, and to identify its significance in a "a consumer society in relation to consumption, knowledge and waste". So far, he has managed to keep these practical and theoretical dimensions on an even keel, observing that "it's almost like riding a bike, something you do without really thinking about it at all".

Justin respects and values the roles that his panel members are playing during his candidature, not just in terms of their knowledge and expertise, but because "they are very much on the ball, they know exactly what's happening—not just with what I'm doing, but outside of that, for example with [the discipline] generally". Typically Justin's is a seven-day week that sees him working across a number of locations—studio, workplace, community and home—in roughly equal time allocations. A small office attached to the studio and one at home are the places where he does most of his writing and Internet-based research. He also uses his own car for local and interstate travel to develop aspects of his artwork "in the field".

Moreover, learning with and through peers is a significant part of Justin's program. He regularly participates in structured activities organised at department and faculty levels. These include "workshop crits", "postgraduate meetings", "open forums" and a "seminar program". The workshop crit involves students "putting up a body of work" with a view to generating sustained interaction and debate, while the meetings comprise two-hour informal gatherings of the postgraduates under Clive's supervision. Both activities are held on a weekly basis. However, the forum and seminars reflect a more conventional format of a formal presentation followed by questions and discussion—usually of around one hour's duration. As far as Justin is concerned, these activities are useful as a means of value-adding new information, theoretical ideas and practical strategies. He describes the benefits in terms of finding out what others are

doing, evaluating their methodologies, and providing constructive feedback—"it's a support thing as well", he adds perceptively.

**Embracing academic considerations**

Doctoral education in the Creative Arts—broadly defined—can be viewed as a relatively new and continuously evolving phenomenon. As a result, its academic standing in some university and professional settings can be problematic. As Clive reveals, "I know that some of my colleagues in other parts of this University still don't get it—they still can't understand how you can do a PhD in the Creative Arts. They think that it can't possibly be research, because it is not a theoretically written paper, and question the idea that knowledge can be embodied in an object—the artwork itself. So for us, that constitutes a knowledge outcome, whereas for them, that cannot be the case given that it is not transferable in an academically recognisable way. From their perspective, you can't take that knowledge and apply it to something else. So there is some shaking of heads, and the occasional talk of 'Mickey Mouse' PhDs."

Clive has wrestled with the status of the visual and performing arts for many years—in contexts ranging from University board meetings to suburban dinner parties. While he is the first to admit that some dubious programs do exist at the doctoral level in this field, he is adamant that the overwhelming majority are of a high standard. Still, if he had the chance, he would establish "a system-wide process of quality control—some kind of benchmarking" with a view to enhancing its academic standing.

Although Clive gained his PhD relatively recently, he has already supervised two candidates to satisfactory completion, and currently has four doctoral candidates under his wing. With his own doctorate fraught with difficulty and requiring major changes in terms of topic and supervision—"the full kind of disaster" to use his phrase—Clive has become increasingly sensitive to the emotional as well as the pedagogical dimensions of contemporary doctoral candidature. "I guess there is a sense of empathy with the processes of reading and experimentation required to actually find the focus or topic, acknowledging that this is a fairly scary experience", he comments sympathetically. From his perspective, a sizeable gap exists between the PhD guidelines one finds on institutional websites and manuals and the messiness that the conduct of research invariably entails.

It is for these reasons that he believes that a developmental approach is fundamental to the effective enhancement of the discipline at this level. "I tend to be gaining experience as I go, and I also bring to bear a lot of my own experience as a candidate. I only received my own doctorate two years ago, and my experience was quite tenuous—doing it part-time, at another university, and in another city. I think a lot of what I went through is informing how I work with candidates. Also, I don't feel like I am some kind of neophyte, because the whole idea of the PhD in the visual arts is fairly new as well in the university system. Some of the people with whom I have been involved in graduating have been some of the first—not *the* first—but some of the first cabs off the rank from the University. So in a visual art context, I have had as much experience as anybody else," he says.

There is considerable evidence to support Clive's rejection of his neophyte status in a relatively new field of study within the academy. Not only is he a regular contributor to academic journals, but he is also continues to practice as an exhibiting artist—nationally and internationally—as well as fulfil the roles of art historian, critic, and author of a book on the visual arts that is on sale in general, as well as academic bookshops. He strongly supports the structure of the doctoral program in his faculty at the University comprising three parts, namely, studio practice (67 per cent), dissertation (33 per cent) and a studio report "that acts as a bridge between the exhibition and the theoretical dissertation … and guides the [examination] panel in making its assessment". This means that Justin is required to complete a substantial academic essay of up to 30,000 words on a topic of relevance to the objectives of his creative artwork that would be exhibited ultimately.

Like Clive, Claire is a practising professional in the Creative Arts, having worked as a curator in one of the leading galleries in Australia for seven years prior to her appointment at the University, and continues to mount exhibitions of national and international work in galleries around the country from time to time. In addition to contributing papers to academic conferences and journals, she has written three commissioned books for mainstream audiences on the visual arts. Employed by the faculty for ten years, much of her learning has been "on the job", given that when she first arrived, the clientele was limited to undergraduate, graduate diploma and masters students. Completing an honours degree initially, she came to academia "late in her career" and is devoid of any personal experience of being supervised at the doctoral level.

Claire spends most of her time supporting doctoral candidates in the framing and development of their dissertations. In a typical week, she might see students working in areas that span the Creative Arts spectrum—some of which might include those in which she has no specialist expertise. In 2005 she is supervising eight students, five of whom are at the doctoral level. Her perception is that students often experience a degree of tension around the theory and practice of art, and while "integration" is one of the faculty's fundamental objectives, the reality is that the hands-on task of bridging this gap often falls to her.

"The term schizophrenia is used by a lot of students to describe the split that they feel—it's almost like a left brain right brain division in their own work—because of the emphasis on creativity and individual expression, while working on their dissertation at the same time … In terms of bringing it closer together, some people say, 'well, I'm going to do three months on my practice, and then an intensive month-long on my writing'. We are always encouraging students to integrate both parts". As Claire acknowledges, however, "for some people it is just too difficult—to turn off their practice and write—and some just get paralysed over the writing".

Numerous strategies are employed in the faculty to support students who experience this particular difficulty and include encouragement to attend short courses in thesis and other forms of academic writing are available to all postgraduate students at the University. In addition, "many rely heavily on each other, for example, in terms of getting started and practising the art of writing", Claire reports. The development of student websites and blogs is also encouraged as a means of strengthening communication, computing and other generic skills. Evidence suggests that in this Creative Arts faculty, the challenge of bridging the theory-practice gap is not as great for continuing students—who have been subjected to an integrated approach since their first semester as undergraduates—as it is for postgraduates who tend to come from more diverse backgrounds and experiences.

**Looking to the future**

As a former employee and current exhibiting artist and PhD candidate, Justin is familiar with the uncertainties and risks associated with working in the creative arts industry. The material and human costs of producing artworks, as well as the financial and other demands associated with staging a show can be substantial—for professionals and candidates alike. As Claire argues, "statistics from the Australia Council suggests that the average earnings for artists is below $8,000 per annum, and I would think that most of our graduates would go on to that kind of income, so they have to do some other work to subsidise their practice … An artist has a much flatter structure that is not nearly as hierarchical as in other areas. Very few artists in Australia rise to any great height. I was reading in the paper recently about one well-known artist, one of our greatest designers, and he said that even in his field that involves major commissions, he makes very little money."

Although Justin was awarded a university scholarship that includes a stipend, the money he earns from his part-time employment constitutes a valued source of supplementary income. However, while the financial aspects are important, there are other factors which form part of the training-work-career equation. For example, from Clive's perspective, "these [part-time

employment] activities train people up for teaching careers and related activities in other departments in [the University], and also give them a sense of an active busy studio, as an added bonus. I can't always do that for all my PhD candidates—it depends on their skills and the amount of money I have at my disposal … We have an evening course program called visual arts access, in which another of my PhD candidates is teaching video editing. So at the moment, all of my PhD candidates have some form of employment in the arts school—either undergraduate, postgraduate or evening programs … The main reasons are training obviously, but also it also keeps candidates in the art making, studio-based world as well."

Having worked in the magazine industry for some years, Justin has all but ruled out the option of returning to the world of business and commerce on completion of his doctorate. Part of his current justification is that, "in the private sector you usually have a boss and sometimes you have to follow orders that you may not agree with", and is considering the pros and cons of exhibiting and teaching. "At the moment, obviously what I would like to be doing is making a living from what I exhibit". After a lengthy pause he adds, "I do also enjoy teaching. In a way I feel like I'm pursuing two career options at the moment, the PhD—researching, writing and art making—and teaching, though they are inter-related".

Whichever path he chooses to follow, it is likely that Justin's passion to create will constitute a cornerstone of his post-doctoral life. "You have to be obsessed to make interesting work and your work has to have a personal slant", he remarks in earnest. This inner drive of students to produce in the Creative Arts is regarded by his supervisors as an essential requirement rather than a desirable attribute. Claire makes this point when she states that "a fundamental issue for the student is that they naturally want to create and make. They are producers, and that is what they want to do". In a similar vein, Clive argues that "you have got to have the desire to make art. I think most people come to this [faculty] not to do pure research, but because they want to make art. But you can't make art—especially in a field like [innovative media]—if you don't have [specialist facilities] and equipment".

The link between resources, training and work is also highlighted by Claire, who points to the fact that for some students, undertaking a higher degree in this field is an opportunity not only to realise the passion of creating art in a research context, but also to reduce the economic hazards associated with being a professional artist. As she elaborates, "it doesn't really matter which field you are in, or at what level, artists make huge personal sacrifices. If students gain a scholarship—and I know this is true of quite a few candidates—then they have greater financial security while doing a PhD than they would normally. The scholarship means that they have a basic wage for three years, whereas if you were relying just on your art practice, you would find it very difficult to live. Remember, it has become more difficult to gain unemployment benefits and so on, so the life of an artist can be really difficult. To a certain extent, you would be cushioned for a while by enrolling in a university if you have support. For some students—like those doing a Masters—there is little or no support. On top of everything else, students have to pay to produce their work".

The economic uncertainties associated with the creative arts industry and professional status tend to create something of a negative attitude within the faculty with regard to the nexus incorporating training, work and career. For example, Claire's position is that "if you are a practising artist and you are doing well, there is no need to do a PhD, because it's not going to improve your career chances as a professional artist, or your exhibition chances, or all the other measures that we would use as indicators of success". As a consequence, she frequently advises students to think long and hard about their reasons, expectations and aspirations with regard to doing a doctorate. There is also a perception that candidates with an impoverished publications record will find difficulty in securing an academic position. In Justin's case, he is yet to publish any academic papers, although he has implemented various blogging and related web-based initiatives designed to record and promulgate a selection of artwork from his portfolio.

However, the career trajectories of the candidates whom Clive has supervised to satisfactory completion appear to counter the perspectives articulated by Claire. As he explains, “I have only had two completions, but one of these has re-exhibited at a gallery in the Netherlands, where she is now living. So in that sense, it [the studio practice] is professional in that the work will be parleyed into a career as an exhibiting artist … The other candidate … got a job at an arts school in New Zealand. The first candidate who graduated in sculpture from this [faculty] got a job at an arts school in Western Australia. So I guess these are both traditional routes for candidates in the Creative Arts”.

**An Australian in Paris**

While Justin’s post-doctoral experiences are still to unfold, an interesting development occurs at the end of 2005 that could enhance his career prospects in the longer-term. Having submitted an application in mid-year to participate in a residency program designed to support Australian artists visiting Europe, he is advised in November that he has been granted access to a studio apartment in Paris from January-March 2006.

Casting caution to the wind, Justin decides that he must seize this once in a lifetime opportunity—although remaining acutely conscious of the financial implications that this entails. As a continuing mature age student, he has already incurred a significant HECS debt, as well as additional financial commitments associated with recent purchases of equipment and a vehicle. There is also the inconvenience of having to terminate the lease on a flat he is renting in a suburb in the vicinity of the University, and relocating on his scheduled return in a few months time.

While rent-free accommodation and workspace for three months constitute the essence of this award, Justin still needs to fund all other expenses, such as travel, meals, utilities and materials. All this tends to lend weight to Claire’s earlier statement that “artists make huge personal sacrifices”. She goes on to comment on this particular case, by observing that “he [Justin] had to have a garage sale—had to sell personal possessions—to fund his airfare to get there [Paris] … as well as money to live on”.

All goes according to plan, however, and Justin is offered an extended residency that sees him located in Paris until the end of May. He thoroughly enjoys the experience, a key component of which involves the continuous meeting and interacting with visiting creative artists from around the world who are co-located in a large complex of similar studio apartments. Ready access to galleries, libraries and advanced technology enable Justin to continue working on his studio practice in what proves to be a highly stimulating and challenging environment.

On reflection, the opportunity “to step outside the PhD world I had created at the University” proves to be one of the most valuable aspects of Justin’s European venture. Not only does it enable him to pause and reflect on key aspects of his candidature to this point, but also provide “a personal touch to my own research”, he reveals. Back on campus in time for second semester, the only significant change to his established schedule is the giving up of his part-time position in the advanced technology facility. He thinks that this will provide some much-needed time to devote to integrating the practical and theoretical dimensions of his research—although he has no intention of giving up his teaching commitments at this stage.

## 6.2 Reflexive interpretation

**Combining work, training and study in one department**

A significant feature of this case narrative is the blurring of boundaries with regard to Justin’s part-time work, specialist training and doctoral studies. Rather than discrete activities, they can be conceptualised as interweaving strands in a complex fabric representative of the doctoral enterprise. This interlocking of strands is most effectively illustrated in relation to the activities

associated with this candidate's employment in the advanced technology facility and as a novice teacher. The supervisor creates the employment opportunities while the candidate is willing and able to comply with the job's requirements.

At one level Justin is employed by the innovative media department to assist with the operation of sophisticated in-house printing. While he is employed to assist in the production of finished artwork for clients, he uses the opportunity to train and mentor other students who seek advice from time to time when they come to the facility with "a particular job in mind". In addition, he maximises the chance to apply these technologies in the context of his doctoral research project. Rather than using this part-time employment to learn about the world of work generally, and arts industry in particular, Justin's generic workplace skills—acquired after seven years in the magazine industry—enable him to hit the ground running and perform at a higher level than a first-time employee.

At another level, Justin determines that while his knowledge of website development and generic workplace skills are sound, he needs to expand his skill base in order to cope with the challenge of teaching undergraduates. By undertaking a formal course in teacher training he signals a capacity to identify a personal training requirement, along with an effective means of addressing it. Of greater significance, however, is the impact of the collaborative approach that forms the basis of the training program. It is clear that Justin was expecting a traditional course where compartmentalised knowledge and skills would be learned and assessed in a logical sequence. Instead, the emphasis on participants sharing their experiences, strategies and issues within a holistic framework proved to be a powerful learning experience.

So what further meaning can we derive from these developments? Theories of workplace learning provide a useful way of making sense of the education, training and work nexus in doctoral education. A common theme in the literature is that individuals learn through work as well as at work (Garrick & Rhodes, 2000; Beckett & Hager, 2002; Bates, 2003). In other words, the experience of working generates understandings, skills and beliefs that are developed in a practical context. Rather than a linear or front-end process whereby an individual acquires a set of knowledge and skills prior to entering the workplace or embarking on a new job, theories of workplace learning emphasise experiential learning as well as interaction with people within and beyond the work setting.

In this regard, Hager makes a useful distinction between learning as product and learning as process (Hager, 2004). His view is that many theories of learning have been based on the assumption that individuals need to acquire "discrete items of knowledge or skill" in order to undertake higher order tasks and responsibilities. Invariably, this leads to forms of structured training whereby the focus is on the component parts of an enterprise, and rational and linear approaches are adopted. Hager argues that the metaphor of 'acquisition' should be replaced by one of 'construction', so that learning in the workplace—as well as other settings—is primarily a process that "incorporates important social, cultural and political dimensions" (p. 15).

By employing Hager's construction metaphor to these narrative episodes, it is possible to view the integration of Justin's learning, training and part-time work as a developmental process in which he interacts with staff and students, in a context that reflects academic and professional dimensions, and in ways that impact on the working environment. In other words, conceptualising Justin's part-time employment as merely the acquisition of personalised knowledge and skill that might serve him well following the completion of his doctoral candidature is limited. It is more productive to view Justin's activities as reflecting the enactment of multiple roles and the performance of multi-faceted tasks that are implemented in constantly changing circumstances. He is not only developing higher levels of knowledge and skill, but applying them in ways that are benefiting other people associated with the doctoral enterprise.

The concept of ‘working knowledge’ (Tennant, 2004) is also useful as a means of highlighting the extent to which “the workplace itself is seen as a site of learning, knowledge and knowledge production”. Justin can be seen to be using his employment contexts as a platform from which he pursues an integrated approach to learning, training and work—while in the process of generating new knowledge. In the longer term, it is possible that this will lead to the development of higher level capacities such as ‘practical wisdom’ (Sternberg, 1998) and ‘thoughtful action’ (Lester, 2004). Such concepts have been developed to reflect the use of higher order capacities in difficult or a-typical situations, whereby practitioners take a leading role in terms of change and development—especially at an organisational level. I mention them here, as a means of introducing the next episode that incorporates reference to the development of practice-based doctorates.

**Bridging the practice-theory gap**

The importance of integrating theory with practice is captured in the comments of Clive and Claire with regard to the doctoral program at the University, as well as reflected in aspects of Justin’s lived experience as a doctoral candidate. The 67:33 split regarding the requirements of the doctorate in the Creative Arts reveals that making art must be complemented by a process of conceptualisation that locates it in a research context as well as subjects it to rigorous analysis. In this case, however, the challenges associated with bridging the perceived gap between practice and theory identified by the supervisors do not appear to be an issue for the candidate for whom they share responsibility— at least to this point in his candidature.

Claire uses the metaphor of schizophrenia to describe the tension that exists for many candidates in the Creative Arts around the divide, especially in terms of the writing process. An integrated approach is pursued by the department, along with a raft of strategies designed to provide practical forms of support. There is evidence to suggest that Justin can articulate the conceptual framework within which he is working, and that he is less troubled by the great divide than some of his mature-age peers in his department. This tends to bear out the internal assessment of academic staff that continuing students are less likely to experience difficulties in this regard. However, as noted previously, Justin is a second-year full-time candidate.

In order to make sense of this episode, it is instructive to consider two Australian studies that provide an historical perspective on the development of doctorates in the Creative Arts. One is a conference paper comprising a review of PhDs in the creative and performing arts in Australia (Evans, Macauley et al., 2005). These researchers found that “of approximately 51,000 PhDs awarded in Australia, approximately 0.8 per cent are in or about the creative or performing arts. Thirteen per cent of these (0.1 per cent of all PhDs) involve creative or performing arts works.” (p. 11). The other publication is an earlier report on research outputs in the field (Strand, 1998). This document includes an historical account of significant developments, such as the impact of the unified national system in the early 1990s, which saw the incorporation of most arts schools with local universities. Both documents highlight the extent to which the development of practice-based as distinct from conventional doctorates in the Creative Arts constitute a relatively new and emerging phenomena.

This also reflects the situation that has developed internationally, where “the domain of art and design is relatively new in a university context” (Durling, 2002, p. 79). Durling argues that while research and practice coexist as different categories of creative endeavour, they are not identical categories. In his view, much of the debate around the quality of PhDs in this field has stemmed from confusion over the meaning of research and the lack of appropriate training in research methodology for candidates. While very few empirical studies on the PhD experience in the Creative Arts have been published, research from the UK reveals that considerable identity conflict exists around “making” art on the one hand, and “analysing and writing” about it on the other. (Hockey & Allen-Collinson, 2005). A major conclusion of the study was that candidates in art and design “find themselves struggling to adapt” to this challenge, noting that

they undergo “the sometimes painful biographical transformation from artist/designer to artist/designer-researcher” (p. 91).

The development of the professional doctorate in the Creative Arts is also worth mentioning briefly, if for no other purpose than to distinguish it from other research and practice-based doctorates. In an account of Australia’s first Doctor of Creative Arts (DCA) program to be introduced at Wollongong University in 1984, tensions around creating and writing are described, along with the limited availability of academically qualified supervisors and examiners (Bell, 1998). Prefiguring the findings of Hockey and Collinson, Bell describes the first tension in the early stages of the degree’s history in the following words. “Some candidates successfully completed a body of creative work for examination but then laboured for many months, or even years, to finalise the accompanying documentation (Bell, 1998, p. 111).

The purpose in summarising some of the research that has been published on doctorates in the Creative Arts is to highlight the extent to which the tensions identified in the case narrative around practice (e.g. producing art) and theory (e.g. analysing and writing about art) are not uncommon. Given that the new type of practice-based doctorate was initiated in the 1990s, issues of quality and status—especially in relation to the conventional PhD—are still being worked through. Hence, Clive’s comments about “the occasional talk of Mickey Mouse PhDs” can be seen in a broader context.

There is value in considering related research as a means of developing a deeper understanding of this case. For example, the theory of academic tribes and territories (Becher & Trowler, 2001) is useful when applied to this episode. Even though one group of researchers has highlighted the fact that specialties such as music and English literature have existed at the doctoral level for decades (Evans, Macauley et al., 2005, p. 8), and the first professional DCA was introduced in Australia in 1984 (Bell, 1998), it is generally acknowledged that practice-based doctorates in this field constitute a relatively recent phenomenon. Select indicators include confusion over the meaning of research (Durling, 2002) and a lack of academic staff with PhDs (Strand, 1998). Some of the consequences that flow from this are a lack of common and agreed ‘boundaries’, ‘ropes’ and ‘tribal elders’ that are considered to be important features of established disciplines. In many ways, academic tribes and territories in the Creative Arts are still being defined—at least as far as practice-based doctorates are concerned.

**Engaging in professional practice**

The ability to contribute to the artistic and wider community by making, exhibiting or reviewing art while employed or enrolled in the academy constitutes the essence of this section. Prime examples are provided by Clive and Claire who continue to continue to maintain creative and professional profiles in galleries and bookshops at national and international levels. There is also evidence of Justin’s desire to keep his artworks in the public eye whenever the opportunity arises by exhibiting at various “shows”.

The capacity to demonstrate creative performance in a professional context is an established practice of Creative Arts staff in the academy. In the previously cited Australian research report, for example, it is argued that “academics who are artists dancers, actors, singers, musicians, curators, art theorists or art historians are expected, as part of their professional obligations, to maintain and develop their expertise and professional standing” (Strand, 1998, p. 18). There is an acknowledgement that some academics undertake research that leads to publications, others create new artworks, while some do both. This practice complements the need to integrate the theoretical and practical dimensions of the Creative Arts identified in the preceding section.

The concept of a community of practice (Lave & Wenger, 1991; Wenger, 1998) also sheds light on the main thrust of this episode. There is evidence to suggest that those involved in the Creative Arts department at the University share not only a common interest in artistic endeavour, but also a passion for its production, promotion and further development. Mastery is

a key feature of a community of practice, and the capacity for academics in this field to demonstrate artistic creativity in a range of settings is critical. This is evidenced by the interaction of the main characters with other members of the profession, and the galleries and related settings where creative artwork is displayed and/or performed.

There is a strong impression gained from the narrative that Clive, Claire and Justin perceive of themselves as creative artists. Producing art and sharing it with others is at the core of their identity. At the same time, however, this identity is constructed in relation to others with whom they interact in the development of, and critical reflection on, their artwork—both within and beyond the academy. As Wenger argues, "we know who we are by what is familiar, understandable, useable, negotiable" (Wenger, 1998, p. 155). Hence, Justin, Clive and Claire share a number of common understandings about professional practice in the visual arts, but also the significance of locating this in conceptual frameworks that will promote the development of new understandings and insights.

The way in which Justin maintains ongoing contact with his industry contacts, and strives "to keep having shows and getting your work out there" further illustrates the extent to which he is operating in multiple communities of practice, all of which have an aspect of the Creative Arts as a key characteristic. The demonstration of his professional practice enables this artist to make sense of his operating environment and that of the artistic and wider communities of which he is a member. This candidate can be seen to be making meaning in a way that one writer describes in terms of "our ability to experience the world and our engagement with it as meaningful" and "ultimately what learning is to produce" (Wenger, 1998, p. 4).

Three dimensions of practice that Wenger attributes to a community are mutual engagement, a joint enterprise and a shared repertoire (p. 73). These can be applied to this episode with a view to explicating further the demonstration of professional practice. First, the cited activities of Justin, Clive and Claire are relational and involve interaction with other people and institutions. These relationships need to be maintained if professional practice is to be an ongoing activity. Second, there is a degree of negotiation associated with the Creative Arts enterprise. For example, each of the characters in the narrative is working collaboratively with a view to contributing to the Creative Arts in a way that is designed to be mutually beneficial, Third, these characters reflect the existence of historical, social and cultural developments. Their professional practices build on what has gone before. When there is talk of mounting an exhibition, for example, they share a common understanding of what this entails along with the concepts and tools involved in its implementation.

**Reflections**

Unlike the three preceding case studies that were set in the context of established disciplines, this chapter has dealt with a relatively new and emerging approach to a field of study at the doctoral level. It is important to acknowledge at this stage, therefore, that empirical studies are rare and that the literature that does exist is concerned primarily with structural and organisational issues. Despite the limited availability of research-based material, however, it has been possible to show that this case affirms much of what has already been established in this field. For example, practice-based doctorates in the Creative Arts are generally structured in ways that integrate practical and theoretical dimensions; issues of status and quality are issues of concern; and the pool of academically qualified supervisors and examiners is small compared with established disciplines.

There are other aspects of published material on the doctoral experience in the Creative Arts that are worthy of note. Even though there is a "dearth of empirical studies of the actual experiences" of candidates in the Creative Arts (Hockey & Allen-Collinson, 2005), the research that has been published reflects a conceptualisation of the doctoral experience that has been dominant for some time. Key characteristics of this approach include focusing primarily on the doctoral candidate; acknowledging the significance of the supervisor, and confining the scope of

the research to the academy. For example, a key theme of the UK empirical study is “the sometimes painful biographical transformation from artist/designer to artist/designer-researcher” (Hockey, 1997, p. 91).

A major objective of the narrative and interpretation that constitute the basis of this chapter is to adopt a somewhat broader approach. In doing so, it is important to state that this should not be interpreted as a criticism of the empirical research that has been cited here. The research by Hockey and Allen-Collinson is both pioneering and rigorous, having been conducted in a robust theoretical framework to reflect a contemporary candidate perspective. The article describing the process and outcomes of this study is highly accessible and informative. Indeed, many aspects of the case narrative included in this chapter are replicated in that study (e.g. the goal of revealing “complexity”; the finding that Creative Arts is a “disputed form of research”). That said, there are aspects of my research that signal a point of departure from the conventional approach to studies of the doctoral experience.

Pedagogical and professional activity are very much at the centre of this case of doctoral enterprise in the Creative Arts. Incorporated in the pedagogical category are formal and informal training activities such as the registered course in teacher training, and the on-the-spot guidance to students, staff and community members in the advanced skills facility. A raft of supportive endeavours has been initiated by the innovative media department such as workshop crits, postgraduate meetings, open forums and seminars. In addition, there is also on-the-job or ‘just-in-time’ learning that is undertaken as much by Claire and Clive as Justin. Both staff and students are learning by doing in many cases, whether this be supervision of doctoral candidates or the teaching of undergraduates.

The scope, sequence and integration of pedagogical activities is of particular significance in this case. There is evidence to suggest that a broad range of activities is being implemented individually and collectively. From Justin’s perspective, there is a high level of integration around the education-training-work nexus. This is reflected in the preference for a developmental, rather than a front-end or linear approach to learning and training. This case suggests that the compartmentalisation of education, training, work, research and career trajectories in the Creative Arts at the doctoral level is potentially problematic. Both the policies and practice of supervisors and candidate reveal a predisposition for developing and strengthening links between these elements of the doctoral enterprise. It is also important to note that peer learning not only permeates this case, but is also sustained during the course of Justin’s candidature. For example, both the workshop crits and postgraduate meetings are held on a *weekly* basis.

Professional activities in this case extend beyond conventional academic tasks such as research, writing and conferencing, to embrace creative endeavours of a different order such as making art, mounting exhibitions and publishing for a general audience. The fact that the Creative Arts profession and the wider community are the main targets for these broader activities is an important characteristic. It highlights a desire on the part of these practising professionals to contribute to the world of art, while simultaneously fulfilling the service dimension of academic practice. Above all, there is a sense in which the main characters in this case are members of a community of practice demonstrating mutual engagement, a joint enterprise and a shared repertoire. At the same time, however, there are sub-communities embracing high levels of specialisation (e.g. photoscuplture).

Although pedagogical and professional activities are central to this case, there are others in the background. Academic work—especially supervision—can be identified in the text, but is not explored in depth given that this is the focus of many other studies in doctoral education. There is also reference to publishing activities, which embrace websites and blogging as well as conventional writing. In addition employment spans the short, medium and longer term. This highlights an objective of the case which has been to construct both the narrative and the interpretation in ways that are open and that allow for multiple interpretations. While I have

identified a selection of issues and themes to pursue in some detail, there are many others that have the potential for further exploration. Examples include economic and financial aspects associated with the creative arts industry; related issues associated with career trajectories in academic, industry and professional contexts; and the international experience initiated by the candidate.

In contrast to studies of the doctoral experience in the Creative Arts and across other fields of study, a significant feature of this case is the positioning of the candidate as one of several individuals participating in the doctoral enterprise. Key players include not only Justin, but also Clive and Claire. Justin's assessment that his co-supervisors are "very much on the ball", suggests that their ongoing interaction with the artistic and wider community has prevented any risk of academic isolation on their part. In the background are a host of other players with whom Justin is interacting such as peers, undergraduates and staff members. There are also people external to the academy such as the professionals who act as sounding boards (e.g. gallery director, graphic designer, writer and documentary film maker), as well as the subjects and collectors in his research and those who are involved in exhibiting his work.

Like most doctoral candidates, Justin has to work within various rules and regulations established by his institution and the department in which he is enrolled. The requirements and weighting of the artwork, dissertation and linking report are mandatory with limited opportunity for variation. Similarly, financial arrangements associated with his scholarship and remuneration for his part-time employment are regulated and subject to accountability requirements. There is evidence to suggest that there is a highly supportive culture operating in the innovative media department, with Clive's objective of securing a part-time job for as many doctoral candidates as possible, and organising a series of structured learning opportunities for postgraduate students constituting prime examples.

Another significant feature of this case is the nature and extent of community engagement, Mention has already been made of the artefacts that constitute the essence of the visual arts; the galleries in which these are exhibited; and members of the artistic community who are associated with them. However, it is clear that there are resources available within the community that can be used to support doctoral candidates and others who work in the creative arts industry. Justin's award of an international residency to pursue his art is a case in point, that incorporates not just the rent-free accommodation in Paris for five months, but access to a host of human and physical resources located in that artistic complex. An initial indication of resourcing levels has been provided by the Australia Council who estimated that "in 1997 the value of the total supply of cultural goods and services will be greater than $15 billion" (Strand, 1998, p. 12), and that in 1996 creative arts schools in Australian universities would have received about $4.7 million from university sources and $4.2 million of grants from external sources (p. 100).

This chapter has demonstrated that a doctoral candidate and those who are influencing his learning and research are not confined to academic pursuits. Each has actively participated in a variety of activities that are connected to the professional and wider community. The candidate has demonstrated a capacity to integrate education, training, work and career development in effective ways. Having illuminated doctoral enterprise in detail across four fields of study, the task of the next chapter is to begin the process of cross-case study analysis.

# 7. Examining doctoral activities

This chapter is concerned with doctoral activities—what candidates and those engaged in their research and learning actually do, and how they operate. The strategy will be to combine quantitative and qualitative material generated by this research. As illustrated previously in Figure 2.1, quantitative data and analysis from this study is embedded in the qualitative material as part of a 'concurrent nested strategy'. The challenge of convergence, however, is such that it cannot be confined to a single chapter and will be continued in Chapter 8. This chapter begins by an explication of the study's 'practice turn' and proceeds to demonstrate what the survey and case studies reveal about doctoral activities.

## 7.1 The practice turn

Just as the narrative turn discussed in Chapter 2 (pp. 30-32) influenced my approach to the portrayal and interpretation of the ten cases, the practice turn had a significant impact on my approach to cross-case study analysis. Although the research was embedded in the ARC Linkage Project, my interest was deflected from doctoral 'experience' towards doctoral 'practice' during the first twelve months or so. One influential factor was the emphasis placed by the CIs on the desirability of exploring new turf—beyond the literature on doctoral education—which led me to follow up their suggestions regarding social and situated theories of learning. Given my prior career in professional learning, theories of legitimate peripheral participation (Lave & Wenger, 1991) and communities of practice (Wenger, 1998) resonated immediately. These influenced my decision to focus on the activities in which candidates are engaged and how they negotiate the demands and expectations of the doctoral enterprise. The initial orientation towards practice therefore, constituted more of a twist rather than a turn, which was reflected in the choice of title—'doctoral practices'—for my blog created in May 2005.

Although the primary focus of Lave and Wenger's joint and individual research is on learning, they both regard practice—and especially the context in which it occurs—as of fundamental importance. For example, Wenger argues that: "the concept of practice connotes doing, but not just doing in and of itself. It is doing in a historical and social context that gives structure and meaning to what we do. In this sense, practice is always social practice" (Wenger, 1998, p. 47). It is interesting to observe that Wenger acknowledges in a footnote that his interest in practice originated with Lave's contention that social practice is the key to grasping the actual complexity of human thought as it takes place in real life (p. 281, note 6).

As indicated in the first chapter of this thesis, however, after the collection and preliminary analysis of data, I found that the three pillars of my initial conceptual framework—learning environments, socialisation and knowledge production—while useful in explaining certain phenomena, were tending to confirm, rather than expand my horizons in relation to established theories. It was during the period April-October 2006 that I conducted a review of the literature concerning theories of practice which proved to be highly significant in terms of advancing my thinking. Postings on my blog at that time document select activities that included my interaction with a number of academic researchers engaged in the application and further development of these theories (e.g. Stephen Kemmis) and my organisation of, and contribution to, a number of internal seminars at CEDAM (e.g. on theories of practice).

**An overview of practice theory**

Practice theory is a relatively recent contribution to the literature and reflects the outcome of collaboration among groups of writers interested in practice, rather than a common and agreed

set of theoretical constructs per se. To a large extent its origins lie in a general dissatisfaction with theories that separate individual from environmental factors, in order to determine causal or other forms of relationship. Its core thesis is that individuals are embedded in a socio-cultural-historical context and as such are mutually constitutive. In other words, the components are fused in the sense of being defined and developed in relation to each other. Consequently, practice—as distinct from individuals or their environments—becomes the primary unit of analysis. A major objective of practice theory as reflected in the literature, is to unravel and illuminate the complexities of human activity, but from a holistic perspective. In contrast to positivist theories that are concerned typically with explanation and prediction, the fundamental objective of practice theory is to develop in-depth understanding of phenomena, for example, through the provision of systematic, detailed and abstract accounts.

Philosophers such as Aristotle, Heidegger and Wittgenstein are often cited as prefiguring the development of practice theory—especially in relation to ideas about existence and tacit knowledge. However, sociologists have also introduced concepts such as 'habitus', 'field' and 'capital' (Bourdieu, 1977, 1990; Bourdieu & Wacquant, 1992), and 'duality of structure', 'double hermeneutic' and 'time-space' (Giddens, 1982), with a view to explaining how individuals and social forces contribute in varying degrees to the development of human activity and its reproduction. From the mid-1980s, several researchers from disciplines within and beyond the social sciences have begun to identify practice as their preferred unit of analysis in a range of theoretical and empirical studies. For example, studies include research on cognitive development in a socio-cultural context (Rogoff & Lave, 1984; Rogoff, 1990).

More recently, however, collaboration among practice theorists has been fostered by means of conferences, proceedings and extended publications (Schatzki, Knorr Cetina et al., 2001; Hamilton, 2005). One member of this growing body of researchers has coined the term 'practice industry' which reflects the extent to which the movement is perceived to be gaining momentum (Rouse, 2001). One of the leaders in the field has been Theodore Schatzki, the author of two substantial volumes on theories of social practice (Schatzki, 1996, 2002). Central to his work is the concept of 'the site of the social' which he describes in terms of a mesh of practices and orders where social life takes place (Schatzki, 2002, p. 123). His site ontology is based on a view that inhabitants not only coexist, but are embedded in a social context that is continuously evolving.

Given that 'mutuality', 'fusion' and 'embedding' are terms that populate the literature on practice theory, a brief explanation is in order. Rogoff provides one of the clearest descriptions in her research on cognitive development in a social context. She argues that development and context are "inherently bound together" and "inseparable contributors" to practice and activity (Rogoff, 1990, pp. 25-41). Similarly, Schatzki argues that "actions, groups and constellations of individuals exist *in* the social" (Schatzki, 2002, p. 141, author's emphasis). Other key constructs in practice theory are that the relations or dynamics between the components of a structure or system are of fundamental importance; the discrete components are of secondary importance; and that each component reflects aspects of the overarching phenomena.

**The potential for practice theory to broaden contemporary thinking**

At the time of writing this thesis, links between practice theory and doctoral education could be described as in their infancy. Routine searches of electronic databases using the term 'doctoral practice' generate a handful of citations. For example, the aim of a recent article on doctoral education was to "investigate how some certain doctoral practices come to count as scandalous and with what effect in universities" (McWilliam, Lawson et al., 2005, p. 214). In this article the term 'doctoral practices' is used generically, referring to the collective endeavour of universities and those with responsibility for the implementation of doctoral programs.

However, two authors in Australia presented a paper at a conference on quality in postgraduate research entitled 'What counts as practice in doctoral education?' (Boud & Lee, 2006). This

constitutes an initial attempt to connect theories of practice with doctoral education. Describing their paper as 'work in progress', the authors identify seven "domains of practice in doctoral education to provide a basis for study and investigation", namely, supervision, governance and regulation, assessment, program provision, establishment of working environment and research culture, candidature, research work and writing (p. 49).

This paper is significant for a number of reasons, not the least of which is that it establishes that there has been little conceptual analysis of the idea of practice in relation to doctoral education research, suggesting that a more sophisticated conception of practice is needed. Building on the work of Pearson (2005), the authors argue that "new and better forms of theorising" are required that "allow attention to the specificities and complexities of practice within doctoral education" (p. 47). Applying one theorist's two-model account of practice (Schwandt, 2005) they construct an initial schematic frame to consider the doctoral domains they have identified.

It is also important to acknowledge the work of two doctoral education researchers in Canada who have recently introduced the concept of an "integrative framework of nested contexts" to address issues of retention and completion (McAlpine & Norton, 2006, p. 3). While the authors do not make explicit reference to practice theory or its proponents, their focus on integration reflects the general thrust of practice theorists identified above who are concerned with mutuality and embedding. McAlpine and Norton's conceptual model locates the supervisor-student experience and departmental disciplinary settings inside broader institutional and societal contexts. After incorporating practice theory as the final conceptual component of this thesis, the next step will be to begin integrating the quantitative and qualitative material generated by this study.

**Two primary elements of practice theory that are fundamental to this thesis**

Activities and entities are two basic units of practice theory employed in this thesis to derive deeper meaning and insight with regard to the doctoral enterprise. Activities comprise structured and semi-structured feats of human endeavour. Schatzki (2002) defines them in terms of a 'nexus of actions' (p. 71). In their simplest form they represent what an individual does—or individuals do. For example, in the process of constructing this section of the thesis, I have determined a set of key points, consulted the literature, keyed in text, used the Endnote referencing system and so on. The more intensely these actions are scrutinised, for example, in relation to rationale, intention, priority, duration and outcome to mention a few, the more complex they appear. Rather than reflex actions or behaviour—automated responses to a particular stimulus—the focus is on deliberative courses of action. In other words, activities are purposeful and can be viewed in relation to other activities.

Entities refer to factors that are integral to the planning and implementation of activities. Schatzki (2002) includes "people, artefacts, organisms and things" (p. 20) in his descriptions of entities. To build on my example from the previous paragraph, in composing this section I have discussed my initial thoughts with some colleagues; accessed books and online articles on practice theory; and utilised ICT hardware and software. In one sense John Donne's quotation—"no man is an island"—conveys the meaning, provided one grasps that entities extend beyond individuals. It is more than a generic context or setting in which individuals are situated. It suggests that there is a multiplicity of elements involved, which are assembled in particular ways, during specific situations, at different times and so on. The key point is that activities cannot be considered in isolation. Entities are the foundations of enactment.

The remainder of this chapter is concerned with the first of these fundamental elements of practice theory. The objective is to integrate material from the national survey with that of the case studies, in order to gain a clearer picture of activities that are central to the doctoral enterprise. In order to determine what can be stated authoritatively about these activities, reference will be made to the literature, the data in this study, along with emerging patterns and relationships.

## 7.2 What does the literature reveal about doctoral activities?

Writers in the field of doctoral education have focused on two important and closely connected activities associated with the doctorate. One is effective supervision—the guidance and support provided by an acknowledged expert that will enhance the candidate's prospects of achieving the outcome or qualification to which they aspire. The other is completion of a thesis that reflects the production of new knowledge as well as the demonstration of originality and creativity on the part of the candidate.

Since the 1980s, writers have been highlighting shortcomings with regard to supervision and offering various strategies designed to improve its quality and effectiveness (Moses, 1984; Connell, 1985; Cullen, Pearson et al., 1994; Parry & Hayden, 1994; Holdaway, 1996; Pearson & Kayrooz, 2004). In response to concerns expressed primarily by candidates and groups that represent their interests (e.g. PGSAs), some institutions have implemented strategies such as supervisor training and development, as well as new structures and organisational arrangements. A major objective of the latter has been to promote greater interaction between candidates, as well as the scholarly communities of which they are part.

More recently, writers of a post-humanist and post-structuralist persuasion have begun to look at supervision in terms of subjectivity—where "subjects are formed as an ensemble of knowledges, capacities identities and dispositions through the interplay of specific social relations and social practices mediated by language" (Green, 2005, p. 161). Rather than view candidates and supervisors from a psychological perspective, for example, as rational, autonomous scholars, these writers see them as embedded in social, cultural and historical contexts. Hence, they see the practice of supervision as being related to the production of subjectivity in particular ways.

Producing a doctoral thesis involves not only the generation of new knowledge per se, but also presenting it in a way that will be acceptable to the academy. University rules and regulations outline the nature of the task, which are often expanded in more detail by academic organisational units and student associations. In recent years, the actual writing of a doctoral thesis has become something of a commercial industry with a plethora of books being published on this topic—much of it in the form of self-help guides (Ogden, 1993; Bolker, 1998; Glatthorn, 1998; Brause, 2000; Murray, 2002; Dunleavy, 2003). At the same time, however, other writers have begun to theorise doctoral writing (Lee, 1998, 2000; Kamler & Thomson, 2006). For example, Lee argues that rather than view writing as a task that is done after the research is carried out, it needs to be "reconceptualised as central to the work of knowledge production" (Lee, 1998, p.123).

However, doctoral programs incorporate more than supervision and thesis production. One writer has developed a conceptual framework of activities and foci of graduate education that includes primary and secondary components (Holdaway, 1996). He classifies one set of activities—research, required coursework, reading, reflecting, discussing and writing—as first-order activities. The other incorporates optional coursework, teaching, publishing, preparing conference papers and preparing research proposals. Holdaway asserts that the primary focus of graduate education is the acceptance of a completed thesis, while recognising that secondary foci such as the acquisition of skills, knowledge, reputation, contacts and publications are also important (p. 62).

## 7.3 What did the survey and case studies reveal about doctoral activities?

Data from the national survey reveal that candidates are typically engaged in various types of doctoral activity (Appendix 7, Table 20.7). During a designated seven-day period the most common tasks performed by respondents included reviewing the literature (75 per cent), thesis writing (45 per cent), data analysis (41 per cent) and research design (41 per cent). Other regular

activities included data gathering, laboratory work, conference presentation and field work (between 11 and 29 per cent). Participation in various types of course work was less common. An interesting feature of the responses to this survey item however, was that 10 per cent of respondents identified their participation in doctoral activities 'other' than the eleven activities specified in the survey item. Twenty three per cent of this group indicated that they had undertaken a form of writing other than 'thesis writing'. Respondents documented a variety of examples including the writing of articles, papers, proposals and submissions. Other activities mentioned include attending various conferences and seminars (rather than giving a presentation), as well as a host of tasks such as transcribing, programming and composing specific to their field of study.

When respondents reflected on their candidature as a whole (i.e. from commencement to July 2005), a significant proportion indicated that they had undertaken various forms of academic activity (Appendix 7, Tables 20.8 and 20.9). These included tutoring (66 per cent), marking (52 per cent), research assistance (45 per cent), and lecturing (36 per cent)—for which they were remunerated for the most part. During the past six months of their candidature (January-June 2005), 48 per cent of respondents recorded that they had been engaged in university level teaching (Appendix 7, Table 20.9). Eighteen per cent of this group indicated they had undertaken 21-70 hours, and 13 per cent less registered less than twenty hours. The remaining 17 per cent were engaged in more than 71 hours of university teaching. This suggests that candidates were engaged in more structured arrangement such as a part-time or casual employment, rather than a temporary or stop-gap basis.

Just over half of the respondents indicated that they had also signed up for a range of training activities during the same period (Appendix 7, Table 20.17). Short courses (less than 40 hours) were most commonly identified (29 per cent), with electronic courses, long courses and internships in the minority (11 per cent combined). Once again it is significant that 12 per cent of respondents indicated they had participated in a form of training 'other' than the five pre-determined categories, however, in this instance respondents were not provided with the opportunity to record specific examples.

The survey revealed that respondents had interacted to a significant degree with peers and staff in semi-structured support activities during the past 12 months. Data show that the range of activities included seminar series (60 per cent), social activities (34 per cent), discussion groups (30 per cent), electronic networks (13 per cent), writing groups (13 per cent) and other groups (11 per cent) [Appendix 7, Table 20.15]. There was also evidence to demonstrate that survey respondents considered themselves primarily responsible for a range of outcomes resulting from their doctoral work. The most commonly registered activity was making a presentation in Australia (72 per cent), with 48 per cent of this group indicating they had presented material on two or more occasions [Appendix 7, Table 20.19]. This was followed by the production of a refereed publication (50 per cent), with 27 per cent of this group indicating they had published two or more. Although smaller proportions of respondents indicated their achievements in relation to the remaining categories in the survey item, these are still significant. For example 39 per cent had made a presentation outside Australia, 36 per cent had produced a non-refereed publication, and 18 per cent had been engaged in a media interview.

The activities identified in the survey were reflected in the case studies in varying degrees. Participation in internal seminars and discussion group activity was widespread, along with conference attendance and presentations. While many had completed short courses (e.g. Endnote), four of the ten had also completed a teacher training program designed for postgraduate students. Five candidates were engaged in academic teaching (Anthropology, Creative Arts, Earth Sciences, Molecular Biology, Regional Studies), and two others were experienced academics in their own right (Engineering and Business Management). The former did a small amount of teaching towards the end of his candidature, but the latter was unable to teach or enter consultancy arrangements under the terms of her 12-month sabbatical arrangement.

Four candidates were involved in fieldwork, each demonstrating high levels of ownership, enterprise and resilience, although the nature of their sites and activities varied considerably. The Anthropology candidate was situated in a foreign country for a period of 15 months inclusive, part of which comprised an internship that enabled him to conduct research in an NGO while working in and contributing to the organisation. The Earth Sciences candidate made excursions of around six weeks at a time into some of Australia's most arid environments in order to conduct extensive sampling of sedimentary deposits. The Cultural Studies candidate spent varying periods of time (from a fortnight to two months) in and around Indigenous communities interacting with artists, their families and art dealers. The Creative Arts candidate drove to markets and shops within and beyond his home state in order to identify and interview collectors of artefacts—who constituted a major focus of his research.

However, the qualitative data point to a number of activities and variation not identified even implicitly in Holdaway's conceptual framework. Two cases involved informants in extensive media coverage. In the Astronomy and Engineering cases, the significance of the candidates' research was such that as a result of their being interviewed, publicity was generated on an international scale, as well as at national and local levels. In the former, media reports were generated immediately following the release of a refereed paper announcing the discovery in the academic and scientific community. In the latter, media interest was sparked by an article that had been published in the newsletter of a local interdisciplinary forum based on the campus of the candidate. Common factors in both cases were that publicity was generated initially from published (academic) material, and that each contained the seeds of a 'human interest' angle. A difference was that the discovery in the Astronomy case was central to the candidate's research and thesis, whereas in Engineering it was peripheral.

There were also activities that reflected a community service dimension. For example, the Earth Sciences candidate took six months' leave to participate in an international project organised by a volunteer agency. Her objective was to share knowledge gained from her doctoral research with a view to supporting a community of farmers located in an arid farming environment. Altruistic objectives were also reflected in the Human Sciences and the Cultural Studies cases, although to a lesser degree. In the former, the candidate contributed to the work of activists in local environmental groups, while in the latter the candidate made explicit efforts to promote the development of local Indigenous communities. The Engineering candidate made a point of proof reading and providing hands-on support to younger doctoral candidates in his department for whom English was not a first language.

## 7.4 How can doctoral activities be classified?

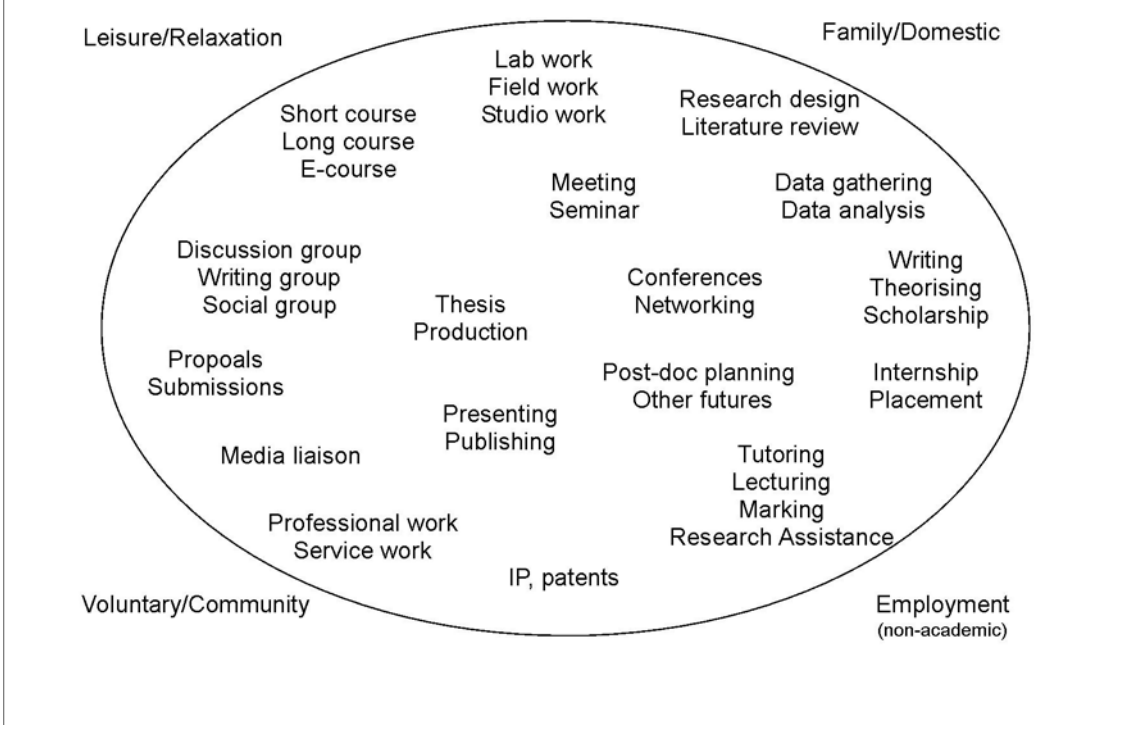
There are many ways of mapping the multifaceted nature of doctoral activity revealed in the survey and case studies. Classifying them into discrete types or classes such as 'research' activities or 'career development' activities, for example, constitutes a conventional approach. Indeed, the survey tended to prefigure certain types by the inclusion of items that were concerned with 'academic' activities (Appendix 6, Item 20 and Appendix 7, Table 20.8); 'training' activities (Appendix 6, Item 28 and Appendix 7, Table 20.17,); and 'doctoral support' activities (Appendix 6, Item 27 and Appendix 7, Table 20.15). An advantage of classification systems is that they provide a means of breaking down a phenomenon into its discrete parts. A disadvantage is that if pursued indefinitely, this analytical process can produce lengthy lists of activities, comprising increasingly detailed elements at the micro-level.

To some extent, Holdaway addresses this issue by classifying groups of discrete activities into two broad categories—those primarily concerned with producing the thesis, and those of a secondary nature designed to generate broader knowledge and skills. Having conducted his research in North America, the United Kingdom and Australia, it is noteworthy that Holdaway observed that secondary activities were 'rarely mentioned' in the interviews he conducted in Australia compared with those conducted elsewhere (Holdaway, 1996, p. 71). Data generated

from this study—in 2005 compared with 1992 when Holdaway conducted his interviews—suggest that this situation may have changed. Even though Holdaway proposes that secondary activities "can be viewed as an integral part of the graduate education experience" (p. 71), his dichotomy explicitly privileges first-order activities that focus on the completion and submission of the thesis. Another limitation of the framework is that it is confined to the academy and doesn't acknowledge the existence of external structures, agencies and networks.

A third way of mapping doctoral activity is to distinguish between individual and social activities. At first glance, this appears to be a relatively simple and straightforward task. Activities like analysing data, writing a thesis and presenting findings can readily be sorted into one category, with participation in seminars, courses and laboratory or field work placed in the other. When viewed more closely, however, the idea of doctoral activity being conducted in isolation becomes problematic. While individual activities can be seen to involve high levels of personal agency, they can also be viewed as being part of broader social, cultural and historical contexts. This reflects a blurring of boundaries between individual and social. The case narratives show that candidates are demonstrating an array of personal attributes such as enterprise and resilience in their various activities, but in doing so reveal the extent to which they are acting in ways that are closely connected to other parts of the doctoral enterprise. For example, in the Astronomy case, while the candidate is acknowledged as having made an important scientific discovery, this is not only embedded in the prior research of her supervisor and adviser, but also requires collaboration with a team of researchers in another country to verify her findings.

**Figure 7.1—Doctoral activities represented as an open and flexible system**




While these forms of analytical classification and grouping provide useful information about the parts of doctoral activity, they are limited in their capacity to demonstrate how these parts are related. When viewed as an open and flexible system—as conceptualised in preceding sections concerned with people, universities and external groups—it is possible to see certain types of doctoral activity in juxtaposition (Figure 7.1). Viewed in this way the activities constitute freely formed arrangements as distinct from specific groupings or hierarchies. Hence, an individual activity could involve two or more elements—training, employment and career development.

Activities might also be loosely coupled during candidature reflecting a multifaceted approach. For example, in the episode in the Anthropology case concerned with his internship, the candidate was portrayed as undertaking a number of activities simultaneously. He was able to increase his understanding of the management of human rights by interviewing informants about cases on which he was working at the time. A further discussion of relationships between activities will be discussed in the final subsection of this chapter.

## 7.5 What kinds of relationship can be identified among doctoral activities?

When the case studies are considered as a set, it is possible to identify patterns that differ from conventional classifications, groupings and hierarchies. By focusing on the relationships that exist within and between the activities—rather than on the activities themselves—differing levels of connectedness begin to emerge. In some cases the relationships are strong, while in others less so. There is also evidence to demonstrate that the nature and extent of linkage varies throughout the candidature. In order to investigate what kinds of relationship exist, the following established types of activity have been selected: support, training, research, academic, career and other.

**Table 7.1—Cases where the interrelationship between doctoral activities is high**

| Case | Level | Characteristics derived from informant transcripts |
|---|---|---|
| Creative Arts | High | *support*—dept. seminars & workshop crits, liaison with ind. reps.<br>*training*—teaching course, three-month residency in Paris<br>*research*—fieldwork, studio work<br>*academic*—teaching, employed in inkjet facility<br>*career*—exhibiting art or academic teaching<br>*other*—freelance work, exhibiting art |
| Molecular Biology | High | *support*—lab meetings, departmental seminars<br>*training*—teaching course<br>*research*—lab work<br>*academic*—teaching, contributing to submission for funding<br>*career*—postdoc preferred, but possibly academic teaching<br>*other*—meetings and seminars with IPs |
| Earth Sciences | High | *support*—CRC seminars and writing groups<br>*training*—teaching course, first aid, vehicle maintenance<br>*research*—lab work, field work<br>*academic*—tutoring<br>*career*—teaching or community development<br>*other*—volunteer work with farmers in arid landscapes |
| Astronomy | High | *support*—departmental seminars<br>*training*—placements in international contexts<br>*research*—observations and calculations<br>*academic*—team member re international projects<br>*career*—post doc position beyond Australia<br>*other*—media reporting, co-authorship of refereed articles |

Support activities include structured and semi structured interactions designed to promote interaction among candidates and those interested in their research (e.g. meetings, seminars, discussion groups organised within and beyond the academy). Training activities include various programs designed to develop and extend skills and knowledge (e.g. registered, informal, short, long and E-courses; internships; and assorted placements and residencies). Research activities include select processes and outcomes (e.g. fieldwork, laboratory work, links, artefacts). Academic activities include forms of paid, unpaid and voluntary employment in university settings (e.g. tutoring, lecturing, marking, demonstrating, research assistance, submission writing and proposal development). Career development activities include various forms of futures planning to do with life beyond graduation (e.g. post-doc and other academic positions; employment beyond the academy; and options other than employment). The other category is designed to capture relevant activities that do not readily fit into the categories

discussed, namely, research, training, academic and career development. When this frame is applied to the ten case studies, a pattern of interrelationship emerges (Tables 7.1 and 7.2).

Cases where the interrelationship between doctoral activities is high occur in the Creative Arts, Molecular Biology, Earth Sciences and Astronomy. These narratives convey a strong sense of connectedness among the six types of activity listed. Even though the destinations of candidates were unclear during the interviews conducted in 2005—two had their eye on postdoc positions and two were considering academic or other career trajectories—a common objective was to ensure that the activities in which they engaged would advance their short and longer term prospects. These cases reflect not only a high degree of strategic intention on the part of candidates, but also the provision of opportunities within and beyond the academy that enabled them to think and act outside disciplinary paradigms.

**Table 7.2—Cases where the interrelationship between doctoral activities is moderate or low**

| | | |
|---|---|---|
| Cultural Studies | Moderate | *support*—unit seminars, visiting experts<br>*training*—peer training re database, short courses (eg. Endnote)<br>*research*—fieldwork—artefacts, artists, custodians<br>*academic*—co-writing of ARC Linkage Grant application<br>*career*—further research in the field<br>*other*—liaison with IP, philanthropic trusts, art dealers |
| Business Management | Moderate | *support*—departmental seminars; e-network of professors<br>*training*—short courses (eg. Endnote)<br>*research*—links with international project<br>*academic*—experienced academic, but no teaching re sabbatical<br>*career*—enhanced promotional prospects in the academy<br>*other*—co-authorship of papers with supervisor |
| Regional Studies | Moderate | *support*—candidate-initiated reading group<br>*training*—teaching course, several short courses<br>*research*—fieldwork<br>*academic*—teaching<br>*career*—lecturing position<br>*other*—supervisor provides support re academic application |
| Anthropology | Moderate | *support*—unit seminars<br>*training*—internship<br>*research*—fieldwork<br>*academic*—tutoring<br>*career*—public service position<br>*other*—published paper |
| Human Sciences | Low | *support*—unit seminars<br>*training*—none identified<br>*research*—electronic mapping, interviews<br>*academic*—none identified<br>*career*—return to consultancy<br>*other*—publication of two articles |
| Engineering | Low | *support*—none identified<br>*training*—none identified<br>*research*—lab work<br>*academic*—none identified<br>*career*—academic teaching desired but considered unlikely<br>*other*—media reporting, use of external facilities, patent |

In three of the four cases, candidates have undertaken a teacher training program in order to enhance their expertise in the departments where they are employed as a part-time lecturer or tutor. Several positive outcomes emerge from this type of supplementary training. First, they are 'refreshed' or brought up to speed with aspects of their disciplinary knowledge. Second, they have the opportunity to participate in a 'teaching' community of practice that enables them to interact and learn from postgraduate students in other disciplines. Third, they have earned a credential and practical experience that will stand them in good stead should they decide to seek an academic position subsequently. It should be noted that this practical experience of the world

of work has an intrinsic value in that it enables the candidate to demonstrate a set of generic skills over and above the highly specialised skills related to his or her field.

There is further evidence indicating that the activities of these candidates transcend academic boundaries and are connected to the wider community. Three have explicit links with industry, and the fourth (Astronomy) is connected to international projects that are funded by governments and other sources in different countries. Through structured and informal activities conducted in a range of settings, candidates are encouraged to share and reflect critically on aspects of their doctoral research. The four cases demonstrate multiple connections between the support, training, research, academic and career development activities in which candidates are involved. The level of integration is such that in the broad range of activities in which they choose to participate, candidates can be seen as enhancing their prospects with regard to current and future opportunities. The key point is that candidates are enhancing their specialist and generic skills simultaneously through their participation in multifacted activities. Rather than Holdaway's hierarchy of primary and secondary activities, it is argued here that a more fluid arrangement exists whereby these candidates are not only integrating both levels of activity, but are doing so in a way that exceeds academic parameters.

Cases where the interrelationship between doctoral activities is moderate include Cultural Studies, Business Management, Regional Studies and Anthropology. It is least pronounced in the cases of Human Sciences and Engineering (Table 7.2). There is evidence in the Cultural Studies case to suggest that the level of integration was high in the initial stages when the candidate and supervisor worked collaboratively to develop the ARC Linkage Grant application that would enable the candidature to be initiated. While the support activities and fieldwork undertaken subsequently were linked, the level of connectedness appeared less than in some of the other studies. A similar pattern can be found across the other cases in that certain activities are related, but which reflect a lower level of intensity. A significant outcome of the Anthropology case was that the candidate accepted a position in the public service prior to completion of his doctorate. This is interesting because it demonstrates the extent to which the candidate's implementation of the support, training, research and activities led him to begin his career outside the academy.

This chapter has demonstrated that candidates participate in a broad range of doctoral activities. While these can be classified and grouped in various ways, the argument presented here is that they are most effectively represented as an open and flexible system. Cast in this way, the activities are loosely connected rather than set in well defined categories or hierarchies. Sitting in juxtaposition they can be implemented individually or in combination with other activities. Finally, it is important to recognise that the nature and extent of integration between activities varies not only within and between fields of study, but also during the length of candidature. Drawing on practice theory, however, these activities cannot be viewed in isolation from the entities that are fundamental to enactment. It is to these allied entities that we now turn in Chapter 8.

# 8. Examining allied entities

This chapter argues that entities are integral to the enactment of doctoral activities and theories of practice. The primary categories of entity to be discussed are key individuals, academic institutions and external agencies. The process adopted in the previous chapter will be continued with a view to determining what can be stated authoritatively about allied entities in relation to the literature, the qualitative and quantitative data in this study, together with emerging patterns and relationships.

## 8.1 Key individuals

**What does the literature reveal about key individuals engaged in doctoral activity?**

The orthodox view of the doctorate is that there are two key individuals involved—candidate and supervisor. Typically, these parties are seen to be in a dyadic relationship that has been portrayed by some writers as a form of apprenticeship (Collins, Brown et al., 1989; Gumport, 1993; Burgess, 1994). This model is seen as applying as much to candidates in the sciences (e.g. laboratory intensive approaches), as those in the humanities (e.g. library intensive approaches—or other environments where artefacts can be accessed). A common perception is that a healthy supervisory relationship is likely to increase a candidate's prospects for success (Salmon, 1992; Parry & Hayden, 1994), while one that is impaired has the potential to jeopardise their chances (Lee & Williams, 1999; Lovitts, 2001).

Over time, a small number of researchers has begun to look beyond the traditional dyadic relationship and to identify other individuals engaged in the process of doctoral research. For example, one researcher has investigated joint supervision (Pole, 1998) noting its potential for "cushioning a fall" in cases where a supervisor is less than effective. A team of researchers has identified doctoral candidates as perceiving themselves to be "at the centre of a constellation of others"—such as other academics, students and technical staff (Cullen, Pearson et al., 1994, p. 41; Pearson, 1996). One of the conclusions reached by this research team is that supervision "includes more than one-to-one interaction of a student and a supervisor" (Cullen, Pearson et al., 1994, p. 102).

**Who is involved in doctoral activity?**

An analysis of data generated in this study confirms that a constellation of individuals other than candidates and supervisors is engaged in doctoral activity (Table 8.1). Extending the work of previous studies, however, there is evidence to suggest that the range of people is more extensive than previously identified. This constellation comprises representatives from beyond as well as within the academy. The former includes researchers from industry, representatives from the professions and members of the wider community. The latter include peers, postdocs and technicians, as well as academics working a range of settings.

Rather than situate the candidate and/or supervisor at the centre of a constellation of others—in the sense of occupying a pre-determined or fixed position—it is proposed that individuals engaged in doctoral activity be considered as part of an open and flexible system (Figure 8.1). Conceptualised in this way, individuals can be seen as in a constant state of flux, moving and establishing a multitude of links over time. In this system, connections are made at particular instances, for specific purposes, with varying levels of intensity and for different lengths of time. Individuals coalesce, couple and uncouple, as well as alternate the nature of their position as the doctoral work transpires. Hence, a candidate might occupy a central position in one group and be on the periphery in another. The model also acknowledges the existence of other groups

such as family and friends, who may be supportive of a candidate (e.g. provide encouragement), but not engaged directly in the doctoral enterprise itself (e.g. have an impact on learning and research).

**Table 8.1—The range of significant individuals identified in the case studies**

| Type of individual | Case study |
|---|---|
| Candidate | All |
| Supervisor | All |
| Peer | All |
| Academic 'A'—same department | Ant, Ast, CA, RS |
| Academic 'B'—same university | Ant, ES, MB, |
| Academic 'C'—other university | Ant, Ast, BM, CS, Eng, HS, RS |
| Postdoc | Ast, Ant, CA, MB |
| Technician | Eng, ES, MB |
| Industry and other non-uni-based researcher | Ast, BM, Eng, ES, MB, |
| Business person (e.g. gallery owners, art dealers) | BM, CS, Eng |
| Online network members | BM, HS, RS |
| Profession<br>scientists, astronomers, engineers<br>museum/gallery directors and curators<br>graphic designer, writer, film maker | <br>Ast, Eng, ES, MB<br>CS, CA<br>CA |
| Community<br>custodians of artefacts<br>NGO staff<br>farmers in arid landscapes | <br>CS<br>Ant<br>ES |

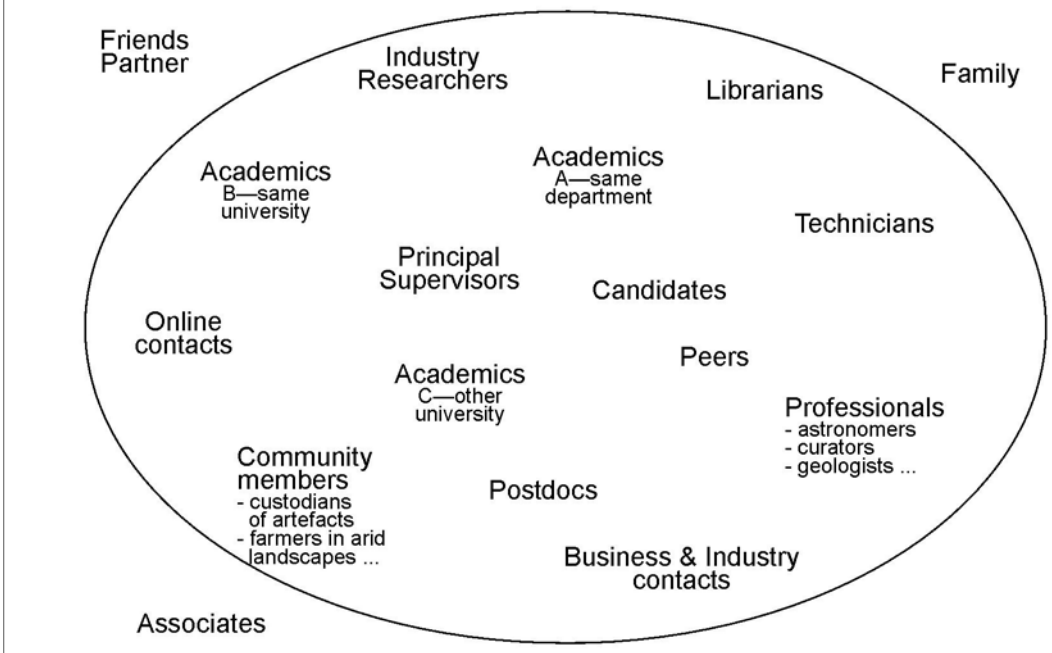
Key: Ant—Anthropology; Ast—Astronomy; BM—Business Management; CA—Creative Arts; CS—Cultural Studies; Eng—Engineering; ES—Earth Sciences; HS—Human Sciences; MB—Molecular Biology; RS—Regional Studies.

Findings from the case study research and the national online survey reveal that individuals influence the doctoral research of candidates in varying degrees. From the candidate perspective, some are clearly having much greater impact than others. Data from both sources suggest that an hierarchy of individuals exists with supervisors clearly at the top and library staff near the bottom (Table 8.2). More information is available about who is involved (Table 8.1) and the nature of their relationships (see case narratives).

**Table 8.2—Individuals identified as influencing candidates' learning and research**

| Individual | Rated 'most' and 'highly' influential per cent | |
|---|---|---|
| | **Case Studies** | **National Survey** |
| Supervisor | 100 | 82 |
| Peer | 40 | 23 |
| Academic 'A'—same department | 20 | 22 |
| Academic 'C'—other university | 20 | 18 |
| Postdoc—post-doctoral fellow | - | 13 |
| Industry-based researcher | - | 11 |
| Other | - | 10 |
| Technician | 10 | 9 |
| Academic 'B'—same university | 10 | 8 |
| Librarian | - | 4 |

**Figure 8.1—Individuals engaged in doctoral activity represented as an open and flexible system**




**Do key individuals exhibit any significant characteristics?**

Extensive demographic information about doctoral candidates in Australia was generated as part of the national survey, and select details are included as Appendix 7. In terms of the case study informants, one of the most striking patterns to emerge was that each of the ten candidates came to the PhD with practical experience of the world of work (Table 8.3). Although they came from diverse backgrounds, eight had worked on a full-time basis for at least 12 months, and six of these had careers of at least seven years duration—usually in their chosen field of study. The significance of this is that candidates were already in possession of work-related competencies and generic skills as well as specialist expertise on commencement of their doctorates—albeit to different levels. It tends to counter the claim by some employers that doctoral candidates are ill-prepared for the workplace. It also suggests that these candidates were better equipped to undertake their doctoral studies in terms of self- and time-management. The informant in Business Management revealed that although employed elsewhere as an academic, the candidate had elected to do her PhD at the University. Her employing institution offered sabbatical leave for a period of 12 months on full pay to conduct her doctoral research. The survey revealed that 30 per cent of respondents identified their main occupation as an academic, which suggests that almost one third perceive themselves to be working in the higher education sector (Appendix 7, Table 20.6).

There is evidence to suggest that candidates in this study with established careers are able to position themselves in strategic ways during candidature. One indicator is the extent to which their professional experience provides them with a confidence, maturity and authority that enhances their capacity to interact with individuals engaged in their research. Rather than academic authority, this constitutes a form of professional authority. In the Cultural Studies case, the candidate makes reference to the fact that having managed exhibitions and published a book on the artefacts that are central to her study has made her research life ‘easier’ in the field. In her words, “Once they [custodians, dealers, museum directors] talk to me, they do become aware that I do know something about what they know, but that I know other things as well”. Candidates in the Business Studies and Regional Studies cases had the status and authority to

approach the leaders of international networks and initiate processes that resulted in significant outcomes for them. While the candidate in the Engineering case is by his own admission an intruder in his department, this does not inhibit his ability to establish and maintain a productive relationship with technical and other staff members whom he perceives as critical to the success of his research endeavour. Indeed, the issue of positioning of technical staff constitutes an interesting episode within this case—especially with regard to how the candidate perceives them, how the candidate perceives academics' perceptions of them, and the self-perception of one technician.

**Table 8.3—Nature and extent of work experience undertaken by case study informants**

| Field of study | Age-group and gender | Nature of work experience |
|---|---|---|
| Earth Sciences | 20s, female | period of f/t work experience in a mine in WA during undergraduate years |
| Astronomy | 20s, female | 12 months f/t work experience in department where PhD is undertaken subsequently |
| Molecular Biology | 20s, female | 12 months f/t employment as research assistant in laboratory where PhD undertaken |
| Anthropology | 20s, male | 5 months f/t (following 3 years p/t) employment as a junior clerk in a legal firm |
| Creative Arts | 30s, male | 7 years f/t employment as graphic designer in the magazine industry |
| Human Sciences | 30s, male | 7 years f/t self employment as a consultant in environmental planning and land management |
| Regional Studies | 40s, male | 20 year career spanning media, public relations and publishing |
| Business Management | 40s, female | 15 year career as an academic in this field, preceded by self-employment as proprietor |
| Cultural Studies | 50s, female | 25 year career as a curator in museums and galleries, followed by fellowship in department where PhD is undertaken |
| Engineering | 60s, male | 25 year career as academic and teacher in another field, preceded by other career paths |

Patterns among some of the other individuals engaged in doctoral work can also be identified. Almost all principal supervisors were highly experienced—six having been supervising candidates for 20 years or more, and three with five to ten years experience. Although one had not supervised a candidate before, he had been working in the field at a university for 30 years, receiving his own doctorate around seven years previously. Each of the five other academics had supervised and were currently supervising several candidates. Each of the four peers nominated were enrolled in the same academic organisational unit, but were specialising in different areas.

It is interesting to observe that while each of the ten principal supervisors had established their reputations in the university sector, six had engaged in a degree of boundary crossing during their careers. Those currently supervising in the cases of Anthropology, Business Management, Cultural Studies, Engineering, Human Sciences and Molecular Biology had studied in other fields. In most cases the fields could be seen as related or complementary, however, in the case of Business Management, the principal supervisor trained initially as a chemist. There is also evidence to suggest that a number of these supervisors had spent time outside the academy during their working lives. For example, the Business Management supervisor had worked in the IT industry, the Human Sciences supervisor had raised a family before returning to study, the Creative Arts supervisor had worked as a photographic artist.

**Where are key individuals located in relation to doctoral activity?**

In terms of their formal mode of attendance, the survey revealed that 79 per cent of candidates identified themselves as on campus and 21 per cent as off campus (Appendix 7, Table 20.5). However, the case studies revealed a more complex pattern. Even though the ten case study informants were designated officially as 'internal' students, they were remarkably peripatetic in practice. Rather than remaining confined to the university campus, they conducted their learning and research activities in a range of external settings. As might be expected, most of these candidates travelled extensively to participate in national and international conferences. More importantly, however, many were also involved in the gathering, analysis and validation of data in locations outside the institution in which they were enrolled.

In the Astronomy case, the candidate is away from her institution "for up to three months in any given year of her candidature", located at various research centres and facilities around the world—some of which house more advanced facilities and technologies than available in Australia in 2005. In the Cultural Studies case, the candidate combines the status of an on- and off-campus student, straddling two homes and a variety of workplaces. In both cases, a high level of flexibility is demonstrated with regard to where and when a candidate engages in doctoral enterprise. As this informant remarked, "I could be two months away then one month back … one month away and four months back … or I might be away for just a fortnight". Other candidates were also engaged in fieldwork spending substantial time away from the university campus. For example, the candidate in Anthropology was engaged in fieldwork for an unbroken period of 18 months in a developing country, while the candidate in Earth Sciences conducted a number of six-week field trips in Australia and a six-month period in an arid landscape in the northern hemisphere.

Rather than travel to their university, two informants chose to work from home for significant periods. The Human Sciences informant estimated that he spent 90 per cent of the time there, while the Business Management informant estimated 30 per cent—despite the fact that shared accommodation on campus was provided by the academic organisational units of both candidates. They cited negative factors associated with shared office space (e.g. distracting conversations), and superior facilities of a home office used for consultancy purposes (e.g. large computer screen) as reasons for working off campus. As might be anticipated, candidates in Molecular Biology, Earth Sciences and Engineering were provided with laboratory space—either individual or shared. Similarly, those in Astronomy and the Creative Arts had access to an observatory and studio on their university campus. Significantly, however, these candidates negotiated access to a much broader range of facilities and equipment within and beyond their institutions. For example, the Earth Sciences and Engineering candidates accessed facilities from other fields and departments on campus, while the latter also made "at least 30 visits" to an external facility "three hundred kilometers from the main campus". The candidate in Astronomy not only accessed telescopes hundreds of kilometers away from her campus in Australia, but also facilities in the Americas, Europe and Asia.

When the spotlight is turned on the principal supervisors in these case studies, their institutional base constitutes the university where these candidates are enrolled. However, while the principal supervisor is located on campus in each case, two academics in advisory roles are located in tertiary institutions in other countries, and one is at another Australian university. A finding from the national survey was that although the overwhelming majority of principal supervisors were on campus (86 per cent), small percentages were off campus in other sectors or other universities (Appendix 7, Table 20.12).

**How do individuals communicate and interact with regard to doctoral activity?**

Modes of communication among individuals engaged in doctoral activity constitute a basic dynamic that can be measured to some degree. The survey revealed that candidates used various mechanisms to keep in contact with the person they deemed to be influencing their learning and

research to the greatest extent. Email (83 per cent) and face-to-face meetings (79 per cent) were the two methods rated by respondents as ‘always’ or ‘frequently’ used during their candidature (Appendix 7, Table 20.14).

Although the case studies confirm the importance of these communication strategies, they provide deeper insights to the way in which participants interact. There is no doubt that the advent of the internet has provided individuals with the capacity to communicate on a 24/7 basis. Individuals engaged in doctoral work are constantly in the process of exchanging questions, comments, documents, hyperlinks and so on, from any location with relative ease. Indeed, most of the informants kept in touch with their supervisor and other significant individuals by email—and occasionally by phone—when either party was in the field or somewhere other than on campus.

Even though advanced information and communication technologies like email are universal—and tele/video conferencing is available but less commonly used—the face-to-face and in-the-flesh meeting appears to be critically important to those engaged in doctoral work. In a field that is manifestly global and mutually dependent, the Astronomy case illustrates the vital role that such meetings play. Regarded as an essential work practice, one adviser informant described the situation in the following terms: “at times, one just has to sit together at a table and discuss graphs and numbers”. Other cases where liaison with researchers located across the globe is a regular feature—Molecular Biology, Business Management and Earth Sciences—there is no substitute for embodied exchanges. To that end, select strategies identified in the case narratives included international project meetings, visits and professional exchanges.

The ten case narratives constitute nuanced accounts of the ways in which individuals communicate in relation to doctoral work. Some candidates view the process of interacting with their principal supervisor as relatively open and spontaneous. For example, in the cases of Molecular Biology, Astronomy and Anthropology, the close proximity of their supervisor’s office meant that candidates were predisposed to simply dropping in as the need arose. In the words of the Molecular Biology candidate, “when I do have problems, then my supervisor is just next door, so I can talk to her most times”. In other cases such as Cultural Studies, Engineering and Business Management, the process included formal and structured meetings as well as informal discussion. For example, the Cultural Studies candidate remarked that “I am conscious of not wasting their [supervisors’] time, and will want to have a material fully written before a formal meeting”. What is significant here is that the interaction is less to do with personal relationships established between candidate and supervisor, and more to do with the modus operandi that is negotiated and implemented during doctoral candidature.

The cases reveal a variety of ways in which candidates, supervisors and ‘significant others’ interact, ranging from types of cognitive apprenticeship to professional partnership. The Business Management case is instructive in that it shows multiple forms of interaction occurring during the course of her candidature. At a very early stage the supervisor arranges for the candidate to co-author a paper with him with the intention of peer review and publication subsequently in an academic journal. In his words, the model of interaction is one where “they [the candidates] are actually doing work with the supervisor, and learning about the process of research”. The candidate clearly welcomes this apprentice-style approach, articulating it in terms of “learning the tools of the trade”. However, during another episode the candidate is interacting with her overseas mentor in a professional capacity on research and development associated with the international network of professors.

A similar blend of approaches occurs in the Astronomy case where in one episode the supervisor is required to accompany the candidate while she is using a high-powered telescope in an off-campus observatory (i.e. a form of apprenticeship), while in another she contributes to international projects and deliberations as a member of the Australian team (i.e. professional collaboration). In the Cultural Studies case, candidate and supervisor co-author an ARC Linkage Grant application for funding to conduct a research project. In so doing, the candidate

uses her specialist expertise to identify and negotiate arrangements with an industry partner—in an area where the supervisor had limited contacts. In another episode, the candidate is working with a peer in a productive relationship that reflects a high level of reciprocity.

In the case of Anthropology, supervisor and candidate can be depicted as working in a form of apprenticeship at the beginning of his candidature when he is in the process of preparing his ethics proposal. However, the expert-novice relationship changes dramatically when the candidate's application is rejected by the University's ethics committee. At that point, the supervisor acts as a sponsor for the candidate. Working together they become 'comrades in arms' against a common foe—the internal committee. The role of the candidate shifts from apprentice to unit member or professional colleague—an individual who needs to be defended and supported. Needless to say, the authority and status of the supervisor—as head of the academic organisational unit that has endorsed the application—have also been jeopardised.

It has been argued in this section that an extensive and diverse range of individuals is engaged in doctoral activity. They have been conceived as operating in an open and flexible system that reflects a level of mutuality, whereby individual influence and shape others with whom they interact. Candidates have been shown to display characteristics in common such as extensive experience in the world of work, along with a capacity to move in and out of the academy in order to pursue their research objectives. In so doing so they have occupied a multiplicity of roles and positions as their candidature progressed. The next section will focus on academic institutions and doctoral activity, with specific reference to the knowledge, cultures and support mechanisms that operate in the context of Australian universities.

## 8.2 Academic institutions

**What does the literature reveal about institutional support provided for doctoral activity?**

The twin concepts of academic tribes and territories (Becher & Trowler, 2001) have provided a useful means of understanding universities and how they operate. Becher's first edition in 1989 mapped "the variegated territory of academic knowledge" and explored "the diverse characteristics of those who inhabit and cultivate it" (p. ix). The second edition reflected on and considered the implications of "over a decade of profound changes in higher education across the world" (p. xiii). By exploring the links between the academic cultures (the 'tribes') and disciplinary knowledge [their 'territories'] (p. xiv), both editions illustrate the way in which one influences the other over time.

A number of other researchers have pursued aspects associated with these concepts. Those investigating academic knowledge have tended to highlight the significance of disciplinary difference, noting the extent to which particular subjects or fields of study predetermine the research methodologies that are employed there (Clark, 1993; Gumport, 1993; Clark, 1996; Neumann, 2002, 2003a; Golde & Dore, 2004). Researchers interested in the social and cultural aspects of academia have focused inter alia on processes of acculturation and induction of neophytes to various disciplinary-based environments (Parry, 1994; Tierney, 1997b; Antony, 2002).

In some instances researchers have distinguished between two broad categories of knowledge and culture—the natural and physical sciences versus the social sciences and humanities (Hacking, 1992; Burgess, 1994; Delamont, Atkinson et al., 1997). Others have classified these into different categories such as hard and soft, pure and applied, emergent and convergent, and urban and rural (Becher & Trowler, 2001; Neumann, Parry et al., 2002). Still others have drilled down further in order to compare subject areas—with specific reference to doctoral education—such as social anthropology, development studies, urban studies and town planning (Parry, 1994), and high-energy physics and molecular biology (Knorr-Cetina, 1999). What follows in this section is a synthesis of data from the case narratives and the national survey that is informed by the literature on the academy.

**What forms of academic knowledge are reflected in doctoral activity?**

Many types of knowledge in the academy can be identified and then classified in different ways. In 2005, the Department of Education, Science and Training grouped academic knowledge into eleven broad fields of study (Table 8.4). A further 57 'narrow' fields—plus 9 'other' categories—were also part of this taxonomy, that is, 66 fields in total. At the same time, periodic modifications associated with these categories can be observed. Prior to 2000, for example, the department used ten similar broad categories which included law and veterinary science as discrete fields, but then deleted them, substituting information technology, creative arts and food, hospitality and personal services.

The adjustment of these categories over time is due to a range of factors including the construction of new knowledge, changing priorities and related political factors such as a desire of governments and their departments to forge stronger links between 'academic', 'research', 'work' and other knowledge systems. One such classification system is the Research Fields, Courses and Disciplines (RFCD), which comprises 24 divisions, 139 disciplines and 898 subjects. Another is the Australian New Zealand Standard Industrial Classification which has 17 divisions and 97 subdivisions. In addition, there is the Socio-Economic Objective (SEO), the Institute for Scientific Indicators (ISI) and the PhD Weblogs matrix, which include similar hierarchical structures.

In general, respondents to the national survey reflected the DEST enrolment pattern (Table 8.4), although the percentage of candidates in the broad field of Health was significantly higher—20 per cent compared with 12 per cent. The nature and extent of candidate diversity was reflected, however, in that respondents were spread across each of the 66 narrow fields. The highest percentages were recorded in Biological Sciences (11 per cent), Other Health (6 per cent) and Other Society and Culture (5 per cent). The lowest were Office Studies, Personal Services and Maritime Engineering and Technology (less than 0.2 per cent). The point being made here is that doctoral candidates can be seen to be studying in a multitude of increasingly specialised areas of knowledge, based on predetermined categories into which they are placed (e.g. by universities or government departments), or which they self-select (e.g. as survey respondents).

**Table 8.4—Broad fields of study in doctoral education, Australia, 2005**

| **Broad field** | **Enrolled doctoral candidates, per cent** | |
|---|---|---|
| | **Australia*** | **Survey**** |
| Society and Culture | 26 | 24 |
| Natural and Physical Science | 20 | 20 |
| Health | 12 | 20 |
| Management and Commerce | 10 | 6 |
| Engineering and Related Technologies | 10 | 6 |
| Education | 9 | 8 |
| Agriculture, Environment and Related Studies | 4 | 6 |
| Information Technology | 4 | 5 |
| Creative Arts | 4 | 4 |
| Architecture and Building | 1 | 1 |
| Food, Hospitality and Personal Services | 0 | 0 |
| TOTAL | 100 | 100 |

Sources: Students, Selected Higher Education Statistics, DEST, 2005 (derived from Table 21)
* Includes doctorate by research and coursework.
** National Online Survey of Doctoral Candidates, 2005.

While not rejecting this quantitative analysis, the qualitative research conducted as part of this study reveals a higher level of complexity. As part of the extended process used in the selection of doctoral candidates I intended to interview, I first conducted a series of informal discussions with 25 candidates enrolled in various fields of study. I then invited each of the 62 volunteers

who responded to my subsequent call for volunteers to provide information about their field of study. This was designed to assist in constructing a sample that would reflect as high a level of candidate diversity as possible. A common finding to emerge from both strategies was that a significant proportion of candidates had great difficulty in nominating one field of study into which their research could be placed. Of the 62 volunteers, 15 (24 per cent) identified their research as inter-, trans-, or multi-disciplinary. In responding to my request, one volunteer (not interviewed subsequently) captured this situation in an email containing the following statements. “Once upon a time a person would study chemistry and then become a chemist working in a lab. Not so much the case these days. You can’t stick a person in the one box and expect them to stay there for the rest of their life. If I focused on one area/field of research I would be out on the streets. My research is multidisciplinary involving earth sciences, biological sciences, information systems, environmental systems, architecture and human environment, teacher education, accounting, political science and policy studies”.

Classification systems invariably involve determining parameters and criteria, and making judgements about cases that don’t readily fit into nominated categories. One outcome from my two pre-interview strategies was that for a significant number of candidates pre-determined mono-disciplinary fields were inadequate or inappropriate. Some felt compelled to identify two or three fields—a few nominated six or more. Another outcome was that in some cases doctoral candidates sometimes were attached to more than one academic organisational unit. Of the 62 volunteers, 20 (32 per cent) indicated the existence of a formal organisational link with another unit—either internal (i.e. on campus) or external (e.g. another university, research agency). For example, one volunteer (not interviewed subsequently) commented, “I am in Anthropology at (department specified) but my focus is on Korea, so I am affiliated with Korean Studies and (another department specified)”.

The ten cases that comprise this study can be categorised in several ways. In terms of broad (DEST) categories: three Natural and Physical Sciences (Astronomy, Earth Sciences and Molecular Biology); three Society and Culture (Anthropology, Cultural Studies, Regional Studies), three discrete (Business Management, Creative Arts, Engineering), and Human Sciences within Agriculture, Environment and Related Studies. Some researchers (e.g. Becher, Trowler, Neumann, Parry) would probably classify two as hard pure (Astronomy, Earth Sciences), two as hard applied (Molecular Biology, Engineering), four as soft pure (Anthropology, Creative Arts, Cultural Studies, Regional Studies) and two as soft applied (Business Management, Human Sciences).

Another possibility, however, is to consider them without the constraints of pre-determined categories, or at least to allow for a more flexible approach. Looking through a different lens and using additional criteria a different picture emerges (Table 8.5). Four criteria are employed, namely, (a) field—the broad subject area in which candidates are researching; (b) academic organisational unit (AOU)—the department or centre where they are enrolled; (c) topic—the focus of the candidate’s research; and (d) other—constructions/sources of knowledge that are non-disciplinary/academic. The pattern that emerges reflects different levels of disciplinarity ranging from very high (Human Sciences, Cultural Studies, Anthropology) to low (Molecular Biology, Engineering, Astronomy).

It is instructive to consider comments from the supervisor in the case of the Human Sciences. As a pioneer of this interdisciplinary field, she provides some valuable insights regarding the dominant disciplinary paradigm and the need to consider broader concepts such as ‘knowledge ‘cultures’. What follows is an extract from this informant’s edited and verified transcript. “Because of the very strong and dominant culture of science as we know it, advocates of multi-disciplinary approaches often assume that integration only includes the disciplines. My position is that disciplinary approaches are very similar, running to the same positivist rules, and that this is only one of several constructions of knowledge. I work from the basis of there being different constructions of knowledge by individuals, communities, specialists and organisations. This involves a broader understanding of just what is knowledge … I am now using the concept of

knowledge cultures, because institutions and cultures [in the world of work] have structured reality differently from either community or scientists … a key part of the doctorate is working in a zone where knowledge is free … You are a graduate of your university, not of your discipline".

**Table 8.5—Levels of inter-disciplinarity identified in the case studies**

| Case | Level | Characteristics derived from informant transcripts, websites |
|---|---|---|
| Human Sciences | High | *field*—environmental science, ecology, geography, health<br>*AOU*—explicit interdisciplinary focus—science and society<br>*topic*—ecotheology, ecophilosophy, environmental sociology<br>*other*—activists, spiritualists and community members |
| Cultural Studies | High | *field*—anthropology, archaeology, sociology, linguistics, c. arts<br>*AOU*—explicit interdisciplinary focus—culture and society<br>*topic*—indigenous studies, art history, informatics<br>*other*—indigenous artists and their communities (ind. partner) |
| Anthropology | High | *field*—sociology, history, archaeology, linguistics<br>*AOU*—explicit interdisciplinary focus—gender and society<br>*topic*—political anthropology, policy studies<br>*other*—non-government organisation staff and clients |
| Regional Studies | Medium | *field*—languages, history, political science, theology, sociology<br>*AOU*—implicit interdisciplinary focus—culture and society<br>*topic*—Sanscrit literature and history, oriental studies<br>*other*—Sanscrit experts beyond the academy |
| Business Management | Medium | *field*—new to doctorate—embraces eco, commerce., psych<br>*AOU*—implicit interdisciplinary focus—innovation and change<br>*topic*—finance, public relations, marketing, web design<br>*other*—businesspeople |
| Creative Arts | Medium | *field*—new to doctorate—embraces visual and performing arts<br>*AOU*—implicit interdisc. approach—integration of technology<br>*topic*—photosculpture, photomedia, consumerism<br>*other*—collectors |
| Earth Sciences | Medium | *field*—geology, geochemistry, geophysics<br>*AOU*—integration—earth and marine science<br>*topic*—geomorphology, geography, climatology, resource mgt.<br>*other*—industry partner, farmers in arid landscape project |
| Molecular Biology | Low | *field*—biochemistry, genetics, entomology<br>*AOU*—integration—biochemistry and molecular biology<br>*topic*—parasitology<br>*other*—industry partner |
| Engineering | Low | *field*—physics, chemistry, earth sciences<br>*AOU*—integration—engineering and information technology<br>*topic*—materials science<br>*other*—n/a |
| Astronomy | Low | *field*—astrophysics, cosmology<br>*AOU*—integration—astrophysics and astronomy<br>*topic*—spectroscopy<br>*other*—n/a |

AOU—Academic Organisational Unit

Although some authors acknowledge that the boundaries of knowledge are constantly shifting (Becher & Trowler, 2001; Neumann, 2003a), they imply that such change is one of degree (i.e. within established disciplinary frameworks), rather than kind (i.e. beyond these frameworks). Similarly, the cited authors acknowledge the existence of interdisciplinary and multidisciplinary fields, but do not discuss these in any detail. As one states in a chapter on a disciplinary perspective on university teaching and learning, "while the focus here is on disciplines, it is acknowledged that interdisciplinarity presents a more complex set of issues which are only touched on in this chapter and the ensuing discussion" (Neumann, 2003a, p. 220). Interestingly, one US study of doctoral education and career preparation found that with regard to candidates surveyed "although 61.2 per cent reported a strong interest in interdisciplinary work, only 27.1

per cent said that they were prepared by their programs to do so" (Golde & Dore, 2004, p. 23). This raises the issue of how academic cultures influence doctoral candidates, and is the subject of the next sub-section.

**What types of academic culture can be identified in doctoral activity?**

Culture has been defined as "sets of taken-for-granted values, attitudes and ways of behaving, which are articulated through and reinforced by recurrent practices among a group of people in a given context" (Becher & Trowler, 2001, p. 23). Becher and Trowler go on to argue that in practice, academic cultures and disciplines are 'inseparably intertwined'. They see the relationship as 'mutually infused' and 'mutually dependent'. In a nutshell, tribes influence the development of territories and vice versa. There is much in this study to support their argument. At the same time, however, the quantitative and qualitative data generated reveal that the situation may be more complex than conceptualised by these authors. The purpose of this subsection therefore is to investigate the operating cultures identified in this study with a view to creating new perspectives and insights.

Central to any discussion of academic culture is the academic organisational unit (AOU), which typically takes the form of a faculty, department or study centre. Traditionally, the nomenclature of tribes have been linked directly to territories, however, a degree of variation has emerged over time. The case studies indicate that three candidates are enrolled in departments of the same genus identified in Table 8.4 above, namely, Business Management, Creative Arts and Engineering. Three more are enrolled in departments that are commonly regarded as sub-disciplines of the natural and physical sciences—Astronomy, Earth Sciences and Molecular Biology. The remaining four candidates, however, are enrolled in centres that refer explicitly or implicitly to interdisciplinary arrangements. In order to maintain the confidentiality of participants, the actual names of the centres in this study cannot be revealed. However, it is important to note that although the centres constitute the unit in which candidates are enrolled officially, these are part of a larger hierarchical structure. The centres are invariably associated with a larger department, school, faculty or college whose title is often linked to a broad field of study.

Although the cultural influence of the conventional department or faculty has been analysed in the literature and can be detected in this study as well, the case studies reveal that the situation is more complex than has been articulated to this point. As noted previously a common strategy in doctoral education texts has been to depict the culture of science-based disciplines as team-based and developmental, and to contrast this with the isolating and independent culture of the humanities. Candidates in the former are frequently portrayed as benefiting from their participation in a dynamic community of practice, while those in the latter are represented as demonstrating higher levels of autonomy. For some it is a case of being "forged in fire" (Lee & Williams, 1999).

Reducing disciplinary culture and its impact to this minimal level tends to have limited value. Hence, a major purpose of the case narratives has been to capture more of the variation and nuances of contemporary cultures and their impact. In the Molecular Biology case, for example, even though the candidate can be viewed as a member of a lab who is contributing to its cumulative research outcomes, she is also demonstrating a degree of agency by undertaking a graduate teaching program that will enhance her prospects for an academic post should she decide to pursue that option. On the other hand, the Cultural Studies candidate is independently pursuing a personal passion, but is also working collaboratively with a view to contributing to the knowledge base not only of the unit to which she is attached, but also the industry partner and the Indigenous community that form part of that project.

A striking feature of each case study was the supportive role played by the AOU in which the candidate is enrolled. At the level of facilities this constituted provision of the essentials such as access to work space, technology, equipment, resources and the like. Not surprisingly, the level

of infrastructure varied according to the field of study with access to lab space provided in Astronomy, Earth Sciences, Engineering and Molecular Biology; studio space in Creative Arts; and office space in the other fields. An interesting finding, however, was the common practice whereby candidates and their peers—at least in their first year—were provided with access to shared office space. In many cases this was a deliberate strategy employed by the AOU to foster interaction and collaboration among first-year doctoral candidates. In the Astronomy case, for example, in addition to shared accommodation, all first-year candidates were required to complete a small-scale research project—in an area with which they were unfamiliar. In some cases this may have been primarily a resourcing issue (i.e. insufficient space to provide each doctoral candidate with an office).

In terms of pedagogical support, all candidates were provided with a supervisor or supervisory panel, which also incorporated accountability arrangements (e.g. planning, reporting and evaluation). More significantly, however, was the extent to which each case study—with the possible exception of Engineering and Regional Studies—reflected a rich tapestry of structured and semi-structured activities designed to foster intellectual as well as skill development. For example, the Creative Arts department arranged for 'workshop crits', 'postgraduate meetings', open forums, and a 'seminar program' on a regular basis. Indeed, some of these activities were conducted on a weekly or fortnightly basis during semester time. Virtually all cases included reference to the provision of a seminar series and/or variations that included reading or discussion groups (NB. the Regional Studies case included a very active reading group—although this was initiated by students rather than the AOU). The Cultural Studies AOU had a specific policy of fostering the development of 'intellectually strong support networks' as well as providing 'thesis writing workshops', a 'visiting scholar program' and a 'challenges to perform program'—that is designed "to show how postgraduate students can produce outcomes from their research in different formats, genres and media".

AOUs identified in the case studies also took it upon themselves to promote a range of social activities. The gamut included everything from morning teas, barbecues and late afternoon drinks, to the celebration of significant events, parties and so on. These were generally welcomed by candidates as a way of mixing with colleagues whom they might not otherwise interact. For example, one candidate commented that "there are conscious efforts to gather socially—both within and outside the centre; birthdays are celebrated—we used to do this individually—but now we do it on a monthly basis". However, as the following comment suggests, not all candidates relished departmental get togethers to the same extent. "Every now and then they [members of the department] gather out the front and cremate sausages and eat them with tomato sauce".

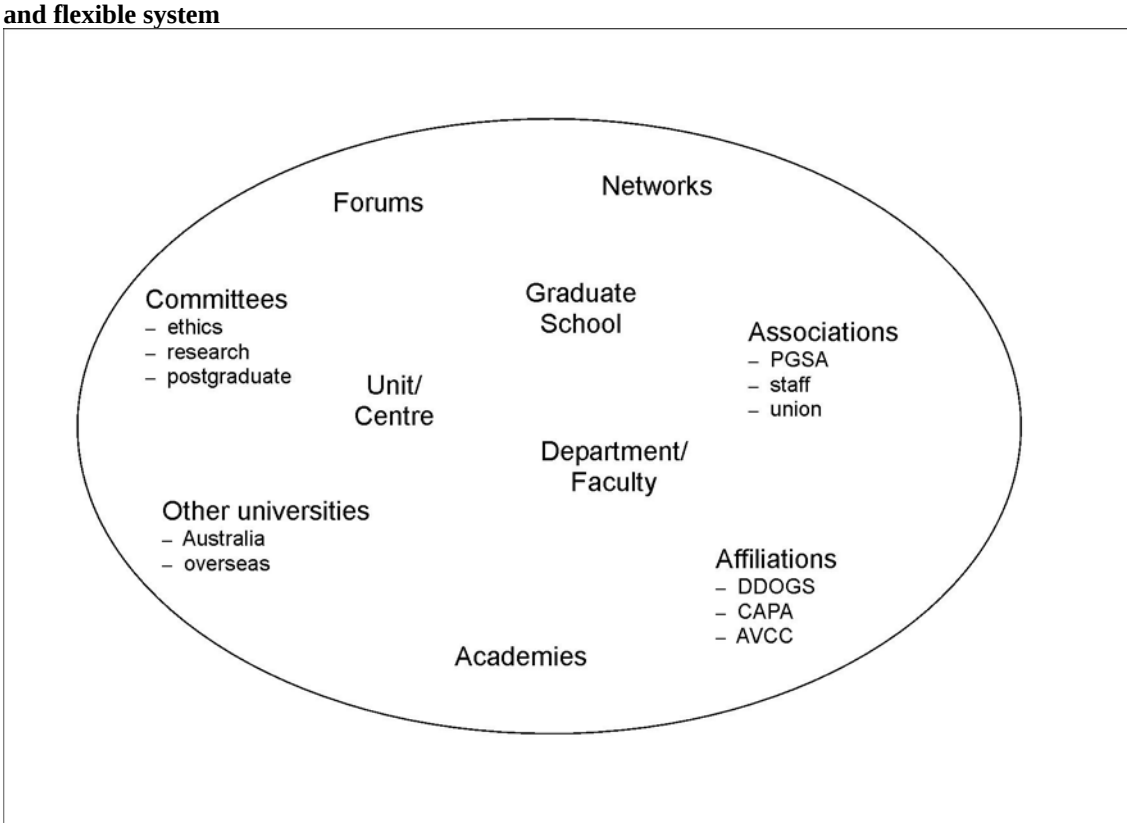
The online national survey confirms that the level of AOU support is not confined to these ten case studies. Indeed, there is evidence to suggest that academic units play an important role in orchestrating a range of activities designed to assist doctoral candidates. For example, those respondents who recorded their participation in a range of support activities to this point in their candidature frequently nominated their department or faculty as the provider. These data show that departments or faculties are particularly active with regard to the provision of seminar series and discussion groups. Their role in conducting social activities, writing groups and electronic networks is also demonstrated, albeit to a lesser extent (Appendix 7, Table 20.16). The survey also reveals the proactive role of AOUs in the provision of supplementary training. Compared with the aforementioned activities their role is less pronounced, however, it is still significant in relation to the conduct of long course particularly, and to a lesser degree short courses, internships and electronic courses (Appendix 7, Table 20.18).

By maintaining a focus on the academic department, however, researchers have inadvertently obscured or ignored other institutional components and cultures. Most universities provide opportunities for candidates and staff to venture beyond established tribes and territories with a view to facilitating intellectual exchange, or giving voice to broadly-based or special interest groups. For example, graduate schools or their equivalent have been established in many

universities with a view to meeting the needs of doctoral candidates who are not only engaged in specialised studies across a broad spectrum, but also coming from increasingly diverse backgrounds and experiences. Postgraduate student associations (PGSAs) constitute another group that aims to represent the interests of candidates, just as unions and staff associations represent those of academic and administrative staff. At a national level affiliations of such groups exist in the form of CAPA, DDOGS and the AVCC (now Universities Australia) in order to reflect collective views of the constituencies they represent.

Data from the survey indicate that graduate schools and PGSAs are providing significant levels of pedagogical and social support to doctoral candidates. There is evidence to suggest that graduate schools play an important role particularly with regard to the provision of writing groups in particular, bit also run short courses and electronic courses (Appendix 7, Tables 20.16 and 20.18). While PGSAs tend to be more active in relation to the conduct of social activities, they are also active in the provision of writing groups and electronic network support. When data pertaining to structured support for candidates are compared, it is clear that the AOU is fulfilling a lead role. It is also clear, however, that graduate schools and PGSAs are playing an important role, which to this point has rarely been acknowledged, let alone documented. The project of which this research is part illustrates a different but highly significant role played by three PGSAs, namely, PARSA, DUSA and CAPA, who are industry partners in this ARC Linkage Project.

**Figure 8.2—Sources of institutional support provided for doctoral activity represented as an open and flexible system**




The case studies indicate that there are many other activities underway at an institutional level reflecting efforts to move beyond conventional tribes and territories. For example, the principal supervisors in three cases were involved in initiatives designed to reduce disciplinary boundaries (e.g. Engineering, Creative Arts, Cultural Studies). Generally, these involved the creation of interdisciplinary forums, programs or organisational structures designed to foster collaboration between candidates and staff from related areas. Reference was also made to a host of broadly-based committees and other groups concerned with matters that impact on the doctoral enterprise. Examples include ethics and research committees, as well as graduate entry

bodies and supervisory panels. Beyond the realm of the institution, the policy and cultural influences of groups such as the Australian Research Council and government departments with responsibility for higher education and research is exercised frequently. As a means of concluding this sub-section, various sources of institutional support identified within this study are illustrated in the form of an open and flexible system in Figure 8.2.

**What is the impact of cultural influences on doctoral candidates?**

The existence of academic cultures is clearly evident in each of the ten cases, and is reflected in established conventions, language, attitudes, beliefs and understandings. Particular characteristics associated with the laboratory-based customs of Molecular Biology and Astronomy, the rituals or "unduly fetishistic" nature of fieldwork in Anthropology and Earth Sciences, and the imaginative and exhibiting traditions of the Creative Arts—can be readily identified. Positivist elements within the fields of natural and physical science are in marked contrast to the interpretive aspects of the social sciences and humanities. At the same time, however, a blend of cultures can be seen to be operating in interdisciplinary fields such as Cultural Studies, Regional Studies and the Human Sciences.

Rather than focus on the particularities of these academic cultures, the intention is to consider the nature and extent of their impact on the candidates in this research—with particular reference to identity. In some cases candidates can be seen to be identifying with conventional disciplinary identities. For example, the candidate in Anthropology perceives himself to be a political anthropologist. In his words, "it determines how I think about an issue or the way in which I'd approach it". Yet at the same time he believes in the development of a cultural logic that is more about living and working in a given context than learning the ropes of a particular discipline. Candidates in fields such as Astronomy, Molecular Biology, Earth Science and the Creative Arts also tended to perceive themselves as the embodiment of those disciplines, namely an Astronomer, Molecular Biologist and so on, albeit in a liminal capacity. This was less so for candidates in interdisciplinary fields such as Cultural Studies, Regional Studies and Human Sciences.

In at least three cases an identity has been attributed to candidates through the use of colourful terminology. For example, the Engineering candidate describes himself as "an encapsulated virus" or "the boy in the bubble"; the Earth Science candidate reveals that she is referred to as "the dune girl" by some of her colleagues; and a supervisor in the Human Science case refers to the candidate as displaying characteristics that seemed to be "part of a lone wolf syndrome". These metaphorical references position candidates in quite specific ways. There is little doubt that after five years, the self-perception of the Engineering candidate is that of an outsider in the department in which he is enrolled. A similar sense of disengagement from her work colleagues—although not as strongly expressed—can be detected in the case of the "dune girl" in the Earth Sciences. The term suggests or implies an hierarchical status (e.g. working at a lower level in terms of sedimentary materials as distinct from hard rock); gender bias (e.g. a female in a male-dominated discipline); and a physical distancing (e.g. out in the wilderness). The concept of a "lone wolf" suggests that the candidate in the Human Sciences is not perceived as belonging to the department where he is enrolled, and could also be perceived as working on a topic that is well beyond the mainstream in that department.

By way of contrast, there are references in the cases that suggest a strong sense of being on the inside—incorporating a strong sense of belonging—not just to the academic organisational unit but to the disciplinary field and to the academy. The candidate in Anthropology, for example, extols the virtues of the unit in which he is enrolled, and the Astronomy candidate refers to the close and family-like nature of her department. Candidates working across traditional disciplines (e.g. Cultural Studies, Regional Studies, Human Sciences), or in more recently established fields of study (e.g. Creative Arts, Business Management) appear to position themselves in relation to the academic unit rather than the field. For example, a number of supervisors in the more recently established fields acknowledge the lower status that these

occupy in the academic hierarchy. However, a phrase used by the peer in the Molecular Biology case highlights the extent to which he has positioned himself by the end of his candidature: “I guess I see myself as part of academia—as a link in that chain—particularly once I’m a post doc, although I don’t think there is much difference to what I’m doing now”.

The fact that this candidate made such a comment in the final stages of his candidature raises a key point about the changing dynamics of the doctoral enterprise. There is evidence in the narratives to support the proposition that there is a degree of fluidity associated with the positions and roles that candidates occupy and the identities that they construct—as well as those that are constructed by others. Rather than assuming a fixed position, candidates adopt a variety of stances in response to changing situations and circumstances. For example, in the Astronomy case the candidate highlights the extent to which she feels part of the ‘family’ of her department, especially at the beginning of her candidature. However, the episode concerning co-authorship that transpires during her third year demonstrates the extent to which she feels ostracised from members of her supervisory panel who have negotiated her role as lead and second author of two papers without her involvement. In her words, “essentially a deal had been struck by a group to which I had not yet been admitted as a member”. These incidents demonstrate that candidate identity is a complex matter that cannot be reduced to singular or fixed categories that operate for the duration of the candidature.

**To what extent are established conventions embedded in doctoral activity?**

One established convention that can be detected from the survey data is that the overwhelming majority of candidates (92 per cent) conduct their PhD by research (Appendix 7, Table 20.4). This finding is corroborated by data from DEST which reported that 95 per cent of candidates were engaged in research in 2005. However, a search of DEST data over 2001-2004 indicates that while the percentage growth of doctorates by coursework has been increasing, this has been at a very slow rate during the past triennium especially [2.7 per cent in 2001; 4.2 per cent in 2002; 4.4 per cent in 2003; and 4.7 per cent in 2004]. Hence, it can be concluded that this convention appears to be relatively well entrenched. One group of researchers confirms this when they argued recently that “generally the professional doctorates in Australia have not had the impact that was expected of them, and that the PhD has quietly strengthened its grip on doctoral education” (Evans, Macauley et al., 2004).

Other survey data from this study reflect greater diversity in patterns associated with the person responsible for determining the general topic of the doctoral program (Appendix 7, Table 20.10), the formal/approved mode of supervision (Appendix 7, Table 20.11), and the anticipated model of the doctoral work to be submitted for examination (Appendix 7, Table 20.20). First, while the majority of candidates determine their own topic (65 per cent), supervisors and others play a major role in the remaining 35 per cent. Second, while most candidates have two or more supervisors (78 per cent), the other 22 per cent is limited to one. Third, most candidates plan to submit their doctoral work in the form of a thesis (74 per cent), while the remainder are considering alternative options. The literature indicates that there a trend exists in relation to models of supervision, given that multiparty supervision began well over a decade ago, following research indicating that candidates with supervisory panels were more satisfied [92 per cent] than those with a single supervisor [71 per cent], (Cullen, Pearson et al., 1994, p. 47).

While the qualitative data from this study confirm the existence of these conventions, it also provides further illumination. Although each of the ten cases can be classified as a program of PhD by research, a multiplicity of approaches, methods and techniques is contained therein. Some are primarily quantitative (e.g. Astronomy, Molecular Biology), some qualitative (Regional Studies, Anthropology), and other reflect mixed methods (Cultural Studies, Human Sciences). Similarly, in relation to choice of topic the established pattern is confirmed given that seven cases could be classified as determined by the candidate, two by the supervisor (Molecular Biology and Astronomy) and one that involves additional parties (Cultural Studies). What emerges from the case studies, however, is that the issue of the topic is coloured in shades

of grey rather than strictly black or white. In several cases a degree of negotiation was involved, which sometimes included consultation with industry partners (Cultural Studies, Molecular Biology, Earth Sciences), and in other instances included renegotiation associated with a change in topic (e.g. Anthropology, Business Management, Human Sciences).

Supervisory panels comprising two or more members constituted the norm in these cases, but the location of members other than the principal supervisor varied considerably—given that formally approved advisers in these cases come from the same or different department in the host university, as well as other universities in Australia and overseas. Candidates in nine cases anticipated submitting a thesis, whereas the Creative Arts candidate intended to submit art, exegesis and a linking document. There is evidence to suggest, however, that some candidates were exploring the possibility of variations to the conventional thesis. For example, at the time of interview the Astronomy candidate was planning to use a collection of her published papers (e.g. the discovery paper of which she was the lead author) as the basis of her thesis, using a series of linking mechanisms to draw these together. Following the advice of his supervisor, the Regional Studies candidate was planning to write his thesis with a view to publishing a reduced version as a book after graduation.

## 8.3 External agencies

**What does the literature reveal about external agencies involved with doctoral activity?**

Writers have been exploring the rhetoric and reality of connections between universities and external agencies for many years. A quick review of the literature indicates that the agencies that have received most attention can be classified into two main sectors—government and industry. In Australia, both state and national governments have played an increasingly significant role in higher education over time, especially in terms of funding for teaching and research. Industry and business have had an important—but possibly less direct—impact, by stimulating, funding or commercialising what they deem to be priority areas of research and development.

Towards the end of the Twentieth Century the concept of the 'triple helix'—an intertwining of universities, government and industry sectors—emerged. The thesis that "the university can play an enhanced role in innovation in increasingly knowledge-based societies" (Etzkowitz & Leydesdorff, 2000, p. 109) generated mixed responses. Some academics questioned the capacity of universities to embrace economic development as well as research and teaching, while governments in a number of Western countries moved to advance this agenda with a view to promoting economic productivity and sustainability. In Australia, for example, building on a number of pervious initiatives at the national level (e.g. the APAI scheme introduced in 1990), more broadly-based policies and programs were initiated including 'knowledge and innovation' (Kemp, 1999) and 'backing Australia's ability' in 2001 and 2004. The latter represented an "$8.3 billion 10-year commitment" to enable "researchers, universities, businesses and other organisations" to build a "world class innovation system" (Howard, 2004).

The literature on connections between higher education, government and industry during the past two decades has been both general and specific. Examples of the former include themes such as work-based learning, some of which explore the integration of discrete elements such as work, learning, training, research and life courses (Beckett & Hager, 2002; Hager, 2004; Hodkinson, 2004; Pearson, Evans et al., 2004; Boud & Tennant, 2006). The concept of the knowledge worker has also been discussed, with particular reference to academics and doctoral candidates fulfilling this role (Candy, 2000; Tennant, 2004). A substantial amount of material has also been published on professional doctorates—especially in Australia and the UK—with particular reference to the integration of academic and professional knowledge and practice (Lee, Green et al., 2000; Scott, Brown et al., 2004; Stephenson, Malloch et al., 2006). At a more specific level, however, some authors have been concerned with the evaluation programs that not only link industry and universities, but which also include doctoral education as a primary

objective (Powles, 1996; Harman, 2002a; Harman, 2002b, 2004). In general, reviews of Cooperative Research Centre (CRC) and Australian Postgraduate Award Industry (APAI) programs have been favourable, particularly in terms of satisfaction for both the candidates and the industry partners involved.

**What type of external agency is involved in doctoral activity?**

Involvement with government and industry is reflected in many of the case studies, albeit it in different forms and with varying levels of intensity (Table 8.6). Each candidate is enrolled in a doctoral program that is funded by the Australian government, and in all but two cases (Regional Studies and Business Management) candidates receive a scholarship that incorporates national funding. Some candidates interact with state government departments, for example, the Cultural Studies candidate requires access to archival records, and others liaise with foreign governments in order to arrange obligatory visas and research permits. Quasi Autonomous Non-Government Organisations (QANGOs) such as the Australian Research Council are cited in some cases, along with a Non-Government Organisation in Anthropology. In terms of industry links, three cases have a formal industry partner (Cultural Studies, Earth Sciences, Molecular Biology), and three work with particular industries and commercial enterprises periodically (Business Management, Creative Arts, Engineering).

**Table 8.6—External agencies identified in the case studies**

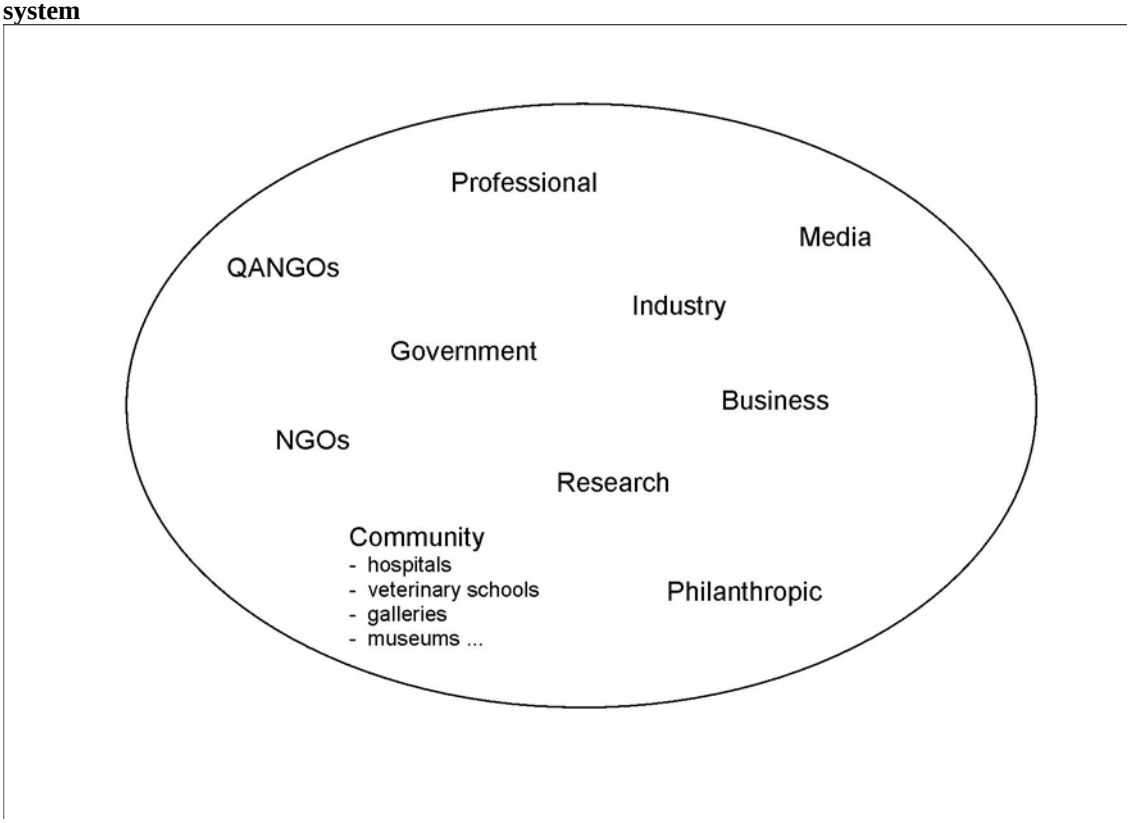
| Type | Case |
|---|---|
| Australian government | Astro |
| State governments | CS, ES |
| Governments of other countries | Anthro, Astro |
| Australian Research Council | Astro, CS |
| Cooperative Research Centre | ES |
| IP Australia (Intellectual Property) | Eng |
| NASA | ES |
| Non Government Organisation | Anthro |
| Industry organisation | ES, MB |
| Industry consortium | MB |
| Galleries, museums | CA, CS |
| Other commercial enterprises | BM, CA |
| E-networks | BM, HS, RS |
| Arts organsisation | CS |
| Hospitals | MB |
| Veterinary schools | MB |
| Local environmental groups | HS |
| International arts residential facility | CA |
| Legal agencies | Eng |
| Research agency/facility—Australia | Astro, Eng, ES, MB |
| Research agency/facility—other country | Astro, Eng |
| Philanthropic trust | CS |
| Arts foundation | CA |
| International charity | ES |
| Curatorial association | CS |
| Media (national & international) | Astro, Eng |

Key: Anthro—Anthropology; Astro—Astronomy; BM—Business Management; CA—Creative Arts; CS—Cultural Studies; Eng—Engineering; ES—Earth Sciences; HS—Human Sciences; MB—Molecular Biology; RS—Regional Studies.

An important finding from both the qualitative and quantitative data, however, is that candidates have links with a much broader range of external agencies. These include a variety of community, research, philanthropic and other agencies. For example, in the case of Molecular Biology, the candidate's research takes her to research institutes, hospitals and veterinary schools. Other candidates have links with philanthropic trusts and charitable organisations. Both

the Astronomy and Engineering cases depict engagement with the media at similar levels. The survey confirms the existence of connections between university, government and industry, and also provides evidence of links with professional organisations. On the basis of the evidence collected from both data sources, the range of external agencies is shown as an open and flexible system in Figure 8.3.

**Figure 8.3—External agencies involved with doctoral activity represented as an open and flexible system**




**What is significant with regard to external agency links in relation to doctoral activity?**

There is considerable variation in the case studies with regard to the number and type of external agencies engaged in doctoral activity (Table 8.7). For example, connections with five or more agencies can be identified in the Cultural Studies, Earth Sciences and Molecular Biology cases. At the other end of the continuum the number is limited to one or two in the cases of Human Sciences, Business Management and Regional Studies. It is also noteworthy that external links operate at a range of levels—local, state, national and international—with many cases demonstrating links at more than one level.

The dynamics associated with establishing and managing external links is one of the most significant features of the case studies. A level of prefiguring exists in some cases, whereby certain links are established prior to the commencement of candidature. For example, in the Molecular Biology case, links with the industry organisation and consortium, along with one of the research agencies (e.g. the 'Trentham Institute') had been established by the principal supervisor in her role as leader of the laboratory. A similar situation occurred in the Earth Sciences case with arrangements pertaining to the CRC and participating organisations up and running prior to the candidate's commencement.

In other cases, however, candidates demonstrate high levels of agency and enterprise. The Cultural Studies case is interesting in a number of respects, particularly given that the candidate was co-author of the ARC grant application in which she would participate as a doctoral researcher. During the submission writing process she identified the industry partner and played a key role in terms of ongoing liaison once the project was underway. There is also evidence to

indicate that this candidate was pro-active with regard to the establishment of links with several museums, galleries, government departments and community agencies that constituted sources of information for her doctoral research. A similar situation occurred in the Anthropology case where the candidate was instrumental in negotiating an internship with an NGO in a developing country, which followed extended dealings with a foreign government around visas and research permits.

**Table 8.7—Levels of involvement with external agencies identified in the case studies**

| Case | Level | Characteristics derived from informant transcripts, websites |
|---|---|---|
| Cultural Studies | High | *type*—government, QANGO, industry, business, community philanthropic, professional<br>*level*—local, state, national<br>*dynamics*—high candidate agency, medium prefiguring of links |
| Earth Science | High | *type*—government, QANGO, industry, research, philanthropic<br>*level*—state, national, international<br>*dynamics*—high candidate agency, medium prefiguring of links |
| Molecular Biology | High | *type*—government, industry, community, research<br>*level*—national, international<br>*dynamics*—high prefiguring of links, medium candidate agency |
| Engineering | Medium | *type*—government, QANGO, research, media<br>*level*—national, international<br>*dynamics*— medium prefiguring of links and candidate agency |
| Astronomy | Medium | *type*—government, QANGO, research, media<br>*level*—state, national, international<br>*dynamics*—medium prefiguring of links and candidate agency |
| Creative Arts | Medium | *type*—government, business, community<br>*level*—national, international<br>*dynamics*—high candidate agency, low prefiguring of links |
| Anthropology | Medium | *type*—government, NGO<br>*level*—local, national, international<br>*dynamics*—high candidate agency, low prefiguring of links |
| Human Sciences | Low | *type*—government, e-networks, community<br>*level*—international<br>*dynamics*—medium candidate agency |
| Business Management | Low | *type*—business, e-network<br>*level*—national, international<br>*dynamics*—medium candidate agency |
| Regional Studies | Low | *type*—e-networks<br>*level*—international<br>*dynamics*— medium candidate agency |

There is also evidence to suggest that there was a more complex set of dynamics involving a number of players fulfilling different roles at different stages of candidature. Technicians were clearly in the driving seat at key points in the Engineering case in relation to identifying and securing access to facilities and equipment that would enable the candidate to conduct advanced experiments and trials. Towards the end of candidature, however, the candidate was initially proactive with regard to approaching a variety of agencies involved with intellectual property issues, but then secured the support of a legal agency to assist in the pursuit of those arrangements. In both the Engineering and Astronomy cases, liaison with the media reflected an interesting dynamic in that while information had been released (e.g. by the publication of academic papers), once the story was picked up, the candidates were approached by commentators from overseas countries as well as Australia.

**How are external agencies contributing to doctoral activity?**

The qualitative data reveal that external agencies contribute to doctoral activity in a host of ways that includes the provision of funding, infrastructure and expertise. In five case studies the government is a source of financial support to candidates in the form of a postgraduate

scholarship. Two other candidates receive scholarships to which industry contributes, namely, Earth Sciences via a CRC, and Cultural Studies in the form of an APAI. However, in the Molecular Biology case, the candidate receives a fellowship to which an industry body contributes in a way that is similar to the APAI scheme. In each of these three cases that involve industry, the partner also provides candidates with a technical budget to assist with conference participation, equipment, materials and so on. While the stipend provided by industry are generally $5000 pa above a standard Australian Postgraduate Award, there is a degree of variation in relation to the technical budgets (e.g. the Earth Science candidate receives $10,000 pa).

External agencies also provide access to technical facilities, equipment and in one case collective databases. In the Astronomy and Engineering cases, candidates travel interstate and overseas to generate data, conduct trials and validate results. The former case involves making observations using telescopes in Europe, the Americas and Asia given that telescopes of that magnitude were unavailable in Australia. In the latter, the candidate was required to travel interstate to gain access to a highly specialised piece of equipment. The processes involved in both cases were somewhat problematic and protracted, given that these facilities were in high demand and involved complex approval mechanisms.

Access to experts, specialists and professionals is a common benefit of being connected to an external agency. Many candidates in this study have picked the brains of experts, requested their hands-on support, or exchanged information and materials with them. In the cases of Regional Studies, Business Management and Human Sciences, candidates used international online communities to gain input from specialists. Those in the fields of Creative Arts and Cultural Studies continue to interact with personnel with whom they had worked previously in a business or professional capacity. Candidates in the Earth Sciences, Molecular Biology and Community Studies cases were exposed to important contacts and networks by courtesy of their industry partners. Links with external agencies have enabled many of them to identify and exploit various opportunities that would normally not be available in conventional academy-based programs, as well as expand their horizons.

Data from the survey confirm that both government and industry are involved in the provision of financial support for candidates engaged in full-time study. While the Australian government contributed to the bulk of scholarships (i.e. over 50 per cent of respondents), industry also contributed to Australian Postgraduate Awards (Industry) Awards (i.e. 5 per cent of respondents), as shown in Appendix 7, Table 20.3. The survey also showed that respondents used the resources of industry for their doctoral research to a significant degree. For example, after university and home-based equipment and materials, respondents indicated they also used those of their employer, an external research agency or an industry partner (Appendix 7, Table 20.21).

A key finding from the national survey, however, was the level of diversity among scholarship providers (Table 8.8). This table provides details of the type of scholarship other than an APA, APAI, IPRS or university scholarship identified by survey respondents. In addition to the main providers (more than 10 recorded listings), other providers were mentioned by a small number of respondents (i.e. one or two respondents) suggesting that the level of diversity may be even higher than illustrated in the table. Select examples included the World Bank, Asian Development Bank, Smart Internet Technology, Road Traffic Authority and the Australian Institute of Sport.

Additional evidence of the contribution of external agencies is revealed in the survey (Appendix 7, Tables 20.16 and 20.18). In survey items 27 and 28 respondents were requested to identify the ‘providers’ of particular kinds of doctoral support activities in which they had participated. To a large extent, the survey confirms the hypothesis that academic organisational units—typically faculties, departments and units—play a significant role in supporting doctoral candidates. The term hypothesis is used because even though there it is generally assumed that

AOUs play a role in doctoral education, limited attention has been paid to the specific nature of that role. For example, Gumport (1993) has identified the department as the major operating unit of graduate education and "the intellectual, social, and administrative home of graduate programs" (p.285). In her discussion of the department's role, Pearson (1999) has highlighted that this approach assumes an "overlap of disciplinary boundaries with departmental structures and physical location, at a time when the relationship is becoming more problematic" (p.281). In research on doctoral student attrition, however, Golde (2005) has maintained recently that "it is impossible to separate completely the effects of discipline and department" (p.695), especially with regard to their potentially negative impact. At the time of writing, it is interesting to observe that two researchers are preparing a book chapter concerned with the influence of the departmental context (Leonard and Becker, forthcoming). One of the points made in an initial draft is that there has been little discussion of the role of the department in supporting—as distinct from administering and trouble shooting—the doctoral experience.

**Table 8.8—Providers of 'other' doctoral scholarships identified by survey respondents**

| Provider | Number |
|---|---|
| NHMRC—National Health and Medical Research Council | 102 |
| CRC—Cooperative Research Centre | 76 |
| Overseas government | 42 |
| Foundation | 37 |
| Industry, company (other than APAI or CRC) | 35 |
| AUSaid | 29 |
| ARC—Australian Research Council | 17 |
| CSIRO—Commonwealth Scientific and Industrial Research Organisation | 15 |
| GRDC—Grains Research and Development Corporation | 14 |
| State government | 14 |

What the survey data reveal, however, is that internal and external groups are playing significant supporting roles. Groups other than academic departments include graduate schools and PGSAs, as well as professional organisations and 'other' external agencies. There is evidence to suggest that graduate schools play an important role in terms of providing training courses and writing groups (e.g. identified by 20-30 per cent of respondents who participated in these activities), and PGSAs are providers of social activities primarily (26 per cent), but also writing groups (16 per cent) and electronic networks (12 per cent). Professional organisations appear to be most active in relation to internships (38 per cent) and electronic networks (23 per cent). It is possible that agencies other than academic departments are providing additional activities which are as yet unspecified. For example, survey respondents registered significant responses to the provision of 'other' supplementary training, namely, 18 per cent for graduate schools and 16 per cent for professional organisations [Appendix 7, Tables 20.16 and 20.18].

The argument presented in this chapter has been that key individuals, academic institutions and external agencies constitute fundamental elements of doctoral activity. By integrating material from the case studies, the national survey and the literature, it has been shown that many players are engaged in the doctoral enterprise. Not only have academic tribes and territories been shown to influence the enterprise, but so too have national research centres, graduate schools and postgraduate student associations. A broad range of agencies beyond the university has also been shown to be having an impact. A key plank in the argument has been that the three entities identified need to be conceptualised as open and flexible systems. In Chapter 9 I shall endeavour to bring together the various systems and to connect doctoral activities and allied entities.

# 9. Constructing a model of the doctoral enterprise

The intention of this chapter is to initiate some preliminary theorising in relation to the analysis that has been informed by reference to theories of practice. The objective is to create a theoretical model that reconceptualises the doctoral experience. The chapter begins with an outline of the purposes that the model is designed to fulfil followed by an explication of its component parts. The centrepiece is the identification a number of core doctoral practices and their relationship to a set of doctoral arrangements.

## 9.1 Delineating the model's purpose and fundamental components

Given that my principle line of argument has been that new constructs are needed to reflect a more accurate representation of the doctoral experience, it is now time to unveil an integrative model that reflects a more comprehensive paradigm of doctoral enterprise. Doctoral enterprise is defined broadly to include the activities, entities and experiences of key individuals engaged in doctoral work. The fundamental purpose of the model is to reflect the complexity, diversity and particularity of the doctoral enterprise in Australia in the first decade of the Twenty-First Century.

The strength of this integrative model will be judged by its capacity to assist theorists and practitioners working in various contexts to construct new meanings and insights around doctoral work. However, it is important at the outset to state that the model should not be perceived as a solution or explanation of this enterprise. Its purpose is to elucidate and stimulate—to provide the means by which the enterprise might be better understood or conceptualised. In other words, the model is designed as a tool for studying this phenomenon in ways that move beyond existing theories and approaches.

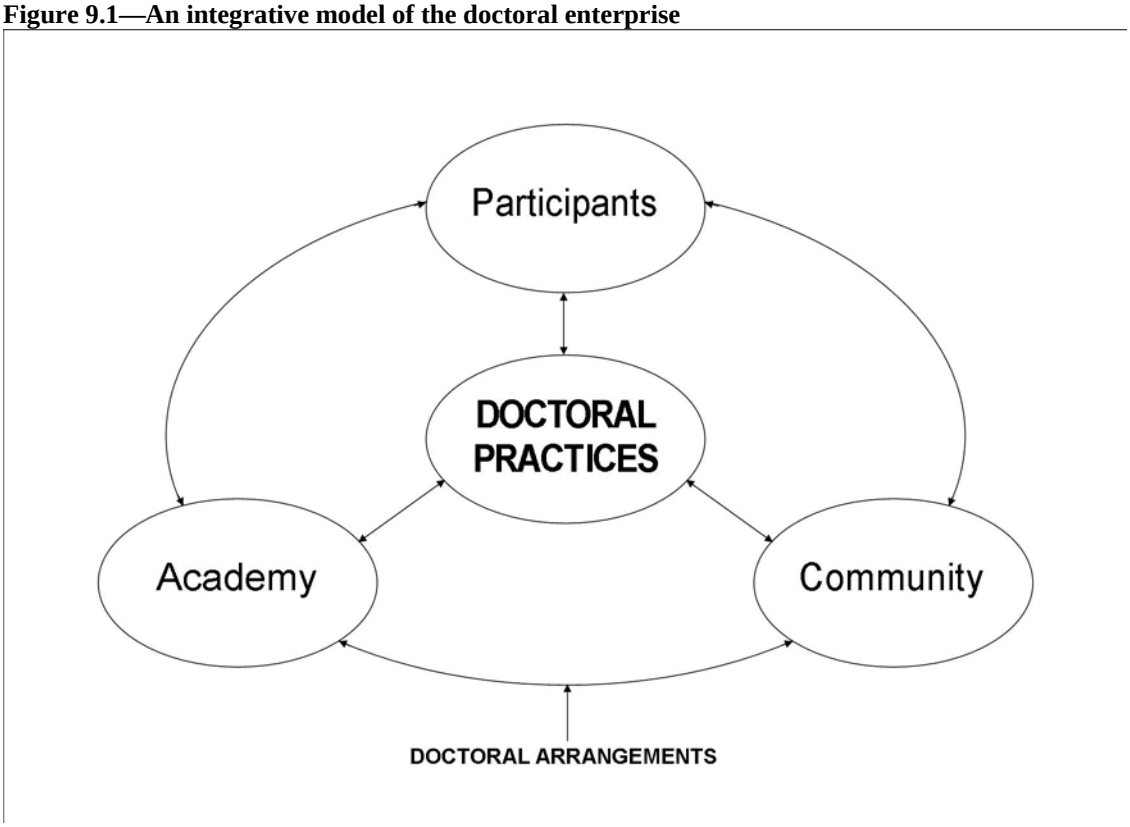
The desirability of exhibiting aspects of qualitative research in multiple formats has been emphasised by two notable researchers in the field who argue that "you know what you display" (Miles & Huberman, 1994, p. 91). In addition to tables and matrices these authors encourage diagrammatic representations in various forms. In the past decade or more, however, the rate of take up does not appear to have matched the zeal of quantitative researchers who continue to develop models as common practice. One advocate working in the field of educational management, however, has recently argued that much greater use of modelling should be made by those engaged in qualitative research (Briggs, 2007). One of her main points is that knowledge constructed through modelling "can be used developmentally as a tool for understanding and an agent for change" (p. 591).

It is possible to conceptualise the doctoral enterprise as comprising two fundamental components—doctoral practices and doctoral arrangements. The former includes the extensive range of organised activities discussed in Chapter 7 as a foundational element. The second category extends the related entities considered in Chapter 8, by incorporating additional factors. By applying Schatzki's ideas and concepts—especially those reflected in what he has termed 'the site of the social' (Schatzki, 2002)—doctoral practices and arrangements are deemed to be mutually constituted. Hence doctoral practices—what those engaged directly in the enterprise actually do and say—are inextricably linked to a set of doctoral arrangements.

The model represents a level of abstraction that goes beyond the analysis of findings presented in Chapters 7 and 8. As a consequence, it is important to clarify briefly how practices differ from activities on the one hand, and the way in which arrangements differ from entities on the other. Essentially doctoral practices comprise a set of organised activities that are connected by way of common understandings and protocols shared by those engaged in the planning and

implementation of doctoral work. Central to the concept of arrangements is the configuration of entities. Hence, when the spotlight is placed on doctoral arrangements it is the meanings, relations and positioning associated with the entities that are illuminated, rather than the entities themselves. In constructing the model, three sets of doctoral arrangements are designated—the participants, the academy and the community.

**Figure 9.1—An integrative model of the doctoral enterprise**




It is interesting to observe that while some practice theorists have presented aspects of their work in tabular format (Kemmis, 2005), few have used diagrammatic representation—in the form of figures, concept mapping and the like. An advantage of a model in the form of graphic is that it provides a visual image of the main components and their relationships. The disadvantage, is that it can either over-simplify the conceptualisation, or lead to obfuscation if too many details are included on a single diagram. In this chapter I shall incorporate a phased process of illustration, and begin by presenting an integrative model of the doctoral enterprise in its most basic form as Figure 9.1. The next step is to discuss the fundamental components of the model in more detail.

## 9.2 Constructing doctoral practice

The types of activity being implemented across the ten case studies were represented as an open and flexible system in Chapter 7. Striking features of that chapter were the number and range of activities undertaken by participants engaged in the doctoral enterprise. Around 40 kinds of discrete activity were identified. Needless to say, the list could have been expanded even further if select activities were to be broken down into smaller elements. The cases reveal that various forms of discussion group are operating (e.g. workshop crits, reading groups, visiting scholar groups …). Similarly, a variety of tasks are being undertaken in the name of data gathering (e.g. observing, collecting, interviewing, measuring …).

In order to manage the diversity identified, preliminary steps were taken to classify these activities. One was to facilitate an initial grouping of activities with common features (e.g. discussion, writing and social group activities) in Figure 7.1. There was also an effort to juxtapose certain activities (e.g. ‘employment-related’ activities such as internships, placements, tutoring, lecturing, marking and research assistance were placed in close proximity). However,

given that the objective of the illustration was to demonstrate openness and flexibility, these groupings were implicit. A more overt strategy was the grouping of activities into familiar categories such as support, training, research, academic and career (Tables 7.1 and 7.2).

Employing the broad theoretical framework developed for this study, however, it is possible to conceptualise these activities and related factors as doctoral practices. This has the immediate advantage of viewing activity from a broader perspective so that the focus is on relationships and patterns, rather than risk becoming bogged down in reductionist analysis. Hence, there is less emphasis placed on determining boundaries, and more attention paid to identifying where intersections and overlaps occur. One of the key factors in practice theory is the focus on the 'organisation' of activities—the way various tasks and assignments are put together. One theorist uses the following phrases to describe this method of clustering: "organised bundles of human activity" (p. 59); "integral blocks" (p. 71); "a set of hierarchically organised doings/sayings, tasks and projects" (p. 73) (Schatzki, 2002). In other words, assembling the activities is more important than delimiting their boundaries.

To that end, one strategy that can be employed is the construction of fewer and more inclusive categories. Titles such as 'curriculum' and 'pedagogy' could be used to designate the grouping of practices associated with the doctoral enterprise. Under the former might be included bundles of activity such as participating courses and organising projects (e.g. field, lab or studio work). Whereas the latter could incorporate interacting with supervisors along with peer learning and other interactive exchanges. Another possibility would be to group activities such as reviewing the literature and data gathering under the heading of 'research' practices. 'Work' practices might constitute another broad category under which various forms of paid, unpaid and voluntary activities might be included.

At first glance, however, this may appear as a variation of the original attempt to classify doctoral activities. Bundling of activities in this way begs a number of questions, for example, how are practices defined and by what means should various activities be grouped together? What criteria might be employed to determine if an activity—participating in courses, for example—is part of a curriculum or a pedagogical practice? In order to address such questions a brief return to the literature is instructive. A number of writers have argued that a practice is a social phenomenon, with some pointing to an integration of activity and organisation. Schatzki, however, identifies four factors that help to explain how activities in any given practice are linked together, namely, practical understandings, rules, a teleoaffective structure and general understandings (Schatzki, 2002, p. 77).

This schema is useful as a means of understanding how a practice differs from an activity and how practices might be constructed. Practical understandings are defined as "knowing how"—which has been described by other writers in terms of the particular knack required to perform a task related to the activity. In other words it is more than just technical knowledge. To illustrate this point Schatski refers to Bourdieu's 'habitus' and Giddens' 'practical consciousness', however, there are many other examples in the literature such as tacit knowledge or 'artistry' (Schon, 1987, p. 25), and 'skilful performance' (Pearson & Brew, 2002, p. 137). A point of departure for Schatzki is his focus on what it makes sense to people to do in a given situation. This theorist argues that know-how is a 'mental state' rather than a skill or capacity per se, coining the term 'practical intelligibility'. In colloquial terms this might be expressed as "nous helps", with a view to capturing the idea that nous (i.e. practical sense, practical intelligibility, practical consciousness and so on) is a frame of mind (i.e. it informs and supports rather than underpins or causes human behaviour).

A set of rules is defined by Schatzki as "explicit formulations, principles, precepts and instructions that enjoin, direct or remonstrate people to perform specific actions". He sees rules more akin to rules of thumb rather than formal statutes or legislation. He defines a teleoaffective structure as "a range of normativised and hierarchically ordered ends, projects and tasks". This means that individuals not only have an eye on the end game, but also experience emotions and

moods. General understandings refer to “social or cultural beliefs and assumptions that are pervasive within a given community” (Schatzki, 2002, pp. 77-86).

**Table 9.1—Doctoral practices**

| **Practices** | **Practical understandings** | **Rules and principles** | **Teleoaffective structures** | **General understandings** |
|---|---|---|---|---|
| **Curricular**<br><br>Negotiating<br>(Re)framing<br>Organising<br>Engaging<br>Evaluating<br>Envisioning | Purposes<br>Knowledge<br>Skills | Entry<br>Originality<br>Creativity<br>Completion<br>Infrastructure | Thesis<br>Projects<br>Proposal<br>Topic<br><br>Passion /<br>/ Ennui | Field of study<br>Program<br>Content |
| **Pedagogical**<br><br>Meeting<br>Interacting<br>Training<br>Networking<br>Collaborating<br>Mentoring<br>Presenting | Flexibility<br>Reflection<br>Scholarship | Supervision<br>Support<br>Reporting<br>Accountability<br>Examination | Qualification<br>Placements<br>Courses<br>Groups<br><br>Enjoyment /<br>/ Frustration | Learning<br>Instruction<br>Assessment |
| **Research**<br><br>Reviewing<br>Designing<br>Generating<br>Analysing<br>Writing<br>Theorising<br>Securing | Ownership<br>Strategy<br>Management | Ethics<br>Methods<br>Validity<br>Reliability | Conclusions<br>Interpretations<br>Findings<br>Questions<br><br>Excitement /<br>/ Disappointment | Problem<br>Evidence<br>Results |
| **Work**<br><br>Publishing<br>Teaching<br>Producing<br>Volunteering<br>Contributing | Resilience<br>Enterprise<br>Balance | Agreements<br>OH&S<br>Peer review<br>Professionalism | Products<br>Services<br>Responsibilities<br>Duties<br><br>Satisfaction /<br>Dissatisfaction | Worker<br>Manager<br>Commodities |

A key point made by this theorist is that the organisation of practice describes the practice’s ‘frontiers’ (Schatzki, 2002, p. 87). This means that the delimitation of boundaries allows for the overlapping and interconnecting of practices—rather than view them as closed systems. Adapting Shatzki’s schema, it is possible to classify four doctoral practices—curricular, pedagogical, research and work—using four criteria—capacities, rules, structures and understandings (Table 9.1). A selection of activities is listed under each practice. The other four columns list examples of capacities (practical understandings), rules, (teleoaffective) structures and (general) understandings. The next step will be to consider each of these core practices in more detail.

## 9.3 Determining core doctoral practices

### Curricular practices

A search of the literature suggests that the curriculum has not been the focus of great deal of research in the field of doctoral education. Connell (1985) was one of the first to acknowledge that the PhD "raises questions about curriculum" (p. 38), however, it would appear that only in very recent times have researchers begun to take up that challenge (McWilliam & Singh, 2002; Gilbert, 2004; Malfroy, 2004; Fraser & Bosanquet, 2006). The contents of Table 9.1 highlight the importance of curricular practices in the doctoral enterprise. They do so by grouping a range of activities identified in the case studies, and drawing on four criteria adapted from practice theory.

Examples of curriculum-related activities include negotiating the substance of the doctoral program—the knowledge to be increased, the skills to be extended and the attributes to be enhanced. Of critical importance is the framing of a problem, or the reframing of existing approaches to an area of inquiry. In general, a host of activities needs to be organised and orchestrated once the design of the study has been determined (e.g. field work, lab work, studio work, project work). Other activities that can be included as part of curricular practices include engagement in intellectual discourse and aspects of academic, professional and community life that are pertinent—but not confined—to a candidate's topic or field of study. Not only is ongoing evaluation of curriculum goals and directions negotiated during the program important, but so is the envisioning of what might follow completion of the doctorate (e.g. career trajectories and future life choices).

Even though the concept of curriculum has not been explored in great depth by those in the relatively narrow field of doctoral education, general understandings about programs, subjects, units of study—specifying goals and objectives along with intended processes and outcomes—pervade the broader field of higher education. In addition, universities have regulations and procedures in place regarding accredited doctoral programs. For example, candidates need to satisfy entry requirements to do with academic achievement, relevant experience and capacity to complete the program as outlined. Creating new knowledge and demonstrating creativity have remained fundamental to the doctorate over time, and there is an expectation that institutions offering the degree will provide appropriate infrastructure (e.g. space, equipment, technology) to support candidates in their quest to achieve those goals. Other precepts include the expectation that a candidate will complete a program in 3-4 years (e.g. in Australia) and that a paper to be published in most academic journals and many international conferences will be peer reviewed.

In undertaking a doctoral program, candidates proceed on the common and agreed understanding that the major outcome will incorporate a thesis—although variations such as an exegesis are possible. To achieve that outcome, candidates may break the process down into a series of stages that include tasks such as determining the topic, formulating the proposal, initiating projects, drafting chapters and so on. It is likely that during these phases candidates will experience emotions on a continuum that ranges from a high level interest in the area of study (e.g. passion), to weariness or becoming completely burned out (e.g. ennui).

The need to have well developed knowledge, skills and experience related to a particular subject area are critical factors in the implementation of curricular practices at the doctoral level. In the Molecular Biology, Earth Science and Anthropology cases, for example, candidates had completed honours degrees in established fields and were seeking to extend their work in those fields. In the Cultural Studies case, a personal passion developed during the course of a career in museums and galleries meant that the candidate had acquired high level expertise outside the academy. In other cases (e.g. Creative Arts, Human Sciences, Business Management, Regional Studies and Engineering), candidates had developed practical understandings in a mix of academic, employment and personal contexts.

The point that needs to be emphasised, however, is the extent to which each candidate in the case studies can be seen to be demonstrating something more than specialist knowledge or technical know-how. There is clear evidence of what has been referred to earlier in this chapter as the incorporation of practical intelligibility or skilful performance in curricular practices. In terms of curriculum negotiation, in the Earth Sciences case, considerable effort was devoted at the commencement of candidature to specifying skills and training that would need to be developed in order to meet the candidate's objectives (e.g. Geographic Information Skills and Optically Stimulated Luminescence). In terms of framing the study, the candidate in the Cultural Studies case refers to the significance of gaining access to "intellectual frameworks, conceptual ideas and seminal texts" from other disciplines that were "essential not only to the development of the database but also to the thesis".

Many candidates seized opportunities and took initiatives that combined their understandings and skills that clearly enhanced the quality of the curriculum which they were enacting. Examples include the Anthropology candidate who negotiated an internship in a developing country; the Earth Sciences candidate who contributed actively to two international projects; and building on a wealth of understandings, skills and experience. There are also examples of candidates being quite strategic about advancing possible career options during candidature, especially in the Astronomy, Regional Studies and Molecular Biology cases.

**Pedagogical practices**

Pedagogy has received considerably more attention than curriculum in the field of doctoral education, although the bulk of research has been concerned with supervision in the relatively narrow context of research training. A number of researchers, however, have argued that pedagogy should be more broadly defined and accorded much higher status (Evans & Green, 1995; Green & Lee, 1995; Lee & Green, 1997; Lee & Green, 1998; McWilliam & Palmer, 1998; Johnson, Lee et al., 2000; Pearson & Brew, 2002). For example, two writers have highlighted the value of candidates engaging in critical reflection with other experts in order to develop their capacity "to transfer their new expertise to different problems and contexts" (Pearson & Brew, 2002, p. 141).

While learning, instruction and assessment are common and agreed functions of doctoral education, there is probably less agreement about their priority or the way in which they should be implemented. As the literature shows and the case studies confirm, a number of pedagogical principles underpin the doctoral enterprise, especially around supervision, examination and accountability. These are often spelled out on university websites and in-house manuals designed for candidates and supervisors. Procedures for candidate support—for example, funding for conference participation or assistance with post doctoral planning initiatives—are sometimes less well articulated, and revealed on a need-to-know basis.

A feature of the case studies is the social nature of pedagogical activities. There are multiple examples of peer learning that are occurring in structured and unstructured situations. Academic organisational units, graduate schools, PGSAs and other groups are active in setting up training and collaborative activities to promote intellectual discourse on a regular basis. Many candidates demonstrate high levels of agency by identifying individuals within and beyond the academy who provide them with the kinds of expertise and knowledge they require. But of course pedagogy is not a one-way track, especially at the doctoral level. There are many instances in the case studies where candidates are engaged in formal academic teaching (e.g. as lecturers, tutors and demonstrators at the undergraduate level), as well as on an informal—and often reciprocal basis. The Cultural Studies case provides a powerful example of two candidates engaged in mutually beneficial teaching and learning.

It is the practical understandings, however, that are of greatest significance in pedagogical practices at the doctoral level. The practical intelligibility of candidates is demonstrated in many of the case studies, particularly with regard to their capacity to grasp the learning requirements

of a situation and to develop strategies to address them. One such understanding is flexibility—the ability to change direction, reframe a problem or try another approach. Select examples from the case studies include the capacity of the Anthropology, Human Science and Business Management candidates to change their topic and initial approaches when circumstances demand that they do so.

The capacity to reflect critically on one's progress is another type of practical understanding. Select examples from the qualitative data include the Earth Science candidate who in response to declining motivation and a desire to apply aspects of what she had been learning and researching, decided to take six months leave of absence to contribute to an international project as a volunteer. The Cultural Studies candidate came to the realisation that her conventional approach to recording and mapping voluminous quantities of data was highly problematic and secured assistance to enable her develop a computerised database. Once again, this needs to be seen as a two-way process, with a good example being the supervisor in the Human Sciences case who moved quickly to re-orient a candidate whom she perceived to be a 'lone wolf' who had 'fallen out with his supervisor'.

There is also a level of practical understanding associated with scholarship. While most candidates have strong academic records or are well-versed in scholarly processes, there is more to scholarship than technical skills often associated with rigorously conducted experiments or erudite academic writing. The ten cases demonstrate that some candidates have the capacity to mould aspects of academic learning to suit the situations in which they find themselves. Although the candidates in the Astronomy, Molecular Biology and Cultural cases were meticulous in their observations and record keeping, they were able to extend their technical scholarship in strategic ways. The candidate in Astronomy sought ways to integrate the refereed articles she had co-authored as the backbone of her thesis. The other two cases used scholarship as a means of preparing submissions for funding to conduct research.

Finally, there are teleoaffective structures—the mix of end points and mind sets—that candidates employ in the implementation of pedagogical practices. They arrange multiple tasks and projects designed to culminate ultimately in the degree which may include courses, placements, internships and residencies at strategic points during candidature. As they plan, implement and evaluate these activities their emotional disposition can change. The frustrations experienced by the Anthropology candidate in negotiating his internship were followed by feelings of satisfaction associated with experiential learning. A gamut of emotions was experienced by the Astronomy candidate with the publishing of two related refereed papers. The Engineering candidate's frustration with delays experienced in accessing external testing facilities is part and parcel of the sequential research process.

**Research practices**

A creative tension exists in the literature—and in higher education policy—with regard to the role of research in doctoral education. Essentially the tension revolves around whether the main purpose of the doctorate is to train and prepare candidates for research (e.g. in a post-doc position); to conduct authentic research (e.g. that will influence research and development); or to fulfil both roles (i.e. to prepare and produce). One researcher has been exploring these and other questions for a decade or more, acknowledging the fluid nature of the relationship between pedagogy and research. Her argument is that "since doctoral students are both learning how to do research and contributing to research and producing knowledge as they learn, it is the intersection of pedagogy and research policy and practice that is of significance in understanding how research education proceeds" (Pearson, 2005, p. 120).

Other researchers have explored the role of research in different types of doctorate, often comparing traditional PhD with professional doctorates (Laing, 2000; Lee, Green et al., 2000; Scott, Brown et al., 2004). One writer highlights the distinction between programs that aim to produce a professional researcher and to produce a researching professional (Laing, 2000, p. 5)

also cited in (McAlpine & Norton, 2006, p. 11). These and other studies highlight the changing research context (e.g. international, global …) and approaches (e.g. Mode 1, 2, 3 …). The literature on doctoral education also considers specific topics pertaining to research and doctoral candidates. One example is the conceptualisation of writing as a social practice that is central to the work of knowledge production (Lee, 1998; Aitchison & Lee, 2006). Another is the promotion of 'criticality' with a view to enhancing the professionalism of doctoral researchers (Barnacle, 2004, 2006). Hellawell (2006) has used the 'insider-outsider' concept as a heuristic device to develop reflexivity in students doing qualitative research.

Returning to the material contained in Table 9.1, what constitutes a problem, evidence and results in research is readily understood among those engaged in the doctoral education. There are also principles and procedures regarding how research should be conducted. Some rules are explicit and enforcable (e.g. by Ethics Committees), while in others there are implicit and in the form of guidelines around approaches (e.g. quantitative methods) and techniques (e.g. sampling) which have been expounded in texts on research methodology (Frost, 1992; Denzin & Lincoln, 2000). While these and other texts often portray research as a set of linear and logical steps—questions, findings, interpretations, conclusions—there is also acknowledgement that in reality the process is rather 'messy' (Mellor, 2001). Similarly, while research is represented more often than not as a highly objective and dispassionate exercise, in practice it can be highly charged. This can be registered on a personal continuum from excitement to disappointment, as well as in the subjectivity demonstrated on the part of the researchers involved in the research.

Both the case studies and the national survey demonstrate that doctoral candidates are engaged in a plethora of research activities. These include reviewing the literature, designing the approach, generating and analysing data, writing, theorising and securing intellectual property and other clearances. It is the practical understandings, however, that are of greatest interest because they provide one of the most effective means of connecting these activities with a view to depicting them as part of a research practice at the doctoral level. Some of these understandings include ownership of the research, being strategic in its operation and demonstrating a capacity to manage the research process in a way that is grounded but also connected.

Examples of practical understanding in the case studies include a number of candidates who demonstrated ownership of their research virtually from the first day of enrolment (e.g. Engineering, Earth Sciences and Cultural Studies). These candidates had identified the specific problem they wished to investigate and remained intent on resolving it, employing methods that they had determined—albeit in collaboration with their supervisors. Some candidates were quite strategic in the conduct of their research, especially in terms of grabbing opportunities and responding to challenges in ways that influenced the direction or outcomes of their research. Making a contribution to international research projects was a significant feature of the Astronomy, Engineering Earth Science cases and demonstrated these candidates' capacity to apply the knowledge and expertise they had acquired in authentic (i.e. non-academic) settings.

The cases also illustrate the way in which some candidates managed their research as a discrete and contained project, often demonstrating highly developed personal and organisational skills (e.g. Regional Studies, Engineering and Human Sciences). Candidates in these cases seemed to have a knack of operating beyond mere technical competence and which integrated agency and structure. However, there were also instances where there was shared management of the research, especially when an industry partner was involved, and/or the research was embedded in the research of a supervisor or an AOU (e.g. Molecular Biology, Cultural Studies, Earth Sciences, Astronomy). The tension identified at the beginning of this section around the role of research in the doctorate is also illuminated, with the Regional Studies case being the most explicit in terms of the emphasis placed on training and preparation. The supervisor, and by implication the candidate, adhere to the view that doctorate is a 'driving licence' (i.e. rather than a licence to explore or produce outcomes that will influence). At the end of the day, however,

supervisor and candidate collaborate with a view to turning the completed thesis into a book. Several cases portray candidates as authentic producers given that the impact that their research is having on the wider community as well as their field of study (e.g. Engineering, Astronomy, Earth Sciences).

**Work practices**

The tension explored in relation to research practices extends to work practices. The concept of production—in the form of knowledge, artefacts, services, markets and so on—is bound up with the fundamental purposes of doctoral education. There is a similar begging of questions around outcome and process, tangibility and intangibility, and remuneration and voluntarism. For example, is it helpful to conceptualise doctoral education as preparation for work, legitimate work, or a combination of the two? To a large extent it depends on how work is defined. Rather than become bogged down in definitional issues it might be productive to begin once again by reviewing the literature on doctoral education in order to consider the way in which work has been conceptualised.

In the first chapter of this thesis the perspective of the CIs was noted in relation to the desirability of positioning candidates as producers—especially given that they concurred with other research suggesting that for postgraduates "conceptualising the final stages of student life as transition to work or graduate employment is deeply flawed" (Ross, 2001.p. 21). It is flawed for two reasons that have been illuminated in this study. First, many candidates have extensive experience of the world of work prior to enrolment. Second, many candidates perceive of their candidature and doctoral research as work. Researchers other than the CIs have explored the concept of candidates as workers, especially knowledge workers (Candy, 2000; Lee, Green et al., 2000; Barnacle, 2004). Others have focused more specifically on the relationship of doctorate and doctoral research to the knowledge economy, working knowledge and performativity (Usher, 2002; Tennant, 2004; Boud & Tennant, 2006). A few have focused on programs designed explicitly to link doctoral education and training with the world of work and career development (Powles, 1996; Enders, 2004; Harman, 2004).

In the field of doctoral education there are few for whom terms such as worker, manager, commodities, markets, remuneration and other key factors associated with the world of work are not readily understood. There are also various principles and procedures associated with the implementation of work—regardless of whether this is undertaken in a paid or voluntary, on or off campus, or central or peripheral to doctoral research. These include various forms of agreement, which may range from a formal contract to an implicit understanding between individuals about a series of duties, tasks or responsibilities to be enacted. Processes regarding occupational health and safety, peer review of academic publications and the demonstration of professionalism may be articulated in policy statements or simply inculcated through exposure to the work environment.

There are many types of work activities that have been recorded as part of the qualitative and quantitative dimensions of this study. These include publishing, teaching, producing, volunteering and contributing to various communities. Publishing has been classified as a work activity because most academic publications are subject to peer review. Hence the artefact produced is of a different ilk to that of say doctoral writing or research. A refereed article or a successfully examined thesis is an endorsed product or commodity and can be regarded as value-added. As such it differs from curricular, pedagogical and research practices. There are also emotions associated with the achievement of bottom lines and other end products, that for example, might range from high levels of satisfaction to dissatisfaction, motivation to disinterest, or confidence to fear.

Practical understandings such as the capacity to demonstrate stamina and resilience in workplace contexts, to display imagination and enterprise, and to maintain an appropriate work-life balance are illustrated in the ten case studies. While staying power, persistence and

determination can be regarded as personal attributes, they can also be conceptualised as frames of mind that predispose an individual to be productive. Important aspects of work practice involve not just the carrying out of tasks but responding to challenges and set backs, but completing them to an acceptable standard. Academic work—in the form of part-time paid employment—was a feature of five case studies (i.e. Anthropology, Creative Arts, Earth Sciences, Molecular Biology and Regional Studies). Four candidates undertook formal training to enhance their skills with a view to reaching what they perceived an acceptable standard—even though this was not made explicit. The publication of refereed papers was illuminated in three cases (i.e. Anthropology, Astronomy and Business Management), with the Astronomy case constituting the most powerful example of a candidate's capacity to deal with challenges associated with overt and covert expectations and standards.

Examples of enterprise in work settings were reflected in the Engineering and the Creative Arts cases. In the former, the candidate began to explore possibilities for commercialisation of his research findings towards the end of his candidature. In the latter, the candidate's used his part-time employment in the advanced facility as an opportunity to hone his skills and apply them to his doctoral work. The volunteer work of the Earth Sciences candidate is a compelling example of creativity and enterprise given that part of her rationale was to test out the applicability of her academic knowledge in a real-world context. It is important to note that were many other examples of enterprise depicted in the case studies, but these can be classified as pedagogical and research practices (e.g. the Anthropology candidate's negotiation of an internship, the Creative Arts candidate's undertaking of an overseas residency).

There are several instances of candidates establishing and maintaining a balanced approach to work-related aspects of their projects. The Regional Studies case shows most clearly the candidate and a peer engaged in the management of family and employment responsibilities with their doctoral research work. The Cultural Studies candidate is depicted as managing a complex arrangement involving two home and research sites. Other cases reveal candidates balancing the demands and expectations of academic and industry partners, and/or those of other providers (e.g. scholarships and awards).

## 9.4 Doctoral arrangements

As illustrated in Figure 9.1 doctoral arrangements comprise the participants, the academy and the community. A diverse range of *participants* is engaged in the doctoral enterprise, who occupy positions that lie outside and inside the academy. Examples include researchers in industry, professionals and community members, as well as candidates, supervisors, advisers, peers and technicians. When conceptualised as an open and flexible system [Figure 7.1], these participants can be configured in multiple ways. Some relationships are pre-determined in accordance with established processes and procedures. For example, most universities mandate that each candidate has at least one supervisor, and endeavour to provide them with access to an appropriate level of support staff. However, other relationships are less formal and involve participants in coupling, uncoupling and regrouping as the need arises. Participant identities are determined in large part by their relationship to one another, which may change over time and in different settings. For example, a candidate can be represented as a novice in some circumstances and an expert in others—depending on the situation and circumstances.

The *academy* incorporates a diverse range of structures and resources. Defined broadly, the academy includes not only the host institution, but universities in other states and in other countries as well. There are many forms of academic organisational unit together with a host of support groups that include graduate schools, associations and committees. While disciplinary and other cultures can be readily identified, there are additional factors with the potential to influence participants of the doctoral enterprise such as infrastructure and resources. Ready access to up-top-date technology, materials and other physical resources can be as important to some candidates as a critical mass of peers, postdocs and researchers is to others. Operating at

local, national and international levels—in physical and virtual environments—the academy is represented in the model as a fluid and dynamic resource that is influencing participants engaged in this enterprise to varying degrees.

The third element is the *community*, defined broadly to embrace those entities that are impacting on the doctoral enterprise, but from outside the parameters of academia. At one level there is a host of external agencies, such as business, industry and philanthropic groups providing hands-on support in the form of funding and expertise in many cases. At another, there are government, quasi-government and non-government agencies that in addition to financial resources may be advancing political, social and other policy driven agendas which may be positive or otherwise. In addition, media and interest groups avail themselves of the opportunity to make judgments in relation to aspects of the doctoral enterprise, in ways that may be detrimental or sympathetic to the objectives of the participants involved.

**Configurations of arrangement**

In this model, the participants, the academy and the community are represented as open and flexible systems. Each of these elements is composed of a number of sub-elements that can be arranged in multiple ways in response to changing circumstances, or to achieve identified goals and objectives. As the double-headed arrows linking the three elements indicate, however, relationships also exist at the level of doctoral arrangements. Just as the sub-elements can be configured so too can the elements, so that the participants, the academy and the community are being arranged and rearranged a continuing basis. A practical example can be drawn from the Molecular Biology case where the candidate's research is embedded in that of her supervisor; the university provides the laboratory and facilities that enable her to conduct her project; and external agencies such as the Chicken Consortium provide financial resources in the form of a fellowship and technical budget in support of the research.

In his conceptualisation of the site of the social, Schatzki discusses the "the way that things are laid our or hang together" (p. 1), "the existence of nexuses" (p. 18), and "the arrangements of entities" (p. 24) (Schatzki, 2002). He uses the term 'orders' to describe the process of configuration. He also makes the point that social order must encompass not only stability and instability, but also regularity and irregularity. In other words, orders and arrangements need to be seen as in a constant state of flux. When the concept of arrangements is applied to the doctoral enterprise, it is possible to conceive of the participants, the academy and the community as being brought together in a multiplicity of ways—within as well as across established disciplines. As a consequence, different relationships are initiated, alternative positions established and various meanings generated.

There is considerable evidence in the case studies to illustrate the nature and extent of configuration—that includes pre-configuration and re-configuration. In the Human Sciences case, for example, changes to supervisory arrangements occurred on two occasions within a twelve-month period. From the perspectives of three informants the candidate was viewed as being 'dumped' by his original supervisor, 'rescued' by a second supervisor, and then independently seeking a third supervisor from another university. These three episodes position the candidate first as victim, second as needy, and third as proactive. From the perspective of researcher, the candidate can also be seen as operating from home, accessing a range of local and international networks, while maintaining links to the host university through the weekly seminar program. Hence, the way in which the participants, the academy and the community are arranged are varied and subject to ongoing modification. The analysis of the open-ended survey questions reflected the complex nature of the relationships and positioning identified by candidates.

Looking across the cases, the three elements were present in each narrative but configured in different ways and with varying levels of intensity. Strong relationships could be identified between the participants and the academy in most cases. The relationship with the wider

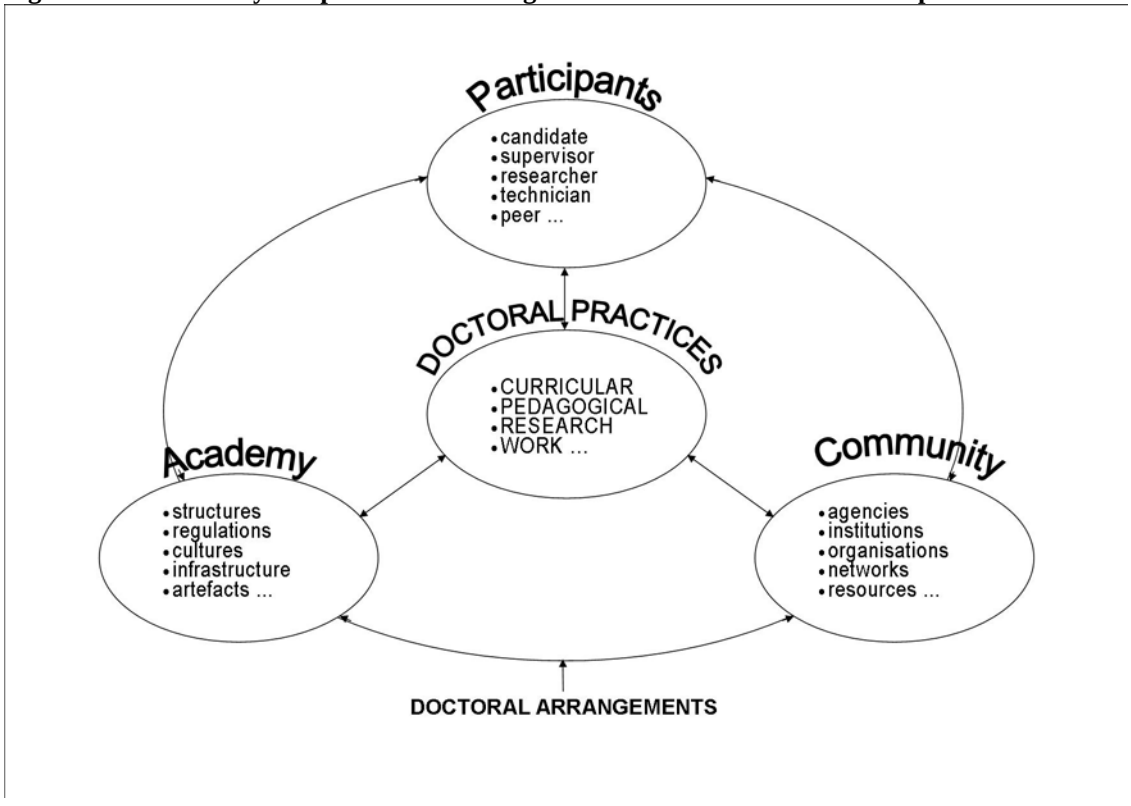
community was high in some cases (e.g. Cultural Studies, Earth Science, Molecular Biology), moderate in others (e.g. Engineering, Astronomy, Creative Arts and Anthropology), and low in the remainder. In addition, the nature and extent of relationships changed during candidature. For example, links with the community were particularly strong in the early stages and tended to become less intense subsequently (e.g. industry partnerships in Cultural Studies, Molecular Biology); some were strong during a particular stage of candidature (e.g. the internship in Anthropology); while others were sustained throughout (e.g. international research agencies in Astronomy, links with CRC contacts in Earth Sciences). It is now time to explore the links between practices and arrangements.

## 9.5 Interrelationships between practices and arrangements

An expanded version of the integrative model of doctoral enterprise incorporating its secondary components is shown as Figure 9.2. The purposes of this diagram are to summarise the main points from the preceding discussion; to illustrate the complexity underpinning the basic elements of the original model; and to point to the links between doctoral practices (i.e. curricular, pedagogical, research and work) and doctoral arrangements (i.e. the participants, the academy and the community). The focus of this section will be on interrelationships between doctoral practices and arrangements.

There are two fundamental tenets of practice theory that provide a useful means of exploring these interrelationships. First, practices and arrangements are mutually constituted, whereby each determines the other—its shape, composition, direction and so on. It also suggests that their subsets—the plethora of activities, people, infrastructure and artefacts—can be seen as interwoven strands forming an intricate fabric. A strong advocate of practice theory describes this interaction between practices and arrangements as a "single mesh" (Schatzki, 2002). At the same time, however, Schatzki is quick to point out that this should not be interpreted as a totality, but an endorsement of complexity, diversity and particularity. His conceptualisation of the "site as an overall phenomenon" provides a way of generating a holistic perspective without becoming implicated in the provision of a complete explanation.

**Figure 9.2—Secondary components of an integrative model of the doctoral enterprise**



Second, practices and arrangements are in a constant state of flux. Given that they are continually interacting with each other, their influence creates a dynamic whereby change is the norm. Schatzki uses phrases such as a "constantly evolving nexus of arranged things and organised activities", and a "continuously churning enveloping horizon" to capture this sense of ongoing development (Schatzki, 2002). Not only can practices and arrangements be viewed in terms of an entangled fabric, mesh or web, but this phenomenon is in a perpetual state of motion. Hence, it can never be captured in its entirety or fully explained. Only glimpses of its complexity can be revealed at given moments in time.

While Schatzki's has the capacity to conceptualise a sophisticated theory of practice, it is his ability to articulate this in a language that is clear and concise that sets his apart from others in this new and burgeoning field. However, the periodic citation of his work in this thesis does not mean that I accept his theory in total or to downplay the role played by others in my thinking. There is a degree of commonality among practice theorists—especially with regard to the significance of social, cultural, historical and other factors—conceptualised by one writer as "extra-individual features" of practice (Kemmis, 2005, p. 393). Kemmis provides a valuable insight on the prime task of a theory of practice which he describes in terms of accounting for the relationships between thought and action in space and time. In his words this task is to account for "how each relationship and mutual constitution develops locally and more widely in space-time, and how each developing or unfolding relationship influences, constrains, stimulates and shapes the others" (p. 398).

Essentially, what I have endeavoured to do in this thesis is select and apply particular components of practice theory—which by and large have been focused on practice in other contexts—and adapting and applying them to the doctoral enterprise. Some theorists have been concerned primarily with 'social' or 'cultural' practices (Bourdieu, 1977; Giddens, 1984; Schatzki, 1996; Pickering, 2001; Swidler, 2001). The focus for others has been on 'professional' practices (Schon, 1987; Higgs, Titchen et al., 2001; Kemmis, 2005; Schwandt, 2005). Needless to say, doctoral practices have been central to my research and the work of such theorists has informed it considerably. If I were to challenge Schatzki, it would be on the basis that his theory is illustrated by just two examples—the Shaker village of New Lebanon, New York in the mid-nineteenth century and contemporary day trading on the Nasdaq market. By devoting so much time and energy to the sample of doctoral candidates in my qualitative research, I am confident that working from an empirical base has validated Schatzki's theory to a significant extent.

The tenets outlined in this section help to generate a deeper understanding of the doctoral enterprise. The four doctoral practices that have been identified constitute integral blocks of activity that affect the way in which the participants, the academy and the community interrelate. Similarly, doctoral arrangements influence the development of curricular, pedagogical, research and work practices at the doctoral level. Rather than labour the point by outlining how a discrete practice or a particular participant creates an impact, a macro-level perspective will be employed from this point.

**Arrangements shaping practices**

The qualitative and quantitative dimensions of this study demonstrate that there are a number of interrelationships between practices and arrangements. At first glance, the impact of arrangements on practices is more readily identifiable—possibly because of established conventions associated with exploring the influence of environmental factors on individuals and groups. Hence, building blocks of the academy—disciplinary knowledge, departments, facilities, texts and so on—can be seen to be shaping sets of organised activity. In each of the ten cases academic influences are pervasive. Infrastructure in the form of observatories, laboratories and studios prefigures what participants do to a large extent in some cases (e.g. Astronomy, Molecular Biology, Engineering, Creative Arts). In others prior knowledge and respected methods are in the foreground (e.g. Regional Studies, Anthropology and Cultural

Studies). The expectation that fieldwork will be conducted is high in three cases (i.e. Anthropology, Earth Sciences and Cultural Studies). However, its impact is shown most clearly in the Anthropology case where, even though the potential for 'fetishism' is acknowledged, this is still pursued despite the interdisciplinary approach of the AOU.

Interrelationships between the community and doctoral practices tend to be most visible with regard to the provision of practical support. Governments, industry, professional and other groups provide physical and human resources that influence the scope and direction of doctoral practices. This can be readily observed in cases where industry partners are shaping curriculum practices (e.g. Molecular Biology, Earth Sciences and Cultural Studies). It can also be detected in cases where work practices are being influenced by the take up of the outcomes of doctoral research (e.g. Engineering and Astronomy). A good example of the interrelationship between the community and doctoral practices is the impact of the CRC in the Earth Sciences case where it is having an impact on a number of practices simultaneously. In addition to contributing to the curriculum and work practices, it is having an effect on pedagogy by facilitating the development of writing and other support groups.

Participants have a bearing on doctoral practices as well, most notably in terms of specialist knowledge and expertise on the part of supervisors, as well as the research and development they may have conducted previously. The influence of the supervisors is illustrated in cases where they had determined the topic (e.g. Astronomy, Molecular Biology), or was highly instrumental in facilitating access to certain doctoral practices (e.g. Engineering, Cultural Studies, Regional Studies). The background and experience of candidates can also be identified as significant in affecting the practices of which they became part (e.g. Business Management, Human Sciences and Creative Arts). In addition the mediating role of the technician in the Engineering case was evident in the practices at the level of the department as well as the individual candidate. The Molecular Biology case, however, provides one of the powerful examples of the impact of a supervisor given that her extensive retraining resulted in new research, curriculum and pedagogical practices being developed.

**Practices shaping arrangements**

When viewed from another perspective, the influence of practices in the doctoral enterprise can be seen to be equal or greater than that of arrangements. One practice theorist, for instance, is in no doubt that practices form the context in which arrangements are constructed. He argues that "practices establish *particular* arrangements (author's emphasis). These arrangements are definite packages of entities, relations, meanings and positions, whose integrity derives from the organizations of practices" (Schatzki, 2002, p. 87). This is a significant point of departure from Bourdieu and Giddens who argue that it is practices themselves that govern people's actions.

The case studies, national survey and literature show that doctoral practices play a key role in shaping aspects of the academy. Greater diversity in research (e.g. Mode 1, 2, 3 …); increased innovation in curriculum (e.g. inter- and trans-disciplinarity); further integration of industry participation (e.g. CRCs, APAIs); and more collaborative pedagogy (e.g. peer learning, mentoring) have resulted in significant changes to academic environments. Structural adjustments include the burgeoning of AOUs other than departments, the expansion of graduate schools across the country, and a more strategic role for postgraduate student associations. Cultural transformations include new and broader perspectives within and beyond academic tribes in the light of increased exposure to a wider range of views from within and beyond the academy, for example, government, industry and the wider community. The commodification of knowledge has meant a much greater emphasis on matters pertaining to intellectual property and commercialisation issues. Fundamental questioning has also occurred in relation to the purposes of doctoral education.

The case of the Creative Arts—a comparatively new field of study—provides a good example of the influence of doctoral practices on the academy given the implementation of an alternative

model of the doctorate (i.e. studio practice 67 per cent, dissertation 33 per cent and a studio report); the integration of work (e.g. provision of part-time employment for candidate and enactment of professional exhibition/performance); and the promotion of a collaborative culture (e.g. workshop crits, postgraduate meetings, theory classes spanning specialist fields). Other research confirms that "academics are artists, dancers, singers, musicians, curators art theorists or art historians are expected, as part of their professional obligations, to maintain and develop their professional expertise and professional standing" (Strand, 1998, p. 18). The Cultural Studies case is interesting too, given the innovative approach to visiting scholar, writing and other groups, as well as the facilitation of intellectually strong support networks. However, these examples also illustrate the extent to which practices and arrangements reflect a process of co-determination.

The impact of doctoral practices on the community has been seen frequently in terms of the take-up by industry and business of theoretical knowledge (e.g. the commercial application of an idea). The Engineering and Molecular Biology cases suggest that this form of academic-industry coupling is still operating. What is more difficult to determine, however, is the nature and extent of the effect of these practices on external agencies, institutions and networks. While the website of the CRC in the Earth Sciences reveals that access to "a large cohort of PhD and Honours students" is a significant factor in addressing its "strategic research priorities", there is no information on the effect of the cohort.

Kay Harman (2002, 2004) has researched the work of CRCs in the context of doctoral education, although her focus has been on the student experience and their attitudes to industry. This researcher points to the fact that "from their beginnings and in line with business practice of industry, managerial cultures have dominated CRCs" (Harman, 2002, p. 473), but is silent on how those cultures may have been affected. A longitudinal study of the APAI scheme explored the issue of "cultural differences" over a decade ago and found that the level of disagreement on the part of industry partners actually increased—from 27 per cent to 39 per cent—with regard to the statement: cultural differences between universities and industry can be easily bridged (Powles, 1996, p. 62).

The Earth Sciences case study demonstrates a high level of preparedness on the part of the CRC generally—and of one industry based researcher specifically—to engage the doctoral candidate in a practical research project. This suggests a degree of openness and acceptance of doctoral practices by industry that constitutes an authentic bridging of cultural difference—relative to the limited number of studies that have been conducted on academic-industry links at the doctoral level. One of the most striking features of the Molecular Biology case is that industry links are of more than twenty years standing, which suggests that any major cultural differences have been resolved or at least accommodated over time. The Creative Arts case also suggests that the level of cultural difference is low, given the willingness of the arts industry to embrace doctoral practice.

This study highlights the relationship between doctoral practices and community groups (e.g. Cultural Studies, Anthropology, Earth Sciences, Human Sciences and Engineering). The Cultural Studies case probably illuminates the impact most effectively given that the community group with an interest and commitment to the collection welcomes the opportunity to become engaged in the research and to understand its significance beyond the local context. In the Anthropology case, there is evidence to suggest that the doctoral practices of the candidate are having an impact on the NGO generally, as well as staff and clients in particular, with regard to broader understandings of human rights issues. Similarly, religious as well as environmental groups are subject to the influence of the candidates' practices in the Human Sciences case.

Turning to interrelationships between doctoral practices and participants, the impact on supervisors and candidates is most noticeable. In most of the cases there is evidence to suggest that the thinking and approaches of supervisors is being mediated by their students. A supervisor in the Earth Sciences sums up the curriculum context succinctly when he states that

“if people didn’t have PhD students, their own research would become fossilised in most cases”. The impact of research practices can be observed in several cases, but most noticeably in the Astronomy case, where as the supervisor commented that “while Lisa had been working a little to the side of our existing research, her discovery became central to it”. There is little doubt that candidates themselves are affected by the practices in which they are engaged, especially in terms of alignment—the extent to which they conform to or challenge accepted norms. This is most clearly demonstrated in the Human Sciences case. It is also a key feature of the Engineering and Astronomy cases, and to a lesser extent in every other case.

At the same time the impact is diffused more widely in the doctoral enterprise—advisers, researchers and technicians. Indeed, an interesting feature of the interview process with the ‘significant individuals’ was their positive reaction to being identified as a significant player in a candidates research. While a number of supervisors weren’t unduly surprised at their nomination, peers and other individuals were more likely to be so—possibly unaware of the extent of their impact. A technician commented “I was quite flattered to be nominated in that capacity, and very pleased”. Beyond the emotional dimension, there was some evidence that doctoral practices were affecting individuals in other ways, given that this technician also revealed that his experience with doctoral candidates had influenced the development of a more structured approach to the supervision of his honours students. In his words, “I emphasise the need for two plans, one for publishing and one for future planning—where you are going and what you want to get out of it. You really need to do this at the very start, even jotting down possible chapter headings so you know what you are aiming for. A number of supervisors with whom I’ve worked have not done that”.

However, it should also be acknowledged that the Engineering case can also be regarded as aberrant, given that there is limited evidence to suggest that the candidate was able to have an effect on the dominant culture of the AOU. There was also a theme in that case—as well as in Astronomy—regarding the impact of candidates who experienced success—especially when research outcomes were reported in the media. In both cases, the ‘tall poppy syndrome’ may have been operating, as a reflection of the competitive cultures of some disciplines and AOUs. However, this might also have been part of a long-standing reluctance on the part of some academics to respond in the public domain to what they perceive to be private matters. While both candidates endeavoured to brush off the lack of response from fellow candidates and staff to public acknowledgement of their achievements, when pressed, they admitted to experiencing very negative feelings. As the Engineering candidate commented, “while I’m reluctant to say I am hurt, I am, and it does hurt me … It devalues you. It minimises you”.

It is worth reiterating at this point that the integrative model of the doctoral enterprise discussed in this chapter constitutes a major outcome of the thesis. Theorising involved in its development draws heavily on theories of practice with a view to developing deeper meaning and new insights to the integrated research findings. In order to bring the thesis to a close, the final chapter will return to some of the key objectives identified in the opening chapter to determine the extent to which these have been met.

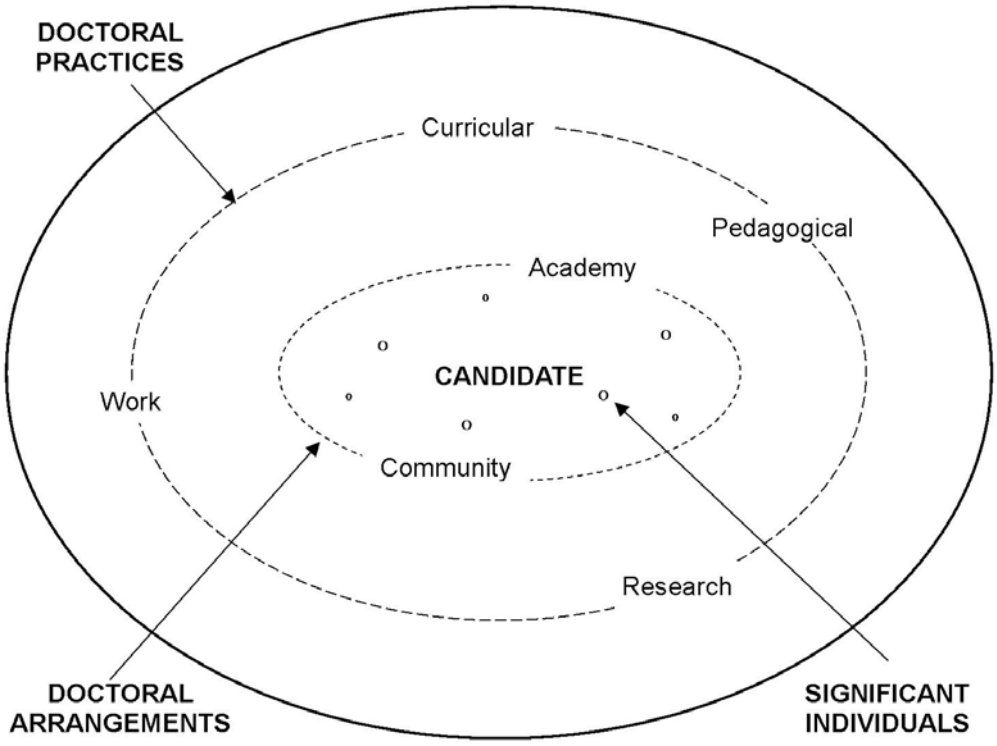
# 10. Considering the potential impact of this research

The final chapter substantiates the claims made and arguments presented in this thesis with a view to discussing their possible impact on contemporary discourse. The focus is on the integrative model of the doctoral enterprise, and how it might be used to promote informed debate and possibly action, at individual and institutional levels. Rather than confining discussion of doctoral enterprise to the academy—those with responsibility for doctoral education, for example—it is suggested that aspects of this thesis generally and the model in particular, need to be considered by a broader range of stakeholders. The chapter begins by repositioning the candidate in the model, with a view to revisiting the discussion in the first chapter around the doctoral experience. After a consideration of wider applications of the model the possibilities for further development are considered along with its capacity to influence contemporary discourse.

## 10.1 Repositioning the candidate in the model

Given that a feature of this research with its focus on the doctoral enterprise overall, has been the de-centering of the candidate, it is timely to consider possible implications for this clientele. Repositioning the candidate at the centre of the model is illustrated diagrammatically in Figure 10.1. Although the process of illustrative modelling is well developed in quantitative approaches it is less so in qualitative research. Briggs, the qualitative researcher cited in Chapter 9, described the process of her empirical research in terms of "modelling the manager role within the college environment" (Briggs, 2007, p. 598). The process being implemented in this section is similar.

**Figure 10.1—Centering the candidate in an integrative model of the doctoral enterprise**



By viewing the doctoral enterprise as an open and flexible system, the candidate can be placed in a central position, in close proximity to a range of individuals deemed to be significant in her or his research and learning. Beyond this are other academic and community entities that can be readily assembled in different ways in response to changing circumstances and situations. Particular doctoral arrangements are established within and mutually constituted with various doctoral practices—curricular, pedagogical, research and work.

By returning to theories of practice it is possible to gain some further insights to the doctoral enterprise as represented in Figure 10.1. Applying the theories of Bourdieu or Giddens, the candidate acquires 'habitus' or 'practical consciousness' by acculturation—by participating in disciplinary-based settings and contexts (e.g. learning by working in a lab or alongside a leading academic in the field). From a community of practice perspective (e.g. Lave and Wenger), the candidate interacts with other novices and acknowledged experts, but with an emphasis on achieving mastery—having been granted provisional access to do so. Both models place considerable emphasis on prevailing disciplinary practices which candidates are seen as acquiring gradually over time. A common theme is the dominance of these practices and the candidate's responsibility to adopt, inculcate or master them through practical and collaborative experience.

When recent variations of practice theory are employed, the candidate can be seen as adopting a more active role in the process. There is a sense in which the candidate is shaping as well as being shaped by the practices employed in the doctoral enterprise. As one theorist has argued, "in participating in practices, people acquire knowledge and abilities, become cognisant of rules, build and alter the physical environment, and have their reactions and the teleoaffectivities governing them shaped and calibrated" (Schatzki, 1996, p. 161). The key point here is the interactive processes involved—more is involved than simply adopting established practices. Candidates are engaged in a dynamic exercise in which their responses to the evolving situation are incorporated.

The argument is that the strength of an integrative model of doctoral enterprise is its representation as a flexible and open system. This enables the enterprise to be viewed from multiple perspectives, with the component parts reflecting a high degree of mutuality. From the position of the candidate, various entities—people, structures, artefacts—are arranged in ways that facilitate her or his participation in a range of practices—curricular, pedagogical, research and work. There is some degree of prefiguration in relation to these arrangements associated with institutional regulations (e.g. entry), academic knowledge (e.g. epistemological) and dominant cultures (e.g. ontological). At the same time, candidates have the capacity to demonstrate considerable agency with regard to the positions and approaches that they adopt. A key point to emphasise is that regardless of how the components of the model are configured, this open system needs to be seen as in a perpetual state of flux. It is not only dynamic but evolutionary.

## 10.2 Considering wider application of the model

The framing of recommendations or future directions for research was never intended to be a feature of this study or the ARC project of which it is part. The overriding objective was to produce a more accurate and in-depth understanding of the doctoral experience than existed when the project was initiated in 2004. By repositioning the candidate at the centre of the doctoral enterprise—or modelling the candidate within the doctoral enterprise—ideas and opportunities inevitably begin to emerge. One possibility would be to use the model as a pedagogical tool. For example, candidates and those with responsibility for their learning and development—such as graduate schools, AOUs, PGSAs and so on—might use the model to stimulate debate in general terms. Alternatively they could use it as a mechanism to promote structured forms of professional learning. Depending on the context, particular stakeholders—supervisors or industry researchers for example—could be positioned at the centre of the model.

There is also the potential for applying the model as a means of generating reform, for example, at the institutional or departmental level.

The model could also be used as a research tool. Using the components of the model as a conceptual framework, doctoral activity in other settings and contexts could be investigated. There would be value in testing the model to determine if the findings would be replicated in the same ten fields of study in other institutions. It could also be tested in a broader range of disciplinary and interdisciplinary settings. Identifying the existence of components or relationships that are either missing or inadequately reflected in the model might be explored. There are a number of specific issues that have emerged in the development of the model that would also be worthy of further investigation. Given the rapid expansion of Information and Communication Technologies, more information is needed about their current level of use; training and development requirements; and the impact of ICTs in relation to the doctoral enterprise. Given the level of inter-disciplinarity that has been revealed, there are many avenues that might be pursued, one of which is the issue of 'border crossing' at the doctoral level and its relationship to knowledge production.

As an aid to curriculum development, the model could identify and promote opportunities and resources in relation to the doctoral interface—the points at which learning, training, research, work and career intersect. These intersections could constitute the curriculum with a view to developing a comprehensive approach to the doctorate whereby work and career trajectories are built in to the candidate's research rather than regarded as supplementary activities. They could also be used to mediate the competing demands from the academic, industry and community sectors. Disseminating examples of good practice will help to promote higher levels of integration and innovation. As a means towards that end, I have prepared three cases from this research in the form of refereed papers or presentations, namely in the fields of Earth Sciences (Cumming, 2007a), Anthropology (Cumming, 2007c) and Molecular Biology (Cumming, forthcoming).

The model could also be used as a conceptual tool or learning strategy to enable others to work with the components in the context of their own knowledge, experience and worksite. Other researchers in the field who have employed similar devices argue that their framework of nested contexts influencing direction and completion is "a heuristic, a visual image that serves as a mnemonic by providing a simplified representation of complex dynamic systems in an integrative fashion" (McAlpine & Norton, 2006, p. 6). My model is designed to serve a similar purpose, and when juxtaposed with other frameworks and models has the potential to stimulate the development of adaptations, variations or entirely new creations. Building on the work of another researcher, the model also has the potential to act as an agent for change (Briggs, 2007, p. 591). There is the possibility that those with responsibility for doctoral education might be encouraged to develop broader and more holistic approaches.

At the same time it is important not to overstate the case. The model and research that underpins it should not be viewed in terms of a solution to a range of issues that have been raised during this study or elsewhere with regard to doctoral education. It is a device with the intended purpose of assisting stakeholders to managing the complexity of the doctoral enterprise. By defining the components and their interrelationships, theorists and practitioners are provided with a strategy designed to assist with the challenge of reconceptualising the doctoral experience to reflect the realities of what candidates do and how they operate in the first decade of the Twenty-First Century. The model provides a mechanism for understanding a complex phenomenon.

## 10.3 Reflecting on the model

There is an obligation on all doctoral candidates to reflect on their research and to consider its contribution to knowledge. As I reflect on the outcomes and processes of my research I am

reminded of a statement made by the candidate in Regional Studies—one of my initial informants. Midway through our semi-structured dialogue I asked him to tell me what is was like to produce new knowledge in such a highly specialised field. He replied: “I feel like I am standing on the shoulders of giants. I have taken other people’s ideas and theoretical approaches, applied them to a new text and circumstances, and then come up with new insights—a new way of looking at this material. I have formulated my own theory and as a result, am looking forward to seeing how this might be taken up. One of the third-year students who I am supervising, is now taking some of the ideas I have reworked, and is carrying those forward in her own research, which I feel very happy about. I feel that I am part of a great big machine, and feel really good about that”.

The interview was recorded in October 2005, and at the end of my own candidature in September 2007, my sentiments reflect an eerie similarity. Standing on the shoulders of the CIs and others working to enhance the quality of doctoral education, I have drawn on theories of practice and many other constructs as a means of establishing a different take on the doctoral experience. There is even a possibility that the integrative model I have developed will be used to inform a new research project planned for 2008. On reflecting more deeply, however, a number of abstract ideas emerge around connectedness and interdependence. One example is the extent to which the concept of embedding has permeated this study given its location in the ARC project; the nesting of quantitative in qualitative method; and the mutuality of doctoral practices and arrangements. Another is the notion of open and flexible systems in which entities can be arranged in various combinations and permutations over time. Indeed, it is tempting to lapse into a false sense of security by simply concluding that everything is connected.

Revisiting the findings from my research provides a more practical perspective in relation to connectedness and interdependence. The overlapping and related nature of core doctoral practices—curricular, pedagogical, research and work—has been emphasised in Chapter 9. The case studies reveal many instances in which candidates and those who influence them are linking these practices with a high degree of effectiveness. The implication for stakeholders is that holistic and integrated approaches to the doctoral enterprise constitute the future. These are seen as enhancing the capacity of participants to cross boundaries, forge connections and create synergies.

In contrast, doctoral programs reflecting a ‘silo’ mentality are likely to keep candidates operating within established paradigms and entrenched cultures. The demands of global economies and knowledge-based societies suggest that the doctoral enterprise needs to reflect greater openness and flexibility. A number of supervisors in the case narratives have flagged the dangers of delimiting and over-regulating doctoral education. They appear to be on the horns of a doctoral dilemma that involves safer topics and tighter control of candidates, with the accompanying risk of creating dependent researchers and mundane outcomes. Similarly, adding to the doctoral curriculum—by means of required coursework or work experience, for example—risks diverting attention away from pioneering research. However, to extend the discussion of implications is to risk going off on a tangent and introducing a set of new ideas. To conclude the thesis, therefore, the final strategy will be to review some of the main arguments presented and claims made.

First, having confirmed that existing conceptualisations of the doctoral experience are inadequate I argue that new models are needed not only to capture the complexity and diversity, but also the particularity of current practices. A major claim is that an integrative model of the doctoral enterprise provides a new and creative way of viewing what goes on in doctoral programs, especially in terms of the players and stakeholders involved and the practices employed. There is potential for the model to influence the direction of doctoral education and research in future. Like all models, however, it is a tool whose value is limited until it is taken up, trialled and adapted by theorists and practitioners alike.

Second, the new knowledge developed as an outcome of this research has a practical as well as a theoretical dimension. I have striven to establish a balance between capturing the nuances and subtleties of the doctoral enterprise on the one hand, and identifying generic themes and issues on the other. In my view, the development of the 'case narrative' offers a mechanism that not only illuminates what key players in the enterprise are doing, but also gives genuine voice to their perspectives and insights. It also presents material in a way that endeavours not to pre-judge or to tailor the contents with a view to aligning with a particular theory or objective of the researcher. By combining case narratives and reflexive interpretation with an integrative model of the doctoral enterprise, I have endeavoured to capture as well as provide a means of dealing with complexity, without being overwhelmed by it.

In terms of meeting needs identified previously by researchers in the field, I have probed the 'black box' of doctoral programs and revealed aspects that had remained 'stubbornly invisible'. My key findings have included the fact that candidates participate in a multiplicity of activities ranging from structured training, peer learning and professional networking to authentic research, academic employment and voluntary work. In addition, these activities are inextricably linked to a set of allied entities that include key individuals, institutional support and external agencies. Problematising the concept of doctoral experience has resulted in the development of different processes and outcomes. Through the use of mixed method analysis it has been possible to generate a range of categories, perspectives and insights across disciplinary and interdisciplinary fields, for example. The emerging collage containing elements from the case narratives, reflexive interpretation, the literature and the integrative model depicts a vibrant collection of images, as distinct from a single snapshot.

Third, achievements on a smaller scale to do with this research are worth noting. One was the development of a 'diversity grid' as a means of selecting interviewees. Another was the extended process developed in relation with my interviewees in order to maintain their confidentiality. I was unable to find any material in the literature on research methodology that addressed these issues. Even though individual transcripts had been verified, the issue of constructing and releasing polyvocal narratives had the potential to compromise other members of the qualitative data sets. Each of the ten candidates in the study not only nominated two individuals who were influencing their research, but also agreed to approach them in the first instance to ascertain if they would be willing to receive a request from me for an interview. This involved the development of trust that could easily have been breached without my securing approval for the use of select extracts in the narratives.

It is easy to get rather carried away with one's sense of achievement at the end of almost three and half years of doctoral candidature. At the same time it is important to acknowledge the limitations of this study. There were 40,794 doctoral candidates enrolled in 2005 in Australian universities. Ten case studies is but a handful when viewed in that context. Similarly, 5,395 survey respondents represent just under 15 per cent of the total population. Studies that invite 'volunteer' informants are frequently subject to potential bias. I suspect that the 62 candidates who indicated their willingness to be interviewed in my study did so because they felt they had a story to tell. Those stories could well have reflected a biased sample in terms of a surfeit of 'successful', 'different' or 'unsuccessful' cases of doctoral experience. Similarly, respondents to the survey were biased in terms of candidates in the earlier years of their candidature, on-campus, full-time and so on. Finally, the possibility of blind spots and blank spots is ever present. Even though I have endeavoured to incorporate various elements within the doctoral enterprise, there will be those that I have not seen, as well as those I have observed but failed to consider in any detail. One example identified earlier is the role of ICTs in the doctoral enterprise.

This thesis has argued that most contemporary approaches to conceptualising the doctoral experience are limited in scope and fail to address its inherent complexity. Using a comprehensive conceptual framework, narrative methodology and reflexive interpretation, it has been possible to capture and interpret fundamental aspects of the doctoral enterprise. These are

complemented by in-depth understandings and additional insights to the diversity and particularity, as well as the complexity of this phenomenon. Through the use of an integrative conceptual model the enterprise comprises two main components—doctoral practices and doctoral arrangements. These components are conceived as mutually constitutive and can be depicted as an entangled web of organised activities and connected entities which are in a constant process of evolution.

# Appendix 1
# Volunteer interviewees

This appendix records details of doctoral candidates[6] who volunteered for interview by field[7] and gender.

| | Male | Female | Total |
|---|---|---|---|
| **Natural and physical sciences** | | | |
| Physics and astronomy | | 2 | |
| Chemical sciences | 1 | | |
| Earth sciences | 2 | 2 | |
| Biological sciences | 2 | 5 | |
| Other—Cognitive psychology | | 1 | 15 |
| **Engineering and related technologies** | | | |
| Manufacturing and engineering technology | 1 | | |
| Process and resources engineering | | 1 | |
| Other—robotics | 1 | | 3 |
| **Agriculture, environmental and related studies** | | | |
| Environmental studies | 1 | 1 | 2 |
| **Health** | | | |
| Other—Mental health | | 1 | |
| Other—Population health | | 1 | |
| Other—Clinical psychology | 1 | 1 | 4 |
| **Management and commerce** | | | |
| Business and management | | 1 | |
| Sales and marketing | | 1 | 2 |
| **Society and culture** | | | |
| Political science and policy studies | 5 | 1 | |
| Studies in human society | | 9 | |
| Law; Justice and law enforcement | 1 | 1 | |
| Language and literature | 1 | | |
| Philosophy and religious studies | 1 | | 19 |
| **Creative arts** | | | |
| Visual arts and crafts | 1 | | |
| Graphic design | | 1 | 2 |
| **Inter/trans/multi-disciplinary** | | | |
| Society and culture + Law enforcement/Teacher education/other | | 3 | |
| Environment + Rural sociology/Public health | | 2 | |
| Anthropology + Political science | 1 | | |
| Environmental studies + Philosophy and religious studies | 1 | | |
| Society and culture + other health—rehabilitation | | 1 | |
| Studies in society + Public health | | 1 | |
| Public health + other health—Social psychology | 1 | | |
| Information technology + Mathematical sciences | 1 | | |
| Anthropology + Migrant studies | | 1 | |
| Chemical sci + Biological sci + Maths sci + Computer sci | 1 | | |
| Across 7 broad fields/8 narrow fields | 1 | | |
| Across 6 broad fields/15 narrow fields | | 1 | 15 |
| **Total** | **24** | **38** | **62** |

[6] While a total of 63 candidates volunteered for interview, one withdrew subsequently.
[7] Fields were self-identified by candidates using DEST categories provided.

## Appendix 2
## Consent form

This appendix comprises the form informants were requested to sign prior to interview, 2005-2006.

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Working Students: Reconceptualising the Doctoral Experience Project
The Australian National University

**CONSENT FORM**
**Interview Participants**

I, ..... of

.....

hereby consent to be a subject of a human research study to be undertaken by Mr Jim Cumming, as part of his PhD research. I understand that the purpose of this research is to explore the lived experiences and environments of doctoral candidates and the contemporary study/research/training/work/career interface. I am aware that this research is part of an ARC Linkage Project that is designed not only to generate new knowledge in doctoral education, but also inform the development of Australian postgraduate associations' policies and practices.

I acknowledge that

- the aims, methods, and anticipated benefits, and possible risks/hazards of the research study, have been explained to me;
- I voluntarily and freely give my consent to my participation in such research study;
- the interview in which I participate will be recorded and transcribed, with confidentiality maintained;
- the findings will be used for research purposes and may be reported academic journals;
- individual results will not be released to any person;
- I am free to withdraw my consent at any time during the study, in which event my participation in the research study will immediately cease and any information obtained from me will not be used; and
- If I have concerns regarding the way the research is conducted then I should contact the Human Ethics Officer, Human Research Ethics Committee, Australian National University. Tel: 6125 7945. Email: Human.Ethics.Officer@anu.edu.au

Signature: ..... Date: .....

## Appendix 3
## Interview schedule—candidates

This appendix outlines a series of discussion starters and questions used for a set of semi-structured interviews conducted with doctoral candidates at a research-intensive university in Australia in 2005-06.

---

Ref. No. .....

Date .....

**1. Introduction**

The purpose of this research is to gather information about your doctoral experiences—and particularly your thoughts, reflections, insights regarding those experiences.

I regard your input as very important given the limited research/data in this area.

Nothing you say will be identified with you personally.

The interview will take the form of a semi-structured conversation and should take about one hour to complete.

Do you have any questions before we begin?

**2. Opening question**

Firstly, can you tell me a little about the nature of your doctoral research?
PROBES—background; experience; field; motivation; expectations; why [X] university; entry
What is the focus? What are the aims, objectives, intended outcomes?

**3. Doctoral practices**

If I followed you through a typical day, what would I see you doing?
PROBES—everyday tasks; routines; patterns; reflections; strategies; training; research; academic work; paid employment; unpaid work; frustrations; impediments; tensions ...
What experiences would I see you having? In what practices would I see you engaged?

**4. Learning environment**

How would you describe the learning environment in which you are operating as a doctoral candidate/researcher?
PROBES—significant individuals; relationships; interactions; support mechanisms; networks; communities; technologies; other learning/working environments; globalisation; complexity and supercomplexity ...

Indicate (a) that I shall return to issue of the interviewees' supervisor and one other significant individual in their doctoral work at the end of the interview; and (b) that we are about half way.
You have been telling me some really important things – how is this interview going for you?

**5. Socialisation**

How would you describe the organisational culture of the department, centre or agency in which you are primarily located?
PROBES—rituals; rights; becoming; belonging; other dominant cultures; professions;

disciplines; identity; status; values; expectations; structures; places; roles; behaviours; protocols; influence; enterprising self ...

**6. Knowledge production**

What are the most significant products or outcomes from your doctorate to this point in your candidature?
PROBES—knowledge; capabilities; capital (human/intellectual/cultural/creative); commercialisation/patents; social benefits; career trajectories/pathways; expectations; critical reflections; insights; continuities and discontinuities; uncertainties and conflicts; authorship ...

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Additional requests for each candidate at the end of the interview

**7. Most significant/influential people in your doctoral work (re Q4)**

Would you be willing to approach the two individual you have nominated as significantly influencing your doctoral research with a view to ascertaining if they would be prepared to receive a written request from me for a brief interview from me as part of this doctoral research?

**8. Observation**

Would you be willing to assist in facilitating a visit to enable me to observe your principal learning/working environment?

**9. Demographics**

Could I please confirm a few demographic details in relation to your candidature (e.g. academic organisational unit; scholarship, age; employment; dependants)?

**10. Closure**

That covers the things I wanted to ask. Is there anything that you would care to add regarding your doctoral experience?

## Appendix 4
## Interview schedule—significant individuals

This appendix outlines a series of discussion starters and questions used for a set of semi-structured interviews conducted with doctoral candidates at a research-intensive university in Australia in 2005-06.

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Ref. No. .....

Date .....

**1. Introduction**

The purpose of this research is to gather information about the doctoral experience—and particularly your thoughts, reflections, insights regarding the experience.

I regard your input as very important given the limited research/data in this area.

Nothing you say will be identified with you personally.

The interview will take the form of a semi-structured conversation and should take about 30 minutes to complete.

Do you have any questions before we begin?

**2. Opening question**

Firstly, can you tell me a little about your background as a supervisor/peer/researcher/critical friend/other significant individual?
PROBES—background; experience; field ...

**3. Doctoral practices**

If I were to follow one of your candidates/peers/colleagues through a typical day, what would I see them doing?
PROBES—everyday tasks; routines; patterns; strategies; training; research; academic work; frustrations; impediments; tensions ...
What experiences would I see them having? In what practices would I see them engaged?

**4. Learning environment**

How would you describe the learning environment in which your candidates/peers/colleagues operate?
PROBES—relationships; interactions; support mechanisms; networks; communities; technologies; other learning/working environments; globalisation ...)

**5. Socialisation**

How would you describe the organisational culture of the department/field/profession?
PROBES—rituals; rights; becoming; belonging; other dominant cultures; disciplines; identity; status; values; expectations; structures; places; roles; behaviours; protocols; influence; enterprising self ...

**6. Knowledge production**

What are the most significant products or outcomes that you see emerging from your doctoral candidates/peers/researchers?

PROBES—knowledge production; capabilities; capital (human/intellectual/cultural/creative); commercialisation/patents; social benefits; career trajectories/pathways; expectations; critical reflections; insights; continuities and discontinuities; uncertainties and conflicts; authorship ...

**7. Demographics**

Could I please request a few demographic details in relation to your supervisory experience (e.g. age group, when and where gained PhD, years of experience re doctoral supervision).

**8. Closure**

That covers the things I wanted to ask. Is there anything that you would care to add regarding the doctoral experience?

# Appendix 5
# Survey processes

This appendix outlines the processes involved in planning and implementing the national online survey of doctoral candidates enrolled in Australian universities, July 2005.

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The implementation of a national online survey of doctoral candidates enrolled in Australian universities in 2005 involved a complex and extended set of processes. In addition to designing, trialling and piloting an electronic survey instrument, it was necessary to devise a strategy for inviting candidates to participate in the survey that were in accordance with established ethical principles and procedures. Having finalised the content, format and style of the questionnaire, a further strategy was required to further develop and upload the instrument to a secure website. The purpose of this document, therefore, is to document a variety of processes in a structure comprising ethics, design, trial, pilot, protocols, website and data management.

It is important to acknowledge that while the project's two doctoral scholars worked collaboratively on the design and implement of the survey, this was done in consultation with three Chief Investigators (e.g. by means of a series of teleconferences and electronic communications that extended over a period of more than 12 months). In addition, support was forthcoming from a range of other groups such as the project's Industry Partners, as well as the Deans and Directors of Graduate Schools (DDOGS) and Postgraduate Research Administrators' Taskforce (PRAT). For example, the issue of the national survey was included as an agenda item at a number of formal meetings of these groups during 2004-05.

## 1. Ethics

The two doctoral candidates submitted ethics proposals to the Human Ethics Committees of The Australian National University (ANU) in December 2004, and Deakin University (DU) in February 2005. Both proposals outlined the collaborative nature of this exercise, and the involvement of Industry Partners—the Council of Australian Postgraduate Associations (CAPA); the Postgraduate and Research Students' Association at the ANU (PARSA); and the Deakin University Students' Association (DUSA). The intention was to locate the survey instrument on the CAPA website after it had been developed and appropriately refined. Further, the cooperation of CAPA and its affiliates around the country would be sought with a view to raising awareness of the survey site. Following minor amendments required by both Committees, approval to proceed was received in March 2005.

## 2. Design

### 2.1 Rationale

A major reason for administering the survey was to generate more comprehensive quantitative data than currently existed at the national level at that time. Given that a good deal of published survey data were concerned with evaluating the quality of the research experience of doctoral candidates (e.g. exit surveys comprising satisfaction ratings), a key focus of this survey was on quantifying their day-to-day practices, time utilisation and outcomes (e.g. vis-à-vis candidates' learning, research, training and work).

### 2.2 Objectives

A primary objective was to generate an up-to-date and accurate—as well as a rich and vibrant—snapshot of the contemporary doctoral population that would describe the essential characteristics and activities of doctoral candidates. Secondary objectives included quality, relevance and style. It was important to generate new information (e.g. on candidates' routines, paid employment, community work), and to ensure that items were relevant and applicable to the full range of doctoral candidates (e.g. full/part time, on/off campus, in/not in workforce, continuing/returning students, PhD/Prof Doc). Given that the survey was to be conducted

online, the questionnaire needed to be readily accessible, appealing, and easy to complete (e.g. drop down lists, radio buttons, check boxes).

### 2.3 Content

The survey instrument was structured in three parts:

- information about the candidate and her/his enrolment
- a week in the life of the responding doctoral candidate
- aspects of her/his doctoral candidature.

There were 41 survey items in total—Section 1 (16 items); Section 2 (3 items); Section 3 (22 items).

## 3. Trial

### 3.1 Context

In order to determine the suitability of the proposed online survey, a trial was conducted with a selection of doctoral candidates at ANU and DU. The main objectives were to ascertain the extent to which the language/terminology was clear and inclusive; the structure/format was easy to navigate; and the items were relevant, precise and likely to generate significant data. Candidates were invited to participate in the trial via email or phone and provided with details of the website where the survey could be accessed. A text box at the end of the survey was provided to enable respondents to provide comments on the instrument.

### 3.2 Sites

The trial was conducted at the universities where the doctoral scholars were based.

ANU—Ten candidates were selected from a range of doctoral programs in faculties and schools of mathematics, physics, entomology, environmental science, epidemiology, psychology, higher education. Six of the respondents at ANU also agreed to participate in a face-to-face meeting or telephone conversation to provide feedback on the survey instrument. Four candidates submitted their responses prior to the time when the system was up and running to record their responses, while six did so after that point.

DU—Approximately 140 candidates in the Faculty of Education were sent an invitation to participate in the trial via email. Respondents were invited to complete the questionnaire and to comment on the questionnaire in the text box or via email directly to the researcher. 11 candidates from Deakin submitted the survey, while an additional four did not identify their institution (+ another six from ANU). The total of electronically submitted responses was 21. Of these, fourteen provided written comments, three of which were from ANU.

### 3.3 Outcomes

The response to the trial was generally positive. For example, comments received indicated that the instrument was easy to ‘follow’/‘navigate’/‘complete’; that it was relevant and useful, and that it could be completed in 10-15 minutes. However, a number of comments were also received pointing to a lack of definition for some terms, and a lack of explanation regarding certain items. Specific suggestions included adding a thank you note; greater consistency with regard to type face; and variation with menus. As a result of the trial, a number of changes were made to the survey instrument.

## 4. Pilot

### 4.1 Sites

A more comprehensive pilot of the instrument was undertaken at the ANU and DU in April-May 2005. This involved approaching around 150 responses in total, by negotiating with one or more departments where doctoral candidates were enrolled at each institution: The Centre for Resources and Environmental Studies (ANU); the School of Resources, Environment and Society (SRES); and the Faculty of Education (DU). Having gained the approval of the

Dean/Director of these academic organisational units, an invitation containing details of a website doctoral candidates was emailed to around 80 doctoral candidates at both universities. Once again, respondents were invited to offer comments and suggestions regarding the instrument.

#### 4.2 Outcomes

A total of 61 respondents (38 ANU and 23 DU) participated in the pilot. Reports from both sites were prepared and considered by the project team. As a result of feedback received, additional items were added; some were modified or deleted; and options for drop down menus expanded. In addition, there was considerable fine-tuning undertaken—especially with regard to language and formatting. The pilot provided a very good opportunity to test and enhance the capacity of the system to record, store, access and retrieve data.

#### 4.3 Additional feedback

The inclusion of the national survey on the agendas of meetings of DDOGS and PRAT resulted in some useful comments and suggestions. For example, a number of additional skills were identified for inclusion in one item (e.g. occupational health and safety; persistence; attention to detail and integrity). It was also suggested that items concerned with skills focused on transferability rather than on development.

## 5. Protocols

#### 5.1 Anonymity

The questionnaire had been set up to ensure that anonymity was assured during the data-collection process. Only members of the project research team (i.e. two doctoral scholars and three chief investigators) had access to the original data. In accordance with established ethical principles and procedures, there has been no publication of any findings that identify any respondent or the institution where s/he was enrolled in 2005.

#### 5.2 Forms

A ‘plain language statement and consent form were drafted and included as part of the trial prior to being uploaded to the CAPA website as prerequisite reading prior to gaining access to the survey.

#### 5.3 Cooperation

Extensive liaison with DDOGS, CAPA, and over 30 postgraduate student associations resulted in high level cooperation from universities and relevant groups with a view to identifying and accessing potential survey respondents. This took a number of forms including the emailing of invitations directly to doctoral candidates; the placing of notices on websites; and conventional mailing to candidates via circulars or newsletters on HDR matters. In all cases, doctoral candidates were invited to access the section of the CAPA website where the survey had been uploaded. To access the site, candidates were required to satisfy a number of requirements that included registering their status as a doctoral candidate and providing their consent to participate.

## 6. Website

#### 6.1 Technical aspects

Technical aspects were handled by the CAPA consultant when uploading the survey to the CAPA website.

#### 6.2 Timeline

Following negotiation with DDOGS and/or their representatives and Postgraduate Student Associations, the final version of the national online survey was administered via the CAPA website during a six-week period, Monday 27 June to Friday 6 August 2005.

#### 6.3 Closure

Kevin Ryland arranged with CAPA to close the survey and download the original data file to a CD that included an SPSS file (Questions 1-39—quantitative data); Excel file (Questions 40-

41—qualitative data); and text file (Questions 40-41). The download was conducted on 15 August, after which the disc was created and mailed to the other doctoral scholar and the three Chief Investigators on 22 August 2005.

## 7. Data management

### 7.1 Introduction

Following liaison involving ARC project team members and CEDAM staff at the ANU (Linda Hort, Director; Robin Collins, Convener Evaluation Services and IT Manager; and Nyree Kueter, Survey Designer and Analyst) it was resolved that minor modifications be made to the original data set with a view to facilitating higher level analysis by the doctoral candidates and CIs.

### 7.2 Initial amendments to SPSS File

Initial amendments to the SPSS file involved some recoding in the light of errors and anomalies identified. For example,

Q8—coding error re year of enrolment—if respondents entered 2002, the year 2003 was recorded on the data file. It was resolved that by using respondents answer to Q9, it would be possible to re-enter '2002' for Q8 in the relevant cases.

Q31 & Q32—coding error where the labels for variables 146 and 158 were reversed. It was resolved to swap the 'caped_cr' variable and the 'capde_cr' given that the actual variable names are correct.

Incomplete Records—missing data primarily from Section 1 and but also Sections 2 and 3. Variation in browser technology experienced by some respondents may have been responsible for some records containing no data for whole sections (e.g. if a respondent went back to check a record in a previous section, it is possible that all data for that section may have been deleted). It was resolved that rather than destroy these records, they should be isolated and stored in a separate file. A total of 165 records were removed from the original database of 5,560 and recorded as a separate file.

### 7.3 Random sample

In order to create a random sample of respondents (e.g. for my preliminary analysis of other comments recorded in Questions 40-41), Robin Collins conducted the following procedure during the period 14-18 November 2005:

A random sample of 400 candidates was created from the SPSS file in order to generate a population of around under 200 respondents who provided responses to both Q40 and Q41. It is acknowledged, however, that by selecting candidates who have answered both questions may introduce a new dynamic.

Additional IDs were created for the sample in order to match the demographic data with the qualitative data which were then merged into a new Excel file.

Note, the instructions for creating a random sample are recorded in Attachment 1.

### 7.4 Further amendments to SPSS file

Under Robin Collins' direction, Nyree Kueter made the following adjustments to the original SPSS file during the period 28 November to 2 December 2005:

The string variables representing categorical/nominal data were recoded into numerical values with labels—given that greater efficiency can be achieved with regard to analysis using SPSS.

The string variables for the ages of the youngest and eldest child were recoded into numbers where necessary—given that entries indicating an age of "less than 1" were given a "0" years value. When parents of only children entered their child's age this was placed solely in the "Youngest Child" column.

The levels of measurement for each of the variables were checked and changed where necessary in the variable view. It should be noted that items on the scale "1=less valuable" to "5=most valuable" were classified as "ordinal" because the scale could not be considered as having equal distances between points. Given that there is some debate regarding the desirability of calculating means and standard deviations for this data, researchers are advised to proceed with caution.

A check was made for invalid data and seven values for age were removed—(6 ranged from "2-5" and there was one "99". All values of "not entered" were deleted and left blank.

**7.5 Creation of Final Data File**

In collaboration with Robin Collins, final versions of the SPSS file and the excel file; together with the data journal were transferred to a CD and mailed to all members of the ARC project team (other candidate and CIs) on 9 December 2005.

**7.6 Storage**

Survey data has been stored on discs and secured in locked filing cabinets in the departments where the doctoral researchers were enrolled, namely, the Centre for Educational Methods, at The Australian National University and the Department of Education at Deakin University.

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## Attachment 1

**Instructions regarding creation of a random sample**

1. Use SPSS to create a sample via 'select cases' command

2. Rename the filter variable something like "sampl50"

3. Turn off Filter

4. Copy "sampl50"

5. Paste it into Excel

6. Check via sort that the number of cases matches

7. Replace all "=" in text of Vars, otherwise they will confuse Excel's formula

8. Concatenate Columns in Excel

e.g. formula

= "ID:* "+GF2+", "+"Q40:*+ GG2

= "ID:*"+GF2+", "+ "Q40:*"GG2

where * = a space

= in sample Ø = not in sample

9. Sort ID + samp400

10. Note cell format in Excel effects import into a Word Table, e.g. "General" format is necessary for the import to be successful.

# Appendix 6
# National survey of the Australian doctoral experience

This appendix comprises the contents of the national online survey administered to doctoral candidates enrolled in Australian universities, 2005.

---

**Introduction**

This survey is structured in three parts:

- information about you and your enrolment
- a week in your life as a doctoral candidate
- aspects of your doctoral candidature.

Many questions will involve simply checking a box or clicking on a button. A few will invite you to select from a drop-down list of possible answers.

**Section 1—About you**

1. You are:

- Female
- Male

2. Your age (in years only) as at 1 January 2005

3. Are you a citizen of:

- Australia
- New Zealand
- Other country

4. Your country of permanent residency—please select

5. Are you of Aboriginal or Torres Strait Islander origin?

- Yes
- No

6. Please indicate your field of study by selecting from the broad and narrow fields listed (you should select the broad field of study option first):

- Field of study (broad)—please select
  -Agriculture, environmental and related studies
  -Architecture and building
  -Creative arts
  -Education
  -Engineering and related technologies
  -Food, hospitality and personal services
  -Health
  -Information technology
  -Management and commerce
  -Natural and physical sciences
  -Society and culture

- Field of study (narrow)—please select
  (from 66 sub-fields)

7. Please indicate if you are receiving a doctoral scholarship in 2005?

- I am a recipient of an Australian Postgraduate Award (APA)
- I am a recipient of an Australian Postgraduate Award (Industry) (APA(I))
- I am a recipient of an International Postgraduate Research Scholarship (IPRS)
- I am a recipient of a university funded scholarship
- I am a recipient of a scholarship other than one of those above (please specify)
- I am not receiving a scholarship

8. When did you first enrol as a doctoral candidate? )—please select

9. Please indicate your enrolment status for each year of your doctorate.

- Year (1992-2005—please select)
  -Full-time
  -Part-time
  -Mixed full-time and part-time

10. What type of doctoral program are you enrolled in?

- PhD by research
- PhD by research and coursework
- Professional doctorate
- Other (please specify)

11. Your formal mode of attendance:

- Internal (on campus)
- External (off campus)

12. Do you live with a partner or spouse?

- Yes
- No

13. How many dependent children currently live, at least half time, with you in your home?

What is the age:

- of the youngest child ?
- of the oldest child (if there are more than one)

14. What is the highest level of education obtained by your parents?

Mother/Guardian; Father/Guardian

- School
- Post secondary school qualification other than from a university
- University degree
- Masters degree
- PhD

15. Is being an academic member of staff (full-time, part-time or on study leave) your main occupation as well as being a doctoral candidate in 2005?

- Yes
- No

16. Would you describe yourself as having a disability?

- Yes - physical
- Yes - sensory
- Yes - other
- No

**Section 2—A week in your life as a doctoral candidate**

17. Which, if any, of these doctoral activities did you undertake in the past seven days?

- Reviewing literature
- Research design
- Field work
- Laboratory work
- Data gathering
- Data analysis
- Writing your thesis
- Formal coursework
- Generic skills courses
- IT coursework
- Conference presentations
- Other (please specify)
- I did not undertake any doctoral activities in the past seven days

18. During the past seven days where did you undertake the majority of your doctoral activities?—please select.

19. During the past seven days how many hours did you spend on:

- Your doctorate
- Paid employment (other than academic activities)
- Paid academic activities (e.g. tutoring, demonstrating, marking, lecturing, research assistance)
- Unpaid academic activities (e.g. tutoring, demonstrating, marking, lecturing, research assistance)
- Family or domestic activities(e.g. family responsibilities, housework etc)
- Leisure activities
- Voluntary/community activities (e.g. charity, cultural, religious, political or environmental activities)

Please select number of hours

- Did not undertake this activity
- Less than 2
- 2 to 5
- 6 to 10
- 11 to 20
- 21 to 40
- 41 to 60
- over 60

**Section 3—Aspects of your doctoral candidature since your initial enrolment**

20. Please indicate if you have ever undertaken any of the following academic activities (other than for your doctorate) to this point in your candidature.

- Tutoring/demonstrating
- Marking
- Lecturing
- Research assistance
- Other (please specify)

- I was paid to undertake this
- I was requested to do this but was not paid
- I volunteered to do this and was not paid
- I did not undertake this activity

21. From 1 January 2005 to date please estimate the total number of hours you have spent on university level teaching—please select.

22. Who was primarily responsible for determining the general topic for your doctoral program?

- Myself
- My supervisor
- Researcher
- Chief investigator
- My employer
- Other (please specify)

23. What is your formal/approved mode of supervision?—please select

- One supervisor
- Two supervisors
- Three or more supervisors
- other

24. Where is your Principal Supervisor located? ?—please select

- On-campus
- Other university
- Off-campus—community
- Off-campus—private
- Off-campus—public
- Other

25. Who have been the most influential players so far during the course of your doctoral candidature in terms of learning and research?

- Supervisor
- Academics in your department/school
- Academics in your university
- Academics at other universities
- Industry based researcher
- Other doctoral candidates
- Post-doctoral fellows
- Technical staff
- Library staff
- Other
- Most influential
- Highly influential
- Somewhat influential
- Marginally influential
- Least influential

26. Which methods have been most effective in keeping in contact with the most influential person in your candidature?

- Email
- Conference
- Weblog
- Face to face meetings
- Telephone
- Letters
- Other
- Always used
- Frequently used
- Occasionally used
- Rarely used
- Never used

27. Please indicate if you have participated in any doctoral support activities during the past twelve months, identifying the provider where possible.

- Writing group
- Discussion group
- Seminar series
- Electronic network
- Social activity
- Other doctoral group
- I did not participate in any doctoral support activities during the past twelve months
- Please identify provider if possible
- Department/faculty
- Graduate school
- Postgraduate student association
- Professional organisation
- Other

28. Please indicate if you have completed any supplementary research training during the past twelve months, identifying the provider where possible.

- Course - less than 40 hours
- Course - longer than 40 hours
- e-training/online course
- Internship/work placement
- Other supplementary research training
- I did not take part in any supplementary training during the past twelve months

Please identify provider if possible

- Department/faculty
- Graduate school
- Postgraduate student association
- Professional organisation
- Other

29. Which of the following doctoral practices have been the most valuable to you in terms of developing higher order-research skills?

- Formulating the proposal
- Reviewing the literature
- Theorising/modeling
- Planning the research
- Conducting the research
- Analysing the data

- Writing up the thesis
- Other doctoral practices

- Most valuable
- Highly valuable
- Somewhat valuable
- Marginally valuable
- Least valuable
- I found none of the above practices valuable

30. How many of the following outcomes have you been primarily responsible for during the course of your candidature?

- Non-refereed publications
- Refereed publications
- Presentations in Australia
- Presentations outside Australia
- Media interviews/presentations
- Patents/commercialised products/services
- Other outcomes
- None
- One
- Two to four
- Five to nine
- Ten or more

31. Which capabilities have you transferred from your candidature to any of your paid employment?

- Computer skills
- Writing
- Problem solving
- Critical thinking
- Working in teams
- Time management
- Project management
- Networking
- Library research skills
- Ethical research practices
- Occupational health and safety
- Other (please specify)

- None of the above

32. Which capabilities have you transferred from any of your paid employment to your doctoral candidature?

- Computer skills
- Writing
- Problem solving
- Critical thinking
- Working in teams
- Time management
- Project management
- Networking
- Library research skills
- Ethical research practices
- Occupational health and safety
- Other (please specify)
- None of the above

33. What is the primary means by which you have been recording the processes associated with your own doctoral experience?—please select

34. Which of the following models is the submission of your doctoral work most likely to follow?—please select

- Thesis only
- Thesis by publication
- Creative art and exegesis
- Portfolio
- Other

35. Please indicate the frequency of the locations of resources (e.g. IT equipment, experimental equipment, materials and information resources) used for your doctoral research.

- University
- External research agency
- Industry partner
- Your employer
- Your home
- Other

- Always
- Mostly
- Sometimes
- Rarely

- Never

36. In addition to the resources provided by your university and other agencies, please indicate how much you have elected to spend on your doctoral research (excluding university fees and living expenses) during the course of your candidature?—please select

- Zero
- Below $500
- $501-$1,000
- $1001-$2,000
- $2,001-$5,000
- $5,001-$10,000
- $10,001-$15,000
- $15,001-$20,000
- Over $20,001

37. Do you see your candidature primarily in terms of—please select

- Education
- Knowledge production
- Leisure
- Personal development
- Professional development
- Training
- Other

38. How would you describe your doctoral experience at this point in your candidature?

- Far better than I expected
- Better than I expected
- About what I expected
- Worse than I expected
- Far worse than I expected

39. After completion, where do you expect to be using the knowledge and capabilities developed during your doctorate? —please select

40. Please add any comments on what has worked well for you up to this point in your candidature (maximum of 100 words)

41. Please add any comments on sources of frustration for you up to this point in your candidature (maximum of 100 words)

On submission of questionnaire, respondents received a note of thanks for their participation.

# Appendix 7
# Select data from the national survey of the Australian doctoral experience

This appendix contains tables that have been derived from a preliminary analysis of data generated from the national online survey conducted in July 2005 using SPSS software. Data were selected with a view to illustrating significant aspects of activities and entities associated with the doctoral enterprise in Australia.

---

**Table 20.1—Gender of survey respondents** (Survey Item No. 1)

| Gender | Number | Per cent |
|---|---|---|
| Male | 2,054 | 38 |
| Female | 3,323 | 62 |
| Missing data | 18 | 0 |
| TOTAL | 5,395 | 100 |

**Table 20.2—Broad field of study of respondents** (Survey Item No. 6)

| Broad field | Enrolled doctoral candidates | |
|---|---|---|
| | Number | Per Cent |
| Society and culture | 1,282 | 24 |
| Natural and physical science | 1,092 | 20 |
| Health | 1,086 | 20 |
| Management and commerce | 347 | 6 |
| Engineering and related technologies | 346 | 6 |
| Education | 405 | 8 |
| Agriculture, environment and related studies | 331 | 6 |
| Information technology | 249 | 5 |
| Creative arts | 194 | 4 |
| Architecture and building | 37 | 1 |
| Food, hospitality and personal services | 7 | 0 |
| TOTAL | | 100 |

**Table 20.3—Scholarship held by survey respondents in 2005** (Survey Item No. 7)

| Scholarship | Number | Per cent |
|---|---|---|
| No scholarship | 1,630 | 30 |
| Australian Postgraduate Award (APA) | 1,310 | 24 |
| University | 1,240 | 23 |
| Other | 696 | 13 |
| Australian Postgraduate Award (Industry) | 270 | 5 |
| International Postgraduate Research Scholarship | 187 | 4 |
| Missing data | 62 | 1 |
| TOTAL | 5,395 | 100 |

**Table 20.4—Type of doctoral program** (Survey Item No. 10)

| | Number | Per Cent |
|---|---|---|
| PhD by research | 4,950 | 92 |
| Professional doctorate | 225 | 4 |
| PhD by research and coursework | 148 | 3 |
| Other | 57 | 1 |
| Missing data | 15 | 0 |
| TOTAL | 5,395 | 100 |

**Table 20.5—Mode of attendance** (Survey Item No. 11)

| | Number | Per Cent |
|---|---|---|
| On campus (internal) | 4,326 | 79 |
| Off campus (external) | 1,144 | 21 |
| Missing data | 15 | 0 |
| TOTAL | 5,395 | 100 |

**Table 20.6—Main occupation as academic staff member** (Survey Item No. 15)

| | Number | Per Cent |
|---|---|---|
| No | 3,765 | 70 |
| Yes | 1,609 | 30 |
| Missing data | 21 | 0 |
| TOTAL | 5,395 | 100 |

**Table 20.7—Doctoral activities undertaken during the past seven days** (Survey Item No. 17)

| | Number | Per Cent |
|---|---|---|
| Reviewing the literature | 4,057 | 75 |
| Thesis writing | 2,443 | 45 |
| Data analysis | 2,219 | 41 |
| Research design | 2,192 | 41 |
| Data gathering | 1,573 | 29 |
| Laboratory work | 1,197 | 22 |
| Conference presentations | 707 | 13 |
| Fieldwork | 571 | 11 |
| Other | 551 | 10 |
| Generic skills courses | 249 | 5 |
| None | 220 | 4 |
| Formal coursework | 194 | 4 |
| IT coursework | 67 | 1 |
| None | 220 | 4 |

**Table 20.8—Academic activities undertaken by survey respondents during their candidature (other than for their doctorate)** (Survey Item No. 20)

| | None | Paid | Unpaid | Voluntary | Missing | TOTAL |
|---|---|---|---|---|---|---|
| Tutoring | 34 | 58 | 4 | 4 | 0 | 100 |
| Marking | 42 | 48 | 3 | 1 | 6 | 100 |
| Research assistance | 45 | 30 | 7 | 8 | 10 | 100 |
| Lecturing | 55 | 28 | 5 | 3 | 9 | 100 |
| Other | 42 | 8 | 3 | 4 | 43 | 100 |

**Table 20.9—Survey respondent time spent on university teaching during the past six months** (Survey Item No. 21)

| | Number | Per Cent |
|---|---|---|
| None | 2,691 | 52 |
| Less than 20 hours | 671 | 13 |
| 21-70 hours | 930 | 18 |
| 71-120 | 394 | 8 |
| 121-170 | 178 | 3 |
| More than 170 hours | 311 | 6 |
| TOTAL | 5,175 | 100 |

**Table 20.10—Person responsible for determining the general topic of the doctoral program** Survey (Item No. 22)

| | Number | Per Cent |
|---|---|---|
| Candidate | 3,492 | 65 |
| Supervisor | 1,598 | 30 |
| Other | 112 | 2 |
| Chief investigator | 103 | 2 |
| Employer | 32 | 1 |
| Researcher | 18 | |
| TOTAL | 5,395 | 100 |

**Table 20.11—Approved mode of supervision** (Survey Item No. 23)

| | Number | Per Cent |
|---|---|---|
| Two supervisors | 3,096 | 58 |
| One supervisor | 1,161 | 22 |
| Three or more supervisors | 1,090 | 20 |
| Other | 23 | |
| TOTAL | 5,370 | 100 |

**Table 20.12—Location of principal supervisor** (Survey Item No. 24)

| | Number | Per Cent |
|---|---|---|
| On campus | 4,609 | 86 |
| Off campus—public sector | 237 | 4 |
| Other university | 186 | 3 |
| Off campus—private sector | 111 | 2 |
| Other | 107 | 2 |
| Off campus—public sector | 34 | 1 |
| Not entered | 111 | 2 |
| TOTAL | 5,395 | 100 |

**Table 20.13—Individuals identified by survey respondents as influencing their learning and research** (Survey Item No. 25)

| Individual | Rated 'most' and 'highly' influential | |
|---|---|---|
| | Number | Per Cent |
| Supervisor | 4,390 | 82 |
| Peer | 1,116 | 23 |
| Academic 'A'—same department | 1,097 | 22 |
| Academic 'C'—other university | 850 | 18 |
| Postdoc—post-doctoral fellow | 617 | 13 |
| Industry-based researcher | 519 | 11 |
| Other | 406 | 10 |
| Technician | 356 | 9 |
| Academic 'B'—same university | 388 | 8 |
| Librarian | 207 | 4 |

**Table 20.14—Method of keeping in contact with the individual deemed to be most influential** (Survey Item No. 26)

| Method | Rated 'always' and 'frequently' used | |
|---|---|---|
| | Number | Per Cent |
| Email | 4,379 | 83 |
| Face-to-face meeting | 4,152 | 79 |
| Telephone | 1,225 | 25 |
| Weblog | 95 | 2 |
| Other | 73 | 2 |
| Letter | 45 | 1 |

**Table 20.15—Survey respondent participation in doctoral support activities during past 12 months** (Survey Item No. 27)

| | Number | Per Cent |
|---|---|---|
| Seminar series | 3,226 | 60 |
| Social activities | 1,812 | 34 |
| Discussion group | 1,595 | 30 |
| None | 1,127 | 21 |
| Electronic network | 713 | 13 |
| Writing group | 691 | 13 |
| Other doctoral group | 569 | 11 |

**Table 20.16—Providers of doctoral support activities identified by survey respondents, per cent** (Survey Item No. 27)

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

**Table 20.17—Supplementary research training completed by survey respondents during the past 12 months** (Survey Item No. 28)

| | Number | Per Cent |
|---|---|---|
| None | 2,579 | 48 |
| Short course—less than 40 hours | 1,564 | 29 |
| Other | 637 | 12 |
| Electronic course—e-training/online | 295 | 5 |
| Long course—more than 40 hours | 292 | 5 |
| Internship | 123 | 1 |
| TOTAL | 5,367 | 100 |

**Table 20.18—Providers of supplementary training identified by survey respondents, per cent** (Survey Item No. 28)

| | Department /faculty | Graduate school | PG student association | Professional organisation | Other |
|---|---|---|---|---|---|
| Short course | 38 | 26 | 6 | 13 | 17 |
| Other | 32 | 18 | 6 | 16 | 28 |
| Electronic course | 27 | 24 | 6 | 13 | 30 |
| Long course | 47 | 18 | 2 | 15 | 18 |
| Internship | 35 | 2 | 3 | 38 | 22 |

**Table 20.19—Outcomes for which survey respondents consider themselves primarily responsible during the course of their candidature, per cent** (Survey Item No. 30)

| | 1 | 2-4 | 5-9 | 10+ | None | TOTAL |
|---|---|---|---|---|---|---|
| Presentation—in Australia | 24 | 36 | 10 | 2 | 28 | 100 |
| Refereed publication | 23 | 22 | 4 | 1 | 50 | 100 |
| Presentation—outside Aust. | 22 | 14 | 2 | 1 | 61 | 100 |
| Non-refereed publication | 15 | 16 | 4 | 1 | 64 | 100 |
| Media interview | 10 | 6 | 1 | 1 | 82 | 100 |
| Other | 5 | 6 | 1 | 1 | 88 | 100 |
| Patent, commercial product | 2 | <1 | <1 | <1 | 97 | 100 |

**Table 20.20—Anticipated model of doctoral submission** (Survey Item No. 34)

| | Number | Per Cent |
|---|---|---|
| Thesis only | 3,987 | 74 |
| Thesis by publication | 1,052 | 20 |
| Creative art and exegesis | 112 | 2 |
| Other | 63 | 1 |
| Portfolio | 36 | 1 |
| Missing | 145 | 2 |
| TOTAL | 5,395 | 100 |

**Table 20.21—Location and frequency of resources used by survey respondents for doctoral research** (Survey Item No. 35)

| | Rated always, mostly, and sometimes used | |
|---|---|---|
| | Number | Per Cent |
| University | 4,715 | 90 |
| Home | 4,216 | 84 |
| Employer | 1,329 | 32 |
| External research agency | 1,249 | 30 |
| Industry partner | 697 | 17 |
| Other | 403 | 16 |

**Table 20.22—View of candidature** (Survey Item No. 37)

| | Number | Per Cent |
|---|---|---|
| Professional development | 2,386 | 44 |
| Education | 935 | 17 |
| Knowledge production | 838 | 16 |
| Personal development | 705 | 13 |
| Training | 309 | 6 |
| Other | 77 | 1 |
| Leisure | 36 | 1 |
| Missing data | 105 | 2 |
| TOTAL | 5,395 | 100 |

**Table 20.23—Level of satisfaction** (Survey Item No. 38)

| | Number | Per Cent |
|---|---|---|
| Far better than anticipated | 410 | 8 |
| Better | 1,225 | 23 |
| About what I expected | 2,552 | 47 |
| Worse | 898 | 16 |
| Far worse | 261 | 5 |
| Missing data | 49 | 1 |
| | 5,395 | 100 |

**Table 20.24—Postdoctoral plans** (Survey Item No. 39)

| | Number | Per Cent |
|---|---|---|
| University | 2,105 | 39 |
| Not sure | 1,238 | 23 |
| Public sector | 819 | 15 |
| Private sector | 767 | 14 |
| Non-profit/community | 278 | 5 |
| Other | 132 | 3 |
| Missing data | 52 | 1 |
| TOTAL | 5,395 | 100 |

# Appendix 8
# NVivo analysis of candidate perspectives on the Australian doctoral experience

This appendix outlines the processes and outcomes involved in an NVivo analysis of respondents to a national online survey of doctoral candidates. The material comprises extracts from a presentation at the Quality in Postgraduate Research (QPR) conference held in Adelaide, March 2006. The presentation was entitled "Candidate Perspectives on the Doctoral Experience: Description, interpretation and theorising".

---

### Introduction

The research that forms the basis of this presentation is part of an ARC Linkage Project entitled "Reconceptualising the Doctoral Experience". My aim today is to promote informed debate on the doctoral experience by drawing on the perspectives of candidates enrolled currently in universities across Australia. The main focus is on the analysis of a selection of qualitative data generated from a national online survey of doctoral candidates conducted in July 2005. The intention is to highlight the voice of candidates in the identification and elaboration of significant themes and issues. Using the NVivo software package to assist with a grounded theory approach, the objectives of this presentation are threefold. First, to describe the expressions of respondents (e.g. words, phrases and themes). Second, to interpret these expressions (e.g. meanings, patterns and relationships). Third, to theorise on the implications arising from these interpretations (e.g. models and matrices).

### Approach

Two items on the survey were in the form of open-ended questions that invited respondents to describe in up to a maximum of 100 words "what has worked well" (Q40) and "sources of frustration" (Q41) to this point in their candidature. Data generated from the first of these items generated just under 100,000 words, with the second resulting in over 150,000 words. In order to analyse this substantial amount of data, I employed three strategies. A random sample of 185 respondents was created using SPSS. Relevant data from the sample (i.e. 15,000 words in response to questions 40 and 41) were transferred from an Excel to a Word file. NVivo software was then sed to assist in the analysis of the data through the identification of key words, categories and themes.

### Content analysis

Using the NVivo software package, the analysis of the survey responses was conducted in five stages that involved moving from description to interpretation and finally to theorising.

—Stage 1—'nodes'—coding initial categories }

—Stage 2—'branches'—grouping categories } **description**

—Stage 3—'trees'—identifying main themes }

—Stage 4—dimensions—developing measures **interpretation**

—Stage 5—models—constructing matrices **theorising**

### Nodes

A key feature of Stage 1 was the creation of around 30 'nodes' by the systematic recording of key words and their derivatives (see Table 30.1). Respondents used some words more than others (e.g. 'supervision', 'work', and 'research'). However, words like 'infrastructure',

‘quality’ and ‘expectations’ (see previous research) were used rarely. There was also variation between responses to Q40 and 41:
e.g. ‘time’, ‘funding’ and ‘scholarship’ (i.e. award) appear three times more frequently in comments about sources of frustration
e.g. ‘networking’, ‘relationships’ and ‘environment’ appear three times more frequently in comments about what has worked well.

**Table 30.1—Node construction**

| **Word** | **Q40-worked well** | **Q41-frustration** | **TOTAL** |
|---|---|---|---|
| Supervis-or; ion | 84 | 108 | 192 |
| Work-ing, er | 87 | 83 | 170 |
| Research-ing, er | 69 | 75 | 144 |
| Time | 27 | 86 | 113 |
| Support-ing, ive | 49 | 35 | 84 |
| Student | 31 | 45 | 76 |
| Project | 23 | 34 | 57 |
| Self | 27 | 26 | 53 |
| Thesis | 25 | 15 | 40 |
| Fund-s-ing | 7 | 24 | 31 |
| Share-ing | 16 | 15 | 31 |
| Academic-s | 10 | 20 | 30 |
| Writing | 13 | 14 | 27 |
| Resourc-es, ing | 10 | 18 | 28 |
| Department | 8 | 17 | 25 |
| Topic | 13 | 9 | 22 |
| Change | 6 | 15 | 21 |
| Family | 7 | 13 | 20 |
| Scholarship | 5 | 14 | 19 |
| Manage-ing, ment | 10 | 9 | 19 |
| Conference | 5 | 12 | 17 |
| Computer | 4 | 12 | 16 |
| Network-s, ing | 12 | 3 | 15 |
| Relationship-s | 9 | 3 | 12 |
| Environment | 6 | 2 | 8 |
| Training | 3 | 4 | 7 |
| Motivation | 3 | 0 | 3 |
| Culture | 0 | 3 | 3 |
| | | | |
| | | | |
| Time and management | 9 | 14 | 23 |
| | | | |

### Categories, sub-themes and main themes

Stages 2 and 3 involved a developmental process that resulted in the creation of initial categories, sub-themes, and ultimately four main themes (see Table 30.2).

**Table 30.2—Identification of main themes and sub-themes**

| | + | — | **Total** |
|---|---|---|---|
| **SIGNIFICANT INDIVIDUALS** | 112 | 68 | 180 |
| —Academics | 56 | 50 | 106 |
| Supervisors | 48 | 49 | 97 |
| Single | 32 | 21 | 53 |
| Multiple | 10 | 10 | 20 |
| Changing | 1 | 6 | 7 |
| —Self | 30 | 12 | 42 |
| —Peers | 24 | 6 | 30 |
| —Family & Friends | 7 | 0 | 7 |
| | | | |
| **DOCTORAL PRACTICES** | 97 | 69 | 166 |
| —Learning | 42 | 12 | 54 |
| Individual/cognitive | 25 | 9 | 34 |
| Community/collaborative | 19 | 3 | 22 |
| —Working | 18 | 35 | 53 |
| Paid | 5 | 25 | 30 |
| Unpaid | 13 | 13 | 26 |
| —Researching | 23 | 14 | 37 |
| Tasks | 11 | 10 | 21 |
| Focus | 13 | 4 | 17 |
| —Managing | 22 | 13 | 35 |
| Time | 7 | 12 | 19 |
| Project | 13 | 1 | 14 |
| Self | 5 | 5 | 10 |
| —Training | 22 | 7 | 29 |
| Supervision | 13 | 4 | 17 |
| Courses | 9 | 3 | 12 |
| —Other | 2 | 7 | 9 |
| | | | |
| **PHYSICAL RESOURCES** | 23 | 51 | 74 |
| —Funding | 11 | 36 | 47 |
| personal expenditure | 4 | 8 | 12 |
| research | 4 | 7 | 11 |
| scholarship | 5 | 4 | 8 |
| —Infrastructure | 15 | 28 | 43 |
| equipment | 4 | 19 | 23 |
| office on campus | 3 | 4 | 7 |
| home | 4 | 0 | 4 |
| industry/community | 3 | 0 | 3 |
| | | | |
| **DOMINANT CULTURES** | 37 | 36 | 73 |
| —Academic | 26 | 38 | 54 |
| Faculty/Department | 4 | 13 | 17 |
| Graduate School | 5 | 2 | 7 |
| —Organisational | 2 | 40 | 42 |
| —Professional | 12 | 5 | 17 |

**Dimensions**

In order to move beyond the descriptive nature of the themes and sub-themes, a further coding of the main themes (i.e. on-coding not re-coding) was undertaken with a view to identifying nuances, subtleties and deeper meanings. A major objective was to interpret the primary analysis (Stages 1-3). A key question was: "How do the comments of respondents help to develop in-depth understanding of the contemporary doctoral experience?" As a result of this further analysis, three dimensions were identified, viz, 'connectedness', 'security' and 'agency'. Each dimension reflects a continuum (e.g. a position on the continuum could be regarded as a property of the doctoral experience).

**Matrix**

A matrix has been developed to summarise/present the dimensions of candidates' perceptions of their doctoral experience. However, this level of theorising should be seen as 'work in progress' (i.e. this is a preliminary attempt rather than a definitive analysis).

| | |
|---|---|
| **Protected Self-Starter**<br>High level connectedness, security and agency<br>[connected, secure & independent] | **Protected Neophyte**<br>High level connectedness and security, but low level agency<br>[connected & secure, but dependent] |
| **Exposed Self-Starter**<br>Low level connectedness and security, but high level agency<br>[isolated & vulnerable, but independent] | **Exposed Neophyte**<br>Low level connectedness, security and agency<br>[isolated, vulnerable & dependent] |

**Cautionary notes**

There is a need to be careful about making grandiose claims about this research and tentative models (Silverman, 2000).

There is a need to be aware of the limitations of matrices and the danger of conceptualising doctoral candidates/experiences as a static phenomenon (e.g. it is possible that candidates could move from between categories (e.g. from a protected to an exposed neophyte) during their candidature.

Similarly, the construction of 'boxes' can narrow rather than broaden thinking and possibilities.

There is a need to determine if the issue of 'sub-populations' within the sample should be considered (e.g. to what extent do the concepts and dimensions hold for Indigenous, disabled ... candidates).

There is a need to confirm that this is a preliminary analysis and reflects work in progress (e.g. Given that I have conducted, transcribed and verified 30 interviews of doctoral candidates and individuals identified by them as significant in their research, these data are informing various aspects of analysis that I am undertaking).

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