

Research Capacity Development of Individuals at Three South African University Research Centres

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A thesis presented for the degree of Doctor of Philosophy in the
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ABSTRACT

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In South Africa, there has been recognition of the need for increasing research capacity at South African universities and within the national science system. Furthermore there has been a need to address imbalances in the racial and gender profile of researchers.

There has been a growth of application-oriented, multidisciplinary research centres at South African universities in response to changing national and international knowledge contexts. Many research centres have a research capacity development (RCD) component and run postgraduate programmes in collaboration with academic departments. Thus it is relevant to investigate what types of contexts these centres provide for RCD and postgraduate education.

In this study, *individual* research capacity development is examined as a process of identity formation and socialisation through social (relational), organisational and epistemological lenses. Individuals' processes of development are studied through analysis of biographical, narrative interviews of researchers and postgraduate students located at the research centres. Case studies of the centres are constructed, drawing on the narratives, semi-structured interviews and documentary evidence. The study aims to gain insights into individual research capacity development in general, in the South African context, and in the organisational contexts of the three research centres and their associated research fields. Furthermore it examines what types of contexts the research centres provide for research capacity building. It considers the opportunities and constraints posed for RCD by their particular organisational structure, location and epistemological dimensions of the research conducted.

Existing literature on research capacity development is focused mainly on postgraduate education within traditional disciplines and departments. This study examines RCD within the application-oriented, multidisciplinary contexts of the research centres. It considers

how the organisational forms of knowledge production in the centres, and epistemological dimensions of the research conducted impacts on postgraduate education and RCD.

Considering RCD generally, the findings of the thesis support arguments for more pedagogically informed approaches, and systematically structured and supportive contexts for developing research capacity. It considers how these contexts can be developed, communities of practice generated and more distributed forms of mentoring can be implemented. While individual mentoring and supervision relationships are crucial, they need to be located within effective programmes for RCD. It is argued that there is a need for mediation and scaffolding of learning in contextualised practice, and forms of mediation are examined.

Research centres at universities are identified as having strong *potential* to provide rich contexts for research capacity development. Their involvement in networks of organisations provide young researchers with access to the ‘different worlds’ in which knowledge is produced, and to opportunities to build up a *repertoire of resources* of research capacity. Their ability to offer sound RCD programmes are strengthened where the centres are integrated into university structures, and where there are strong relationships with traditional departments.

The ability of research centres to run successful RCD programmes in the current context tends to be constrained by reliance on ‘soft funding’ and the associated lack of stability. Furthermore, reliance on project funding results in a lack of resources, both material and *human* resources for supervision and mentoring. These factors affect the potential for establishing conditions for pedagogic continuity for developing future generations of knowledge producers in the research fields of the centres.

May 2007

DECLARATION

I declare that *Research Capacity Development of Individuals at Three South African University Research Centres* is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Arona Dison

May 2007

Signed:



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ACRONYMS

ANC	African National Congress
COSATU	Congress of South African Trade Unions
CSD	Centre for Science Development
CSIR	Council for Scientific and Industrial Research
DLA	Department of Land Affairs
DOE	Department of Education
DWAF	Department of Water Affairs and Forestry
FRD	Foundation for Research Development
HBU	Historically Black University
HSRC	Human Sciences Research Council
HWU	Historically White University
IDS	Institute for Development Studies, University of Sussex
IHRG	Industrial Health Research Group, UCT
IWR	Institute for Water Research, Rhodes University
NUMSA	National Union of Metalworkers of South Africa
NRF	National Research Foundation
PLAAS	Programme for Land and Agrarian Studies, UWC
SALB	South African Labour Bulletin
SWOP	Sociology of Work Unit, University of the Witwatersrand
UCEWQ	Unilever Centre for Environmental Water Quality, Rhodes University
UCT	University of Cape Town
UWC	University of the Western Cape
WRC	Water Research Commission

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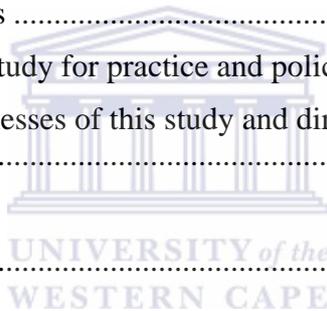
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PREFACE

Looking back, looking forward ...

An untold story behind this thesis is my own story – my story of research capacity development and identity formation as an educationalist and a researcher. I will not tell my whole story here. I will not tell of my own meandering river route¹. I will use this space to share some of my reflections on the thesis process.

Being able to start this project was one of the most exciting opportunities of my life. Being awarded a Spencer fellowship was a gift and a privilege. Three years seemed like a very long time. It felt like there was space to explore, to follow intuitions, to frame a study loosely and see what came up. The project took shape. I made progress. The interviews elicited rich data. I was linking emerging patterns to theoretical frameworks. Three years were coming to a close and I was nowhere near ending.

Also, I was changing. The project was going in directions that I had not foreseen. My knowledge of the field at the start was not sufficient to appreciate the literature that became relevant later on. There was a temptation to keep changing, keep moving, and discard what I'd written in the past. I would be like Penelope in *The Odyssey*, weaving cloth and unpicking so that she never actually completed. Instead I had to keep knitting the jersey, tolerating the bad tension and dropped stitches in parts, and eventually sew the whole thing together.

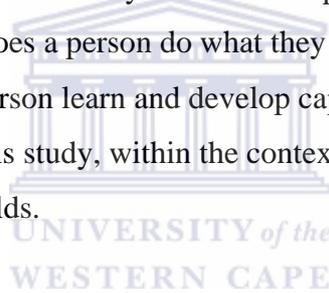
In retrospect, I would like to have done the kind of thesis where one writes and publishes a number of journal articles covering different parts of the study. This would accommodate a changing writer. I would reflect on the development of the study over the different pieces of writing – the contradictions that emerged, the changes in direction. I would reflect on my own growth in the process. I would not have felt an expectation to sew it into one seamless final product.

¹ In the thesis, I develop the concepts of the 'single-stream' and 'meandering river' routes of identity formation and socialisation.

Having written a doctoral thesis, I am now clearer about what I think such a thesis should be. I support the view of a doctorate as research training. I think it should be contained and bounded, while maximising the learning experience involved. I believe that in the social sciences in South Africa, mixed messages are conveyed about what a doctorate is.

The experience of grappling with a doctoral thesis has been a humbling one. I changed my perspective on the experiences of those informants in this study who had completed or attempted doctoral studies. I gained more understanding of the difficulties faced, and developed heightened respect for those who had succeeded.

Arising out of this study as well as my own experience of doctoral studies, I have appropriated and adapted Simon's concept of a 'project of possibility'. Such a project involves forming a vision of "that which is not yet" (Simon, 1992:14) and working towards making that vision a reality. This study is based on a premise that one learns to do research through practice, but how does a person do what they do not yet know how to do? Furthermore, how does a person learn and develop capacity through practice? These questions are explored in this study, within the context of RCD in the research centres and their associated research fields.



Research ... is perhaps the most powerful vehicle that we have to deepen our democracy. Research engenders the values of inquiry, critical thinking, creativity and open-mindedness, which are fundamental to building a strong, democratic ethos in society. It makes possible the growth of an innovation culture in which new ideas, approaches and applications increase the adaptive and responsive capacity of our society, thereby enhancing both our industrial competitiveness and our ability to solve our most pressing social challenges. It contributes to the global accumulation of knowledge and places South Africa amongst those nations who have active programmes of knowledge generation.

National Plan for Higher Education (2001)

If you're a researcher and you suddenly become a celebrity, you must know you have lost the plot, because research is not about that, it's not about the glamour ... it's about very mundane, basic, boring, lonely things ...



Sakhela Buhlungu (8/11/2002)

CHAPTER ONE: INTRODUCTION

1.1 Introduction to this chapter

This study of research capacity development (RCD) in South African research centres is located in the period of rapid transition in national history. This was a transition from the system of apartheid that had been in place for almost fifty years to a democratic government which had the task of reconstructing deep rifts and imbalances in every sector of society. In 1994 the country held its first democratic elections, after a long period of resistance and struggle by groupings opposed to the apartheid system, and the African National Congress was voted into power. The state of knowledge production in South African universities has been deeply affected by this history, and one of the goals of educational policy in this field post-1994 has been to facilitate a transformation process in the national science and higher education system.

Higher education policy documents between 1996 and 2001 emphasised the need for research to contribute to economic and social development as well as advanced technological innovation which would enable South Africa to compete at a global level. At the same time the importance of basic research was recognised for sustaining and building a research culture, for reproducing new generations of researchers and for long-term contribution to innovation (NCHE, 1996, DOE, 1997, DOE, 2001). Crucial ongoing themes in analysis of the research system have been limitations in current research capacity and future sustainability of the system; a decline in basic research; strong concerns about reproduction of the scientific workforce; and the need to address stark imbalances in the racial and gender profile of knowledge producers (DOE, 2001, Bawa and Mouton, 2002, Mouton, 2005).

There has been ongoing analysis of these themes on a macro level. However, there has been very little research on an important element within all of these themes, which is *individual* research capacity development within South African universities. In this study, research capacity of an individual is conceptualised as a *repertoire of resources*, consisting of knowledge, capabilities and personal attributes, which have been developed and

integrated through a process of identity formation and socialisation in particular research settings. (My conceptualisation of RCD will be discussed further below in section 1.6.) There is a need for inquiry into capacity development of individuals within the micro settings of knowledge production. Clark (1995) argues that “what the best macro frameworks do ... is to generate and support the best micro settings” (xx). It is these ‘small worlds’ which are the subject of this study, along with the research capacity development processes of the researchers. This study examines micro settings provided for research capacity development within research centres and their intersection with the lives of the researchers and postgraduate students who are located within them. The study is framed by a central question concerning what we can learn from narratives of individuals and case studies of application-oriented² research centres in South African universities about research capacity development.

I have focused mainly, but not exclusively, on black researchers and postgraduate students in my choice of informants. I need to clarify that this is not because I see research capacity development as an issue concerning only black researchers. I believe development of research capacity concerns *all* researchers and postgraduate students. However, I made the decision to focus mainly on black individuals in the study because of the urgent need to address imbalances in the racial, gender and class profile of knowledge producers in South Africa. One cannot gloss over the real effects that lack of access to material resources, cultural capital and specifically quality education have had on black, working-class or rural people. Thus there is a need for more knowledge on how individual researchers and postgraduate students have been affected by these factors in their processes of research capacity development, in order for these realities to be taken into account in RCD programmes. At the same time one needs to recognise the agency of individuals in their own development processes and contributions to societal transformation, and consider how organisations can best support these processes.

As I have mentioned, this study of research capacity development is located within the current ‘transformation’ period in South Africa, in relation to changing societal requirements of knowledge production, both in South Africa and internationally. Within, the context of the three centres, it explores the organisational forms and epistemological

² I use the term ‘application-oriented’ instead of ‘applied’ as a broad category, which takes into account the range of types of research conducted in the research centres. (See section 4.5.2).

shifts in knowledge production that have developed in response to this complex combination of historical, social and economic factors. It considers how research capacity development and postgraduate education within the research centres are shaped by the organisational forms of the research centres and epistemological dimensions of research being conducted in them. The study is located within the time framework within which I conducted the interviews (2002 to 2004). However, the historical dimensions of the study are present in the narratives of the researchers, and the stories of the centres within the case studies.

In this introductory chapter, I outline the higher education context in South Africa in order to contextualise the research problem. (The international knowledge context affecting RCD will be discussed in Chapter 4.) This is followed by the rationale for the study and research questions. I will then explain how research capacity and research capacity development has been conceptualised, and identify and position the various lenses which are used to investigate RCD in this study. Lastly, I will present a brief outline of the rest of the thesis.

1.2 Historical and policy context of knowledge production in South African universities

In this section I locate the study within the South African higher education context by outlining key elements in the Science and Technology policy and HE policy, pertaining to RCD. I then briefly discuss the role of the research funding agencies, the National Research Foundation and its predecessors. Lastly, I trace important trends in knowledge production in the HE sector, particularly universities, during the period from the early 1990s to 2003.

1.2.1 Higher Education (HE) policy process

Prior to 1994, and in the early years after the elections, there was intense work in policy research in all sectors of South African society in order to inform new policies of government. Important policy developments affecting research were in the sectors of Higher Education and Science and Technology. The HE system under apartheid was fragmented, highly differentiated and discriminatory. The central recommendation of the White Paper on Higher Education was the transformation of higher education through the development of a single, co-ordinated system. In relation to research, the White Paper

recognised that “the production, advancement and dissemination of knowledge and development of high-level human resources are core functions of the higher education system” (DOE, 1997:31). It went on to reaffirm that research plays a key role in these two functions and identified the following key problematic areas in the higher education system:

- lack of articulation between elements of the research system, and between the research system and national reconstruction needs
- insufficient research capacity in higher education, with existing capacity not adequately linked to postgraduate studies
- stark race and gender imbalances
- skewed distribution of capacity between historically black and historically white institutions (DOE, 1997, Bawa and Mouton, 2002).

National development goals and the establishment of a national research system to support social and economic priorities have been critical frameworks for developments in higher education research since 1994. Policy documents called for increasing responsiveness of higher education research. At the same time, they emphasised the role of traditional frameworks of research conducted in universities, and the value of academic scholarship and open-ended intellectual inquiry (DOE, 1997, DOE, 2001). The growth and development of basic research within the higher education system was seen as crucial for “generating high-level and discipline-specific human resources”, and providing opportunities for interacting with international research activities, all of which facilitate innovation (DOE, 1997:32). However, as noted in the National Plan (2001) there has been a decline in basic research and a shift in research focus towards strategic and applied research.

The National Plan recognised the importance of sustaining research strengths that were already established in the HE system at the same time as promoting responsiveness and new kinds of knowledge output. Priorities and strategies identified by the White Paper and National Plan included the following:

- Greater articulation and coordination of research activities across the national system

- Increase in postgraduate enrolments and outputs, with priority access for black and women students to masters, doctoral and postdoctoral programmes.
- Development of new centres of excellence and niche areas in HE institutions with demonstrable research capacity or potential – while sustaining existing capacity.
- Increase in collaboration and partnerships
- Development of a national research plan which set out priorities for research and postgraduate training, targets to achieve a more representative research community, and incentives for collaboration and partnerships (CHE, 2004).

In terms of funding for research, it was proposed that the previous ‘blind’ subsidy allocated to universities, irrespective of research productivity, be replaced with a system of institutional accountability for use of research funds. One of the instruments for this was that research funding would be allocated on the basis of research outputs and research graduates (research masters and doctorates). Although the new HE funding formula was only implemented in 2004, it underlined recognition of the need for building up areas of research excellence, and provided greater incentives to universities to prioritise effective postgraduate education with a greater success and throughput rate.

1.2.2 Science and Technology (S&T) policy

Policy developments in science and technology constitute another part of the background to RCD in South Africa. The S&T policy process aimed to reduce fragmentation in the national science system. The White Paper on Science and Technology (1996) introduced the concept of a National System of Innovation (NSI) which was intended to promote synergy between various elements of the system, promote innovation, and develop a research framework in line with national priorities. The science system was thoroughly reviewed in the years prior to 2000 and a national research plan was initiated. The national plan was aimed at increasing innovation, facilitating further integration in the S&T system, and developing the Science, Engineering and Technology workforce, by promoting the development of young, black male and female researchers (CHE, 2004).

Another focus has been the establishment of funding drivers for transforming the research and innovation system, which included changes in the overall system of funding and the introduction of special funding strategies (*ibid*). One development was the merging of the

former funding agencies, the Centre for Science Development (CSD)³ and the Foundation for Research Development (FRD)⁴ into the National Research Foundation (NRF), which took place in 1999/2000. The CSD previously disbursed funding for research in the social and human sciences, and the FRD in the natural sciences and engineering (NRF, 2000:29).

1.2.3 The National Research Foundation and its predecessors

The parliamentary mandate of the NRF was to distribute funding within focus areas that reflected the development, equity and capacity-building priorities of the state (CHE, 2004). A central goal of the CSD, the FRD, and later the NRF was that of promoting the development of human resources and research capacity and supporting research through the awarding of contracts, grants, scholarships or bursaries to individuals or research institutions. From 1997, the Research Capacity Development Directorate of the CSD specifically set out to work towards race and gender equity within the human sciences as a whole as well as within institutions. It also aimed to strengthen the research culture and ethos of historically disadvantaged tertiary institutions (Tyeku, 2000:2). It attempted to implement “a coherent and integrated approach to research capacity development” that combined activities targeting individual researchers, in relation to the institutions where they are located and its research support structures. These initiatives were linked to regional and national research development priorities (*ibid*: 3).

An evaluation of the RCD programme of the CSD and FRD found that while there was an increase in participation of black and female academics and students in their redress programmes, overall participation by black and women academics in research remained low (NRF, 2000:31). Tyeku noted that the effectiveness of RCD programmes was often hindered by institutional problems and difficulties in the broader HE context. RCD programmes aimed to reach a balance between generic approaches to capacity development, such as general research methodology training and addressing domain-specific RCD needs. From the CSD experience, it became clear that RCD activities cannot be developed and implemented out of context (Tyeku, 2000). When the NRF took over from the CSD and FRD, it continued to prioritise redress programmes (NRF, 2000). The

³ The Centre for Science Development (CSD) was the development and support arm of the Human Sciences Research Council (HSRC) of South Africa. The HSRC is a statutory body, established primarily to conduct large-scale socially relevant research.

⁴ The FRD was the equivalent body for the Centre for Scientific and Industrial Research (CSIR), a statutory scientific research agency.

Thuthuka project was initiated in 2001. This was a focused intervention to address the research and development needs of young, black and/or female and disabled academics with the HE sector. However, it appears that there has not yet been a thorough evaluation of this project (NRF, 2005). The NRF also worked at building research capacity at an institutional level through the Institutional Research Development Program (IRDP) (NRF, 2005). This programme was based on the principle that research capacity should be developed in *all* HE institutions, with different models of RCD for institutions with established research cultures, and those which were less productive overall. In the latter case, niche focus areas were supported and developed.

I have summarised the key issues affecting RCD which have been identified in policy documents and the policy frameworks that have been set up to address these issues and achieve policy goals. In the following section I will outline the trends that have been taking place in knowledge production in South Africa, in relation to broader international developments.

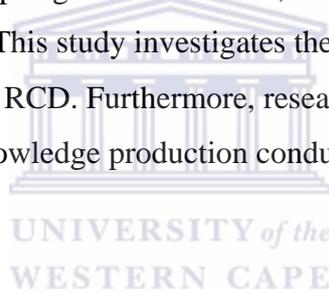
1.2.4 Contextual background to RCD in South Africa

In this section I review major changes in the university sector in South Africa, which have implications for RCD and for knowledge production in research centres. I will also outline changes in the demographic profile of postgraduate students and academics/researchers and discuss the implications for the reproduction of the research system in South Africa.

Knowledge production in South Africa's HE system has become increasingly responsive to national social and economic needs, as well as industry's knowledge needs. One of the indicators of this has been the growth in contract income flowing into HE institutions. Between 1996 and 2000, contract income in the HE sector increased from R288 million to R637 million (CHE, 2004:116, sourced from SA Knowledgebase, CREST, University of Stellenbosch). As in the international context, collaboration between HE institutions and industry has been beneficial for both parties and for the national economy. It provides a source of income for research in the institutions, and facilitates skills and technology transfer. "Higher education collaboration with other sectors, such as government departments, science councils and NGOs is also strongly promoted as part of the responsiveness to the needs of the broader society" (CHE, 2004:116). There has been a

significant growth of HE research projects with industry collaboration through funding initiatives such as the Technology and Human Resources for Industry Project (THRIP) (Bawa and Mouton, 2002, CHE, 2004).

One of the outcomes of the growth of contract income for HE research, the diversified forms of research being conducted, and the co-operative interactions with users and clients has been changes in organisational structures in order to facilitate these processes. In South Africa, as well as in universities in the international context, there has been a growth of a 'development periphery', comprising units that "reach across old university boundaries to link up with outside organizations and groups" (Clark, 1998:6). As in the international context, an important organisational form that has developed for knowledge production at universities is the application-oriented research centre. These centres are often multidisciplinary, and conduct a range of modes of research. Research centres in many cases play a role in training postgraduate students, who will enter the labour market into a range of research contexts. This study investigates the types of settings that the selected research centres provide for RCD. Furthermore, research education is examined in relation to the range of modes of knowledge production conducted in the application-oriented and multidisciplinary contexts.



Responsiveness to societal needs has mainly been considered in the international HE literature in terms of meeting the knowledge needs of industry and government. It has been aimed at enhancing competitiveness in the global market and addressing needs for technological innovation. There has been recognition that social responsiveness includes a dimension of serving the public good, through addressing knowledge needs of a range of social groupings (Gibbons *et al*, 1994, Subotzky, 2000, Nowotny *et al*, 2001, Rip, 2001). However, on the whole, these concerns have not been central in international first-world literature on global changes in knowledge production. In South Africa, there is an urgent, ongoing demand for effective strategies to address pressing social needs in areas such as poverty, health, land, labour and environmental issues, amongst many others. These strategies need to be informed by relevant research, including both formative research and ongoing, critical evaluation.

A number of academics have begun to consider this social development aspect of responsiveness in research. In South Africa, Subotzky (2000) and Cooper (2006) have

identified the importance of research which addresses social and economic needs of communities within the public sector, or knowledge needs of civil society (including trade unions, social movements, local governments and community organisations). Cooper (2006) discusses sustainability, quality and the role of universities in relation to such socially responsive research.

Responsiveness in research plays a central role in the work of all three of the centres in this study.

- The Sociology of Work Unit (SWOP) researches a wide range of issues, centred on labour and work related issues.
- The Programme for Land and Agrarian Studies (PLAAS) conducts research on social dimensions of land, which informs policy and practice on land and other rural development issues.
- The Unilever Centre for Environmental Water Quality (UCEQW⁵) conducts research which contributes to sustaining water quality at various levels from national policy to use of water by the rural poor.

As well as doing application-oriented research, all three of these centres are involved in high-quality research which contributes to an international body of knowledge in their respective fields.

One of the factors which has had a substantial impact on research and RCD in South Africa is foreign aid, which has been distributed mainly through development cooperation agencies, networks and partnerships with South African universities (Bateman, 2004). Many of the programmes arising out of these partnerships emphasize RCD, based on increasing recognition of the need for local knowledge production to inform policy and programmes of developing countries. Furthermore there has been recognition of the need to invest in capacity of research institutions and of individuals in order to contribute to building sustainable systems of knowledge production (Hurni *et al*, 2001:19). Funding for RCD from foreign aid and from philanthropic foundations has been channelled through various forms. These include scholarships for higher degrees, exchange programmes

⁵ Pronounced U-sec

between foreign and South African universities, and project funding with a specific research capacity building element. The types of research that are prioritised tend to be application-oriented, policy-oriented and multidisciplinary. Thus as well as influencing research agendas and the scale of research in South Africa, foreign funding has had a significant impact on the ways in which RCD programmes are organised.

The need to work towards equity and in the production of knowledge in South Africa has been a strong driving theme in policy intentions and programmes discussed above. In this section I will outline some trends in the equity profile of research. Statistics about research productivity are based mainly on the quantitative indicator of research output as reflected in numbers of research publications. One of the limitations of this indicator is that research outputs take different forms. With the growth of application-oriented research, outputs increasingly take the form of research reports rather than articles. Thus this indicator reflects productivity in basic research but does not capture the full range of research being conducted.

South African research output in general has remained the same since 1987, and has declined as a proportion of world research output. This indicates that South Africa's research output has been stagnating since 1990 (Mouton, 2005:15). It has been mentioned above that the distribution of research capacity and productivity across the different range of South African universities has been extremely skewed.

SAPSE figures⁶ on research output amongst different institutional groupings (universities, technikons, and distance education institutions) has shown that historically black institutions more than doubled their contribution to overall research output of HE institutions between 1986 and 1999. However, in 1999, the contribution of historically black universities (HBUs) to overall output was still very low (10.7% of total output of HE institutions) compared to historically white universities (HWUs) (79.4%). Within the historically black university sector, two universities – the University of Durban-Westville and the University of the Western Cape (UWC) together produced the bulk of the output (44.3%) of the HBUs (Bawa and Mouton, 2002). Within the university sector as a whole, the same five HWUs continued to produce the majority of research output consistently

⁶ The SAPSE (South African Post-Secondary Education) database refers to all publication units recognised for subsidy purposes by the Department of Education.

from pre-1994 to 2001. These were Rand Afrikaans University, University of Cape Town, Witwatersrand, Stellenbosch, University of Natal and University of Pretoria (Bawa and Mouton, 2002, CHE, 2004). As mentioned above, HE policy at that stage recommended maintaining existing capacity, while promoting responsiveness and addressing race and gender inequities in postgraduate training. It also recommended the building of new capacity and centres of excellence in research and postgraduate training (DOE, 2001).

I will briefly discuss demographic profiles of research capacity and capacity development, based firstly on data on postgraduate students and secondly, on research outputs.

DoE HEMIS⁷ data showed that from 2000-2003 there was a steady increase in the number of local and international students registering for postgraduate study at universities. For example, the number of masters students increased by more than 10 000 and the number of doctoral students increased by 2400 (Kraak and Koen, 2005:6). Koen (2004) points to the methodological complexity of measuring retention, attrition and time-to-completion rates of postgraduate students. Furthermore, it is clear that while there has been steady growth in the number of doctoral students, this has not yet been matched by a significant increase in graduates (Mouton, 2005:19). In terms of equity goals at universities, there were significant gains in postgraduate enrolments from 2000 to 2003. By 2003, white males no longer constituted a majority of doctoral students, although they retained a majority in the natural sciences. White female students increased, but African male and female students still constituted a minority. (Kraak and Koen, 2005:7).

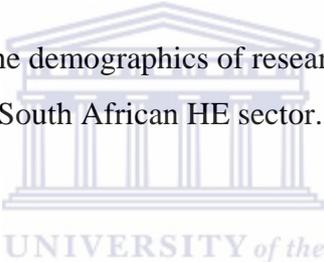
Interpretation of these statistics needs to be qualified in terms of three factors. Firstly, as mentioned above, they refer to enrolment and not graduation figures. Secondly, there has been a large increase in international students, most of whom are black, which affects the figures on equity goals according to race. Thirdly, only a third of university masters students are registered for research qualifications, compared to two thirds who do a professional masters degree, or who choose to exit with a postgraduate diploma (*ibid*: 4-8). Thus, when looking at numbers of masters registrations in relation to developing human resources for knowledge production, one needs to bear in mind the discrepancy between research and professional/ coursework masters qualifications.⁸

⁷ Department of Education (DoE) Higher Education Management Information System (HEMIS)

⁸ Although one cannot predict how many research masters students will end up working in knowledge production, it gives some indication of development of research capacity in the HE system.

Analyses of trends in research output by race, between 1990 and 2002, show that white academics produced the vast majority of articles in the HE sector during this period. There was a steady but slow decrease in their proportion of the total research output (from 96.1% in 1990 to 92.5% to 89.8% in 2002). There was an increase in proportion of contribution by African, coloured and Indian academics respectively. The combined contribution of black authors (referring to the above three groups) increased from only 4% in 1990 to 11% in 2002 (Mouton, 2005:18, sourced from SA Knowledgebase, CREST). In terms of gender, the contribution of female authors, as a proportion of overall research output in the HE sector, increased slightly from 16% in 1990 to 22% in 2002 (Mouton, 2005:18, sourced from SA Knowledgebase, CREST). These figures show that although there was some movement towards achieving equity goals in this period, progress was slow, and there were still huge disparities in the racial and gender profile of postgraduate students and in research productivity.

An alarming finding about the demographics of research output is related to the ageing of publishing academics in the South African HE sector. Bawa and Mouton (2002) point out that

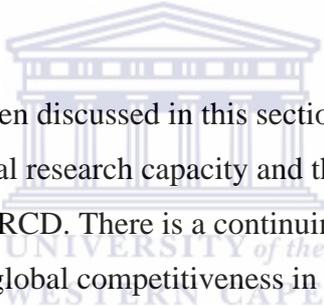


... the production of research papers as a function of the age of the researchers in the system is an extremely important and sensitive diagnostic of the overall state of the research system since it is a first measure of the system's medium-to-long-term sustainability (231).

Whereas 18% of all articles published by South African scholars in 1990 were published by authors over the age of 50, this percentage increased to 48% in 2002 (Mouton, 2005:17). Another factor that compounds the worrying implications of the aging profiles is the international phenomenon of very few authors in any field producing a disproportionately large number of scientific publications (*ibid*).

The combined effects of the 'frozen demographics' referred to above, particularly in relation to race and the aging of publishing scholars, show that the future of South African research is under threat (*ibid*:18). The HSRC predicted in 2003 that there would be a shortage of more than 6 500 academics over the next five years (Mouton, 2005:19). It has been argued that these shortages and the burden on established scholars would have a prohibitive effect on the production of a new generation of researchers (*ibid*). Reduced

numbers of experienced academics would have an impact on levels of research capacity in institutions, research culture and the ability to provide supervision and mentoring. Thus there is an urgent need to address the issue of RCD in South African HE institutions. I have discussed the strong emphasis on responsiveness, collaboration between HE institutions, industry and government, the decrease in funding for basic research and the increase in contract income in the research system. In combination these factors exert a strong pull towards the strategic and applied ends of the research spectrum. A possible consequence is a decline in the proportion of basic research conducted in HE institutions, which may push some academics away from research careers. Furthermore “given that applied research competence rests on the foundations of basic research, a general decline of R&D capacity may threaten not only higher education, but the national research system as a whole” (CHE, 2004:125). A significant aspect of this threat is the probability that a decline in basic research would negatively affect the reproduction of new generations of researchers.



A number of factors have been discussed in this section which underline the importance of the development of individual research capacity and the strengthening of policies and programmes for developing RCD. There is a continuing need to develop competent researchers to contribute to global competitiveness in knowledge production and to generate knowledge needed to address national social and economic priorities. I have mentioned particular threats to the reproduction of the scientific workforce in South Africa. Furthermore the slow rate of change of the equity profile of South African research, particularly in the case of African male and female researchers, has been noted. Although there is a need to improve RCD across the board, capacity development of black and female researchers needs to be prioritised in order to achieve equity goals, and to sustain the system of knowledge production in South Africa in the long term. In the light of these factors, the study of research capacity development is very relevant in the current South African HE context. I will discuss below how this study aims to contribute to understanding about individual processes of RCD and contexts conducive to building capacity.

1.3 Application-oriented research centres

Although I will discuss current international developments in higher education which affect RCD in Chapter 4, it is necessary to frame my choice of application-oriented research centres as settings for RCD, in relation to international as well as South African knowledge contexts. Rip (2004) argues that in the current fluid and shifting context of knowledge production, research training has to prepare students and young researchers “for roles and skills that are not yet clearly articulated”. Thus the goals for research training are moving targets (153). He suggests that in order to address this problem one needs to diagnose the changes taking place, by trying “to understand the longer-term patterns and to reason back to requirements for research training” (*ibid*).

Clark (1998) describes how the entrepreneurial universities which he studied had to adapt their organisational infrastructures to respond to demands from government, business and civic life. He argued that these changes in organisational structure enabled the universities to cope with the conditions affecting higher education and to thrive in them. There was a growth of units that had more capacity than traditional academic departments to “reach across old university boundaries to link up with outside organisations and groups” (Clark, 1998:6).

At an epistemological level, outward-reaching research centres contribute to knowledge production at universities, by challenging, extending and reconfiguring traditional modes of knowledge production.

“They bring into the university the project orientation of outsiders who are attempting to solve serious practical problems critical in economic and social development” (*ibid*).

Researchers are presented with real-world problems which are not located in a disciplinary frame, and need to construct them as *research* problems and develop relevant conceptual frameworks and methodological approaches to address them. The changes in organisational forms and epistemological dimensions of knowledge production described by Clark (1998) correspond broadly to the mode of knowledge production described as

'mode 2' knowledge production by Gibbons *et al* (1994). This will be discussed further in Chapter 4.

Application-oriented, multidisciplinary research centres are an example of organisational structures that are emerging within universities as a response to changing knowledge contexts. Cooper (2005, 2006) has found that research groupings located at HE institutions in South Africa have become important sites for the conducting of both application-oriented and types of basic research. There are features within these centres which pre-empt some of the directions that are likely to become more significant and widespread in knowledge production in the future. These features relate to their organisational form, structural location and position within networks of different organisations, and changing forms of knowledge production.

There is an important historical dimension shaping the two social science centres in the study. In the latter apartheid years, non-governmental organisations and networks had been established in South Africa to work towards facilitating change in particular sectors. In the early 1990s, with change in sight, the approach of these groupings shifted from mainly resistance work to planning and policy research directed at implementation of major changes in government policy and practice (Ramphele, 1996, Turok, 2003). During this period, research units were set up at universities to facilitate these processes as well as to interact with the research work that was being done in the departments. As previously discussed, funding was donated by sympathetic foreign agencies and governments to support the work of NGOs and research units. Many activists in the liberation struggle channelled their work into such organisations.

Both SWOP and PLAAS originated in this period with the purpose of combining high quality academic research while contributing to societal change. UCEWQ did not have an agenda of facilitating social change directly, although its research contributed to the government's goal of providing clean water to the majority of the population. However, UCEWQ's purpose was clearly aligned with a new approach within the Department of Water Affairs (DWAF) to water policy and management and the need for knowledge and instruments to develop and implement this approach.

Cooper (2003) observes that in South Africa many research centres are developing fairly long-term permanent structures. He also indicates that in some universities in South Africa, the periphery is beginning to outsize the departmental heartland in terms of numbers of staff (Cooper, 2004:4). However, there are a number of factors related to their funding base and the way in which they are accommodated at HE institutions which contribute to instability of the centres.

Firstly, because centres are funded by 'soft money', researchers tend to be employed on short contracts of one to three years and there are very few permanent posts for full-time researchers (Cooper, 2004:4). Thus there are not secure career paths for researchers. Researchers need to constantly raise funds to ensure the future of the centre, and their own employment within it. Secondly, the relationship of research centres to the established structure of academic departments is often loose and sometimes unclear (Cooper, 2004:4). Thirdly, Cooper has found that most university systems and rules which govern the research groupings are either a) unclear, or b) applied in an ad hoc way via the systems and norms applicable to the academic departments. I will argue that research centres, located at universities, have the potential to provide rich and dynamic contexts for research capacity building. However, the features of instability and unclear articulation with university structures, in many cases, pose significant challenges to their ability to provide contexts which are conducive to RCD.

1.4 Rationale and research questions

This thesis aims to contribute to the study of postgraduate education and research capacity development, drawing on insights from the narratives of individuals and the case studies of the research centres.

In higher education in South Africa, there is general awareness amongst academics about the need to develop research capacity at different levels more effectively, and that an important component of this is research capacity development of individuals. Although competent academics have an understanding of what the research capacity is in their field, it is often not communicated explicitly. Similarly, these academics have ideas about how it is developed, that is often based on their own experience, and the models of postgraduate education that are present in their departments and institutions. Because of a lack of

explicit articulation, these understandings are often taken for granted and not subjected to critical discussion. Nor are they based on empirical and theoretically informed research. Much of postgraduate training, particularly in the humanities and social sciences, takes place through an individual apprenticeship model, which is a one-on-one mentoring process of a postgraduate student by a supervisor.

Emerging policy on research education in Europe and the UK draws attention to the inadequacy of the individual apprenticeship model of research education in the current HE context (Enders and de Weert, 2004, Henkel, 2004) and the need for this to be supplemented with a more systematic pedagogical approach. Henkel (2004) argues that there is a need for “more collective thinking about the broadening aims of research education and the means by which they can be met” (179). She argues that:

Graduate education is now itself the focus of more systematic study, as well as of more explicit and distinct policy making. In the process, the function of the research supervisor is being reconceptualised and the processes through which research students learn are being made more explicit (*ibid*).

This thesis aims to contribute to the study of postgraduate education and research capacity development, drawing on insights from the narratives of individuals and the case studies of the research centres. Research on individuals’ processes of research capacity development, and on environments and programmes for research capacity building can make a valuable contribution to developing pedagogically informed approaches to RCD.

Internationally, studies have been conducted on identity formation of academics (Henkel, 2000, Kogan, 2000) and socialisation of postgraduate students in traditional disciplinary contexts (Clark, 1993, Gumport, 1993b, Becher *et al*, 1994, Delamont *et al*, 2000).

Research education within changing knowledge contexts has begun to be investigated and reported on (Pearson and Brew, 2002, Enders and de Weert, 2004, Henkel, 2004, Rip, 2004). However, there is a need for more in-depth research in this area and specifically on capacity development in applied, multidisciplinary research contexts.

In South Africa, there has been very little theoretically grounded and empirically based study of what capacities are required by researchers and academics, and *how* these capacities are being developed in local contexts. Thus, there is a need for more research

that contributes to understandings of how research capacity can be developed more effectively in South Africa. South Africa provides an interesting site for this study, since it is a developing country, emerging from its apartheid legacy, with all the distortions caused by apartheid social structures. There are demands for relevant research to address needs for reconstruction, and at the same time, equity goals need to be reached to develop a more representative knowledge-producing workforce. Furthermore, as in other parts of the world, there have been shifts in organisational forms and epistemological dimensions of knowledge production and research is needed about educating knowledge producers and equipping them to meet the range of demands of research in changing knowledge contexts in South Africa.

Application-oriented research centres in South African universities provide interesting and relevant settings for the study of research capacity development, since they encapsulate many of the elements of changing international and national knowledge contexts. Located in the 'development periphery' of universities (Clark, 1998), the organisational forms of their structure and location differ from traditional academic departments. They generally have access to very little funding from the university, and often rely mainly on income from contracts with clients, donors and funders. They are involved with collaborative research relationships with partners such as government departments, industry, science councils and organisations representing civic society. Furthermore, research conducted in these centres takes a range of forms and there is a strong application-oriented dimension, with different forms of multidisciplinary inherent in the knowledge production process.

Many research centres have an RCD component and run postgraduate programmes in collaboration with academic departments. In most cases, the individual projects of students are integrated into broader research projects of the centre. The choice of research centres as the setting for research capacity development in this study, provides rich material to learn more about how these organisational and epistemological factors impact on the settings that such centres provide for RCD, and how these factors affect the processes of identity formation and research capacity development that individual researchers undergo. This study is located in relation to the broader changes in knowledge production both internationally and nationally. Moreover, it gives insight into the particular development contexts of research centres that have grown up with the mandate of contributing to social, economic and environmental change, as well as conducting high quality research for

academic audiences. In the study, I consider what these types of university-based research centres can contribute as settings for research capacity development, and what can be learned from these settings about research capacity development both in their particular fields of research, and in South Africa.

Although the research centres are small, they were selected on the basis of their RCD programmes, which provide rich *opportunities to learn*. While it is important to draw on findings of international research to inform educational research, policy and programmes, there is great value in research on local practices, which has been grounded within the complexities of particular South African contexts. The decision to select research centres in niche areas with demonstrable research capacity as well as potential for growth of research capacity was informed by policy aimed at supporting and further developing centres of excellence and niche areas in research (DOE, 2001).

The study is guided by the following central research question:

What can we learn from narratives of individuals and case studies of application-oriented research centres in South African universities about research capacity development?

This question is explored through the following sub-questions:

1. What can we learn from individual narratives of researchers and postgraduate students in the research centres about research capacity and how it is developed:

- in a general sense
- in a South African context
- in the research centres and associated research fields ?

2. What opportunities and constraints do the research centres, in each case, provide for RCD in terms of:

- Organisational form and structural location
- Models of research capacity development implemented
- Types of knowledge production in the centre
- Epistemological dimensions of the disciplinary or multidisciplinary field of study of the centre?

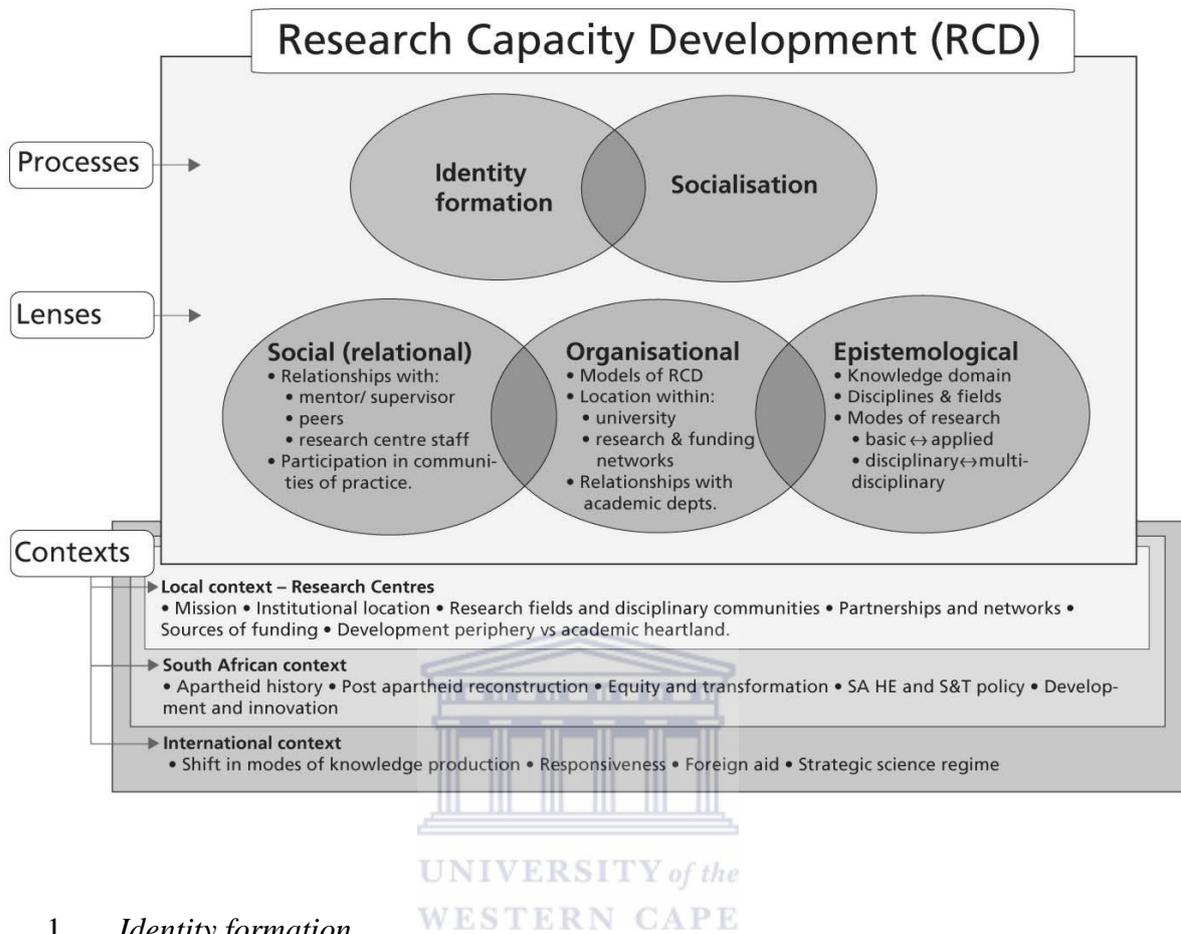
1.5 Approach to research capacity development in the study

Over the course of this study I have come to understand research capacity development as a process of identity formation and socialisation, in which various elements of knowledge and competence are acquired within organisational settings and in social contexts.

Processes of research capacity development are shaped by the disciplinary or multidisciplinary dimensions of the research field in which the individual is being socialised. Knowledge and competencies are integrated into the individual's repertoire of resources as part of her ongoing identity formation process. Some of these sources of knowledge are in an explicit, codified form, and some need to be acquired and mastered through social practice. As part of the process of RCD, the researcher learns to apply these developing capacities, within situated practice, drawing on integrated knowledge in ways that are appropriate to particular organisational, social and epistemological contexts.

In terms of the organising framework for this thesis, research capacity development is investigated as two interrelated processes, *identity formation* and *socialisation*, in which learning is embedded. These processes are viewed through three lenses, which are *social*, *organisational* and *epistemological* dimensions of RCD and RCD settings. These function both as lenses with which to view RCD and as contexts within which research capacity is developed and knowledge and skills are integrated and applied, through social practice. I see RCD as being encapsulated in the processes of identity formation and socialisation, which are connected, as two sides of a coin. The concept of *identity formation* foregrounds the individual within social contexts, while *socialisation* foregrounds the organisation or institution into which the individual is being socialised. This corresponds to the dual focus of the study – firstly, the development of *individual* researchers in relation to social, organisational, and epistemological contexts; and, secondly, the settings which *research centres* provide for research capacity building.

Figure 1: Lenses for viewing research capacity development



1. Identity formation

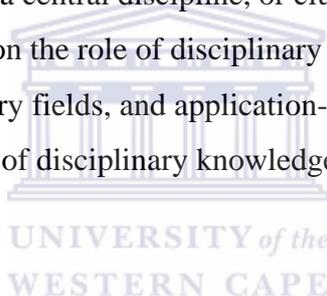
The process of research capacity development is strongly tied up with the individual's process of *identity formation*. This study takes into account an individual's background, personal qualities, approach to learning, psychological processes, relational and emotional experiences which contribute to RCD. Through a study of biographical narratives, these aspects of the researcher's path of development are viewed within historical and socio-political contexts.

The biography of researchers prior to coming to university is acknowledged as being deeply formative, and informs the analysis of individual narratives. However the main focus is on identity formation processes of individuals as researchers in a higher education setting. Thus RCD is viewed in relation to disciplinary and research fields, and in the organisational context of research centres, and their relationships to other organisations both within and outside of the university.

2. *Socialisation.*

Research capacity development takes place as part of a process of socialisation of researchers and postgraduate students both into organisations and into disciplinary and research fields. Scholars such as Clark (1983), Becher (1989), and Delamont *et al* (2000) view disciplinary affiliation as the primary source of academic identity and enculturation. However, as Fulton (1996) argues “to say that people identify with their discipline more than with the immediate organizational context is *not the same as saying that they are primarily shaped by it*” (*ibid*: my emphasis).

This study seeks to contribute to knowledge about research capacity development, by examining it in relation to a complex range of factors which *shape* it in the selected research centres and related fields. I am not disputing the central role of disciplinary socialisation in the development of academic identity and RCD. This role is clearer in research fields that draw on a central discipline, or cluster of cognate disciplines. However there is a need for research on the role of disciplinary knowledge, socialisation and identity formation in multidisciplinary fields, and application-oriented research settings, which may demand new configurations of disciplinary knowledge and methods (Gibbons *et al*, 1994, Rip, 2004).



Some of the factors influencing socialisation and identity formation of researchers are sketched out below in relation to the three lenses of *social, organisational* and *epistemological* dimensions of RCD and RCD settings.

1. *Social dimensions*

I use the term *social* to mean ‘relational’, in other words, pertaining to relationships between people, both individuals and groups. Important relationships which affect identity formation processes include those with mentors, peers and staff within a research centre, as well as other individuals in the research field. Some relationships are intentionally set up within organisations to facilitate RCD, and some develop spontaneously. Groupings that have developed for other reasons may function as productive communities of practice for RCD or they may not. The nature of these communities of practice, the effectiveness of mentoring relationships and the role that they play in researchers’ learning, identity formation and socialisation processes, are examined in this study. Furthermore the location

of these relationships and groupings within broader RCD programmes are considered within the research centres.

2. *Organisational dimensions*

Processes of RCD are studied in relation to the *organisational* dimensions of the research centres and the approaches to RCD and practices which are implemented within them. The context which a research centre provides for RCD is affected by its location in relation to:

- the university
- academic departments
- networks with organisations external to the university, including government, industry, research councils and international donors
- access to sources of funding

Furthermore capacity development processes are affected by the organisational structure of the research centre, and the models of RCD implemented in the centre. Organisational culture, both of the research centre concerned, and the broader institution, also influences the centres' ability to nurture researchers' and students' development.

3. *Epistemological dimensions*

Through an *epistemological* lens, I will consider the various *purposes* of the research centres; the modes of research they produce and how this shapes the settings that they provide for RCD. It will be argued that research centres conduct a range of types of research, which can be located on a continuum from basic to applied research (Cooper, 2003). I will examine the types of disciplinarity or multidisciplinarity of the research fields of the centres. I will explore the impact that involvement in various modes of research has on the settings which research centres are able to provide for RCD.

There are close affinities between the organisational and epistemological aspects of knowledge production, as argued by Becher *et al* (1994) and Delamont *et al* (2000), and research capacity development is located in relation to these dimensions of knowledge production in particular domains. "The everyday realities of academics and apprentice scholars are grounded in social worlds in which academic, disciplinary subcultures and

local organizational practices are closely intertwined” (Delamont *et al*, 2000:4). The relationship between organisational and epistemological dimensions of knowledge production and research capacity development is explored in the context of application-oriented and multidisciplinary research centres.

In this chapter I have sketched out the historical context in which this study is located. I have highlighted the policy context in which the shortcomings of the HE system and broader science system for addressing national knowledge needs were recognised and policy frameworks were put in place in order to enhance research capacity nationally to facilitate innovation and produce high-quality, relevant research.

Development of research capacity of individuals is a crucial element of this process and equity goals have been set to address the inequalities in research expertise at an institutional level and in terms of race and gender. Furthermore there has been recognition of shifts in the organisational and epistemological dimensions of knowledge production as research is generated through partnerships and networks between different institutions, is driven by a multiplicity of funding sources and is increasingly application-oriented and conducted outside of traditional disciplinary boundaries. RCD thus needs to prepare researchers for operating in contexts which are fluid and shifting.

I have identified research centres as sites in which to explore the nature of research capacity within these contexts, and how it is developed, using the lenses that I have outlined above. I do this through examining processes of learning, identity formation and socialisation as described in the narratives of individual researchers and postgraduate students, and analysing how these processes are facilitated within research settings in application-oriented research centres.

1.6 Outline of the thesis

In the preface, I introduced the study from my own perspective, and reflected on how some of the themes which emerged in the study, played themselves out in my own story of my development through the thesis process.

In this introductory chapter, I located my study within the recent South African historical context of the period of transition to democracy, the South African HE context and in relation to changes in the production of knowledge. I explained my selection of research centres as the context for RCD in this study. Lastly, I discussed my conceptualisation of research capacity and development, in relation to a number of lenses.

In Chapter Two, I discuss the research design and methodology used in the study. This was based on case studies of the three research centres, combined with biographical narratives of researchers and postgraduate students about their own processes of research capacity development.

Chapters Three and Four contain literature reviews which are woven into two components of the overall theoretical framework for this study. Chapter Three focuses on theories about learning, the acquisition of knowledge, and development of capacities, which are understood as taking place within processes of identity formation in social contexts. Chapter Four develops a framework for understanding the organisational and epistemological dimensions of research capacity development.

Chapters Five and Six are empirically based chapters, which cut across the three research centres. Chapter Five investigates research capacity development as a process of identity formation and socialisation. Chapter Six highlights some aspects of mentoring and supervision relationships and closely analyses how learning is mediated through a mentoring process in the narrative of one of the researchers.

Chapters Seven, Eight and Nine investigate research capacity development through case studies of the three research centres in the study. Chapter Seven is on the Sociology of Work Unit (SWOP); Chapter Eight is on the Programme for Land and Agrarian Studies; and Chapter Nine is on the Unilever Centre for Environmental Water Quality (UCEWQ). In Chapter Ten, I conclude by summarising the findings of the study and discuss implications of the research for practice and policy in the area of RCD and postgraduate education.

CHAPTER TWO: METHODOLOGY AND RESEARCH PROCESS

... at the end of the day, the work has to be done, and it's a huge mental leap to accept that difficulties and problems and things are there to be overcome. They don't form part of the story, they are simply a factor of life and you get on with it. You write the thesis. You don't write in the thesis that your car was broken into, and that your samples were stolen and you did your experiment thirty five times. You simply write the experiment that worked. And nobody is going to give you a degree, for all the things that went wrong ...

Professor Tally Palmer, Director of UCEWQ

... what we call "research methodologies" are stories told after the fact to try to make rational a substantially irrational process. I have found that conducting research is a bit like going for a swim: floating, getting out of one's depth, diving below, treading water, swimming strongly. This is not like swimming in a river that has a source, a course, and a mouth: hypothesis, experimentation, results. Rather, it is like swimming in a large pool. There is no beginning and no end, just water and endless shoreline. One gets in, moves around in the water, and after a while one gets out (Appel, S, 1999:144, in Wedekind, 2001:24).

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2.1 Introduction

The aim of this study is to gain insight into individual processes of research capacity development, and how these are facilitated and constrained in RCD settings. The understanding of individual RCD with which I approached the study was that it takes place as part of the individual's overall growth and development and is located in social contexts. The dual focus on individual processes and social contexts led me to adopt a research design that incorporated biographical narrative interviews of individuals combined with case studies of the research centres concerned. During the course of the research my conceptualisation of research capacity development became more defined, and the lenses for examining processes and settings emerged more clearly, as outlined in the previous chapter.

The two main units of analysis are:

1. *The individual researchers and postgraduate students.*

Through biographical narratives focusing on the individuals' development as researchers, I have been able to gather rich data about their processes of development, located within their life stories and the historical and political contexts which have shaped their lives. Their accounts of their development of research capacity are also located within the social, organisational and epistemological contexts of research settings and postgraduate programmes.

2. *The research centres.*

The research centre as a unit of analysis is a site for RCD which has social, organisational and epistemological dimensions.

- It is the setting in which the individual is located in *social* relationships and communities of practice, which may facilitate or undermine her development.
- It provides the *organisational* setting, the location in relation to academic departments and external groupings, and structures RCD programmes in particular ways.
- In terms of *epistemological* dimensions, the purpose and orientation of the research centre and the modes of research undertaken influence the competencies developed, and the type of context which the centre provides for RCD.
- Furthermore, the research centre provides important points of contact between the individual and the university, and between the individual and the national and international disciplinary or multidisciplinary fields as well as policy and funding networks.

The orientation of my research in relation to Habermas' knowledge-constitutive interests fits broadly into the 'practical' interest, which has *understanding* as its central goal.

Grundy (1987) characterises the practical interest as an interest in taking right action ('practical' action) within a particular environment. The production of knowledge is seen as taking place through the making of meaning. Phenomena are studied in the contexts in which they occur, and they are analysed in relation to these contexts.

The insights gained from this study can make a contribution to understanding of research capacity development generally, within South African contexts, and within the context of application-oriented and multidisciplinary settings. This study can be located within what Mishler (1990) calls ‘inquiry-guided’ research. He uses this term for a “family of approaches that explicitly acknowledge and rely on the dialectic interplay of theory, methods and findings over the course of a study” (*ibid*:416).

These approaches share an emphasis on the continuous process through which observations and interpretations shape and reshape each other. This feature marks their departure from the dominant model of hypothesis-testing experimentation.

I will discuss biographical narrative methodology in the following section, and will cover case studies within section 2.3 on ‘Research design and process’.

2.2 Biographical narrative methodology

Biographical narrative methodology is part of a tradition within the social sciences which focuses on individual lives as a subject of study. Wedekind (2001) has written a detailed review of the use of biographical methods in different disciplines in the social sciences. He identifies three broad qualitative approaches to life history methodology. He calls these *naïve realist*, *discursive*, and *individual humanist* approaches. *Naïve realist* approaches “assume a neat correspondence between the account of a life, and the life as it is lived and ... deny the role of the researcher in the construction of the account of the life” (*ibid*:53). *Discursive* approaches refer to a range of methods that emphasise the textual aspects of biographical research. They privilege the text in their analysis, rather than what the text refers to. *Individual humanist* approaches place emphasis on the individual as an autonomous subject, “placed centre stage in any process of enquiry” (*ibid*:61), somewhat removed from the social world. Some research within this tradition seeks to give “subjective voice” to social actors (Rustin, 1998), whose views are usually excluded from social science and policy-related research.

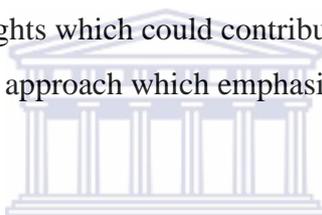
Biographical narrative methodology fits into a fourth category of biographical research which places greater emphasis on the social contexts in which individuals’ lives are lived (Rosenthal, 1993, Chamberlayne *et al*, 2000, Fischer-Rosenthal, 2000, Reddy, 2000, Wedekind, 2001). At the core of research which takes this approach is “an understanding

of individuals as socially constituted and socially constituting” (Wedekind, 2001:98).

Rustin (1998) explains the use of such an approach in the following way:

Our biographical method makes it possible for us to study the interaction of subjects, structures and cultures at a detailed micro-level from the perspective of individuals and their immediate networks as their narratives disclose these to us. ... As we see the biographical account being elaborated, we are also able to take note of its ‘external’ reference points, the ‘elements of the social’ which have to be negotiated, internalised, or opposed by individuals as they make their decisions about and accommodations to their social environment ... (Rustin, 1998:114).

Biographical, narrative analysis can be used for the study of general social phenomena through a focus on their “embodiment in specific life stories” (Chase, 1995:2). This approach is consistent with my aim of learning about individual research capacity development situated in broader social contexts. Furthermore one of the purposes of my research was to provide insights which could contribute to RCD practice and policy. Thus I was drawn to a biographical approach which emphasises the social contexts of individuals’ lives.



Wengraf (2001) argues that the elicitation of biographical narrative material can be seen as “generating particularly rich and usable empirical material for a variety of social research questions” (*ibid*:118). He presents one of the key arguments that have been used by narrative researchers to explain the particular contribution that narrative methodology can make to social science research. The argument is that “many of the assumptions and purposes, feelings and knowledge, that have organized and organize a person’s or a society’s life are difficult to access directly” (*ibid*:115). To ask for a person’s explicit knowledge and approach results in accessing material that they have processed, and have available for fairly quick articulation in words. In addition respondents “have considerable conscious control of how they present and argue such explicit knowledge and norms” (*ibid*). The value of narrative is that it accesses *both* the narrator’s explicit assumptions and norms, experience that has been processed and theorised by the narrator, *as well as* tacit and unconscious assumptions and norms of the individual or a cultural or social grouping, as expressed by the narrator.

Wedekind (2001) draws a distinction between a ‘total life history’ and a ‘focused life history’. A total life history “attempts to capture the full span and depth of a person’s life” (*ibid*:102) while a focused life history focuses on specific dimensions of a person’s life. In this study I used the latter, more specifically ‘career life histories’. My focus was on the individual’s life as a researcher, which left some openness about what they considered relevant to their life as a researcher. I will discuss this in more detail in section 2.3.3.3 on ‘Data gathering’.

My use of life history methodology was motivated by an interest in the processes of learning and development of researchers from their perspective. Moreover, I also wanted to learn more about what type of contexts, social relationships and programmes were conducive to developing research capacity of individuals. By selecting individual researchers or postgraduate students within research centres, I could build more understanding of the social, organisational and epistemological contexts of their development. I could interpret the individuals’ narratives in relation to social networks and communities of practice that emerged from the data. It was also possible to triangulate perspectives from interviews with different informants at the same research centre. In the semi-structured interviews with directors, a question was included that asked about their careers and how they came to be in their particular research field. Their career histories were relevant for a number of reasons. The main reason was that individuals in leadership positions have an important influence on organisations. The research centres were relatively small and new, and, in each case, had been started by the director. Thus the ‘life history’ of the centre was closely linked with the corresponding period in the career of each of the directors.

2.3 Research design and process

2.3.1 Case study methodology

In this study I have aimed to construct rich, contextually grounded case studies in a multiple-case study design. It was appropriate to use case study methodology, since the central questions in my study are concerned with, firstly, learning about *how* individual research capacity development takes place within the research centres and their associated research fields; and secondly, *what* types of contexts are conducive to RCD. Yin (1994)

describes a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, because the contextual conditions are highly pertinent to the phenomenon. He recommends the use of case studies as one of the possible research strategies suitable for researching ‘how’ and ‘why’ questions which are *explanatory*. My study is not explanatory in a hard, causal sense. Rather through detailed description of the cases and interpretation of multiple sources of data, I aim to throw light on how research capacity is developed within the life histories of the individuals, and within the specific contexts of the research centres. Qualitative case study methodology is not used to generalise findings to a broader population through statistical inference. Rather, Yin argues that the purpose of case study research is to develop “a rich, theoretical framework” which “later becomes the vehicle for generalizing to new cases” (Yin, 1994:46). Thus case studies follow a theoretical logic rather than a statistical logic (Yin, 1994, Mason, 1996, in Silverman, 2000). I will discuss the issue of generalisability further in section 2.4 on ‘Validity of research’.

2.3.1.1 Selecting research centres

I used purposive sampling in my selection of case studies. Denzin and Lincoln describe purposive sampling in terms of seeking out “groups, settings and individuals where ... the processes being studied are most likely to occur” (Denzin and Lincoln, 1994:202, in Silverman, 2000:104). Stake (2000) recommends that a researcher takes variety and balance into account in selection of cases. He stresses that the most important factor in choosing a case is that it offers the ‘opportunity to learn’ (446). In a multiple-case study design, every case has a specific purpose within the overall scope of the study. There are also pragmatic factors that influence case selection such as negotiation of access, and practical access to the case within constraints of time and resources.

Since case study methodology follows a theoretical logic rather than a statistical logic, sampling is conducted according to theoretical criteria. Mason (1996) explains theoretical sampling in the following way:

...theoretical sampling means selecting groups or categories to study on the basis of their relevance to your research questions, your theoretical position ... and most importantly the explanation or account which you are developing. Theoretical sampling is concerned with constructing a sample ... which is

meaningful theoretically, because it builds in certain characteristics or criteria which help to develop and test your theory and explanation (Mason, 1996:93-94, cited in Silverman, 2000:105).

Selection of the three research centres in this study was initially guided by identifying settings where RCD programmes were being implemented and where RCD was identified as a priority. I conducted exploratory interviews with directors of the research centres to find out what approaches to RCD were being implemented, and whether the research centres were suitable cases, that would provide *opportunities to learn*. Initially I had been open to selecting academic departments or research centres located in universities. The decision to select three *research centres* sharpened the focus of the study, since they have common characteristics which allowed me to test out tentative accounts being formed from the different case studies. The selection of research centres meant that the study could focus on application-oriented and multidisciplinary research. There were also significant differences between the case studies, which predicted contrasting results.

I have drawn up a matrix of the research centres, in which the commonalities and differences are represented, according to 5 dimensions. The commonalities between the three research centres are that they each view research capacity development as a *priority*, and they are all *application-oriented*.

Table 1: Commonalities and differences of the research centres

	SWOP	PLAAS	UCEWQ
Perception of RCD	RCD a priority	RCD a priority	RCD a priority
Central purpose of research	application-oriented	application-oriented	application-oriented
Knowledge domain	social sciences	social sciences	natural sciences
Disciplinarity or multidisciplinary	sub-discipline of single discipline with permeable boundaries	multidisciplinary research field	multidisciplinary research field
Dominant model/s of RCD focused on	group model: internship programme – honours and masters	Individual model: full-time researchers doing higher degrees. Full-time funded doctoral students	group model: group of masters students

The other 3 dimensions consist of the *knowledge domain* of the disciplinary field – social sciences or natural sciences; the *types of disciplinarity* in the research field; and the *models of RCD* employed in the centres which have been focused on in this study. Two of the centres, Sociology of Work Unit (SWOP) and the Programme for Land and Agrarian Studies (PLAAS) are located in the social sciences, while the Unilever Centre for Environmental Water Quality (UCEWQ) is in the natural sciences.

I characterise the disciplinarity of the research fields in the following way: The research field of the Sociology of Work Unit (SWOP) is located in a speciality of a single discipline, sociology. However, sociology is a discipline that has permeable boundaries, and hence an openness to multidisciplinary research. In the case of PLAAS, Land and Agrarian Studies is a sub-field of Development Studies, which is a multidisciplinary field. Water Quality Studies is a multidisciplinary field within the natural sciences. (These issues are discussed in more detail in Chapter 4).

The dominant model/s of RCD which were focused on in the study, were the following: SWOP and UCEWQ each had a ‘group model’ of research training, in that a group of students were involved in a structured programme of support and interaction. SWOP had an internship programme, which was run at an honours and masters level. The masters programme was linked to the coursework and half-thesis programme run by the Sociology department. In UCEWQ the masters programme was conducted by thesis, without a coursework element. However, there was a structured programme of weekly meetings and seminars for the masters students. PLAAS has conducted research training through various methods. In this study I focus on two models of RCD at PLAAS. The one model was that of researchers who were employed full-time at the centre while pursuing higher degrees. The second model involved doctoral students on full-time scholarships, who were based at the centre.

The research centres that I chose were relatively small, especially when compared to settings, where RCD is being developed in large, established departments in the natural sciences, and research centres in first world countries with more resources for research. My choices were influenced by a number of reasons. I put considerable effort into looking for suitable case studies, and decided to choose research centres, where informed sources communicated to me that there were interesting approaches to research capacity

development taking place. My interest was in the qualitative aspects of RCD taking place in the units rather than high numbers of doctoral students, and I was convinced that there was much to be learned from micro processes which may be small-scale.

A possible weakness in my selection of centres is that the UCEWQ group model of masters education was only in its first year of implementation. However, the centre provided a rich and interesting case, both because of the contrasting organisational and epistemological factors in the natural sciences as well as the interest and approach to research capacity of the senior staff at the centre. There was a history of individual masters and doctoral training, which was also of interest. Thus there were rich *opportunities to learn* in each of these cases.

2.3.2 Selection of researchers and postgraduate students

Studies of life histories of individuals are also case studies, and there are similar principles which guide selection of informants. A combination of criteria was used for selecting individuals to interview, including the criteria of purposive sampling and *opportunity to learn*. I aimed to select a range of researchers and postgraduate students in each research centre. Thus I did a biographical interview with at least one of the following people: a senior researcher, a junior researcher, a postgraduate student, a past student and a researcher associated with the centre. In some cases one individual fitted into more than one of these categories.

I also did semi-structured interviews with directors of research centres and staff who were involved with research capacity development programmes.

From initial interviews with directors, I selected researchers and also used a 'snowball' technique of sampling (Miles and Huberman, 1994), where I asked informants to suggest others who would be interesting to interview. I aimed to achieve a balance by selecting researchers who were likely to have different perspectives, although they were in a similar position to each other. In addition I aimed for a balance of race and gender, focusing mainly but not exclusively on black and women researchers. I also took into account the class backgrounds of researchers and whether they came from rural or urban backgrounds (although class backgrounds are less easy to discern from the outset).

I conducted eighteen biographical interviews with researchers or postgraduate students located in or associated with the research centres. I used sixteen of these, putting aside the other two, because they did not add to the study. I held seven informal interviews with directors of the centres, and staff who had positions with responsibility for research capacity development programmes. (These interviews are outlined in the appendix.)

One of the factors in my research design which could be open to criticism is the fact that I focused on doctoral students in one research centre and masters students in the other two centres. This occurred because it was only later in the research process that I decided to focus mainly on the internship programme within SWOP and the masters programme within UCEWQ. There was not an equivalent programme at PLAAS at the time of the research. I do not see this as a major weakness since I have studied the phenomenon of research capacity development in the centres and the nature of the contexts which they provide, and my main focus was not to do a comparative study of the research models.

2.3.3 Conducting of ‘fieldwork’⁹

2.3.3.1 Pre- research process

In the initial exploratory stages of this study, I visited key figures who worked for the Centre for Science Development (CSD) in the late 1990s as well as managers who were running research capacity development programmes in the National Research Foundation. I interviewed them about their understandings of research capacity and experiences of research capacity development programmes. This initial research experience assisted in my conceptualisation of research capacity and development processes. I also used this opportunity to ask these informants about possible case studies. While I was deciding on which research centres to select for the study, I did preliminary interviews with the director of each centre, to assess whether the centre would be suitable for the study.

I did not do a formal pilot study to test the research methods used. I decided that it would be sufficient to use the initial interviews as a trial process. It was acceptable to use these interviews as data for my study, since the study was not a tightly controlled study using

⁹ I use the term ‘fieldwork’ here to describe the main stage of data gathering in a research process, not in the sense of going out into ‘the field’ as in anthropological research.

precise instruments that needed to be trialled. I felt confident in my ability to conduct interviews, since I had had a substantial amount of interviewing experience, including a small-scale study using life history methods (Dison, 1997). I made minor adaptations to my interviewing strategies, during the course of the fieldwork.

2.3.3.2 Time-scale of interviews and study

I conducted most of the interviews of researchers between August 2002 and May 2003, starting with PLAAS, in Cape Town, then SWOP, in Johannesburg, and lastly UCEWQ, in Grahamstown. The focus of the study was on the research centres and RCD programmes as they existed at the time of the interviews, as well as on the historical development which shaped them. My study of individual researchers and postgraduate students was on their development of research capacity within the context of their overall development. Thus aspects of their life histories which contributed to their development as researchers are included in the study.



2.3.3.3 Data gathering

I have mentioned that I used a combination of biographical interview methods, semi-structured interviews, and documentary sources of data. There are many different methods of conducting life story interviews, which are linked to different approaches and purposes. In my research on life history methodology, I was influenced by a specific approach referred to as a Biographic Narrative Interpretive Method (BNIM). This is part of a biographic approach to social science research which aims to use life history methods to develop more understanding of broader social processes. The approach “seeks to understand the link between individual agency and wider social structures and processes”, (Chamberlayne *et al*, 2000:22). It has relevance for professional practice as well as policy development and implementation, highlighting the ‘lived experience’ of policy outcomes (*ibid*).

I adopted aspects of the BNIM approach to interviewing, with some adaptation. However, I did not use the associated method of analysis, since it became clear that it was unsuitable for the overall purpose of the study. BNIM interviews encourage the interviewee to provide an uninterrupted narrative of their own life. “They are asked to ‘tell their story in

their own way beginning wherever they like, for as long as they like'” (Wengraf, 2001:141). The initial narrative can last ten minutes or three hours, depending on how long the interviewee takes. The text of the interviewee’s *told story* is supplemented by material developed by further questioning, which starts only when the initial narration is brought to an end by the interviewee. This stage of further questioning is the second stage and the questions are focused on topics that the subject has brought up, and are aimed at eliciting more stories on those topics or themes. In this way the interview is driven by the “systems of relevancy” of the interviewee, not of the researcher (Wengraf, 2001:123-124). It was appropriate in the case of my research to focus the interview on the experiences of research in the interviewees’ lives and their development as researchers, thus the central question that I asked was for them to tell me the story of their life *as a researcher*.

The interviews varied in length, some of them lasting up to two and a half hours in total. I tape-recorded each interview, as well as taking brief notes, while being conscious of the need to make eye contact with the interviewee, and listen in an active and interested way. After the uninterrupted narrative, I spent five to ten minutes going through my notes, identifying further questions arising out of the initial narrative. After each interview, I wrote a reflection on the interview, noting significant elements. I also noted aspects of the interview that would not necessarily be apparent from the tape-recording, such as interpersonal dynamics with the interviewee, or particular body language.

The elements of the BNIM method that I used were successful in eliciting rich data from informants. Some interviewees were able to talk freely for an hour or more, while others felt uncomfortable with the lack of structure. The latter group of interviewees, often younger researchers or postgraduate students, tended to tell a short narrative, but even these short narratives, generated useful questions for the second part of the interview, which were freely responded to.

The lack of directiveness of the interviewing method is linked to a grounded theory approach, which I will discuss further below. In this study, it has been effective in drawing out the interviewees’ perceptions of important factors in their development as researchers. However, there were disadvantages, for my purposes, of the extent of lack of directiveness in the biographical interviews conducted.

The BNIM method includes a third stage of interviewing which is directed by the interviewer's emerging conceptual framework after preliminary analysis of the earlier interviews. However, for practical reasons, I did not include this stage. In retrospect, it would have been useful to go through a more systematic process of data analysis after conducting a few interviews, in order to shape the interview method to fit the goal of the study more precisely. It would have been beneficial to introduce more structure to the interview method, while maintaining a generally open-ended approach.

As I mentioned, the data generated by the biographical interviews were rich. Significant experiences were dealt with in depth, and expanded on when the interviewees were asked further questions in the second stage of the interview. A disadvantage of the method was the breadth of material covered. I did select aspects of the interviews that I thought were most relevant when I analysed the data. However, the volume of data generated, required extra time and resources to process. Interviewees were invited to start their story where they wanted to. Some started with their childhood, school experience, undergraduate or postgraduate experience. The histories given prior to university gave me valuable insights into the backgrounds of the individuals in relation to class, geographic origins, educational background, and community settings. The research careers of the individuals were located within the context of the whole trajectory of their lives.

My interviews with directors of centres and staff involved in research capacity development programmes were semi-structured. In contrast to the biographical interviews, they were far more directive, although I maintained an openness and flexibility in the interviewing process. In interviews with directors, I included a question about their lives, by asking about their career and how they came to be involved in their particular research field. However, this aspect of the interview was answered in a shorter form than in the biographical interviews, as it was only one question amongst a number of others. I interviewed each of the directors of centres at least twice.

I gathered a wide range of documentary sources of data, including annual reports, reports to funders, internal discussion documents, guidelines for mentors, a journal article reporting on an internship programme, brochures on postgraduate programmes and web pages. I used these documents in some cases to develop more background knowledge of the centres, to inform decisions about selecting researchers to interview, and to inform the

framing of questions for semi-structured interviews. I also used documentary sources as data in my writing up of the case studies of the research centres.

2.3.4 Managing and analysing data

2.3.4.1 Transcription

In terms of the methodology used, the narrative was important as a whole. Thus I transcribed the interviewee's narrative and responses to questions in full. I aimed to record their language as accurately as possible, using the grammatical forms used. This was important because editing by a transcriber is already a process of interpretation of data, which according to sources such as Wengraf (2001), should initially be minimised. I transcribed half of the interviews myself, making notes during the transcription process. I had the rest of the interviews transcribed, but briefed the transcriber thoroughly, and afterwards went through the transcriptions carefully myself, listening to the tape-recording and making notes. I used the transcriptions during the analysis process, occasionally referring back to the tape-recorded interviews.

The BNIM method draws on a 'grounded theory' approach, developed by Glaser and Strauss (1967). This is an

“inductive process of developing theoretical constructs from qualitative empirical data, then re-examining the data as these concepts and theories evolve, in an interactive way” (Rustin, 1998:114).

A widespread criticism of this theory is its failure to acknowledge implicit theories which guide work at an early stage (Silverman, 2000:145). The approach which I have used to analyse data could be located between grounded theory and 'guided analysis' (Freeman and Richards, 1996:372), where categories are developed *a priori* arising from literature, previous knowledge and experience, but analysis is guided and categories are modified through interaction with the data. Rustin (1998:114) critiques grounded theory on the basis of its “social structural ‘thinness’”, its reluctance to ‘ground’ empirical data within sociological concepts and theories. He argues that Glaser and Strauss were concerned with their subjects' own capacity to generate social meaning, without full consideration of the structures and cultures which constrain this process (*ibid*). My analysis and interpretation

seek to link the meaning generated by the research informants to broader social, organisational and epistemological contexts.

2.3.4.2 Organisation and coding of data

Before embarking on analysis of the whole data set, I began a process of data analysis with initial exploratory analysis of a limited number of interviews. This work in process was written up in the form of two conference papers (Dison, 2003, Dison, 2004a).

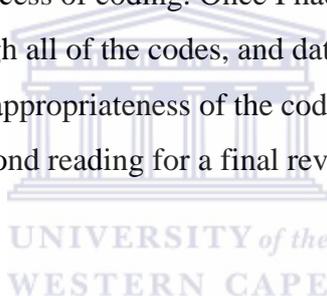
Miles and Huberman (1994) capture the essence of coding in qualitative research in the following way. It involves reviewing units of data and dissecting them meaningfully “while keeping the relations between the parts intact” (*ibid*:56). This part of analysis “involves how you differentiate and combine the data you have retrieved and the reflections that you make about this information” (*ibid*). Ely *et al* (1991:87) refer to the need to “distil categories”, while keeping hold “of the large picture so that categories are true to it”.

Miles and Huberman (1994) describe codes as tags or labels for assigning units of meaning to data compiled. Codes are attached to ‘chunks’ of text. I decided to code chunks of text which formed a meaning unit, rather than choosing to code sentences or paragraphs. By selecting particular codes for data, one is already beginning the analysis process. Chunks of text do not ‘contain’ meaning, but are attributed with meaning by the researcher, who has to make choices about how best to code the data. This is not to say that one cannot code chunks of data with different codes, which is referred to as multiple coding (Bazeley and Richards, 2000). Miles and Huberman argue that choices made about coding are “embedded in a particular logic or conceptual lens, whether the researcher is aware of it or not” and it is preferable to be aware of the conceptual framework being used (1994:57). However, there is not necessarily such a neat translation from conceptual framework to coding framework, and in this study, there has been a reiterative process between coding of data and emerging conceptual framework.

Codes are used to retrieve and organise meaning units. There needs to be a system for organising the codes so that “the researcher can quickly find, pull out, and cluster the segments relating to a particular research question, hypothesis, construct or theme” (*ibid*: 57). Clustering and being able to display meaning units connected to a particular question

or theme transforms the data into a more accessible form for the researcher to make interpretations, inferences and begin to draw conclusions.

The organising system that I used was NVivo, one of the computer assisted qualitative data analysis software (CAQDAS) packages. I formulated broad categories for coding, and generated further codes from the data. I organised the codes into a hierarchical (tree structure) form, using NVivo. This was helpful for developing conceptual framework for the data, which contributed to the developing framework for analysis and writing up. The coding took the form of a reiterative process. It included deductive processes of using my emerging theoretical framework to inform classification, and inductive processes of forming codes arising out of the data. NVivo has a system of ‘nodes’, which are ‘containers’ for codes (Bazeley and Richards, 2000). Meaning units from the data sources are classified under these nodes. Because of using NVivo, I had the flexibility to move nodes around during the process of coding. Once I had done an initial coding of all the interview data, I read through all of the codes, and data units that were categorised under them, in order to check the appropriateness of the coding and to ensure consistency. After making changes, I did a second reading for a final revision and pruning of the coding system.



2.3.4.3 Analysis and writing

The first stage of large-scale analysis took place through the process of developing a coding system and coding the data. The second major stage of analysis and interpretation took place during the process of drafting the analysis and discussion chapters. In writing these chapters, there were two main tensions that needed to be resolved.

Firstly, a decision had to be made on whether to structure the analysis and discussion chapters according to the main processes lenses for viewing RCD, which are identity formation, socialisation, social, organisational and epistemological dimensions of RCD, or whether to organise the discussion within a framework of case studies of the research centres.

The second tension related to the extent to which I would report on the analysis of data on the individual researchers in relation to themes, detached from their life histories, and to

what extent I would focus on extracts of narratives that were contextualised within the life paths and ongoing development of the individuals.

In terms of the organisation of the analysis and discussion chapters, I included one chapter on identity formation, drawing on the different research units, as well as a general chapter on mentoring and supervision. I have reported on the three research units as case studies, using these chapters both to provide insight into RCD within the particular locations of these centres, and in relation to the research fields of the centres.

With regard to the second tension, I aimed to achieve a balance between analysing the data along thematic lines, and including extracts from individuals' life stories as recounted to me. I analysed the narrative extracts in order to understand their development of RCD within the overall identity formation processes of the informants, both within their lives and within the multi-dimensional contexts in which these unfolded.

During the course of the study, I wrote and presented three papers related to my research at educational conferences and gatherings of doctoral students and supervisors (Dison, 2002b, Dison, 2003, Dison, 2004a). Before presenting the papers in which initial data analysis took place, I showed each paper to the relevant informants and engaged in dialogue with them about it, which generated more data.

2.3.4.4 Relationship between theoretical framework and analysis of data

I have mentioned that I have conducted this study through a recursive interaction between theory, analysis and interpretation of data. After preliminary research and reading I formed tentative, loose 'hypotheses' about the role of identity formation and socialisation into communities of practice (COPs) in research capacity development. During the analysis of data, I compared these hypotheses with my interpretations of the data from the individual narratives, and from the case studies of the research units. The theoretical framework of identity formation and socialisation into COPs was also relevant to organisational and epistemological dimensions of RCD, since individuals' identity formation processes are influenced by the organisational and disciplinary or multidisciplinary contexts, into which they are socialised.

During the analysis of material relating specifically to organisational and epistemological dimensions, patterns in the relationships between organisational and epistemological aspects of research settings and the implications of these for approaches to RCD began to emerge. This was taking place at the same time as I was reading about these relationships in literature on postgraduate study (Becher *et al*, 1994, Delamont *et al*, 2000). Thus I was able to compare the patterns in relationships discussed in the literature, with the patterns I was observing in the case studies in my research.

2.4 Validity of the research

In quantitative and experimental research, clearcut procedures have been developed to ensure the validity of findings of the research. Qualitative research has frequently been criticised for the absence of such ‘standard’ means of assuring validity. Qualitative researchers have argued that the understandings of validity and related procedures employed in quantitative research cannot be imposed on qualitative research. A number of researchers have developed alternative concepts of validity in qualitative research and appropriate procedures for informing validity of qualitative research (Lincoln and Guba, 1985, Lather, 1986, amongst others).

Maxwell (1992, 1996) views understanding and validity in qualitative research from what he calls a realist perspective. He explains this approach as one in which data is treated “as *fallible* evidence about phenomena studied, to be used critically to develop and test ideas about the existence and nature of the phenomena” (Maxwell, 1996:56). He argues that validity of research relates to the purposes, goals and methods of the research, and thus needs to be assessed in the context of a particular study. Following Hammersley and Atkinson (1983, in Maxwell, 1992), he emphasizes that data in itself cannot be valid or invalid. It is the inferences drawn from them that are. Validity or lack thereof refers primarily to the ‘account’ of the researcher, not to data and methods. Rather than suggesting procedures to ensure validity, Maxwell (1992) aims to make explicit the way qualitative researchers think about, and deal with, validity in their actual practice. In this discussion, I suggest some procedures which can be used to inform these types of validity. I use the word ‘inform’ rather than ‘ensure’ as these procedures can *contribute* to developing a more valid account, an account that provides a greater degree of ‘epistemic gain’ (Taylor, 1995:17, in Muller, 2000:152).

2.4.1 Categories of understanding and corresponding types of validity

Maxwell (1996) identifies five broad categories of understanding that are relevant to qualitative researchers, with corresponding types of validity. He refers to these categories as *descriptive* validity, *interpretive* validity, *theoretical* validity, *generalisability*, and *evaluative* validity. I will discuss the first four categories¹⁰.

Descriptive validity is concerned with the factual accuracy of an account. This refers both to primary descriptive validity - physical and behavioural events that the researcher has observed directly, and secondary descriptive validity, “the validity of accounts of things that could in principle be observed, but that were inferred from other data” (*ibid*:286). In the case of interview data, descriptive validity refers to whether an account accurately reflects particular statements made by informants in an interview. In principle any disagreement about primary descriptive validity of an account could be resolved by the appropriate data. For example, a tape recording of adequate quality could be used to determine if the informant made a particular statement during an interview (*ibid*).

Interpretive validity is concerned with what “objects, events and behavior *mean* to the people engaged in and with them” (*ibid*:288, original emphasis). Maxwell argues that researchers should make sure that they understand the accounts of meaning from the perspective of the participants¹¹, before they go on to make further interpretations. However, the researchers’ interpretations should not privilege participants’ meanings above other sources of evidence. Furthermore accounts of participants’ meanings are never a matter of direct access, but are always *constructed* by the inquirer on the basis of participants’ accounts and other evidence.

Theoretical validity concerns an account’s function as an *explanation* and refers to the “legitimacy of the application of a given concept or theory to established facts” (Maxwell, 1992:292). Maxwell refers to two aspects of theoretical validity: the validity of the *concepts themselves* as they are applied to the phenomena, and the validity of the understanding of *relationships* among the concepts, as they are applied to the setting or phenomenon being studied. The first of these aspects closely matches what is generally

¹⁰ The category of evaluative validity was not relevant to my study.

¹¹ Maxwell uses the term ‘participant’ whereas I generally refer to informant or interviewee in this chapter.

known as *construct validity*, and the second aspect includes what commonly called *internal* or *causal validity* (*ibid*:291).

Generalisability is often referred to as *external validity*. It refers to the extent to which “one can extend the account of a particular situation or population to other persons, times or settings than those directly studied” (*ibid*:293). Generalisation in qualitative research usually takes place through development of a theory that not only makes sense of the particular persons or situation, but can be applied to different situations. Generalisability is based on the assumption that the findings of research on a particular person or situation may be useful in making sense of similar persons or situations, rather than on an explicit sampling process and the generalising of findings to a specified population through statistical inference (Maxwell, 1992, Yin, 1994). Nevertheless issues of sampling and generalisability are important whenever one wants to apply inferences drawn from research on particular persons, organisations or processes to other persons, organisations or processes.

Maxwell distinguishes two aspects of generalisability, *internal* and *external* generalisability. Internal generalisability refers to generalising within the community, group or organisation studied to persons who were not interviewed, and events and settings that were not observed. External generalisability refers to generalising to other communities, groups or organisations. In terms of *internal* validity in my study, it has been necessary to be aware of the extent to which the experiences of RCD of people who were interviewed may differ from processes undergone by people who were not interviewed. Sampling is important here in order to achieve balance in the claims that can be made about RCD in the research centre. In my study, one of the ways in which I aimed to make the sampling more representative (although not statistically representative), was to select a diversity of informants in each research centre in terms of age, experience, class, gender and, to some extent, race.

I will briefly mention an example of a case where I specifically aimed to make sampling more representative. I had used a ‘snowball’ sampling strategy (Miles and Huberman, 1994:28) in the selection of a number of researchers and postgraduate students. When I interviewed one of the postgraduate students in a particular unit and began to analyse data from her interview, I realised that her narrative reflected a failure to achieve her goals on

her part, as well as failure on the part of the research centre where she was located to facilitate her success. In order to achieve a more balanced account in terms of the research centre, and to reach a fuller understanding of what had occurred, I selected another postgraduate student to interview, who was in the same centre on a similar programme to the first student, but who was succeeding in her studies.

Maxwell argues that internal generalisability is more important for most qualitative researchers than external generalisability because qualitative researchers rarely make explicit claims about the external generalisability of their accounts (Maxwell, 1992). Some proponents of case study methodology argue that the concept of 'transferability' is more appropriate for qualitative research and particularly for case studies (Lincoln and Guba, 1985, Stake, 2000). Lincoln and Guba (1985) argue that there is a trade-off between internal and external validity in research. Internal validity is linked to contextually grounded understanding of a particular case, which militates against abstraction and generalisation to different contexts. The argument is that the responsibility of the researcher is to ensure internal validity of a study, and it is for the *reader* of research findings to determine for herself the potential for applicability to other contexts, having gained sufficient richness of understanding of the particular context researched in the study. In this study, I have aimed to construct rich, contextually grounded case studies in a multiple-case study design. I have developed a theoretical framework in the process of doing the study, which I have related to the relationships and processes which I have observed from the data.

Maxwell (1992) contrasts how threats to validity are dealt with in quantitative and experimental research and in qualitative research. In the former, threats to validity are addressed through prior design features. In qualitative research, such prior elimination of threats is less possible, "both because qualitative research is more inductive and because it focuses primarily on understanding particulars rather than generalising to universals" (*ibid*:296). Qualitative researchers deal primarily with specific threats to the validity of particular aspects of their accounts, and they generally address such threats by seeking evidence that would rule them out. This reinforces Maxwell's argument that ways of addressing validity need to be formulated in the context of a particular study. Particular threats to validity are often addressed after a tentative account has been developed, rather

than attempting to eliminate such threats through prior features of the research design (*ibid*).

2.4.2 Some procedures for informing validity

I will briefly outline some procedures which can be used to inform the aspects of validity of a study presented above, and discuss how I have used them in this study. *Triangulation* of sources of data, methods or theories is commonly used in qualitative research as a way of improving validity of a study. I will focus here on triangulation of data from different sources, in the form of different informants, data relating to different research centres, or between different types of sources, such as interview and documentary material.

Triangulation can be used to inform *interpretive* validity. For example, different participants' understandings of processes or events can be triangulated to inform the understanding of the inquirer in her analysis and interpretation of data. Yin (1994) argues that triangulation of different sources of data can be used to address potential problems of *construct validity*, one aspect of Maxwell's category of theoretical validity. If one is analysing data in terms of a particular construct or theory then use of multiple sources of evidence can corroborate applicability of the construct or theory.

Respondent validation is a method that can be used to inform descriptive, interpretive and theoretical validity. In terms of *descriptive validity*, participants can be sent transcripts of interviews, so that they can check for accuracy of information from their interviews referred to in analysis chapters. In terms of *interpretive validity*, participants can be sent drafts of writing containing analysis of their interview material, so that they can see how this has been interpreted, and inform the researcher if they disagree with the interpretation. Respondent validation can also be used to inform *theoretical* validity, as participants may give feedback which affirms or challenges inferences made by the researcher, and analysis in terms of a particular theoretical framework. Lather (1986:271) uses the term 'face validity', as an aspect of construct validity. Face validity occurs where a construct used in analysis makes sense to the informants, in terms of their understanding of the situation. Fielding and Fielding (1986) caution that informants' feedback "cannot be taken as direct validation or refutation of the observer's inferences. Rather such processes of ... 'validation' should be treated as yet another source of data and insight" (Fielding and Fielding, 1986:43, cited in Silverman, 2000:177).

Validity of a study can also be enhanced by the way that the research is reported. Firstly, transparency and explication of methods of analysis used can give the reader insight into how conclusions were reached from analysis of data, Direct linkages can be shown between data, findings and interpretation (Mishler, 1990). Secondly, display or availability of texts used in analysis can give the reader grounds on which to make their own judgement of analysis and interpretation of textual data (*ibid*). In a similar vein, Glassner and Loughlin (1987) stress the need to “retain good access to the words of the subjects” (Glassner and Loughlin, 1987:27, in Silverman, 2000:190). In this study, I have chosen to use extracts of texts from interview transcripts, so that the reader can see how participants have narrated events and processes in their own words. Full transcripts of interviews could be included in an appendix to a study, but I have not done this because of volume of data. Mishler (1990) states that the existence of full transcripts and tapes, which can be made available to other researchers, also enhance the validity of a study.

In this study, respondent validity was used to inform both descriptive and interpretive validity. Respondents were sent transcripts of the interviews, and papers and draft chapters were sent to the respondents concerned, so that they could check the accuracy of factual reporting and respond to the interpretations made. Thus, during the process of analysis and writing, I interacted with those informants who responded to me about the emerging interpretations. I received both affirming and critical responses on my analysis and interpretation. A number of these informants were affirming about my integration of theory and data in the respective papers. The directors of the centres all responded positively to the analysis of the case studies of their centres. One of the directors was particularly interested in the concept of ‘communities of practice’ used in the analysis, and its applicability to research capacity development. This affirms the face validity of the use of this construct in the analysis.

2.5 Reflexivity

Validity in qualitative research needs to be informed by ongoing *reflexivity* on one’s own practice and the research process. The need arises out of the recognition that as social researchers we are integral to the social world we study. Feminist, post-structural, interpretive and critical discourses recognise that “knowledge and understanding are

contextually and historically grounded, as well as linguistically constructed” (Mauthner and Doucet, 2003:415). Within discussions of reflexivity, “attention is often drawn to the social location of the researcher as well as the ways in which our emotional responses to respondents can shape our interpretations of their accounts” (*ibid*:416).

There are two areas in which reflexivity is crucial for this study. The first area is related to racial identity, and the second is concerned with my own experience of developing research capacity.

I, as well as the majority of informants in this study, grew up in apartheid South Africa. Thus we have been shaped by experiences of racial division, as well as in many cases involvement in groupings that opposed the dominant dispensation during the apartheid years. Moreover, I would argue that, whatever one’s ideological beliefs, individuals who grew up with the geographical, material and cultural divides which were so stark and racially ordered at that time, have been deeply affected with an awareness of race. Beliefs and sensitivities about racial issues exist at different levels, some at more conscious and processed levels and others less conscious. Issues of racial identity were played out within the research centres in the study, along with factors related to class, gender and geographical origins of individuals.

I have been aware of my position as a white, middle-class researcher, studying research capacity development, mainly focusing on black researchers. I have needed to reflect on an ongoing basis on the possible effect of my unconscious assumptions on my conducting of the research. I have also had to be aware of the possible effect of my racial identity on my relationships with informants (particularly black informants), including assumptions that they may have had about me, or that I may have had about them. In some cases tensions that have emerged have needed to be addressed through dialogue with informants. The way in which I have addressed the issue of my own unconscious assumptions is to practice reflexivity to as great an extent as possible, through reflection on issues relating to race that emerged in the data, reflection on my relationship with informants where I was aware of possible tension, through dialogue with informants and through writing reflective journal entries.

The second area where there has been a particular need for reflexivity has been in relation to the dual position that I occupy. On the one hand, I am conducting a study on research capacity development, and on the other hand, I am a doctoral student developing my own research capacity. Although I have not explicitly drawn on my own experiences as a source of data, my own experiences and insights are valuable in informing my understanding of RCD processes and contexts. Maxwell (1992) argues that he has drawn on his own experiences and understandings “in the same way that a linguist is able to draw on his or her or her own ‘intuitions’ about his or her native language in constructing an analysis of that language”(Maxwell, 1992:282). In making this statement he acknowledges his intuitions as a source of data. However, there is a need for reflexivity to guard against unconsciously privileging one’s own unfiltered understandings throughout the research process.

2.6 Ethical considerations

There is a need for careful consideration of ethical practice, especially when doing research on or with human informants. There is not one standard procedure that can be applied, since there is such complexity in the area of ethical practice in social science research, and research projects have different purposes. Relationships between researchers and informants take different forms, depending on the purpose and design of the project. Biographical research raises particularly complex ethical issues. The nature of the data is often personal, and the use of narrative in analysis and reporting, refers to a person within the context of her life story, which tends to be exposing.

Plummer (2001) outlines general ethical principles, which provides a guide for ethical practice in research. These include principles of “respect, recognition and tolerance for persons and their differences”; an “ethic of care” which involves “promoting the caring of others”; promoting equality, fairness and justice; promotion of freedom and choice; and the principle of minimizing harm (Plummer, 2001:288 in Wedekind, 2001:124). I agree with Wedekind that these principles should provide a guide for ethical practices which need to be developed in day-to-day research. While these principles are valuable for informing a researcher’s underlying approach to ethical practice, there need to be mechanisms for building ethical practice into the research design and for demonstrating that ethical practices have been followed.

There are two main issues which tend to be emphasised in guidelines on ethical practice in the social sciences, such as those found in university handbooks. These are, firstly, the issue of anonymity and confidentiality, and, secondly, the need for informed consent on the part of informants. Standard ethical conventions advise the protection of informants' identity, unless otherwise agreed. In the case of public figures, it may be appropriate to use real names, although this still needs to be agreed to by the informants. Wengraf (2001) distinguishes the concept of confidentiality from anonymity. Confidentiality "indicates that certain confidential material may not be used any form, however anonymized" (*ibid*:187). Clearly this cannot apply to a whole interview, but certain statements in interviews are clearly framed by an informant as being "off the record". The issue of anonymity is not clear cut, since even if informants' real names are not used, their identity is often apparent to those who know them, because of the events and relationships described. Anonymity of informants can be protected by changing certain identifying details. However, this needs to be done in such a way "so as not to destroy the social-science research value" of the analysis (*ibid*).

The practice of respondent validation, which was discussed as a method for informing validity can be used to deepen ethical practice in research. This involves informants being given the opportunity to read drafts of analysis which draw on their interview material. The purpose in terms of ethical practice is so that they can see how the interview material has been used and how they have been represented in the reporting of the research. Issues of representation in research concern organisations being researched as well as individuals. I will discuss how I have conducted this study on the basis of principles of ethical practice. One of the decisions that had to be made about reporting the research in the thesis was whether to use real names of research centres and individuals, or whether to conceal their identity by using fictional names. I decided to use real names of research centres for the following reasons: I was researching the centres as particular cases and contexts for RCD. Thus the research centre needed to be presented as a whole entity, and contextual details were important for the study. The research fields of the centres could not be changed, since one of the central lenses for studying RCD was epistemological. Thus if I used fictional names for the centres, I would still need to locate them within their research field. This meant that a reader located at a university might be able to identify which real research centre was being referred to. Furthermore, one of the sources of data used were documents

such as annual reports, whose titles indicated the real name of the research centre. Where individuals did not want to be identified, I used fictional names.

I have discussed some of the general ethical issues regarding reporting of interviews with individuals above. The following issues arose in relation to how individuals were represented in this study. Firstly, in aspects of the reporting, there was not a need for presentation of a coherent 'character' since the data was discussed in relation to the research themes, rather than in terms of the narrative of a particular person. However, in many cases, the interview material was used as part of analysis of the process of development of a person. Secondly, the development of individuals was being researched within social, organisational and epistemological contexts which manifested themselves mainly in the research centres. Thus in much of the analysis, the development of individuals were analysed within the context of the research centres. This meant that even if fictional names were used, others involved in the research centre would be able to identify the informant.

At the stage of conducting interviews, I explained the purpose of the research to the informants and they gave me verbal consent to use their interviews for the research, and also to tape-record the interviews. I consulted each individual about a number of aspects relating to representation and validity of research. I explained that I had not yet made a decision about whether to use real names of research centres and individuals, subject to informants agreeing to this. I consulted with directors of the centres about whether they agreed to the use of real names of the centres if I chose to do this. I consulted with informants about whether they agreed to the use of their real name, or whether they would prefer the use of a fictional name. All the directors agreed that I could use real names of the centres. The majority of informants agreed to their real names being used. During the interviews some comments were clearly labelled 'off the record' by the informants. One of the informants requested that I use certain aspects of the interview with sensitivity. I noted the responses of the informants on a checklist, but did not foresee the need to draw up a formal document to be signed by the informants. When I started writing up the analysis and discussion chapters, I made a decision to use real names of research centres and of individuals, in cases where they had agreed to this. I have included sensitive information (though *not* confidential information) where I was convinced that it was informative for the study, but not in cases where it was dispensable. I have complied with the requirements of

the informants, and have followed up on sending transcripts and drafts of analysis to informants, where this was requested. One of the difficulties of this approach that I encountered in cases where sensitive data was used, was balancing the sensitivities of individuals with my commitment to show my analysis to members of the research centre. In these cases, I decided to first show the draft to the individual concerned before showing it to other members of the research centre.

2.7 Conclusion

In this chapter I have discussed how this study was designed to gain insight into the development of research capacity of individuals within social contexts. I have explained why I chose to use a combination of biographical narrative methodology and case studies. I used biographical, narrative methodology to gain access to individuals' accounts of their processes of identity formation as researchers and their development of research capacity. In the narratives, the accounts of these processes have been contextualised within historical, political and social contexts and have also provided insight into the research centres, RCD and postgraduate programmes in which the individuals were located. Through analysis of the narratives and the case studies of the centres, I have been able to address the question of what type of settings these research centres provide for RCD with reference to their organisational form and location, and the models of RCD implemented. I have also been able to focus on the types of knowledge production taking place in the centres, the epistemological dimensions of the research fields of the centres, and how these factors affect RCD in these contexts.

My approach in this chapter has been to address significant tensions and challenges which emerged in the conducting of the research, and reflect on how I have confronted these. This study aims to gain insight into research capacity development processes of individuals, and the settings which research centres provide for RCD. In the following two chapters, I will present the theoretical framework which has been used to analyse the data. In Chapter 3, a theoretical framework, drawing on learning theory, is constructed for analysing *individual* research capacity development within social contexts. Chapter 4 provides a framework to analyse the *settings* which research centres provide through organisational and epistemological lenses.

CHAPTER THREE: A FRAMEWORK OF THEORIES OF LEARNING FOR ANALYSING INDIVIDUAL RESEARCH CAPACITY DEVELOPMENT WITHIN SOCIAL CONTEXTS

3.1 Introduction

As mentioned above, the topic of research capacity development (RCD) is approached from two main perspectives in this study. The one perspective foregrounds the individual researcher or postgraduate student who is undergoing a process of identity formation and capacity development as a researcher in a particular discipline or research field. The second perspective foregrounds the research centre and the context that it provides for research capacity development. In this chapter, I construct a framework for understanding research capacity development from the perspective of the *individual* on the path to becoming a researcher. Chapter 4 will provide a framework to analyse the *settings* which research centres provide, drawing on higher education literature.

I have conceptualised research capacity development as a process of identity formation and socialisation, in which various elements of knowledge and competence are acquired through situated practice in particular organisational, social and epistemological contexts. This chapter provides a background to *how* research capacity is developed. This is investigated by analysing processes of learning and the acquisition and integration of elements of knowledge required to become a competent researcher. In order to do this, I have woven together a conceptual framework based on theories of learning and knowledge, which are used to explain the processes observed in the data. The framework links learning to *identity formation*, and emphasizes the *social* contexts within which research capacity development takes place.

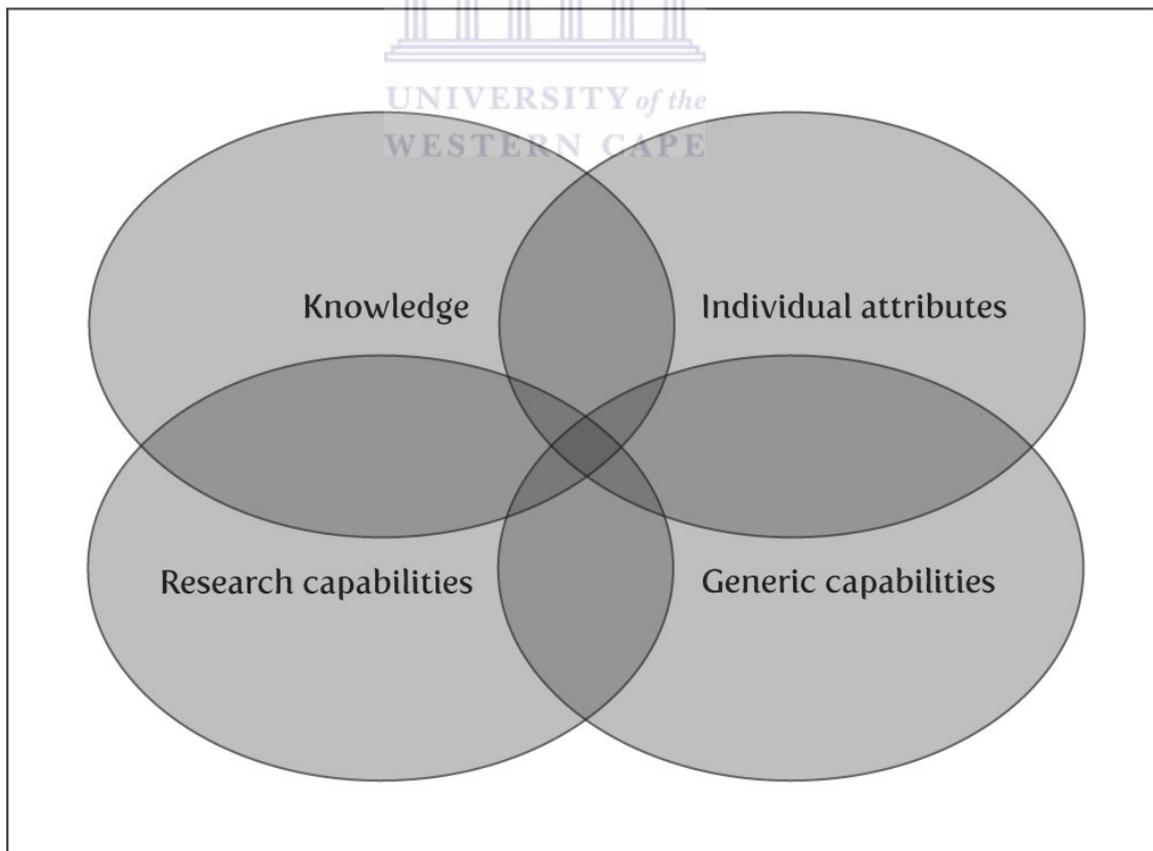
I begin the chapter by addressing the question, ‘what is research capacity?’, identifying broad categories of capacity and the overlapping of elements within them. I then discuss the theories of knowledge and learning which make up this part of the theoretical framework for analysis of the data. I cover Lave and Wenger’s theory of legitimate peripheral participation into communities of practice in some depth (Lave and Wenger, 1991, Wenger, 1998). I then discuss various theories under the following themes: breaking

through to higher levels of learning, tacit and explicit knowledge and ‘cognitive apprenticeship’.

3.2 What constitutes research capacity?

The question, ‘What is individual research capacity?’ is one of the central questions that I have been considering throughout the course of this study, in order to address the question, ‘how is research capacity developed?’. In this section I outline how I have come to define research capacity and unpack its different elements and the interrelationship between them. Research capacity of an individual is conceptualised as a *repertoire of resources*, consisting of knowledge, capabilities and personal attributes, which have been developed and integrated through a process of identity formation and socialisation in particular research settings. Elements of this repertoire need to be drawn on and used appropriately in particular, social, organisational and epistemological contexts.

Figure 2: Elements of research capacity



In the diagram above I construct a model of four broad and overlapping categories within which elements of research capacity can be located. These categories are *knowledge*, *research capabilities*, *generic capabilities* or *soft skills*, and *individual attributes*. I will explain what I mean by these categories. Furthermore, I will outline the elements of knowledge, research capabilities, generic capabilities and individual attributes which are required as part of a researcher's repertoire of resources and categorise them in relationship to these broad categories. I am aware that these elements do not fit neatly into categories, and have designed the model to emphasise the relationship between the categories. It is not my intention to generate an exhaustive list of elements of capacity required but to develop a framework to facilitate analysis of RCD. Different elements of capacity are required by researchers in different disciplinary and research fields, but some elements are common to all researchers.

1. *Knowledge* includes elements drawn from codified knowledge, tacit and experiential knowledge. Elements of knowledge needed may include the following:

- disciplinary knowledge defined by Eraut as “discipline-based theories and concepts, derived from bodies of coherent, systematic knowledge” (1994:43);
- knowledge of research methodology
- technical knowledge
- procedural knowledge
- philosophical knowledge
- knowledge about research ethics
- political knowledge of broader political contexts or policy contexts
- knowledge of the micro-politics of organisational and institutional settings and networks; and
- various forms of contextual knowledge.

One example of *contextual knowledge* is that of a researcher who has insider knowledge of a community being researched in relation to factors such as language, cultural practices and local politics. Another example refers to a socially distributed research context in which researchers need to develop sufficient knowledge about stakeholders of the research in order to be able to interact with social groupings which have interests in the research.

2. *Research capabilities* include *generic research abilities* and *disciplinary research capabilities* which are firmly situated in a disciplinary or research field. Generic research abilities can be identified within particular knowledge domains, such as in the sciences or in the social sciences and humanities. However, in the practice of research, even generic research competencies are applied within the framework of particular epistemological and organisational dimensions of the disciplinary or research field and purpose of the research. Researchers need to put knowledge into action in activities such as applying disciplinary frameworks to formulate research questions, design a research project or analyse data. They need to access codified knowledge about research methodology but they also need to be able to utilise this knowledge appropriately at different stages of the research process. Research capabilities include *technical* skills such as using laboratory equipment in the natural sciences, various skills in information technology, and ability to do statistical applications. In most cases the application of these skills for research needs to be embedded in broader knowledge and understanding of the research field, of the research project, and how these skills contribute to knowledge production in this context. The extent and depth of this understanding may vary depending on the level at which the researcher is operating. For example in a team project, a researcher who is managing the project would have a broader understanding than a research assistant, laboratory assistant or a fieldworker of the overall research project.

I have referred to the need for knowledge of broader political and policy contexts as well as knowledge of micro-politics of organisations and networks. However, what is needed is more than knowledge, but the ability to draw on that knowledge appropriately in action in responding to macro political contexts and interacting productively with local micro-politics. Researchers also need to understand international and national knowledge contexts, and to be able to situate themselves in relation to these. As mentioned in the previous chapter, they need to be "prepared to confront the political changes in the world of research", taking into account and engaging with the perspectives of multiple worlds (Henkel, 2004:179-80). There is also a need for awareness and capability with regard to social robustness (Nowotny *et al*, 2001, Rip, 2004), which was discussed in the previous chapter. These elements of knowledge and capability cannot be developed in isolation, but are acquired and formed through processes of identity formation and socialisation in particular contexts.

3. *Generic capabilities* (Eraut, 1994) or *soft skills* (Enders and de Weert, 2004) are capabilities needed in professional practice generally, which need to be distinguished from generic *research* abilities, which are specifically needed to do research. *Generic capabilities* include a range of abilities clustered around management, communication, teamwork, problem-solving and interpersonal abilities. Organisation and management skills are needed at an individual level for organising one's own work and practising time management etc. In addition many researchers need to develop competence in project management, financial management and leadership abilities.

In most instances these capabilities are applied in *particular* epistemological and organisational contexts. For example, I see the concept of problem-solving as being meaningless as a generic skill outside of a particular context. Competence in teamwork would take different forms in different epistemological and organisational contexts. As discussed above, within traditional organisational forms of knowledge production, teamwork has been prevalent within the natural sciences, while knowledge production in the humanities and social sciences has taken a more individual form (Becher *et al*, 1994, Delamont *et al*, 2000). In application-oriented research contexts, however, there are demands for different forms of teamwork. For example, Gibbons (1998) argues that teamwork in mode 2 contexts requires the ability to work with individuals from different backgrounds, manage divergent intellectual frameworks and relate them to the current research problem. The generic capability of communication applies to a wide range of forms of communication, both written and oral. Moreover, within changing knowledge contexts, scientists and researchers are required to communicate competently with a diverse range of people from academic peers to government or industry partners, from funding agents to members of the public or civil society organisations. The need to develop and draw on a repertoire of resources is becoming an essential aspect of research capacity in increasingly complex knowledge production contexts.

4. *Individual attributes* refer to personal qualities which are needed for learning how to do research or to pursue a higher degree and which make up an important component of overall research capacity. It is self-evident that researchers need the cognitive and academic abilities to engage with the knowledge and analytical demands of research. Additional personal qualities mentioned by informants in the study included curiosity, hunger for knowledge, assertiveness, self-motivation, confidence and tenacity.

Developing research capacity as part of a postgraduate degree and as part of ongoing research practice requires emotional intelligence (Brockbank and McGill, 1998) to manage a process of transition and cope with uncertainty (Becher *et al*, 1994) and to deal with practical and intellectual challenges. In this study maturity was found to play an important role in individual research capacity development. Maturity did not necessarily mean age, but also to levels of experience, self-regulation and the ability to tolerate uncertainty and setbacks in order to reach a broader goal. The ability to create support structures, develop relationships which facilitate learning and to learn from mentors was found to play an important role in students' and young researchers' processes of research capacity development. This relates to the *agency* of postgraduate students and young researchers in their own RCD processes.

There is a question about the extent to which personal qualities are innate, develop through socialisation, or can be learned (Furnham, 1990, Spencer, 1983, in Eraut, 1994:175). It is most likely that all three of these play a role. Individuals need to work with the qualities inherent in their 'personality', and those developed in earlier socialisation processes. However, it is also possible and necessary to develop certain qualities further, for example creativity, assertiveness, confidence or tenacity. Both inherent personal qualities and socialisation processes shape interpersonal abilities and sensitivities which in research contexts need to be developed further. Although students coming into an academic environment need to have the potential to be researchers in terms of their academic ability and personal qualities, the educational or research contexts into which they move should be conducive to developing and strengthening these qualities.

In the diagram above, individual attributes are depicted as overlapping with 'generic capabilities'. There is a link between individual attributes and their development into generic professional capabilities, which can be illustrated through the concept of interpersonal abilities or 'people skills'. Some individuals tend to have strong interpersonal abilities which may have an innate component and may have been further developed by socialisation processes. However, this strength needs to be channelled into particular capabilities such as teamwork abilities, management and leadership.

In this thesis I develop an argument that the elements of research capacity outlined above

are developed through processes of identity formation and socialisation in particular social, organisational and epistemological contexts within sites of knowledge production. A researcher needs to develop a repertoire of resources which she can draw on and utilise appropriately in different contexts of conducting research, disseminating findings and in other aspects of research practice. The types of resources required and their development and application will be elaborated on in the empirical chapters. It will also be argued that individuals from a diversity of backgrounds and, in the case of multidisciplinary research, from different disciplinary backgrounds bring a range of resources to research organisations. This adds to the richness of organisational culture and research practice.

In the remainder of the chapter, I will develop a framework of learning theories, mainly from socially situated traditions in order to analyse *how* research capacity is developed within the research centres in the study.

3.3 Locating this study within approaches to learning and knowledge

Learning theories are in some cases woven through various approaches and interpreted and developed in different ways. I see approaches to learning as a continuum. The theories which I have found useful for analysing processes of learning and identity formation as components of research capacity development fit mainly into social constructivist and socially situated or socio-cultural approaches to learning and knowledge. As Rorty argues, no one paradigm or perspective can account for the complexity of learning. “[e]verybody needs everybody else” (Rorty in Bredo, 1999). Cobb argues that the sociocultural perspective generates theories “of the conditions for the possibilities for learning”, whereas “theories developed from the constructivist perspective focus on both what students learn and the processes by which they do so” (Cobb, 1999:146).

In this study, I have aimed to investigate research capacity development in terms of what researchers learn, how they learn and what conditions are conducive for learning. I have done this within layers of broader contexts, looking at how these conditions affect the ‘what’ and the ‘how’ of RCD. Thus it has been appropriate to draw on theories from constructivist as well as from socially situated approaches. In this study I also use theories which do not fit into either of these approaches. For example, I draw on some of Bernstein’s theories, which can be used to inform analysis of research capacity

development in relation to disciplinary fields.

3.3.1 Constructivist approaches

Constructivism encompasses a broad set of theories about learning. Harris (2000) argues that constructivist share the view of learning described below:

... constructivists hold that in order for learning to take place, there has to be a connection between new information and existing mental structures. The key point of departure ... is that humans *actively construct* their own *meanings* and understandings of the world through reflection on their experience. *Constructivism* is about how people make sense of the changing texture of their experience. Meaning making is an interpretive and hermeneutic process (*ibid:20*)

However, constructivists differ in the extent to which they privilege the role of social context in learning and in their views of the nature of reality and knowledge. It is possible to distinguish two broad categories within constructivism which are a *psychological* approach, where active learning is seen primarily as an individual process occurring in the head and an *interactionist* or *social constructivist* approach, where learning is viewed as being interactive and located in socio-cultural contexts (Cobb, 1999, Harris, 2000).

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Psychological constructivist approaches, drawing on the work of Piaget, analyse thought in terms of conceptual processes occurring in the individual. The individual generates cognitive schemas to guide actions and represent her experiences. These are tested according to how well they fit with her experience. The best fitting of the schemas are tentatively adopted and retained as guides to action (Ernest, 1992). Some theorists are constructivist in their views of *how* learning takes place, but see knowledge and reality as external and objective.

Social constructivist approaches emphasise the socially located nature of knowledge and learning and the interactive and relational aspects of learning. Social constructivist approaches to learning overlap strongly with socially situated approaches and I will focus on the latter, which will be discussed in the following section.

3.3.2 Socially situated approaches

Socially situated approaches to learning are rooted in psychology, sociology and anthropology. The main early sources are based on Dewey's pragmatism and Vygotsky's work on developing a socio-cultural approach to mind (Harris, 2000). They seek to understand the relationship between internal processes of the mind and social and cultural formative influences. Thus " 'knowing' is viewed as inherently connected to the activities engaged in within a context and culture in which the act of knowing occurs rather than having an individual, internal, character" (Knight and Trowler, 2001:51). Lave (1991) sees knowledge as being generated through dialectical relations between people engaged in activity and the social world. "... Learning, thinking and knowing are relations among people engaged in activity *in, with, and arising from the socially and culturally structured world*" (Lave, 1991:67, original emphasis). She argues that knowledge of the social world and meaning attributed to concepts within the social world are always socially and culturally mediated. The meaning of a concept is generated "in dialectical relations between the social world and the persons engaged in activity; together these produce and re-produce both world and persons in activity" (*ibid*:67). The view of reality underlying social constructivism is one of multiple representations generated through socially situated activity. The existence of an objective reality is not ruled out but it is argued that any objective reality can only be known through the mind and the culturally shared symbol systems that it relies on (Harris, 2000). An anti-realist stance is taken to an extreme in postmodernist relativist views where realities only exist in so far as they are constituted through discourse, and while some discourses carry more power than others, they are all of equal value (Parker, 1992).

Theories of socially situated learning have much to contribute to understanding processes of learning and cognitive development, which are viewed as being embedded in socio-cultural and historical contexts. A central concept which has been developed is that of *mediation* of cognitive development by social interactions. Lev Vygotsky, a social psychologist in post-revolutionary Russia developed theories on mediation that have become influential in current theories of socially situated psychology. Although his research was mainly conducted on children, the value of his work for understanding adult cognitive development has been recognised (John-Steiner and Soubberman in Vygotsky, 1978:128).

According to sociocultural theories, individual development is seen not “as the unfolding of inborn capacities, but as the transformation of innate capacities” as they interact with socioculturally constructed mediational means (Lantolf and Pavlenko, 1995:109).

Vygotsky emphasised the role of culturally developed sign systems as psychological tools for thinking (Vygotsky, 1978, Cobb, 1999). He argued that human activity and development is mediated by cultural means, and that mediated activity fundamentally changes all psychological operations (Vygotsky, 1978). He then further developed the concept of mediation through his work in relation to socially mediated activity, where cognitive development was facilitated through interaction with other humans. Learning was seen as taking place “first *in relation to others* and only later is it internalised individually ... Therefore social interaction leads to cognitive development – not the other way around” (Harris, 2000:22).

A central theory in Vygotsky’s work is that of the *zone of proximal development* (ZPD). This refers to the “distance between the actual developmental level as determined by independent problem solving and the level of potential development” through problem solving with guidance from a teacher, mentor or “in collaboration with more capable peers” (Vygotsky, 1978:86). The concept of ZPD will be developed further in section 3.4.1 on ‘Vygotsky’s theories of mediation ...’ below.

Engeström’s work in activity theory (building on that of activity theorists Davydov and Leont’ev) took Vygotsky’s theories of development into a more collective sphere. He focused on how the collective activity of individuals within activity systems generated new forms of societal activity as solutions to problems embedded in everyday actions. He argued that through contributing to societal and cultural development, individuals simultaneously facilitate their own development (Engeström, 1987). Both activity theory and the theory of *legitimate peripheral participation* share a concern with individual development within social groupings (activity systems or communities of practice). Activity theory is directed more towards transformation of whole systems which cause a ripple effect of social change, whereas theory of legitimate peripheral participation places more emphasis on “connecting issues of sociocultural transformation with the changing relations between newcomers and old-timers in the context of a changing shared practice” (Lave and Wenger, 1991:49).

In the following section, I will discuss a number of educational theories which are drawn on in my analysis of the development of research capacity. I will discuss Vygotsky's contribution to theories of mediation further; I will present and critique Lave and Wenger's theory of legitimate participation in communities of practice (Lave and Wenger, 1991, Wenger, 1998) and I will develop a model for analysing a process of breaking through to higher levels of learning, drawing on Argyris and Schön's theory of 'double loop learning' (1974, 1978) and Engeström's theory of 'learning by expanding' (1987). Lastly, I will consider the role of emotion in learning.

3.4 Educational theories for understanding how RCD takes place

3.4.1 Vygotsky's theories of mediation of development

I have introduced the concept of mediation in the brief outline of socio-cultural approaches above. In this section I elaborate on Vygotsky's theory of mediation within the zone of proximal development (ZPD) and cognitive development and introduce the concept of scaffolding which has arisen out of it.

As mentioned, Vygotsky formulated the concept of the ZPD in relation to children's development but it has also been used productively in research and teaching in the field of adult learning. I will discuss the theory and then explain how it can be applied to adult learning, and research capacity development in particular. Vygotsky defines the zone of proximal development as:

... the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers (Vygotsky 1978:86).

He adds that the child's actual developmental level relates to functions that have already matured. The ZPD defines those functions which have not yet matured but are in the process of maturation, currently in an embryonic state. "These functions could be termed the 'buds' or 'flowers' of development rather than the 'fruits' of development" (*ibid*). Furthermore, learning which is oriented toward developmental levels that have already been reached is

ineffective from the viewpoint of a child's overall development. Thus, the only 'good learning' is that which is in advance of development. He argues that learning:

creates the zone of proximal development; that is learning awakens a variety of internal development processes that are able to operate only when the child is interacting with people in his environment and in cooperation with his peers. Once these processes are internalized, they become part of the child's independent developmental achievement (Vygotsky, 1978:89).

Thus children internalise and *transform* the assistance they receive from others and eventually use these same means of guidance to direct their subsequent problem-solving behaviours.

Vygotsky argued that "awareness and deliberate control appear only during a very advanced stage in the development of a mental function, after it has been used and practised unconsciously and spontaneously" (Vygotsky, 1986:168). This suggests that prior to the development of self-directed, conscious control, action is a more direct or less mediated response to the world. Bruner, building on Vygotsky's work, argues that it is through the ZPD that the mind "grapples itself to 'higher ground'" (Bruner, 1986:73). It is through mediation in the ZPD that this conscious control is developed.

Bruner asks how 'good learning' can be achieved in advance of development. "How can the competent learner lend consciousness to a child who does not 'have' it on his own?" (*ibid* :74). He developed the term *scaffolding*, which refers to support structures which assist the learner to accomplish a task which is within her ZPD, but which she would not be able to achieve unassisted at that stage in her development. "Because scaffolds are literally temporary, adjustable frameworks for construction in progress, their metaphorical sense retains the important Vygotskian meaning of an ever-shifting ZPD" (Cazden, 1994:174).

Vygotsky's theory of socially mediated learning in the ZPD is valuable for the study of adult learners as well as of children. It suggests that it is through social practice that cognitive functions are developed and in order to participate in social practice an individual needs to be assisted or supported in a task. Through doing the task in a collaborative way or with assistance, she develops the awareness and conscious control to do the task independently. The process of developing research capacity consists of many stages where the researcher or postgraduate student needs to learn to master a practice which she has previously been unable

to do. These transition points can be mediated by collaborative work in a team or with assistance from a mentor or supervisor. There are various ways in which scaffolding can be provided to assist this transition with the ultimate goal of the learner developing the ability to master the practice independently. I will discuss various forms that mediation and scaffolding can take in this chapter and will examine processes of mediation in RCD contexts in the empirical chapters.

Vygotsky uses the concept of *internalisation* to explain how activities that are conducted collaboratively beyond the actual developmental level of the learner, can facilitate the development of cognitive processes through which the learner can perform the activity independently (Vygotsky, 1978:57). He argues that learners internalise and *transform* the help they receive from others and eventually use these same means of guidance to direct their subsequent problem-solving behaviours. An operation that is initially conducted as an external activity conducted socially between people is reconstructed by the learner and begins to occur internally (*ibid*). These concepts of mediation and internalisation are developed further with reference to Engeström's work in section 4.4.3.1 on 'Learning by expanding ...'.

3.4.2 Legitimate peripheral participation in communities of practice

The strength of Lave and Wenger's theory of learning as *situated activity* lies in its grounding in traditions which theorise social practice. These include Giddens' conceptualisation of social practices as the medium through which elements of social structure are produced and reproduced, and Bourdieu's theory of practice being regulated by *habitus*. *Habitus* refers to schemes which guide action, based on historical individual and collective practices (Gherardi, 2000:216-7). Such theories emphasise the integration in practice of agent, world and activity (Lave and Wenger, 1991). Lave and Wenger align themselves with socially situated approaches to learning (introduced above in section 3.3.2), which view learning as inherently connected with participation in activity in specific social practices. Through such participation, individuals learn ways of being in the worlds in which they participate but also contribute to constituting these worlds.

The theory of *legitimate peripheral participation in communities of practice* was developed by Lave and Wenger (1991), through an analysis of studies of systems of apprenticeship in practical work and craft contexts and in the social context of Alcoholics

Anonymous members. Wenger (1998) built on the theory of communities of practice with application to organisational business contexts. In this study I draw mainly on the work of Lave and Wenger (1991) and on elements of Wenger's (1998) work.

Lave and Wenger's theory is based on the central theme of newcomers in communities of practitioners developing mastery of knowledge and skill through moving towards full participation in the sociocultural practices of these communities (Lave and Wenger, 1991:29). Legitimate peripheral participation refers to changing relations that an individual has to a community of practice.

Newcomers are socialised into communities of practice:

through a process of increasingly centripetal participation, which depends on legitimate access to ongoing community practice. They develop a changing understanding of practice over time from improvised opportunities to participate peripherally in ongoing activities of the community" (Lave, 1991:68).

Lave and Wenger see peripherality as a positive term, indicating the interested involvement of the actor. "It suggests an opening, a way of gaining access to sources of understanding through involvement" (Lave and Wenger, 1991:36). Through the process of sustained participation in communities of practice, people change their forms of participation and their identities in communities to become a full participant, an old-timer. This process of identity formation entails development of 'knowledgeable skill', which refers to socially structured knowledge about the practices of the community, and ability to participate competently in those practices.

Learning is integrated with identity formation, in that:

... learning only partly – and often incidentally – implies becoming able to be involved in new activities, performing new tasks and functions, mastering new understandings ... Learning implies becoming a different person with respect to the possibilities enabled by these systems of relations. Learning involves the construction of identities ... Thus identity, knowing and social membership entail one another." (*ibid*:36).

Lave and Wenger emphasise their view of the learner as a 'whole person' in the processes of participation, learning and identity formation that she undergoes (*ibid*:53). This does not

refer to the Enlightenment concept of a human “as a fully centred, unified individual” (Hall, 1992:275). (See section 5.2 on ‘Conceptualising identity formation’.) Rather, the ‘whole person’ is contextualised within multiple social relations through which people define themselves (Lave and Wenger, 1991). Lave and Wenger (1991) focus on identity formation in relation to a *particular* community of practice. Building on this theory, Wenger (1998) takes account of a plurality of identities of individuals and the contradictions and inconsistencies that they experience through their multimembership of different overlapping communities. This is developed further below.

The following three dimensions of Lave and Wenger’s theory of learning in communities of practice in apprenticeship situations are particularly relevant:

1. Newcomers have the opportunity to see community practice early on and have a broad idea of what it entails. Thus they develop a vision of practice which is more encompassing than just the particular tasks in which they are engaged. This provides them with an understanding of what goals they are expected to attain (*ibid*:71).
2. *Motivation* for learning is bound up with an individual’s participation and identity formation process in relation to the community. (See 5.4.1 on ‘Identification, commitment, vision and goals’.)
3. The role played by the relationship between the master and apprentice and explicit teaching practices in facilitating learning, is de-emphasised. Furthermore, the opportunities provided for learning by the work practices of the community and the learning arising out of interaction with peers and near peers is emphasised (*ibid*:93).

One of the questions which needs to be addressed in the application of communities of practice theory is how a community is delineated as an analytical unit. Wenger (1998) attempts to address this question by providing a list of indicators of a community of practice (125). I will not outline these indicators here since I find them atomistic and not particularly useful but I will refer in my analysis to the three dimensions of coherence of a community of practice identified by Wenger (1998:72-85).

1. *Mutual engagement* of participants. Practice exists because people are engaged in actions whose meanings they negotiate with one another.

2. Negotiation of a *joint enterprise*. This creates among participants relations of mutual accountability.
3. Development of a *shared repertoire*. “The repertoire of a community of practice includes routines, words, tools, ways of doing things, tools, gestures, symbols, genres, actions, or concepts that the community has produced or adopted in the course of its existence, and which have become part of its practice” (Wenger, *ibid*:83). Over time a shared repertoire develops which constitutes resources for sharing meaning (*ibid*).

For a newcomer to gain access to practice, peripheral participation must provide access to all three dimensions: to mutual engagement with other members; to their actions and their negotiation of the enterprise and to the repertoire in use. The approximation of participation must engage newcomers and provide a sense of how the community operates (Wenger, 1998:100). In order to be on a path to inclusion, newcomers must be granted enough legitimacy to be treated as potential members of the community. Granting the newcomers legitimacy is important because they are likely to come short of what the community regards as competent engagement. “Only with enough legitimacy can inevitable stumblings ... become opportunities for learning rather than cause for dismissal, neglect, or exclusion” (*ibid*:101).

The socialisation of researchers and postgraduate students into locally situated communities of research practice, can be understood as processes of legitimate peripheral participation into these communities. In this study I will explore the organisational forms through which individuals can be located in situations of legitimate peripheral participation. Communities of practice can refer to groupings such as a research group, organised around particular laboratory research in the natural sciences, or can be constituted by a research project in a research centre. In a collective approach to postgraduate study, a class or group of students can provide a community of practice. An individual is situated in a position of legitimate peripheral participation, through her position as a postgraduate student, a research intern, or a young researcher, located at a centre.

Brown and Duguid (1991) and Wenger (1998) make it clear that communities of practice are not distinct autonomous entities. Communities of practice are “fluid and

interpenetrative” (Brown and Duguid, 1991:49) Brown and Duguid conceptualise an organisation as a ‘community-of-communities’, in which shape and membership of various sub-communities emerge in the process of activity. Furthermore communities do not exist only within organisations but cut across boundaries of organisations, arising out of involvement in shared practice. Wenger (1998) emphasises an individual’s multimembership in a number of overlapping communities. Thus the process of identity formation involves *constructing* an identity through ‘reconciliation’ of ways of being as members of different communities. Reconciliation is an ongoing process which includes integration and struggle, where various identities, are in conflict (Wenger, 1998:160). Using the concept of activity systems, which has similarities with communities of practice, Engeström argues that it is through conflict within and between activity systems that learning takes place (Engeström, 1987).

3.4.2.1 Criticisms and qualifications

I have found the theory of communities of practice extremely valuable for understanding social processes and contexts of learning. It provides a way of conceptualising individual development, learning and identity formation within social contexts, which is consistent with the approach of this study. There are a number of areas where this theory needs to be challenged, or qualified. In this section, I discuss criticisms of theory of communities of practice raised by scholars, and aspects of the theory that I find problematic in relation to my study.

The theory of ‘communities of practice’ has intuitive appeal in that the essential concept can be easily recognised by participants involved in organisations and applied to organisational processes.¹² I have not found the theory helpful for generating a detailed framework for analysing RCD. Rather it has worked as a heuristic for conceptualising learning, identity formation and socialisation of individuals in a broad sense. There are elements of the theory such as the precise concept of legitimate peripheral participation which is helpful for analysing the organisational forms of RCD. One of the criticisms levelled at ‘community of practice’ theory in HE literature has been the looseness of the analytical unit of ‘community of practice’ (Knight and Trowler, 2001), which I have

¹² This was indicated by the ease with which one of the directors of the research centres in this study was able to appropriate the concept of ‘community of practice’, and apply it to his research centre, after reading one of my papers using this theory.

referred to above. Within any university department or research unit, there will be layers of 'communities' right down to the level of dyads (consisting of two people) whose members are involved in shared practice. To a certain extent this difficulty is addressed through development of concepts of community-of-communities (Brown and Duguid, 1991) and multimembership in different overlapping communities (Wenger, 1998).

There are three elements of Lave and Wenger's (1991) theory which are challenged in this study. Firstly, Lave and Wenger are concerned with the way that newcomers become involved in communities of practice, without programmes being intentionally structured to achieve this. They dismiss pedagogical practices that are specifically structured to facilitate learning. Secondly, they de-emphasise the apprenticeship relationship between master and apprentice or mentor and learner in the RCD context, in favour of the opportunities for learning which are distributed amongst many different relationships of participation and interaction. Thirdly, Lave (1996) dismisses "the idea of learning as cognitive acquisition – whether of facts, knowledge, problem-solving strategies, or metacognitive skills" (8).

I will address each of these issues in turn. Firstly, I am interested in what makes some organisations successful in socialising new entrants and developing research capacity and how these features of practice can be documented and theorised so that the resulting findings become accessible for informing research capacity development programmes. It is my view that the theory of communities of practice makes a contribution to a theoretical framework for empirical research which can be used for informing understanding of learning contexts and creating more effective learning contexts. I differ from Lave and Wenger's approach in seeing the purposeful construction of effective learning contexts as a crucial part of research capacity building. Rather than undervaluing pedagogical intervention, I support Henkel's argument that there needs to be *more* of a structured, pedagogical approach to research training (Henkel, 2004), and Pearson and Brew's argument for supervisors to develop more pedagogically informed practice (Pearson and Brew, 2002).

Secondly, Lave and Wenger's argument that there needs to be more focus on the resources for learning provided by a range of fields of practice and relationships within a learning context, as opposed to the prevalence of the individual apprenticeship model, is extremely useful. One should not underemphasise the crucial role played by the relationship between

a mentor and a postgraduate student or young researcher in developing their research capacity.

Thirdly, while I do not accept theories of learning as cognitive acquisition that takes place in a decontextualised way, I understand learning as involving elements of acquisition. I find sociocultural theories which address the development of problem-solving strategies and metacognitive abilities through acquisition and *transformation* in social contexts have much to contribute. Vygotsky's theory of mediation in the ZPD, and Engeström's theory of 'learning by expanding' (discussed in 3.4.3) fit into this category.

A further criticism of the concept of 'communities of practice' is the danger of adopting a romanticised view of 'community'. One needs to recognise that not all university departments or research centres constitute communities of practice or generate a culture which nurtures such communities. Vaughan's (1996) study shows how the socially constitutive nature of the operations of workgroups can also operate in ways that are dysfunctional. Rules of appropriateness and recurrent practices which have the effect of progressively normalising deviance can be developed and become taken for granted (Vaughan, 1996, in Knight and Trowler, 2001:65). Communities of practice can also perpetuate cultures such as competitiveness, self interest or conservatism, which work against creating a nurturing environment for newcomers. Theory of communities of practice incorporates the notion that communities contain forces of both conservatism and change – a tension between the reproduction of communities and transformation. Some communities are more open and encouraging of transformation than others.

I have argued that socially situated approaches do not take account of individual perspectives on knowledge and learning sufficiently. Eraut (2004), while agreeing with the concept of learning being socially situated, criticises Lave and Wenger (1991) on these grounds. He argues that individuals who acquire knowledge as members of a group "interpret it within a personal context and history that has been shaped by their experiences in other groups, both prior and contemporary" (*ibid*:203). There are also aspects of a person's knowledge that have been constructed through lifelong learning and have become unique to them, because of the unique set of situations in which they have participated (*ibid*).

An important limitation of theory of communities of practice for this study is that it does not provide analytical tools for understanding learning in relation to epistemological aspects of disciplines. Lave and Wenger's focus in learning is mainly on acquiring the socio-cultural knowledge needed to gain access and contribute to communities of practice, and it is based mainly on research on apprenticeship in practical activity such as that conducted by tailors and butchers. Knowledge production is also a form of social practice and there are elements of communities of practice theory that can be used to analyse socialisation into research communities. In order to analyse the epistemological dimensions of research capacity development within disciplinary and multidisciplinary fields, I have drawn on other learning theories discussed in this chapter as well as theories on organisational and epistemological dimensions of the construction of knowledge, discussed in the previous chapter.

3.4.3 Experiential learning and breaking through to higher levels of learning

'Learning by doing' is a concept often used by academics involved in research capacity building. It is widely accepted that much of research capacity development takes place through 'learning by doing' or 'learning from experience'. However, there is a need for theoretically informed knowledge of *how* this type of learning takes place and what conditions lead to learning or lack of learning.

In this section I discuss theories used to analyse 'learning from experience' or 'learning by doing'. Some of these theories have originated from constructivist approaches to learning and others have been approached from constructivist as well as socially situated approaches. I discuss an aspect of Engeström's theory of learning by expanding, within the context of individual learning, although his main focus is on collective processes of learning and the interrelationship between individual learning and collective learning processes.

In *experiential learning* (Kolb, 1984, Boud *et al*, 1985), which I will outline very briefly, learning is viewed as an ongoing process grounded in experience. Knowledge is continuously derived from and tested out in the experiences of the learner. This is depicted in the form of a cycle of learning and development where learners are involved in an iterative reflective process which starts from their own experience. Learning is derived

from immediate, concrete experience. Learners reflect on and make observations about their experiences. These observations are assimilated into a generalisation or provisional ‘theory from which new implications for action can be deduced. These implications or hypotheses then serve as guides for creating or interpreting new experiences (Kolb, 1984).

3.4.3.1 ‘Learning by expanding’ and ‘double loop learning’

Amongst the narratives in this study were a number of accounts by students or young researchers of situations in which they were confronted by a demanding challenge in their research which was difficult to resolve. The informants described an experience, which can be interpreted as breaking through a double-bind situation, finding the resources and developing the ability to undertake the task. There are two theories from different perspectives on learning which address a transition of this nature. These are Engeström’s theory of *learning by expanding* (1987) and Argyris and Schön’s theory of *single- and double-loop learning* (1974, 1978). Both of these theories develop a model of individuals breaking through to a higher level of learning. Although they both refer to learning of individuals in relation to collective learning, I discuss their theories here in relation to learning processes of individuals.

A number of typologies of levels of learning and stages of learning have been developed within the fields of education and educational psychology. Bateson’s typology (1972) has influenced both Argyris and Schön and Engeström. This hierarchy of learning is comprised of the following levels: ‘Learning 1’¹³ is the lowest level, which he sees as rote learning or learning conditioned by stimulus and response (Bateson, 1972, in Engeström, 1987).

‘Learning 11’ means the “acquisition of the context or the structure of some type of Learning 1” (Engeström, 1987:92), which results in an unconscious ‘learning to learn’, a tacit knowledge of ‘how to make it’ in school and work. It takes the form of habitual responses. Level 11 ‘learning to learn’ is also referred to as metacognitive processing (Strohm Kitchener, 1983).

¹³ Strohm Kitchener (1983:225) refers to a first level of cognitive processing, which are “pre-monitored cognitive processes on which knowledge of the world is built” such as counting, memorising, reading, perceiving, acquiring language. This is a more convincing interpretation of a first level of learning than Bateson’s.

'Learning 111' is a form of learning that takes place when the unconscious habitual responses of Learning 11 are insufficient to deal with a situation. This happens when an individual encounters a double-bind situation (Bateson, 1972, in Engeström, 1987), where she receives two contradictory messages, or has to deal with a "structurally altered social context" (Engeström, 1987:93) which the learned habits of Learning 11 do not help to resolve. She cannot resolve the situation through habitual ways of thinking and her current knowledge does not provide her with the conceptual tools to address it. Engeström describes this situation as a 'need state' (*ibid*:112). In a need state a learner may revert to old habitual responses, which neither resolve the situation nor lead to development of the learner. Alternately, she may 'break through' to a Learning 111 level, which throws the "unexamined premises [of Learning 11] open to question and change" (Bateson, 1972, in Engeström, 1987:92).¹⁴ Level 111 learning entails greater ability to control and direct one's cognitive processes.

Engeström's theory has similarities to the theory of single- and double-loop learning which was developed by Argyris and Schön (1974, 1978). According to this theory, single-loop learning takes place in response to feedback, but leaves underlying values and theory unchanged. It is a form of Learning 11. Double-loop learning refers to learning experience where underlying values, assumptions and habitual modes of inquiry are challenged. It has the potential to threaten underlying values by "cracking their paradigms" (Brockbank and McGill, 1998:44).

Engeström (1987) argues that Learning 11 enables an individual to resolve discrete given problems, whereas in Level 111, the problem or the task itself must be created. (I will refer to these types of problems as closed and open-ended problems). As Schön writes, "problems are not presented to the practitioner as givens", but "must be constructed from the materials of problematic situations which are puzzling, troubling and uncertain" (Schön, 1983:40, in Engeström, 1987:99). Engeström (1987) distinguishes between a whole task and a component of a task that is allocated in a hierarchical division of labour. In any activity there is always a whole task but in some settings like a classroom or research laboratory, tasks are divided into smaller components and allocated to students or

¹⁴ There is a very loose correspondence of Learning 11 with a 'surface approach' to learning, and Learning 111 with a 'deep approach' to learning (Marton and Säljö, 1976),

researchers. In laboratory practice, “it is necessary to have as complete control as possible over the goals that the subjects are trying to accomplish, [thus subjects are not] called upon to formulate their own goals and so are confronted with only a part of the problem – the solution part” (Newman, Griffin & Cole, 1984:191-192, in Engeström, 1987:124-125).

In situations where students or researchers are faced with a task that requires conceptualisation of the task as a whole, and problem formulation of an ‘open problem’, Level 111 learning is required. Topic selection in the social sciences is generally an individual choice and requires extensive problem formulation by the postgraduate student. In the natural sciences, a research topic is usually allocated to postgraduate students, and they are required to formulate their own research design. Becher (1994) noted that in some disciplinary areas, students may be given a “small but fairly self-contained problem in a project designed in advance by the supervisor, who would nevertheless leave room for some shaping and decision-making by the student” (*ibid*: 74). The issue of topic selection in the social sciences and natural sciences will be discussed in more depth in Chapter 4.

There are different levels of open-endedness of research projects, but even where a researcher is presented with a research design to address a topic, there will be stages in the project, where she confronts open-ended problems that need to be resolved, and Learning 111 will be required. Development of autonomy in research practice of young researchers is considered in relation to closed and open-ended problems in Chapter 5.

In their discussion of double-loop learning, Brockbank and McGill argue that both single- and double-loop learning are necessary in the learning process. However

... paradigmatic activity cannot be sustained on the edge all the time by virtue of the fact that ... double-loop learning involves ‘shifting’ a person’s reality and involves change which may be disturbing. There is a need for some containing (in the sense of holding rather than controlling) in order to cope with a temporary ‘chaos’ in a transformative phase. Day-to-day learning, meeting goals and altering practice on the basis of experience, enables double-loop learning rather than pervading the life of the learner (Brockbank and McGill, 1998:44).

They add that the journey is necessarily a personal one as the emergent knowing is the learner’s own. She has to take that leap into the unknown, to reach her own personal

authority (*ibid*). In this way experiences of breaking through to higher levels of learning are part of a researcher's process of identity formation.

Brockbank and McGill suggest that the energy needed to fuel the changed trajectory from single- to double-loop learning comes from emotion. It is emotion which enables the learner to “shoot out of the single orbit” and into the “orbit of double-loop learning” (Brockbank and McGill, 1998:45). They argue that an understanding of human emotion and the emotional interactions of people are needed to facilitate and support this type of learning. In the narratives in this study, a number of researchers have described experiences of making a shift into a higher level of learning, which was activated by a problem which was difficult to tackle with current internalised knowledge. It was evident that these experiences generated emotional stress and emotional energy was needed to push through and resolve the problem. These types of experiences come with the territory of engaging in challenging learning processes, learning how to do research, and undertaking postgraduate study. These challenges are likely to be more intense for individuals from poor socio-economic and educational backgrounds.

Vygotsky's theory of mediation in the zone of proximal development (ZPD) is relevant here. Firstly, the theory implies that the task required of the learner should be within her ZPD. In order to enable progress, the problem needs to be challenging for the learner, but the gap between what she is currently able to do and the job which is beyond her reach should not be so great as to make the shift to a higher level of learning impossible.

Secondly, it is only through practice on the task that the development processes will be activated to enable the learner to master the challenge and thereby shift to a higher level of learning. But how can the individual work on the task without having the ability to master it adequately? There is a need for mediation either through social interaction or another form of scaffolding to enable the learner to do so, setting in motion a process of cognitive development to a higher level of learning.

This will be discussed in more depth and related more specifically to postgraduate education in section 3.6 on ‘Mediation of learning ...’. The role of *mediation* in facilitating shifts to higher levels of learning is an important theme in this study. This will be explored in relation to mediation through a relationship with a mentor or supervisor, the structuring

of a postgraduate programme or RCD programme, and interaction within communities of practice that the researcher is located in.

Becher *et al* (1994) have noted that undertaking a doctoral study involves “a transition in which personal, social, moral and intellectual identity and choices are closely intertwined” (*ibid*:152). They also note that there are uncertainties and experiences of isolation that are, to some extent, inherent in the process. These experiences of transition, uncertainties and isolation are likely to cause some level of emotional upheaval of students and there needs to be recognition of this and structured support for students undergoing these processes.

As I mentioned above, Brockbank and McGill (1989) argue that since double-loop learning involves an individual shifting her reality, experiencing uncertainties and changes, there is a need for some containing in the sense of holding, in order to cope with a temporary ‘chaos’ in a transformative phase. In this study, I investigate what kind of social relationships and organisational structures play a containing role in this process in research capacity development programmes.

Some communities of practice provide supportive contexts for the learning processes of young researchers and postgraduate students. As I have mentioned above, such communities do not always provide a positive, supportive environment for members. Attention needs to be paid to the cultures being generated in communities of practice as well as the role of more formal structures in facilitating learning processes.

3.4.3.2 The role of emotion in learning

Many learning theories do not account sufficiently for the role emotion plays in learning. Outside of the boundaries of the discipline of psychology, emotion has generally not been given much consideration in academia. “The dualist roots of the academy has led to devaluing the body, emotions and feelings, privileging only the mind and the intellect” (Brockbank and McGill, 1998:46). Although there are claims that social practice theories study learning in a more holistic way than other dualist approaches, I see the lack of focus on affective factors as being one of the limitations of socially situated theories. While I do not theorise the role of emotion based on an in-depth study of psychological theories, I am

convinced that the role of affective factors is so important it needs to be taken account of in any study on facilitating research capacity development.

Many of the informants in the study referred to their learning processes being driven by passion for their emerging research field. They described their learning in terms of inspiration, motivation and excitement. Furthermore, to do research requires creativity and imagination, which are linked to emotional experiences. Some of the informants were driven to do research, by anger and pain at the injustices they saw and experienced. These injustices occurred both in the contexts of their research fields, for example, in water provision, or rural underdevelopment, as well as in the knowledge production realm. I have discussed the emotional stress generated by the need for transition to higher levels of learning in developing research capacity and by factors inherent in completing a thesis, such as isolation, uncertainty and challenges to identity.

Apart from the stress inherent in these processes of learning, there also needs to be consideration in a South African context of the emotional stress experienced by students from socially and educationally disadvantaged backgrounds in tackling advanced study, while having to adapt to unfamiliar academic cultures, and, in many cases, experiencing financial difficulties. Case and Gunstone (2006) found students' emotional state to be a substantive factor "either enabling or inhibiting students' application to study, and their adoption or otherwise of a conceptual deep approach to learning" (*ibid*:11). They also noted that a majority of students at UCT had to deal with fairly significant personal trauma, "given the frequently dysfunctional social environment of post-apartheid South Africa and the impact of issues such as HIV/AIDS, poverty and crime" (*ibid*:13). In such cases there is a combination of emotional stress arising from socio-economic and personal factors which can have the effect of inhibiting deep approaches to learning, in combination with intellectual challenges which demand transition to higher and deeper levels of learning. The combination of these factors underline the need for awareness of the stresses experienced by students and for a pastoral component to postgraduate programmes.

In this section, I have discussed and interwoven theories on learning which contribute to my theoretical framework for understanding how research capacity development takes place. In the following section I will discuss theories of tacit and explicit knowledge and their interrelationship in learning and practice.

3.5 Tacit and explicit knowledge

'Learning by doing', which was introduced in section 3.4.3 on 'Experiential learning ...', relies on an interrelationship between tacit and explicit knowledge, which plays out in practice. This relationship is complex and there are contrasting views about how tacit and explicit knowledge relates to each other. A number of dichotomies have been drawn in theories of knowledge, such as informal and formal, practical and technical, and tacit and explicit knowledge. Informal knowledge refers to knowledge acquired from everyday experience, whereas formal knowledge refers to knowledge learnt through schooling or other types of formal tuition. Oakehurst (1962) following Aristotle, makes a clear distinction between 'technical' and 'practical knowledge'. Technical knowledge is capable of written codification, but practical knowledge is expressed only in practice and learned through experience with practice (in Eraut, 1994). Behind this distinction is "an assumption that technical knowledge is used systematically and explicitly, while practical knowledge is used idiosyncratically and implicitly" (Eraut, 1994:47). Many theorists have rejected the notion of a dichotomy between explicit and tacit knowledge, and explored the interrelationship between them (Ryle, 1949, Polanyi, 1966, Brown and Duguid, 2001), while others have reinforced a distinction in structure and acquisition between 'schooled knowledge' and tacitly acquired knowledge (Bernstein, 1996, Muller, 2000) .

Polanyi (1966) explains tacit knowledge as that which cannot be articulated, encapsulated in his phrase, "We know more than we can tell" (Polanyi, 1966:4, cited in Brown and Duguid, 2001:203). He sees tacit and explicit knowledge as two interdependent components of knowledge, and argues that knowledge always has a tacit dimension, which is buried in personal identity (Polanyi, 1966, in Brown and Duguid, 2001:203-204). Polanyi's tacit/ explicit distinction echoes Ryle's contrast between 'know *how*' and 'know *that*', which are also seen as interdependent. He argues that 'know *that*' cannot be acted on on its own, and to make 'know *that*' useful requires appropriate 'know *how*'. 'Know *that*' may circulate as precepts and rules, and is acquired differently from 'know *how*', which is acquired through practice (Ryle, 1949, in Brown and Duguid, 2001:204).

The research subjects of many social practice theorists, such as butchers and midwives (Lave and Wenger, 1991) or photocopier technicians (Brown and Duguid, 1991) imply that

this applies only to practical knowledge - manual labour as opposed to intellectual labour. Challenging this assumption, Brown and Duguid (2001) emphasise that the interdependence of tacit and explicit knowledge applies equally to intellectual knowledge and learning. It makes sense that the various knowledge forms – explicit, codified knowledge, practical and experiential, all play a role in the *process* of learning. The view held by some social constructivists that intellectual practice is simply one social practice among others (Lave, 1996) is criticised by Muller (2000) in relation to the distinction between formal and everyday knowledge and the ‘rules’ or principles which govern the production and acquisition of formal knowledge (discussed below).

Brown and Duguid summarise Polanyi’s and Ryle’s arguments in the following way. Both challenge the idea that knowledge circulation involves explicit knowledge alone, and that tacit knowledge is ‘non-tradable’ and needs to be converted into explicit form to circulate. Both Polanyi and Ryle argue that:

... [not only is] conversion (if it involves uprooting knowledge from the tacit) ... problematic, but also that tacit knowledge is required to make explicit knowledge usefully tradable or mobile. Only by first spreading the practice in relation to which the explicit makes sense is the circulation of explicit knowledge worthwhile (Cook & Brown 1999). Knowledge runs on rails laid by practice (Brown and Duguid, 2001:204).

This can be applied to a young researcher or postgraduate student learning about research methodology (through codified, explicit knowledge). The extent to which she can learn how to do research through reading or taking a research methodology course, in a decontextualised way, is limited. Once she has had some experience of doing research, codified knowledge about research methodology will carry more meaning and will be more easily applied to further practice. Similarly, a conversation with a supervisor or mentor about aspects of research methodology, or linking trends observed in data to disciplinary knowledge, can only be fully understood and integrated, once the young researcher has had some experience in doing fieldwork, or analysing data.

The question of *sharing* knowledge and insight about practice across contexts is tackled by Giddens (1990), using the concepts of ‘disembedding’ and ‘re-embedding’ knowledge (in Brown and Duguid, 2001). Giddens uses this term in the context of workplace practice, where people communicate across contexts separated by place and time, knowledge is

disembedded in one place and re-embedded in another. The likelihood of effectiveness of communication depends on how similar the embedding conditions are at both end of communication. If one relates this to the learning and development of an individual within social and organisational contexts, it highlights the difficulty of flow between knowledge embedded in practice to explicit communicable knowledge, and, conversely, the difficulty of translating explicit knowledge into practice.

From a different perspective to Brown and Duguid, Bernstein (1996, 1999, in Breier, 2003) emphasizes the separateness of tacit and explicit knowledge and the lack of flow between them. Bernstein distinguishes between horizontal discourse - which generates horizontal (everyday or commonsense) knowledge - and vertical discourse - which generates vertical (formal or academic) knowledge. Horizontal discourses are local, segmental and context-bound. They are *tacitly* acquired, through involvement in social relations (Breier, 2002). In contrast, vertical discourses are general, explicit and coherent. They are distributed through formal schooling, through principles or “rules that govern both the production and acquisition of vertical knowledge” (Young, 2004:196).

According to Bernstein’s theory, knowledge passes through the educational system through a series of reinterpretations which he calls *recontextualizations*. Muller (2000) provides an example in the discipline of chemistry, where a discourse “is *delocated* from its substantive practice and context in the experimental laboratory and relocated into a new discourse”, for example a school science teaching context, according to different principles of selection, ordering and focusing. This relocation transforms the practice of the original discourse into a completely different practice (*ibid*:63). Bernstein argues that horizontal discourses cannot generate vertical knowledge because, unlike vertical discourses, they do not have principles of recontextualization (Young, 2004:196).

Brown and Duguid’s argument about the role of practice in circulation of knowledge is relevant to understanding research capacity development at the level of an individual’s development, the learning relationship between an individual and a supervisor or mentor, and the learning that takes place through practice in communities. Developing research capacity through practice requires a researcher to integrate different elements of knowledge, so that she develops a repertoire of knowledge and conceptual tools to mobilise in action. *How* this takes place is not clearly understood.

In socially situated accounts of learning, the concept of practice is often used to refer to joint practice in social contexts. In a research capacity development context, types of joint practice would include interactions with a supervisor or mentor, collaboration in research projects, interactions in seminars, and group assistance in data collection or analysis (as described in Chapter 9). However, individual activity also constitutes practice, for example, processes of conceptualising, reflecting and writing. Brown and Duguid (2001) argue that practice always forms a basis for learning. Integration of learning also takes place through reflection on practice (Schön, 1983, Brockbank and McGill, 1998), either individually, with members of a community of practice, or with a supervisor or mentor. One can deduce, using Giddens' terms, that in order to reflect on practice and negotiate meaning and understandings with others, knowledge needs to be disembedded from the context of practice. Through reflection and negotiation of meaning, knowledge becomes more integrated into the researcher's resources that are readily available to her, and can be re-embedded into other contexts of practice.

Bernstein's theory of vertical and horizontal discourses problematises the relationship between learning academic, codified knowledge and acquiring tacit knowledge. He draws attention to the 'rules' and principles of vertical discourse, and the need for recontextualisation of discourses within different knowledge contexts. It serves as a reminder to reflect critically on different types of knowledge, processes of acquisition and the difficulty of flow of knowledge from one context to another. It is beyond the scope of this study to build theory of how elements of explicit and tacit knowledge are mobilised in relation to each other, recontextualised, and integrated into a researcher's overall capacity. However, when drawing on theories of integration of different types of knowledge in my data analysis and interpretation, I need to maintain a critical awareness of the complexity of the processes being investigated.

In the following section I discuss a theory of pedagogic practice for facilitating the acquisition of tacit knowledge.

3.6 Mediation of learning through cognitive apprenticeship

I have argued that research capacity development takes place as a process of identity formation and socialisation into communities of practice. Lave and Wenger (1991) view learning and development of expertise as taking place through sharing of tacit knowledge in communities of practice. They argue that a newcomer gains knowledge through acquiring tacit knowledge of what it is to be a member of the community through immersion in the *informal* practices of the community. Collins, Brown and Newman (1989), in their article on cognitive apprenticeship, apply theories of socially situated learning to pedagogic practice, particularly in the facilitation of problem-solving abilities. They see their work as part of “a major direction in current cognitive research ... to attempt to formulate explicitly the strategies and skills of underlying expert practice and make them a legitimate focus of teaching” (Collins *et al*, 1989:480).

Collins *et al* (1989) recognise that many of the strategies and skills involved in complex cognitive activities have tended to remain tacit because they arise from the practice of solving problems *in situ*. Understanding how to use them depends on understanding the way they are embedded in the context of actual problem-solving (Collins *et al*, 1989:480). They attempt to explain how teachers facilitate the acquisition of tacit knowledge through strategies of *cognitive apprenticeship* in problem-solving activities. Collins *et al*'s research is located in classroom teaching in relation to a more basic form of problem-solving than that involved in research. However, the principles involved in the theory of cognitive apprenticeship are helpful for analysing the mediation of complex problem-solving, facilitated by a mentor or supervisor. I will outline their theory of scaffolding, coaching and modelling within cognitive apprenticeship in my analysis of a process of mediation of learning in 6.3.

Collins *et al* stress the importance of sequencing in learning programmes. They have identified three principles for sequencing of learning activities. They argue that learning activities should be sequenced according to:

1. *Increasing complexity*, which refers to the construction of a sequence of tasks and environments or microworlds, where increasingly “skills and concepts necessary for expert performance are required” (*ibid*: 484). In relation to postgraduate education

and RCD, sequencing could be ordered in terms of increasing *conceptual* complexity. It is not realistic to provide a “monotonic” steady increase in complexity, rather there are more likely to be “jumps in complexity” (*ibid*).

2. *Increasing diversity*, which refers to a sequence of tasks in which an increasingly wider variety of strategies or skills are required. This is linked to increasing complexity of the problem-solving activity, as it requires more factors which need to be considered, in order to succeed in the activity.
3. *Global before local* skills. This requires the learner to build a conceptual model of the whole activity, before attending to the detail of the sub-tasks that make it up.

In modifying these principles to a postgraduate or research capacity building context, one needs to recognise that there is much looser ‘control’ over guidance in the sequencing of a learning programme in these contexts than there is at a school level. Thus they serve as broad guiding principles to be considered, rather than providing a programme for curriculum development. These guidelines are more appropriate for postgraduate education at an honours and masters level than at a doctoral level. In some cases, the commonsense notions of academics and supervisors influencing postgraduate programmes draw on principles similar to those explicated above. However, such principles could be used in a more systematic way to inform planning for postgraduate study programmes. I will discuss (in Chapter 7) the possibility of structuring a transition process through different levels of study postgraduate programme, drawing on these principles. This should not be done in a rigidly prescriptive way, as one needs to allow for different routes of postgraduate study and research development.

The need to build a conceptual model of an activity as a whole (third principle) relates to an argument developed in Chapter 5 that there is a need for a researcher to be exposed to the practice of a research community as a whole, and to develop an understanding of the bigger picture of the research enterprise within that community and related network of organisations in order to develop the competencies needed to forge her identity as a researcher within a particular research field.

3.7 Conclusion

Postgraduate and research capacity building programmes need to be informed by understanding of processes of learning and identity formation which individuals undergo in developing capacity. In this chapter, I have discussed my understanding of research capacity as a repertoire of resources, consisting of knowledge, capabilities and personal attributes, which have been developed and integrated through a process of identity formation and socialisation in particular research settings. I have woven together a framework of theories of learning which inform analysis of these processes as presented in the narratives of individuals in this study. These theories have been selected and interwoven through a reiterative process of theoretical research and data analysis.

I have found theories of learning within socially situated contexts helpful for understanding individuals' processes of identity formation and building of research capacity. The theory of legitimate peripheral participation in communities of practice can provide insight into how individuals are socialised into nested social settings (Lave and Wenger, 1991) within research contexts. Analysis of RCD processes through a rich, theoretical framework of learning theories is extremely valuable, since insights about the learning needs of students and young researchers indicate certain conditions that need to be in place in settings for effective research capacity building.

Becher *et al* (1994) draw attention to the immensely challenging nature of learning how to do research and engaging in postgraduate study. It is challenging both at the level of the broader processes of transition of identity that is required and because of the ongoing demands for cognitive growth in order to manage tasks which are beyond the grasp of the researchers' previously integrated abilities (Engeström, 1987).

In order to enable this cognitive development, learning processes need to be mediated through various means such as the relationship with a supervisor or mentor, participation in communities of practice and structured RCD programmes. Recognition of the extent of the cognitive demands of postgraduate study implies that attention needs to be paid to matching the needs of learners and programmes of study as well as to a consideration of cognitive and conceptual development in negotiating tasks and topics. There is both a need for scaffolding and for the gradual withdrawing of scaffolds with a concurrent facilitation

of increasing autonomy. The theoretical framework with regard to learning needs to be applied within the South African context, and the particular challenges embedded in it.

In the thesis the research centres are the main settings in which the learning processes of individuals have been studied. Application-oriented research centres offer particular opportunities as well as structural constraints for research capacity building.

In Chapter 4, I will develop a framework of theory from higher education literature on *socialisation*, knowledge production in different contexts and the *organisational* and *epistemological* dimensions of knowledge production which affect research capacity development. This framework will link the way knowledge production is organised within research settings to the epistemological aspects of knowledge production in disciplines and disciplinary areas. Socialisation and research capacity development is grounded in these dimensions of the knowledge production setting.



CHAPTER FOUR: RESEARCH CAPACITY DEVELOPMENT AS SOCIALISATION WITHIN ORGANISATIONAL AND EPISTEMOLOGICAL CONTEXTS

4.1 Introduction

In this chapter a theoretical framework is constructed with which to analyse the settings that the research centres in this study provide for developing research capacity. This framework provides a background and theoretical tools for studying these settings through organisational and epistemological lenses. In Chapter 1, I sketched the South African historical context in which this study is located, with the particular political, socio-economic and policy contexts which influenced research capacity development in the post-apartheid transition.

In this chapter I draw on literature on socialisation within HE contexts, in order to understand the socialisation of individuals into organisations and into disciplines or disciplinary fields. I review literature on socialisation in traditional academic departments, focusing on models of postgraduate education and socialisation in the natural sciences and social sciences. I draw on Becher *et al* (1994) and Delamont *et al* (2000), who analyse the relationship between the way in which knowledge production is organised and the epistemological dimensions of knowledge production in the natural sciences and social sciences. Furthermore they study the impact that these factors have on socialisation of postgraduate students within those domains of knowledge. These studies primarily address socialisation within single-discipline, traditional departments. Research has recently begun to be conducted on research capacity development within changing knowledge contexts (Enders and de Weert, 2004, Henkel, 2004, Rip, 2004, Subotzky *et al*, forthcoming). However, there is a need for more empirical research in this area generally, and in the South African context specifically.

In this study the type of settings that research centres provide for RCD will be analysed in terms of the organisational structure and location of the centres, the modes of research conducted and the nature of the disciplinary fields of the centres. The issue of pedagogical continuity is emphasised by Delamont *et al* (2000) as essential for the reproduction of academics within traditional disciplines. Understanding of pedagogical continuity needs to

be extended to theorise the role that it plays in reproduction of the scientific workforce within the context of changing modes of knowledge production (Henkel, 2004). In reviewing literature on socialisation and research capacity development, I emphasise the need to build a clear understanding of the various purposes for which research capacity is being developed, how this shapes the nature of the capacity required of researchers, and the implications of this for how capacity is developed. Careful consideration of these questions in relation to empirical evidence and through an appropriate use of literature and theory is necessary to make informed claims about postgraduate education and RCD programmes. In this chapter I review the literature which is drawn on in the study to inform analysis of settings and programmes for developing research capacity. I weave it into the conceptual framework that has been developed in my consideration of these questions in relation to the data and the particular contexts of the three application-oriented research centres.

4.2 Socialisation

This section lays the groundwork for analysing research capacity development as a process of socialisation. My understanding of socialisation draws on Giddens' structuration theory, which focuses on the interrelationship between social structures and human agency. Giddens argues that social structures are 'dual' in that they are "both the medium and the outcome of the practices which constitute social systems" (Giddens, 1981:27). Agency and structure, which organises social systems, are not constituted independently, but are part of the same process of enactment of social practices. In other words, structure shapes people's practices, but it is also people's practices that constitute and reproduce structures (Sewell, 1992).

Structuration theory addresses questions of social reproduction and social change and the relationship between the external (institutional) and internal dimensions of social life. "Social praxis as repeated interaction over time and space is understood to connect and bind agency and subjectivity with the structural, systemic relations, reproducing and transforming them continuously" (King, 2000:308, drawing on Giddens, 1984:25).

Structures are enacted by what Giddens calls 'knowledgeable' human agents, that is, people who have internalised elements of social structure (such as the rules and resources generated in social interaction) and are able to put them into practice. Thus structures are

not only constraining but enabling (Giddens, 1984:25). Sewell (1992) expresses the implications of this theory for social change in the following way:

This conception of human agents as “knowledgeable” and “enabled” implies that those agents are capable of putting their structurally formed capacities to work in creative or innovative ways. And if enough people, or even a few people who are powerful enough act in innovative ways, their action may have the consequence of transforming the very structures that gave them the capacity to act (Sewell, 1992:4).

My understanding of socialisation is informed by the view of structuration briefly outlined above.

Studies on academic socialisation in higher education have focused on two main areas – the socialisation of academic staff (Tierney and Rhoads, 1993, Tierney, 1997, Trowler and Knight, 1999, 2000), and that of postgraduate students (Becher *et al*, 1994, Delamont *et al*, 2000). This study draws on literature dealing with academic socialisation in HE institutions generally as well as literature on academic staff and postgraduate students.

Socialisation refers to the process of an individual being inducted into the structural and cultural elements of a social institution. These include “traditions, customs and practices, transmitted knowledge, beliefs, moral and rules of conduct, as well as the linguistic and symbolic forms of communication and the meanings” shared by these communities (Becher and Trowler, 2001:47). It requires the development of a “sufficient level of technical proficiency in one’s intellectual trade” (*ibid*) as well as loyalty to one’s collegial group, and adherence to its norms. In the study of socialisation in higher education there has been a heavy emphasis on symbolic dimensions such as “organisational saga”, myths and legends and icons (Clark, 1983, Becher, 1989). However Trowler (1998) argues that “the values, attitudes and recurrent practices which permeate everyday life” play a more important role in socialisation (142). For an academic, “learning how to go on” (Giddens, 1983, in Knight and Trowler, 2001:53) in an organisation involves learning the way things are done, understanding concepts that have taken-for-granted meaning in those contexts and learning appropriate discourse repertoires. Socialisation also involves becoming familiar with the culture of the organisation in relation to teaching, research and other practices, and learning the philosophies underlying practices in the organisation (Trowler and Knight, 1999, Knight and Trowler, 2001). Learning within the socialisation process

relates not only to the form but to the deep substance - the meanings and subtle aspects of practice (Brown and Duguid, 1991).

The culture of an organisation is not unitary and coherent. Rather, academics become socialised into “many-faceted cultures” (Tierney and Rhoads, 1993:9). While HE institutions are part of a system that “has developed its own massive structure and bounded procedures” (Clark, 1983:3), they are extremely complex and diverse institutions, interdependent with other parts of society. Much of the more recent research on socialisation in higher education has been influenced by constructivist understandings which stress the active role of individuals in the construction of culture. Tierney (1997) emphasises the interpretive aspect of socialisation, involving the creation of meaning, rather than top-down transmission. Trowler and Knight (1999) highlight the “continuing importance of agency, identity and the role of the individual in constructing their social world within certain constraints” (Trowler and Knight, 1999:185). Thus processes of socialisation are located in a tension between individuals’ own identity formation and the conditioning of powerful structural elements embedded in the contexts in which they take place. Becher and Trowler (2001) argue that the creative power of individuals to change existing cultures in higher education should not be overemphasised, since there are powerful structural elements reinforcing the status quo. While this needs to be recognised, one also needs to take into account that at times of rapid societal change such as in the current South African as well as international higher education context, there are new opportunities as well as constraints affecting potential for change.

Understanding the relationship between structure and agency in socialisation through the lens of Giddens’ structuration theory, is particularly helpful for inquiry into research capacity development in a South African context, both in terms of socialisation into organisational contexts and into disciplinary fields. On the one hand there is a need for individuals to develop the capacities which will enable them to contribute to research excellence. On the other hand, individuals from previously excluded backgrounds need to contribute to changing the ethos and cultures of organisations and institutions, so that they may contribute to facilitating change in society. Furthermore, there is a need for high quality research which can be drawn on to address local South African problems, as well as contributing to bodies of international research “from the periphery of [dominant] cultural worlds” (Webster and Fakier, 2000).

Clark (1983) identified four main sources of professional identity of academics, which are generated and firmly positioned within the HE system. These are the discipline, the institution in which academics are located, the national higher education system, and the academic profession more broadly. While he saw disciplinary affiliation as the primary source of academic identity and enculturation, he argued that academics were caught between the cross cutting imperatives of their discipline and the institution to which they belonged. The discipline was associated with cosmopolitan sources of identity, while the institution was associated with the local context (Clark, 1983, Henkel, 2000).

The generalisability of the primacy of disciplinary affiliation in academic identity (Clark, 1983, Becher, 1989) to a broad range of HE contexts has been questioned by some authors, who argue that Clark (1983) and Becher (1989) studied institutions, departments and academics at the elite end of the range (Fulton, 1996, Trowler, 1998). Fulton¹⁵ found that research on a broader range of higher education institutions reinforced the finding that academics identify strongly “with and through the discipline which they practise, and in which they have been trained” (1996:163). However, he qualified this by arguing that “to say that people identify with their discipline more than with the immediate organizational context is *not the same as saying that they are primarily shaped by it*” (*ibid*: my emphasis).

This study seeks to understand research capacity development in relation to the complex range of contexts and factors that *shape* it in the selected research centres and related fields. As I have stated, I am using the lenses of social, organisational and epistemological dimensions of RCD. The research centre provides the setting within which these factors are manifested. The organisational lens focuses on the organisational setting and location of the research centre, through which both the HE institution and the enterprises (such as research, teaching consultancy) which the centre is involved in, impact on the individual. Furthermore, the influence of the national HE sector as a whole, and its shifts in policy and implementation largely impact on the individuals through the policies and practices of the research centre.

¹⁵ This is based on an analysis of empirical data from Carnegie survey (1992), an international study of the academic profession. The survey included academic staff in universities and other HE institutions in four European countries.

The research centres in this study are largely application-oriented and in many cases multidisciplinary, which makes analysis of disciplinary socialisation more complicated. Within the setting of the research centre, researchers and postgraduate students are socialised into the broad disciplinary or research field of the centre, and begin to insert themselves into this field of practice, in the process of building their own research area. Individuals' experiences of current and previous disciplinary socialisation (from earlier post- and undergraduate experience) also need to be taken into account. Relationships between research centres and academic departments have a crucial impact on the research centres' ability to facilitate disciplinary socialisation.

In a context where HE institutions are increasingly involved with and responsive to societal forces external to the institution, the impact of this involvement needs to be considered in relation to both the identity formation and socialisation process of researchers and postgraduate students. In South Africa there are demands for responsiveness of knowledge production to contribute to social, economic and political reconstruction, as well as addressing urgent problems such as poverty, unemployment and health issues, to name but a few. On the other hand there are demands from industry to contribute to global competitiveness. Research centres constitute one of the organisational forms that have developed to accommodate and promote further collaboration and partnerships between universities and outside institutions and social groupings. The various types of research which are needed in changing knowledge contexts, and particularly in South African contexts, necessitate the rethinking of traditional approaches to research capacity development. (I will discuss this further in section 4.7 on 'Perspectives on knowledge production ...'.)

Furthermore at an international and national level, the diversification of the profile of individuals coming into academia in terms of their socio-economic backgrounds, race, gender and prior professional experience means that there needs to be consideration of the contributions which individuals (and groups) make to organisational culture (Becher and Trowler, 2001, Tierney, 1997). This applies both in the socialisation of students and academic staff. This diversity confirms the inadequacy of relying on traditional approaches to socialisation into higher education institutions (Tierney and Bensimon, 1996). This study can inform policy and practice in research capacity development in South Africa

through its investigation of RCD in application-oriented research centres. Important elements of the study concern the diversity of researchers and postgraduate students and opportunities and constraints for addressing equity issues, as well as the resources that individuals from diverse backgrounds contribute to knowledge production. The study also investigates the repertoire of research capacities that are needed in changing knowledge contexts and begins to explore how they can be developed.

An important aspect of research capacity development is the acquisition of tacit knowledge, which takes place through socialisation processes. I have discussed in the previous chapter, Lave and Wenger's argument that the acquisition of tacit knowledge is an intrinsic part of gaining knowledge through participation in social practices (Lave and Wenger, 1991).

A 'situational learning' approach¹⁶ to socialisation, which needs to be distinguished from 'situated learning', challenges an idealised understanding of socialisation as a smooth process of enculturation into organisational and disciplinary settings. The studies within this approach highlighted the uneven and rocky aspects of paths of socialisation. They emphasised the development of possible disjuncture between the knowledge and understandings of established practitioners and their students. They also noted how occupational novices are often faced with considerable demands on their time, effort and intellectual resources, and as a result of this their everyday coping strategies may seem to counter the stated aims and values of senior academics and practitioners. They may generate their own subcultural responses and strategies to 'get by' (discussed in Delamont *et al*, 2000:10). Disjuncture between understanding and practice of experts and novices, can be further investigated through Engeström's theory (discussed in Chapter 3) of individuals' experiences of 'double-bind' situations which they find themselves in, and the strategies that they adopt of resorting to habitual ways of thinking, or breaking through to higher levels of learning (Engeström, 1987).

Clark (1983) argues that academic identities are formed in relation to the cross-cutting imperatives of the discipline and the enterprise, meaning the institution. These two sources of identity converge in the basic operating unit – the department or the institute which is

¹⁶ This approach, associated with Everett Hughes and the Chicago school in Sociology, was influential in the study of socialisation in the 1930s (Delamont *et al*, 2000).

“simultaneously a part of the discipline and a part of the enterprise, melding the two and drawing strength from the combination” (Clark, 1983:32). As universities respond more broadly to research needs from industry and society, they become more complex in structure and there has been a proliferation of research centres or institutes. Thus research centres and units need to be considered as an important site of socialisation and identity formation, particularly where they run postgraduate programmes.

In Clark’s study on postgraduate education (1993) he draws attention to the ‘small worlds’ of the university in which research training takes place.

Effective systems are composed of thousands of small worlds of laboratories and seminars for which such descriptive terms as craft and apprenticeship are still appropriate. What the best macro frameworks of system, bureaucracy, and profession do is to generate and support the best micro settings. The multiplication and grand diffusion of these small worlds becomes the heart of the problem (Clark, 1993:xx).

Clark argues that the success of research training at universities relies on “the specific operational conditions ... at the end of a chain of nested supportive settings in the national system and in the host institution” (Clark, 1993:374). This study seeks to learn more about these small worlds in the research centres being studied, in order to identify what combination of factors result in micro settings most conducive to RCD.

As discussed in Chapter 3, the micro settings examined in this study include both structured components of RCD programmes as well as social groupings which emerge organically and are facilitated by programmes. A research centre is located in a chain of nested and overlapping settings both within the university and overlapping with outside organisations. It can be seen as a “community of communities” (Brown and Duguid, 1991) with smaller communities of practice within it. Socially situated theories of learning, identity formation and socialisation are used to analyse RCD within these micro settings and to examine individuals’ paths of learning and identity formation in social and organisational contexts.

4.3. Research capacity development as socialisation in the context of academic departments

4.3.1 Disciplines and paradigms

Across the research literature on postgraduate study, there is agreement that one cannot generalise about identities of research students because of the strength of disciplinary identity and the difference in experience of doctoral students (Clark, 1993, Becher *et al*, 1994, Delamont *et al*, 2000). The differentiation in disciplines also means that one cannot impose common structures on research education (Becher *et al*, 1994). Academic disciplines have developed within historical and institutional contexts and have become strongly associated with organisational forms such as those of academic departments (Delamont *et al*, 2000, du Toit, 2001). Bourdieu and Bernstein have argued that the symbolic boundaries that define those disciplines are culturally arbitrary (Delamont *et al*, 2000) and have developed as a part of the history of knowledge production and universities. In spite of these origins, there is a remarkable degree of consensus and stability within disciplines (*ibid*), but over time there have been fundamental changes within disciplines, and development of new disciplines as well as dying out of old ones. There has also been ‘substantive academic growth’ with increasing specialisation of fields within disciplines and development of sub-disciplines and multidisciplinary fields (Becher, 1989, Clark, 1991). These changes arise from external societal forces as well as from internal processes within disciplines.

A novice researcher learns through socialisation what counts as an appropriate research question within a discipline, and what kind of activity this requires, including what methods of inquiry, data analysis and interpretation are applicable and appropriate. Furthermore, there are distinct criteria for evaluating research within disciplines. There are different understandings of what constitutes various levels of postgraduate research and “what is sufficiently original, what is doable, what is feasible” (Delamont *et al*, 2000:15). The concept of ‘paradigm’ was originally developed by Kuhn (1962) to refer to that which gives coherence and implicit guidance to a group of scientists working within a research field during a stable - ‘normal’ or ‘mature’ phase of science. One of the definitions for paradigm used by Becher (1989) is “the particular constellation of ideas and techniques, beliefs and values which serves to define a disciplinary culture” (*ibid*:10).

Patton (1978) in Lincoln and Guba (1985:15) describes a paradigm as:

... a world view, a general perspective, a way of breaking down the complexity of the real world. As such paradigms are deeply embedded in the socialization of adherents and practitioners: paradigms tell them what is important, legitimate and reasonable. Paradigms are also normative, telling the practitioner what to do ... Patton (1978:203).

Kuhn argues that, during a period of normal science, scientists do not question the 'rules' and assumptions underlying the paradigm (Kuhn, 1970). A paradigm provides its adherents with a framework for action. However, there is an essential tension in the process of scientific work between the reaffirmation of paradigmatic, orthodox knowledge and the imperative to innovate and discover (Kuhn, 1977, in Delamont *et al*, 2000). Disciplines and paradigms provide academics and researchers with 'doable' research projects and programmes. They permit individual researchers and research groups to "project their own work into wider frames of reference and significance" (Delamont *et al*, 2000:16). Much research has been done on socialisation within traditional disciplines and departments. However the role of disciplinary knowledge, conceptual and theoretical frameworks in socialisation in hybrid research fields is complex. Furthermore, the question has been opened up of how disciplinary frameworks are drawn on in knowledge production and socialisation in changing knowledge contexts (Gibbons *et al*, 1994, Henkel, 2004), but it still needs to be further researched. (I discuss these issues further in sections 4.5, 'Modes of knowledge production ...' and 4.6, 'Perspectives on knowledge production ...').

This study begins to explore how disciplinary frameworks are drawn on in research capacity development in the research fields and settings of the multidisciplinary, application-oriented centres in question. I will discuss socialisation into single-disciplinary fields in the natural sciences and social sciences in the following section.

4.3.2 Relationship between organisational and epistemological elements of socialisation within 'single-discipline' departments

One of the central organising frameworks of this study is the relationship between *organisational* aspects of knowledge production, including social dimensions embedded in organisation, and epistemological dimensions, and how this shapes RCD. Becher's classic

book *Tribes and Territories* (1989) is an analysis of the interrelationship between the social aspects of knowledge communities and the epistemological properties of knowledge forms in higher education institutions. By “social aspects” he means “the ways in which particular groups of academics organise their professional lives” (*ibid*:1) as well as cultural aspects of academic communities. Two studies on postgraduate education in HE institutions in Britain (Becher *et al*, 1994, Delamont *et al*, 2000) included analysis of the relationship between the organisational forms of knowledge production, the epistemological dimensions of the disciplines concerned, and the impact of these on the nature of postgraduate education. These two studies examined research education within various disciplines in the natural sciences, social sciences and humanities. Key findings were that although the dividing lines between the natural sciences and social sciences/humanities were not hard and fast, there were commonalities that could be identified in the organisational and epistemological aspects of disciplines in these knowledge domains, and the modes of research education that were practised.

Delamont *et al* identified two distinct models or ‘ideal types’¹⁷ of disciplinary socialisation through doctoral study. They found commonalities in the way doctoral work is structured within natural science departments and social science departments. They contrast these models in the natural and social sciences in what they call ‘single-discipline’ departments. They also contrast socialisation through doctoral study within single-discipline departments and multidisciplinary settings. In this section I focus on the models of socialisation within single-discipline departments in the natural sciences contrasted with the social sciences. I pay attention to research education of postgraduate students, although this discussion has implications for socialisation of researchers as well as students. I will discuss application-oriented and multidisciplinary settings for RCD in section 4.7 on ‘Perspectives on knowledge production ...’. While the models of organisation of natural science and social science disciplines are based on empirical research, they are generalised and presented as ideal types for the purpose of establishing an understanding of the relationship between organisational and epistemological aspects of research development contexts, which will be explored further in this study. The following two sections draw on the work of Clark (1993), Gumport (1993b), Becher (1994), Delamont *et al* (1997), Delamont *et al* (2000).

¹⁷ I also use the term ‘ideal type’ in this section to refer to a generalized prototype or model, without implying that this model has more value than others.

4.3.2.1 The natural sciences

The natural sciences have dominated thinking about the relationship between research education and the advancement of knowledge. One example of this is Clark's description of an ideal setting¹⁸ for postgraduate education that manifested the Humboldtian principle of the unity of research, teaching and study. The setting was a research group in a large chemistry department in a major American research university (Clark, 1993). It has been widely accepted that in the natural sciences the research group provides a key organisational frame for research (Gumport, 1993b, Becher *et al*, 1994). In Becher *et al*'s study of physics and biochemistry departments, they found that the research group provided the main source of identity and professional development for scientists. While the strength and reputation of leaders of research groups were significant, research practice tended to be collective and group-based, and postgraduate research education was conducted through a group apprenticeship model (Becher *et al*, 1994).

Becher *et al* (*ibid*) attributes the collective orientation of organisation of research in the natural sciences and the centrality of the research group to *external* reasons and *internal* reasons, linked to epistemological dimensions of the natural sciences. The *external* reasons are due to the large-scale nature of projects, the funding acquired for these, and the reliance on expensive and complex equipment.

The *internal* reasons are associated with the location of the natural sciences what Becher (1989) categorises as a hard pure knowledge domain. Knowledge within this domain has a relatively steady cumulative growth, and new findings are typically generated by a linear development from the existing state of awareness. The boundaries within which scientists work are clearly defined and circumscribed (*ibid*). There are clearly “discernible areas of growth and development, research frontiers along which teams of investigators are ranged” (Becher *et al*, 1994:99). Referring to the perceptions of academics in the fields of physics and chemistry, Becher *et al* note that:

... the power of the metaphor of the bounded territory or space within which work is organized and conceptualized is striking. It is strongly connected with

¹⁸ In this case ‘ideal’ is used to mean favoured setting.

the centrality of problem formulation and problem solving. ... there is a collective expectation and confidence that problems can be prioritized and authoritative predictions made about which ... solutions will prove to be the most productive. (Becher *et al*, 1994:68-69).

According to this view the bounded territory is that of the discipline, the sub-discipline and the research group. Each provides a frame in which problems can be defined, prioritised, and programmes of knowledge production can be organised. Thus there is a need for a coordinated approach and rational division of labour. However, the reality is not as tidy or rational as this (*ibid*).

Apart from the research group, the laboratory has also been identified as a central site of knowledge production and reproduction as well as socialisation of postgraduate students. The research group provides the social context and the laboratory provides a central physical site where knowledge is produced, methodology and use of equipment is developed and transmitted, and tacit knowledge is shared between more experienced and less experienced researchers (Collins, 1985, Knorr-Cetina, 1995, in Delamont *et al*, 2000). (In a discipline where there is also a fieldwork component to research, the practice of data collection in the field would also form part of the socialisation process, as discussed in Chapter 9.)

The model of laboratory research is organised around conducting research in a particular research area. Delamont *et al* (2000) found that the research groups which they studied consisted of one or two professors with doctoral students, postdoctoral researchers and technicians. A supervisor would have several doctoral students at one time, working in his or her area on topics that were to some extent related. The conducting of laboratory research relied on team work. Laboratory work operated on a “principle of reciprocity”, and members of a research group provided assistance and support for each other (*ibid*:65). Delamont *et al* found that the collective approach to research organisation extended into research education, and that responsibility for postgraduate students was shared, in contrast to the social science model where this responsibility was centralised in the supervisor. An important feature of laboratory work was continuity of practice. Doctoral students describe their research as ‘taking further’ and ‘building upon’ the work of others (*ibid*:67).

The way that research practice and research education is structured in the natural sciences is linked to epistemological aspects of this knowledge domain. Similarly the way that research education is organised arises out of the contribution to knowledge production that postgraduate students are required to make within a discipline. Becher *et al*'s study emphasises the substantial contribution made by postgraduate students to knowledge production in the sciences. However, the form of this contribution varies in different disciplines and according to the level of complexity of the subject matter. Becher *et al* found that in some areas of biochemistry, research groups depend heavily on students for much of their more basic problem-solving (Becher *et al*, 1994). Small projects, which are 'doable' as PhD theses are carved out of broad research programmes (Delamont *et al*, 2000:59). Supervisors may allocate a small but fairly self-contained problem for a student to solve in their project. The supervisor may even design the project in advance, but would nevertheless "leave room for some shaping and decision-making by the student" (Becher *et al*, 1994:74).

The restricted parameters of doctoral students' projects are related to the organisational and epistemological dimensions of knowledge production in the natural sciences described above. It is also a strategy to facilitate the success of the thesis within a required time period, or at least to minimise the risk of failure. Possible disadvantages of this model are that it may limit creativity and innovation in postgraduate work in the sciences and "strategies for identifying the conceptually creative future leaders of the discipline may be neglected" (Becher *et al*, 1994:74). This view is challenged within Clark's description of what he saw as an ideal setting for doctoral education, mentioned above (Clark, 1993). In the setting described, there was recognition that almost all of the students were "operationally creative; that is they can solve problems. Only about 5 to 10 percent, however, are conceptually creative. They are the ones that formulate research objectives" (Cram, 1989, in Clark, 1993). It is implied that, within the research group described, students with potential for conceptual creativity were identified and nurtured. This question will be considered in relation to the Unilever Centre for Environmental Water Quality Studies (UCEWQ) in Chapter 9.

4.3.2.2 The social sciences and humanities

In this section I discuss traditions that have developed within the social sciences and humanities of organisation of knowledge production, related to epistemological features of disciplines, and the impact of these factors on research education.¹⁹ It draws largely on Becher *et al*'s study of the disciplines of economics, sociology, history and modern languages (Becher *et al*, 1994) and Delamont *et al*'s study of anthropology departments (Delamont *et al*, 2000). Within the social sciences the dominant concept of research has been that it is an individual pursuit. Becher *et al* (1994) found that in a discipline such as history, the need for research organisation is limited. Compared to the natural sciences, research costs are low and there is no need for expensive equipment requiring co-ordinated organisation.

The characteristic model of research education in the social sciences is individual apprenticeship, which relies heavily on the relationship between the student and supervisor. This model is seen as sustaining the goal of enabling students to become independent scholars or researchers. Students' research topics may be removed from those of their supervisor, in contrast to the natural sciences. Their research topics also tend to be individualised so there is less overlap with those of other students. There is not a sense of being part of a bigger project as in the natural science model. These factors contribute to a lack of interaction amongst postgraduate students and a sense of isolation that many students experience. Postgraduate students are generally not overtly directed to a research topic, but are given a reasonably free choice. This is based on the knowledge that students will have to be motivated by the topic for a number of years, and they are more likely to sustain their interest in the topic if they have chosen it out of an intrinsic interest. There is likely to be a strong element of negotiation regarding the feasibility of the project, and the viability of the study in relation to the relevant academic community (Becher *et al*, 1994).

Becher *et al* and Delamont *et al* found that the view of the doctoral thesis as an individual and original piece of work was common in the social sciences. Furthermore, it was seen as providing the foundation for a career as an individual academic or researcher. However, conceptions of what constituted significance and originality varied between the disciplines.

¹⁹ I will refer to 'social sciences' without including humanities every time, for the sake of economy of language.

The view described above is at one end of a spectrum of perspectives, with at the other end a view of doctoral studies as predominantly research training. Within history, sociology, modern languages (Becher *et al*, 1994) and anthropology (Delamont *et al*, 2000), expectations of a doctoral thesis tended to be very demanding. They were described in terms such as needing to make a new contribution to the literature, breaking “new ground in the discipline”, and getting into “a large piece of work” (Becher *et al*, 1994:87). This contrasts with the externally predefined and bounded nature of the contribution expected from doctoral study in the natural sciences. However, in some disciplines such as sociology and economics, there were new, more collaborative forms of research being implemented and in fields such as these, there was a growing trend towards more limited expectations of the thesis (*ibid*:85).

4.4 Positional and personal modes of socialisation

I have discussed how academic departments within different knowledge domains have been characterised according to organisational forms and epistemological dimensions of knowledge production. Delamont *et al* (2000) identify particular modes of social relations associated with different knowledge domains, using the concepts of *positional* and *personal* modes of socialisation. These concepts are extremely valuable for analysing social and relational aspects of RCD embedded in the organisation of research education. Delamont *et al* derive these concepts from the work of Bernstein (Bernstein, 1971, 1975), who used it in relation to socialisation in families. They extend this usage “to capture key elements of academic disciplines and departments as agencies of apprenticeship” (Delamont *et al*, 2000:152).

[In a positional form of socialization] social roles are primarily *ascribed*. One’s identity is determined primarily in relation to a closed set of roles and relationships. Such roles are explicit, and reflect clear distinctions of generation and hierarchy. The [research group] has clear external boundaries round it; there are clear lines of demarcation within it. The personalizing mode of socialisation, on the other hand is predicated on *achieved* identities and a more open-ended set of relationships. Boundaries and roles within the socializing group are much more fluid, and there are weaker external boundaries too. The individual’s position is not based, then on ascribed positions, and identities are matters of negotiation rather than reflecting strong hierarchical or generational divisions (Delamont *et al*, 2000:152-3, original emphases).

Delamont *et al* (2000) argue that in both natural and social sciences senior academics exercise authority, but in the natural sciences, control is more clearly hierarchical and overtly structured, which is consistent with a positional mode of socialisation. In the social sciences the system of control is more implicit and more negotiable and the mode of socialisation is personal. When the mode of socialisation is more personal, the student's own status will be less explicit. It will be derived from individual negotiations with significant others – especially the supervisor (*ibid*:153). The distinction between personal and positional modes of control is not intended to be evaluative. While relationships in the social sciences superficially appear to be more egalitarian, there are underlying hierarchies operating, which are less explicit than in an organisation with a positional mode of operating. The individualistic mode of socialisation is not necessarily a comfortable one, and can cause uncertainties and isolation.

The setting up of distinctions between models of RCD in the natural and social sciences is not intended to shape the framework of analysis of this study in terms of this dichotomy. Rather, it contributes to a framework for analysing how organisational and epistemological dimensions of knowledge production are connected in disciplines and research contexts, and how this impacts on RCD. The elements of the conceptual framework set up in relation to single disciplines, can then be applied to application-oriented, multidisciplinary sites of knowledge production. Concepts discussed in comparison between different knowledge domains, are useful for informing analysis. However, in many cases interpretation of the data, using these conceptual frames, show forms of organisation or social relationships that are contrary to the frameworks established here.

It is not only fit between the empirical evidence and theoretical predictions that are of interest, but also lack of fit. An example of this could be a group apprenticeship model of RCD in a social science setting, or conversely an individual apprenticeship model within the natural sciences. Also of interest are settings where there is a crossing over of these ideal types. For example, Becher *et al* (1994) refers to the occurrence of collaborative approaches to research in some disciplines within the social science and humanities, such as sociology and economics, which generate new modes of organisation and new approaches to research capacity development (*ibid*:93). They found that these disciplines were among the social science and humanities disciplines that formed part of a trend towards more limited expectations of the thesis. They argued that collaborative modes of

research education in economics and sociology could affect the expectations of the thesis. “While the outcome may be the advancement of knowledge, it was likely that that would be “within a bounded and predetermined frame” (*ibid*:86). There are also cases where one can identify positional modes of relationships within the social sciences or personal modes of relationships within the natural sciences. This is also relevant to note when considering the types of contexts that are most conducive to effective RCD.

The studies which I have drawn on in this section have been conducted in traditional departments within universities and are based largely on a traditional view of socialisation and RCD, which foreground disciplinary identity formation and socialisation. In this study of research centres, the application-oriented, multidisciplinary nature of the research adds new dimensions of complexity, which cannot be fully understood using theory predominantly derived from studies of single-discipline, academic departments. It is necessary to understand organisational forms, epistemological dimensions of knowledge production, and socialisation in traditional research settings in order to be able to compare these with aspects of the application-oriented and multidisciplinary settings in the study. In sections 4.6 and 4.7 below, I will discuss theories for understanding organisational and epistemological dimensions of RCD in application-oriented research centres. However, it is mainly in the empirical chapters that I explore the links between organisational forms of knowledge production and epistemological dimensions of the research fields and how this impacts on research capacity development processes.

4.5 Critical mass and pedagogic continuity

The concept of ‘critical mass’ has been identified as an important factor for research capacity development both internationally and in South Africa. In the UK, the Harris Review of Postgraduate Education emphasised the importance of a context of critical mass of research activity for research education (Harris, 1996, in Delamont *et al*, 1997a). Although the Harris report does not explicitly define critical mass, it outlines quantitative and qualitative dimensions to the concept. Quantitatively, critical mass depends on the collection of a significant volume of active researchers and funded research projects within a single research site. Qualitatively, it implies a degree of coherence in the research programmes pursued by those researchers. The emphasis on critical mass thus “directs attention to the general research milieu within which doctoral students and others work on

shared problems, with shared intellectual and material resources” (Delamont *et al*, 1997a:6). South African policies and funding strategies for developing research capacity have emphasised the need to build up critical mass in particular research areas. This has led to funding policies promoting concentration and selectivity in research and research training both in the UK (Delamont *et al*, 2000) and in South Africa (NRF, 2005).

In a critique of the Harris report, Delamont *et al* (1997a) argue that ‘pedagogic continuity’, which is linked to critical mass, is a more fundamental concept for understanding research capacity development in disciplines. I will first discuss the concept of critical mass, and pedagogic continuity within traditional disciplinary contexts. I will then consider the relevance of pedagogic continuity in the context of application-oriented research fields. Delamont *et al* (1997a, 2000) argue that the model of critical mass described in the Harris report draws on a research milieu found in the laboratory sciences (as described above in section 4.3.2.1 on ‘The natural sciences’), and is strongly interlinked with the academic subculture of those disciplines. In a large natural science department, there tends to be a critical mass of academics/researchers, postgraduate students and postdoctoral students working in the same research area. In their study they found that there was a collective approach to research education with responsibility for postgraduate students delegated amongst the different generations of the group. The supervisors provided “guidance on the framework and direction of research while experienced group members such as postdoctoral researchers and doctoral candidates, more advanced in their work, help[ed] the inexperienced PhD students” (Delamont *et al*, 2000:159). The collective mode of research education, with the involvement of practitioners at different levels of experience in the socialisation of newcomers, can be linked to Lave and Wenger’s theory of legitimate peripheral participation (1991).

Lave and Wenger emphasise the role of a range of participants, at different levels of participation in a community of practice, in facilitating learning of a newcomer. Learning takes place not just through a “teacher/learner dyad” but through “a richly diverse field of essential actors and, with it, other forms of relationships of participation” (Lave and Wenger, 1991:56). They also note the “importance of near-peers in the circulation of knowledgeable skill” (*ibid*57). Competence in doing research in a discipline relies on developing an understanding of the deep structure of disciplinary practice, which arises out of enculturation. Interaction with other students at different levels of development in their

studies and immersion in a strong research culture, combined with an ongoing process of interaction between student and supervisor or mentor, plays an important role in this enculturation process. Thus through participation in a community, located in the context of laboratory, research group, and (in some disciplines, in the field), postgraduate students acquire and extend their knowledge about scientific practice, as well as acquiring knowledge about the social structure of the community and participation in it.

The organisation of research and research education as well as the epistemological dimensions in the social science model mean that it is less likely to provide a context of critical mass for research capacity development (Delamont *et al*, 2000). The reliance on the individual apprenticeship model and the fragmentation of research interests contributes to the social and intellectual isolation of postgraduate students (*ibid*). There is no equivalent to the position of the postdoctoral students who are involved in daily contact and problem-resolution with the postgraduate students in the natural sciences. In some cases, there are regular meetings of postgraduate students to discuss methodological and theoretical ideas, which also provide a forum for presentation of work. These can be very beneficial and can provide a measure of the support which is described in postgraduate work in the natural sciences. Delamont *et al* point out that often the work presented is on very diverse topics, and thus there is a different level of interaction, compared to that in which researchers are working on an “ongoing shared mission” (*ibid* :166). For many social science students, “*no group exists ... so there are no colleagues across ranks to be collegial with*” (*ibid*:156, *original emphasis*).

It is necessary to reiterate here that Delamont *et al*'s models of organisation of postgraduate education in natural science and social science are ideal models and that in practice not all departments conform to these patterns. I have mentioned, for example, Becher *et al*'s (1994) findings about new, more collaborative forms of organisation of postgraduate education in fields such as sociology and economics (See section 4.4 on ‘Positional and personal modes ...’). Delamont *et al* (2000) argue that a collective approach to postgraduate education “is more congruent with disciplines that have a discrete subject area and identity, with shared theoretical approaches and methods. In other words, “a collective orientation is easier to sustain within the boundaries of relatively ‘pure’” subject areas” (160). This generalisation is questioned, based on analysis of the case studies in subsequent chapters.

Delamont *et al* (1997) caution against accepting an unquestioning view of critical mass, and imposing a single model of research productivity on different disciplines (6). They argue that it is *pedagogic continuity* that research students, supervisors and disciplines need rather than just a critical mass of research activity (7). They develop the concept of pedagogic continuity from the work of Hacking (1992, in Delamont *et al*, 2000). Hacking's focus is on the social production of stability in scientific disciplines. He argues that many sciences are pedagogically stable and "it is through the stability of pedagogical practice and pedagogical knowledge, taken-for-granted forms and contents of scientific thought are transmitted from generation to generation" (Delamont *et al*, 2000:13). Pedagogic continuity refers to a process of enculturation rather than formal teaching. It tends to be strong in laboratory science disciplines with the type of organisational structure described in section 4.3.2.1 on 'The natural sciences'. Delamont *et al* argue that it requires certain preconditions. Firstly, there needs to be a critical mass, sufficient numbers of postgraduates (at different stages of research) and postdoctoral students. Secondly, there needs to be a *continuity of funding* that allows for several individuals working in the same area both simultaneously and in succession (*ibid*:160).

Because the research centres in this study as well as their postgraduate programmes are relatively new, one can assess whether they have potential for pedagogic continuity, rather than whether they support pedagogic continuity *in the present*. Furthermore, pedagogic continuity would not reside wholly in a research centre, but would depend on strong relationships between the research centre and academic departments and be influenced by the nature of the research field. It would be conducive to and fed by a strong academic culture that supports and nurtures postgraduate study.

Henkel (2004) argues that the shift towards strategic science regimes in knowledge production internationally involves a new form of stability emerging in relationships between university research groupings and parties interested in knowledge production in industry and government. This has the potential to facilitate a new form of pedagogic continuity. An environment conducive to pedagogic continuity may be built up in a research field through strong university research and postgraduate programmes in partnership with other HE institutions and organisations in the field, if there was sufficient stability in the network of relationships. The role that South African research centres could

play in facilitating such an environment is threatened in the current context, by the instability and problems in articulation with university structures, described in section 1.3 on ‘Application-oriented research centres’. This will be discussed further in section 4.7 on ‘Perspectives on knowledge production’.

4.6 Modes of knowledge production in the centres

The research centres in this study have developed in order to achieve a number of purposes. These include meeting short-term societal knowledge needs; informing policy formulation and implementation; contributing to international disciplinary fields; and developing capacity of professionals and researchers within the field. In the study I will explore how the range of types of research being conducted impacts on RCD and postgraduate education within the centres. I will first provide some background to these questions by reviewing debates in higher education and science and technology studies literature about the shifts taking place in knowledge production.

4.6.1 Global shifts in production of knowledge

4.6.1.1 ‘Mode 2’ knowledge production

I begin with Gibbons *et al*’s (1994) thesis of a new mode of knowledge production, which has attracted much attention in the fields of higher education, science and technology and has influenced policy-making and implementation, particularly in South Africa.

Gibbons *et al* argue that there has been an emergence and widespread growth of a new mode of knowledge production. This has been accompanied by significant changes in the cognitive and social norms of the production, legitimation and dissemination of knowledge. They use the term ‘mode 1’ to refer to a traditional mode of knowledge production, which takes place within epistemic bounds of a discipline in which the research problem originates.

Gibbons *et al* (1994) argue that the new mode of knowledge production, labelled ‘mode 2’ has been emerging alongside ‘mode 1’. It is characterised in terms of the following key factors: Whereas science in mode 1 is generated first within academic disciplines, generally in theoretical and abstract terms, and then applied, mode 2 knowledge production

is generated within a context of application. It is trans-disciplinary in that scientific questions are framed, theories generated and solutions offered outside the traditional disciplinary boundaries. Mode 2 knowledge is produced on many heterogeneous sites by diverse types of knowledge producers. This changes the nature of the production process in cognitive as well as in organisational terms. Mode 2 knowledge production is more accountable to society and the market than mode 1. Lastly, in mode 1 science, quality is assessed through peer review by colleagues within the discipline. However, in Mode 2 knowledge production, other forms of assessment are employed which are more contextualised in society, and use a wider set of criteria (Gibbons *et al*, 1994, Scott, 1997).

Gibbon *et al*'s argument has stimulated much debate in the higher education field, redrawn attention to earlier work analysing changes in production of knowledge (Weingart, 1997, in Ravjee, 1999, Rip, 2000) and prompted scholars to articulate more nuanced interpretations of continuity, change and interrelationships in modes of knowledge production (Rip, 1997). The Gibbons thesis was taken up in a relatively uncritical way in higher education policy discourse in South Africa, partly due to the timing of the publication of Gibbon *et al*'s book in 1994, which coincided with the conceptual framing of policy formulation for the National Commission on Higher Education (NCHE) (Subotzky, 2000).

More recently, the Gibbons thesis has been approached more critically. Drawing on Ravjee (1999), Subotzky (2000) groups responses to Gibbons *et al*'s argument into three broad categories.

One set of responses questions the usefulness of the Gibbons thesis in understanding current changes. Some critics in this category query whether the developments, which Gibbons *et al* refer to as growth in a new mode of knowledge production, do in fact, constitute a paradigmatic shift in knowledge production (Weingart, 1997). Muller (2000) criticises Gibbon's tendency to slip into a 'replacement' version of the thesis, i.e. the position that mode 2 is *replacing* mode 1. Muller strongly supports an adjunct theory, arguing that forms of mode 2 knowledge production have existed for a long time, but in late modernity mode 2 has become much more visible. Furthermore, mode 2 knowledge production depends on a sound mode 1 disciplinary base.

A second set of responses has not rejected the Gibbons thesis outright, but has focused on seeking empirical evidence to determine what changes have been occurring in knowledge production, particularly in developing countries, and to conceptualise how these changes can be understood (Subotzky *et al*, 1998, Mouton, 2001). Rip (2001) criticises the dichotomy inherent in the mode 1 – mode 2 distinction, and argues that there are a variety of modes of knowledge production which need to be researched.

A third set of responses acknowledges that shifts have occurred towards problem-solving, applications-driven knowledge production. To differing degrees, these scholars encourage the support of mode 2 knowledge production in South Africa. The main rationale underlying this view is based on the perceived importance of applications-driven science as a more socially *relevant* form of knowledge production (Kraak, 1997, Subotzky, 1998). Subotzky (1998) criticises Gibbon *et al*'s notion of 'socially distributed knowledge' as being largely defined in terms of the market. He argues that mode 2 knowledge production needs to be steered towards contributing to reconstruction, development and poverty alleviation and to benefiting the public good, as well as the private interests to which it is currently predominantly oriented (Subotzky, 1998, Subotzky, 2000).

While I have found Gibbon *et al*'s argument stimulating and thought-provoking, it has not, on the whole, helped to make sense of the organisational and epistemological dimensions of knowledge production in the research centres in my study. The central argument of a shift towards more application-driven research is clearly relevant for research centres, particularly if one interprets this concept as research *problems* being generated in the context of application, and not necessarily in terms of the actual research being conducted in the context of application. Gibbon *et al*'s description of transient research teams that come together to solve specific problems may be applicable to some projects of the research centres concerned, and may have been more widespread in earlier stages of some of the research centres' histories. However, on the whole there has been a trend towards more stability, work on medium to long term research projects and more continuity in groups of researchers, academics and members of other interest groups involved in collaborative research. This needs to be qualified by recognition of the challenge to long-term stability of research centres, based on their position on the periphery of university structures and their reliance on project contract and grants from donors for much of their

funding. Lastly, there is a range of different types of research being conducted in research centres.

These modes of research need to be investigated more thoroughly and this study begins to do this in the context of the research centres concerned. I have not found clear instances of transdisciplinarity in the types of knowledge production taking place at the research centres and will return to this below.

While developing a framework to analyse the types of research being conducted at the research centres, and to relate this to research capacity development, I have found it more productive to look at the distinctions that have been made between different types of knowledge production. I start from a distinction between basic and applied research, and how categorisations and understandings of these concepts have changed, along with shifts in knowledge production. However, this is far from straightforward.

4.6.1.2 A range of types of research

I begin this section by outlining the classification of research types defined in the Frascati manual²⁰ which is widely used as a reference point. Research types are classified into basic, applied, fundamental and strategic research. Mouton (2001) traces the shifts in classification from the 1960s to the 1980s.

Basic research was defined as “original investigation with the primary aim of developing more complete knowledge or understanding of the subject(s) under study” (Frascati, 1993, in Mouton, 2001:160). Mulkey explained basic research as that which researchers are expected to pursue “on the basis of their scientific significance” for a peer audience (Mulkey, 1977 in Henkel, 2004:171). *Applied* research refers to original investigation undertaken to produce results that have useful practical consequences. It often involves applying findings of basic research or solving already recognised problems.

In the early 1970s the category of *strategic research* emerged. Rip points out that the concept of strategic research was initially located closer to the applied side of the

²⁰ Mouton (2001) refers to the Frascati manual (1993).

basic/applied continuum (Rip, 1991, in Mouton, 2001). However, Irvine and Martin (1984) placed strategic research closer to the side of basic research (Mouton, 2001). They distinguished between two kinds of basic research - strategic and fundamental research. *Fundamental* research refers to basic research, which is “carried out without working for long-term economic or social benefits other than the advancement of knowledge”, and without attempting to apply the research to practical problems or to transfer the results to sectors responsible for their application (Irvine and Martin, 1984, in Mouton, 2001:160). *Strategic* research is basic research, which is “carried out with the expectation that it will produce a broad base of knowledge likely to form the background to the solution of recognised current or future practical problems” (*ibid*).

I will discuss the concept of strategic science, drawing on Henkel (2000, 2004), Rip (1997, 2000) and Mouton (2001). Henkel (2004) argues that in the past there was a clear boundary between basic and applied research, arising out of the social contexts in which research was carried out. In a traditional model of knowledge production, there was a high level of separation between research and potential users. However, the divide between basic and applied research has become less clear. This has arisen out of factors which include society’s demands for ‘relevant science’, and decreasing government expenditure on higher education and fundamental research, which in combination have resulted in closer collaboration and exchange between academic scientists, industry, government and other research users (Irvine and Martin, 1984, Clark, 1998, Henkel, 2004). These shifts have been accompanied by changing understandings of the relationship between science, technology development and innovation.

Changes in science policies have led to shifts in the “balance and shape of research agendas” (Henkel, 2000:204). A number of scholars have observed a process of new strategies being applied in knowledge production at universities (particularly in science and technology fields) aimed at generating income, and creating stability for their research fields through developing partnerships and producing directly useful research for industry or government. At the same time there is a need to shape research agendas proactively, so that basic research interests can continue to be pursued, and ongoing knowledge production can be sustained in research fields (Rip, 1997, Henkel, 2000).

Henkel (2004) refers to the shift to a strategic research regime as if it has already occurred and become stabilised in society. She argues that the demand for strategic research from governments and the private sector has required an acceptance by government and industry that the creation of new knowledge, which is at the leading edge of scientific fields, is a priority for them. This has led to the creation of a relatively stable epistemological and value framework for academic research. Rip (1997, 2000, 2004) is more tentative in his claims, describing strategic science as a “regime-to-be” (Rip, 2000). He sees this regime as a change in science organisation and science policy, rather than as a complete break from the past. He argues that “pressures for relevance of scientific research, and, in general, new linkages with, and interference by, the ‘outside’ world, have opened up ... protected space for science” (Rip, 2000:32). Linkages develop between societal institutions that require cutting-edge knowledge from science and knowledge-producing institutions and groupings. Through these linkages ‘science’ acquires funding not just to provide research results to satisfy immediate knowledge needs, but to set in motion long-term knowledge production programmes, which promise ongoing relevant knowledge to serve society.

He identifies ambivalence in the shift to strategic research, based on an uncertain combination of reluctant responses to change by some scientists, and exploitation of new opportunities by others. On the one hand, the emerging regime creates a protected space “for scientists to do their own thing” (Rip, 2000:33). This rests on the claim of a productive relationship between science and society, where society is content to accept promises of long-term relevant knowledge. On the other hand the label of strategic science could be used as a ‘rhetorical device’ to mobilise funding (Rip, 1997, Mouton, 2001).

The discussion above refers to a changing research *regime*, that is, changes in the *organisation* of sites of knowledge production and research relationships. Associated with this are cognitive or epistemological changes in knowledge production, resulting in what may be a new mode of knowledge production in the form of ‘strategic’ research. Strategic research combines relevance (to specific contexts) and excellence (the advancement of science). It contributes “to a reservoir of scientific knowledge and technological options” (Rip, 2004:156). This is available “for others to fish in” to inform knowledge and innovation needs (*ibid*). To what extent have these developments been taking place in a South African context? This question is posed in the following section, and the types of knowledge production taking place in application-oriented research centres are considered.

4.6.2 Modes of knowledge production in South Africa, and in application-oriented research centres specifically

An audit of science and technology research at South African HE institutions was conducted (Mouton and Hackmann, 1997), which related scientists' perceptions of classification of research to data on research output. Based on evidence from the audit, Mouton (2001) argued that there was ambiguity regarding the concept and practice of strategic research in these institutions. On the one hand, there was evidence that supported Rip's (1997) view of strategic research "as a site – located somewhere in the middle ground of the continuum [of fundamental to applied research] – for organising and co-ordinating research depending on the context" (Mouton, 2001:171). On the other hand there was some evidence to suggest the emergence of a distinctive form of knowledge production (*ibid*). In a study on applied research centres in South Africa, Cooper (2005) found that enormous value was placed (especially by industry) on strategic research conducted at universities. Yet there was "a serious shortage of funds for this more medium-to-long-term research work" (*ibid*:146). This finding relates to another element of ambiguity in the system of knowledge production in South Africa. A number of studies conducted in South Africa have pointed to the emergence of an important form of knowledge production in application-oriented research groupings that is closer to basic research than applied research (Boshoff, 2002, Cooper, 2006).

The findings arising from Cooper's study of twelve applied research groupings at South African HE institutions have been informative for making sense of the types of knowledge production in the research centres in my study (Cooper, 2004, 2005, 2006). Cooper found that the research groupings that he studied conducted a range of different types of research. He saw categories of research fitting into a continuum with 'curiosity-oriented' research at the one and 'application-oriented' research at the other end. I have adopted the term 'application-oriented' to refer to the research centres and as a loose term for the type of research that they do. I find it misleading to call them applied research centres, since it has become apparent that much of the work that they do is not in fact applied research.

Cooper identified two essential types of research which he initially located at the application-oriented end of the spectrum which he called 'fundamental-applied' and

‘development-project’ research. The concept of ‘fundamental-applied’ research is similar to that of strategic research. It is research aimed at unlocking fundamental knowledge, but always with applications in mind that could benefit industry (or other research users) (Cooper, 2005).

He illustrates the concept of fundamental-applied research with an example of a group of researchers who were undertaking basic research in the sub-field of plant genetics, with the purpose of enhancing grape-growing methods for the wine industry, which was their major funder.

He saw ‘development-project research’, on the other hand, developing the application of knowledge with a clear project context in mind (Cooper, 2004). Cooper found that some research groupings were conducting very little basic research, but were applying current theories in their field to a range of project-based investigations, for which they had been contracted. An example of this was an environmental science unit which was applying established methodology to conduct environmental impact assessments.

More recently, Cooper (2006) has reformulated the concept of ‘fundamental-applied’ research, and replaced it with ‘use-inspired basic research’, influenced by the work of Stokes (1977, in Cooper, 2006). He explains ‘use-inspired basic research’ as high quality, peer-reviewed basic research, conducted with ‘an eye out’ to its potential use. This is contrasted with ‘pure basic research’ and ‘pure applied research’. ‘Pure basic research’ corresponds to fundamental research in the Frascati definition, i.e., “without working for long-term economic or social benefits other than the advancement of knowledge” (Irvine and Martin, 1984). Cooper defines ‘pure applied research’ as research which “involves new knowledge production in the context of solving the problem” but “*where the focus is on application without searching for fundamental understanding*” (Cooper, 2006:7, my emphasis).

The central thrust of this shift, as I understand it, is that instead of categorising ‘fundamental-applied’ research under application-oriented research, he has located this type of research as a form of basic research. ‘Use-inspired basic research’ is similar to the concept of strategic research as used by Irvine and Martin (1984), Rip (1997) and Henkel (2004). They have different connotations, since the term strategic research is

conceptualised as fitting into a ‘strategic science regime’ (Rip, 1997). In this study I choose to use both terms.

Cooper argues that the main focus of applied research groupings in universities should be on conducting use-inspired basic research, although this need not be to the complete exclusion of other forms of research (Cooper, 2005). In relation to the social sciences, he argues the main contribution of South African universities to research addressing social and economic needs should be high quality ‘use-inspired basic research’. For example, in universities the most valuable form of research aimed at addressing social problems, is the conducting of high quality research informed by “the latest international academic literature and research findings” on the social problems concerned (*ibid*:12).

Etzkowitz and Leydesdorff (1997) conceptualise changes in knowledge production in universities in relation to the concept of the ‘triple-helix’ of academia-industry-government relations. This is framed largely within the context of innovation in science and technology. Cooper (2006) argues that a fourth helix of *civil society* needs to be added to this. Given the legitimate role of knowledge production at universities in socio-economic development, he argues that “academic work for trade unions, community organizations, local government bodies, NGOs etc. is equally valuable alongside (some) of our academic colleagues’ work for Industry ... and Government” (Cooper, 2006:12). This is particularly relevant in considering knowledge production in the social sciences in South Africa. Cooper adds that there is already a tradition of research of this type being conducted in South Africa. It overlaps with research that is being conducted for government; much of it is policy-oriented and in many cases it is located within application-oriented research groupings. Cooper observes that there has been a trend of knowledge production for civil society drifting into the mode of ‘pure applied research’, that is project-oriented research directed at addressing a specific, localised problem. Opposing this trend, he argues strongly that the most valuable contribution that knowledge production in universities can make to civil society is through “high-quality, peer-reviewed, basic research knowledge, but with an eye out with respect to its possible application”, which he calls ‘use-inspired basic research’ (*ibid*:14).

All three of the research centres in this study conduct various types of policy research as a significant part of their overall range of research. Recent debate in the field of education

policy research has relevance for theorising policy research in application-oriented centres. There is a strong argument emerging that the main contribution of HE research to policy and development priorities is through the conducting of rigorous, scholarly research, which has value both in its own right and as a necessary foundation for applied research (Denyssen and Breier, 2003, Subotzky, 2005). This does not preclude conducting a range of types of policy research nor disseminating it to various audiences involved in policy processes, for different purposes. However, there is growing recognition that the main focus of policy research conducted at universities should be on scholarly research that can be drawn on to inform policy work.

The implications of this view are that:

- There is a need for proactive research agenda formulation, as opposed to purely responsive research projects.
- Funding for such research needs to be acquired and used creatively in order to further the conducting of such research (Denyssen and Breier, 2003).

The balance in a research centre between different types of research and the need for proactive planning and strategies for knowledge production is closely linked to the ability of a research centre to build and sustain research capacity of new researchers in their field. This argument will be developed further in relation to the three research centres in this study.

4.6.3 Disciplinary and multidisciplinary forms of knowledge production

The research fields of all three of the research centres in this study can be loosely described as multidisciplinary, but the multidisciplinaryity takes different forms in each of the centres. The term ‘multidisciplinaryity’ is used in a number of sources in what I refer to as a relatively ‘tight’ definition. According to this view, multidisciplinary research consists of a collaboration between researchers from different disciplines in researching the same general subject or problem. In this collaborative process, individuals from each discipline use their own disciplinary concepts and methods in their approach to the research (Gibbons *et al*, 1994, Chachage, 1999, in Webster and Fakier, 2000, Delamont *et al*, 2000). The term

‘multidisciplinary’ is also used loosely to refer to a number of different ways in which different disciplines are drawn on and integrated in specialised research fields.

Definitions used by Gibbons *et al* (1994), drawing on Jantsch (1972), of different types of interaction between academics from different disciplines, are useful to an extent.

Multidisciplinarity is characterised “by the autonomy of the various disciplines and does not lead to changes in the existing disciplinary and theoretical structures” (Gibbons *et al*, 1994:29). Co-operation takes place through working on a common theme but from different disciplinary perspectives. This corresponds with the tight definition referred to above. *Interdisciplinarity* is characterised “by the explicit formulation of a uniform, discipline-transcending terminology or a common methodology. The form scientific cooperation takes consists in working on *different* themes, but within a common framework that is shared by the disciplines involved” (Gibbons *et al*, 1994:29, my emphasis). This did not apply to any of the research centres in the study.

Transdisciplinarity, which is one of the key characteristics of what Gibbons refers to as ‘mode 2’ knowledge production, arises where a consensus is arrived at by a diverse range of specialists about a common theoretical approach, evolving out of the context of application. It involves a “mutual interpenetration of disciplinary epistemologies” (Gibbons *et al*, 1994:29). Once the theoretical consensus is attained, it cannot easily be reduced to disciplinary parts. Furthermore, Gibbons *et al* view transdisciplinarity as “problem solving capability on the move. A particular solution can become the cognitive site from which further advances can be made, but where this knowledge will be used next and how it will develop is difficult to predict as are the possible applications that might arise from discipline-based research” (*ibid*:5). I will argue that, In the case of knowledge production in the centres in this study, there is more of a systematised building on previous epistemological development in the research field which precludes it from fitting into Gibbon *et al*’s, concept of transdisciplinarity.

I analyse modes of knowledge production in relation to disciplines, sub-disciplines and research fields, using the concepts of ‘boundedness’, ‘permeability’ and ‘hybridity’. My use of these concepts has been influenced by Bernstein’s theory of classification and framing (Bernstein, 1975) and the concepts of ‘insulation’ and ‘hybridity’, (Muller and Taylor, 2000). Individual disciplines can be classified in terms of how strongly insulated

they are from other disciplines, or the extent of permeability of their boundaries (Bernstein, 1975).

From this perspective, there are three broad types of knowledge production in the research centres:

1. Research that is conducted within the sub-discipline of a discipline which has permeable boundaries. (This is within the context of a loose meaning of multidisciplinary).
2. Research that fits into a tight definition of multidisciplinary. In this case, researchers and academics may work in their own 'primary' disciplinary frameworks, on research projects that are framed by an application-oriented problem, or within multidisciplinary research centres.
3. Research which is conducted through a hybrid mode of knowledge production, drawing on different disciplinary knowledge and methodological approaches. The disciplinary approaches and methodologies are integrated in research practice, and there is stability and continuity in the progressive building of the research field.

I see these three types of knowledge production relating broadly to the research conducted at SWOP, PLAAS and UCEWQ respectively. This will be further investigated in the three case studies.

Types of multidisciplinary in knowledge production within research fields have an impact on socialisation of researchers and postgraduate students. As mentioned above, Bernstein's theory of *classification* and *framing* (Bernstein, 1975) provides helpful conceptual tools for analysing disciplinary fields. Although he developed the theory in relation to schooling in the UK, it has been applied to a higher education context (Delamont *et al*, 2000, Becher and Trowler, 2001, Breier, 2003). *Classification* refers to the extent to which the content of a discipline is insulated from that of other disciplines. *Framing* refers to the extent to which there is an explicit and agreed content which makes up the curriculum of the discipline. When classification is strong, then disciplines are clearly bounded. When classification is weak, then "knowledge is ordered with reference to different principles, whereby boundaries between content are weaker and more flexible" (Delamont *et al*, 2000:8). Delamont *et al* argue that these principles – classification in particular - have

significant consequences for the production of academic identities, and modes of identification in relation to knowledge domains. When subject matter is strongly classified, then that subject matter – the discipline - becomes the main *raison d'être* of academic socialisation in its own right.

Disciplines differed in the extent to which research topics at doctoral level were seen as an expression of particular disciplinary traditions. “Where doctoral work was described in terms of disciplinary tradition, framing was strongest. Where doctoral work was presented in terms of the overriding research problem or topic, then framing was at its weakest” (Parry *et al*, 1994:41). In other words, where framing was strong there were definite boundaries which defined what counted as appropriate disciplinary work. Where framing was weaker, then disciplinary boundaries became blurred and disciplinary, theoretical content was subjugated to the research task at hand. This will be examined further in relation to the data in the three case studies.

4.7 Perspectives on knowledge production

In this chapter, relevant literature on socialisation and postgraduate education in traditional disciplinary departments has been reviewed. There has been discussion on changing contexts of knowledge production, and consequent changes in organisation of sites for production of knowledge as well as epistemological dimensions of research, disciplines and disciplinary fields. The central question that needs to be considered is what capacities are required by researchers and how these can be developed in the light of these changes.

In this section, different perspectives on knowledge production and the purposes of research capacity development are presented. We need to be clear about the relationship between purposes of research for which researchers are being trained, the types of research competencies and overall capacity that is required, in order to make claims about research capacity development. There has not been extensive empirical research done on RCD in application-oriented research contexts or research centres specifically. Research has begun to be conducted on research education within changing knowledge contexts (Enders and de Weert, 2004, Henkel, 2004, Rip, 2004, and others, in a special issue of Higher Education Policy, 17 (2)).

In this section, I reintroduce the approach that I categorise as a traditional, disciplinary approach to knowledge production. I present views on research education within multidisciplinary settings from a group of authors who fit into this approach. I will then outline perspectives on the above questions from various academics in the higher education field, who have considered research capacity development within changing knowledge contexts. I have chosen to discuss the views of these particular academics because of the thought-provoking nature of their contributions.

A traditional disciplinary approach foregrounds the importance of strong disciplinary training and identity. This approach is most strongly represented in higher education literature. It is built on a body of empirical research. However, this research has been conducted largely in traditional university departments, many of them single-discipline departments. Some proponents of this approach have been Clark (1983, 1993, 1995?), Becher (1989) and Delamont *et al* (2000). I have discussed findings from research within this tradition in a fair amount of detail. However, in this section I will present the views of Delamont *et al* (2000) and Parry *et al* (1994) (the same group of authors) on research education in multidisciplinary departments. Delamont *et al* (2000) found that generic difficulties faced by research students can be compounded in multidisciplinary settings. In the multidisciplinary departments that they researched, they found that:

As well as the complications of working in a department without one strong discipline, there was clearly a lack of a well-defined group structure characteristic of the traditional science department. The intellectual interests of staff members were fragmented, with each scholar working from within his or her own 'original' subject specialism (*ibid*:169).

Delamont *et al* argued that the isolation experienced by many doctoral students in the social sciences tended to be exacerbated in multidisciplinary settings (*ibid*:170). They found that within multidisciplinary departments, staff and students tended to work from within a single-discipline base. This was not thought to be a problem for the majority of PhD students because most of them came from single-disciplinary backgrounds and issues such as research topic, theoretical allegiance, choice of supervisor and methodology were treated accordingly. The discipline of origin was seen as important in providing a research framework from which the student could develop her work. However, a lack of disciplinary base or framework could expose PhD students to too many theoretical options,

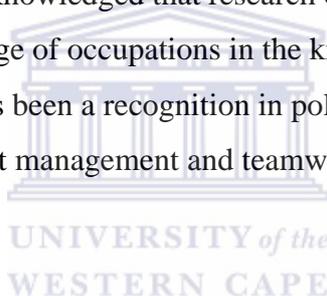
which could be confusing (Parry *et al*, 1994:40). PhD candidates who had done their previous studies in a multidisciplinary context, and saw themselves as essentially multidisciplinary, were seen to pose more of a problem, because they could not easily relate to any particular body of knowledge (Delamont *et al*, 2000:170).

These findings make a useful contribution to understanding postgraduate education. However, it would not be wise to extrapolate them uncritically to application-oriented research contexts such as research centres nor to deduce that research education within a single discipline should be promoted as the ideal or the only effective form of research education. Their underlying assumption about the purpose of doctoral study appears to be the reproduction of academics within disciplines and advancement of knowledge within disciplinary frameworks. Essentially they perceive multidisciplinary as a *problem* for postgraduate study. However, if one perceives the purpose of research capacity development and postgraduate education in terms of equipping researchers to work in a far broader range of contexts than in the academic labour market, and meeting the demands of changing requirements of knowledge production, one needs to see these demands as posing a challenge, rather than a problem.

Muller (2000), amongst others, argues that thorough disciplinary socialisation is necessary in order to be able to conduct quality research in application-oriented, multidisciplinary contexts. Critiquing educational policy responses which have taken on a strong version of the Gibbons *et al* Mode 2 thesis (the replacement thesis), he argues that mode 2 knowledge production depends upon a sound mode 1 disciplinary base, and therefore the implications for policy are to strengthen and consolidate mode 1 undergraduate courses in institutions. He further develops his case for building a sound mode 1 knowledge base with the following argument: The most effective examples of mode 2 are “research projects which configure disciplinary specialists within an organizational format that produces a knowledge outcome that could not have been produced by any one disciplinary input” (Muller, 2000:49). The knowledge contribution of mode 2 arises out of the productive partnership across previously insulated specialisms. The conditions for success of mode 2 are those which enable previously autonomous but highly specialised disciplinary operations to be productively reconfigured. Muller would concur with Delamont *et al* (2000) that universities need to educate students within the modes of enquiry of disciplines and build strong mode 1 competence. He emphasises that this is particularly necessary at

undergraduate level, and sees more scope for multidisciplinary research training at postgraduate level. Muller's argument that strong disciplinary socialisation is needed is convincing. However, preparing researchers to conduct high quality research in changing knowledge contexts requires *more* than traditional, disciplinary socialisation. Furthermore, the reality of researchers and students coming into application-oriented research contexts from different routes needs to be taken into account in research capacity development programmes. These factors are investigated further below and in the case study chapters.

When considering research competencies that need to be developed, one needs to bear in mind the different contexts that researchers are or will be working in. Doctoral education is no longer seen as predominantly aimed at reproduction of the academic labour force (Becher *et al*, 1994, Enders and de Weert, 2004, Henkel, 2004). Increasingly researchers are employed in organisations outside of HE institutions (Gibbons *et al*, 1994). Furthermore, it has been acknowledged that research or systematic inquiry plays an important role in a wide range of occupations in the knowledge society (Henkel, 2004). One of the results of this has been a recognition in policy of the need for more explicit training in soft skills, project management and teamwork (Enders and de Weert, 2004, Henkel, 2004).



As part of their argument on changing modes of knowledge production, Gibbons *et al* (1994) put forward what they see as new sets of skills and competencies needed by researchers in order to be able to conduct research effectively in Mode 2 contexts. Multiple competencies needed by researchers, include problem solving, problem identification and brokering skills, as well as linking problem solvers to problem identifiers. Gibbons (1998) asserts that researchers need to be able to work in teams comprising individuals from different scientific backgrounds, and they must become skilled at handling more than one intellectual framework and relating it to the current research problem. However, Gibbons *et al* do not offer suggestions about *how* these competencies can be developed within research education.

In the following section, I will discuss the contributions of two scholars, Henkel (2004) and Rip (2004), to conceptualisation of research education in a changing international knowledge context. While Henkel's central focus is on research education and academic identity, Rip's central argument concerns the need to diagnose what cognitive components

and institutional arrangements are suitable for research training to meet the changing knowledge needs of society.

I have discussed the opening up of boundaries of universities arising out of changes in their relations different elements of society. There has been an institutional element to this process of change as well as epistemological dimensions.

As universities assume multiple functions, they create more complex internal structures, more flexible and open to external interests. They establish units that can be focal points of attraction for external research funding, research collaborations and technology transfer. Research centres or institutes have proliferated, sometimes as specialized off shoots of departments, sometimes cross-cutting the discipline-based departmental organization to bring together researchers from a number of disciplines in an emergent or growing research domain (Henkel, 2004:173-4).

Both Henkel and Rip see these hybrid and 'transgressive' (Scott, 1997 in Henkel, 2004) research organisations as important current and future sites for research capacity development. Henkel argues that "academics have exchanged membership of a bounded world for involvement in multiple worlds" (Henkel, 2004:174). Academics are increasingly expected to cross disciplinary, institutional and national boundaries. There are demands to link up with state, industry or groupings from civil society. There is a need for generating funding and entrepreneurship. Thus contexts for research capacity development need to prepare students and young researchers to be able to cope with the demands of knowledge production in changing knowledge contexts.

The development of research organisations is bound up with the growth of 'strategic research' and the nature of strategic research impacts on their practice and broadens the repertoire of capacities needed by researchers. In section 3.5.1.2 on 'A range of types of research', I referred to Henkel's argument that the demand for strategic research from governments and the private sector and the strategic response from academic research organisations, have led to the creation of a relatively stable epistemological and value framework for academic research. She suggests that new modes of knowledge production do not provide a threat to pedagogic continuity, but a trend towards strategic research can in fact promote pedagogic continuity. This is because relationships between knowledge production in universities and external institutions are developed with an assumption that

the academic research agenda will be sustained and will be pursued largely in the research group or centre in the university.

[The academic agenda] is built on rigorous training and specialization in a discipline or community of inquirers, within which the focus, theoretical base, methodologies and epistemic criteria have been developed. The substantive and methodological knowledge, understanding and skill to develop that kind of research take years to acquire. [Thus this] kind of continuity and the foundations on which it is based are always going to be required, although not necessarily within a single disciplinary framework (Henkel, 2004:175).

One needs to be cautious about applying Henkel's analysis to South Africa. The literature reviewed (in section 4.5.1.2) suggests that overall systems of knowledge production in the UK and Europe are moving towards a more stable epistemological framework, based on strategic research. This is a trend that *appears* to be taking place internationally, and in South Africa, there is still ambiguity about to what extent this trend is underway. Research by Mouton (2001) and Cooper (2005) suggest that this trend has not solidified in South Africa. Furthermore there are a number of constraints affecting knowledge production in South Africa, including levels of funding available and size of research organisations; critical mass of experienced researchers; and research capacity of HE institutions and other organisations. Nevertheless, Henkel's analysis is valuable because, firstly, it points to a trend that we may be moving towards in South Africa. Secondly, it may be advisable for higher education and science and technology policy actively to encourage the development of the types of relationships described and the stability that comes with them. Thirdly, the concept of pedagogic continuity is extremely valuable for educating future generations of knowledge producers, and Henkel shows that it does not only apply to traditional disciplines, but that there is a need for pedagogic continuity to support research capacity development in new knowledge contexts as well (Henkel, 2004).

Rip (2004) points out that in the present fluid and dynamic situation of knowledge production, "research training has to prepare students for roles and skills that are not yet clearly articulated" (Rip, 2004:153). A way of addressing this is to diagnose the changes, try to understand the longer-term patterns and to work backwards from projections to requirements for research training. As mentioned in section 3.5.1.2, Rip sees the central long-term pattern within knowledge production as a move towards a strategic research regime. Strategic research combines relevance (to specific contexts) and excellence (the

advancement of science). Using a metaphor borrowed from industry, Rip suggests that research training should be geared towards creating “‘T-shaped people’, in which the down-stroke represents depth and specialist knowledge in a discipline and the cross-stroke represents breadth and flexibility” (European Science Foundation, 2002:4 cited in Rip, 2004:154). From a diagnosis of ongoing changes in science and research, Rip identified particular competencies needed for a scientific career in a strategic science regime (Rip, 2004). I will discuss these under the two broad categories of strategic abilities and social robustness, elaborating on Rip’s argument.

Firstly, to be able to contribute to innovation and strategic decision-making in a strategic science regime, scientists need to master a range of approaches and skills. One of these is an “ability to carry out ... scanning of developments in scientific and societal environments, and some skill in the identification and exploitation of ‘leads’” (*ibid*:157). Thus either at the level of institution, organisation, research group or individual, researchers need to be alert to potential societal knowledge needs related to their field of expertise. In addition to this they need to be able to plan strategically in order to generate funding for research and they need to define and pursue proactively a research agenda. Furthermore within a research group or organisation, there needs to be a co-ordination of these elements of conducting research to achieve sustainability of funding and a balance of research projects.

Secondly, there is a need for both social robustness and scientific robustness (Nowotny *et al*, 2001, Rip, 2004). The need for social robustness arises from the changing position of scientific expertise in society. Society wants expertise from scientists, even in the face of uncertainty. There is greater public understanding of science and interaction with scientific research. Consequently, there needs to be consideration of ‘people’, often organised in civil society groupings, as stakeholders at different levels of the research system.

Furthermore, scientists need to take greater responsibility for societal impact from expert advice arising out of scientific research (Rip, 2004, Gibbons, 2005). Another dimension is that for research to be socially robust, it needs to be informed by the experience and knowledge of people affected by the phenomenon being researched. This should be built into the research process and overall research design (Gibbons, 2005).

Some researchers will be more involved than others in both of the areas of competence and knowledge discussed above. However, all researchers need to have an awareness and understanding of these aspects of the context in which knowledge production takes place. Furthermore, Rip acknowledges that not all of the requirements needed “under the regime of Strategic Science” can be developed within the period of a postgraduate degree. Nor do they all need to be present in one person. However, they should all “be present or at least made visible in the group or centre in which the PhD is completed” (*ibid*:158). All of these elements should be encountered “during the PhD journey” (*ibid*) or during the journey of research capacity development.

Henkel’s discussion of the implications of changes in modes of knowledge production for research education is centred on two main themes:

1. The need for a pedagogically informed approach to research education, with more systematised opportunities for learning.
2. Facilitation of students’ negotiation of the different ‘social worlds’ which are involved in knowledge production.

In the light of the first theme, Henkel supports the shift of emphasis that has taken place internationally to viewing the function of the doctorate as primarily research education, with “a more bounded and less ambitious interpretation of originality” (*ibid*:178). She argues that policy developments which bring about more clearly structured systems of higher education have strengthened the powerful organising principle of the discipline or sub-discipline. There has been increasing recognition of the need to supplement the apprenticeship model of research education with a more systematic pedagogical approach.

Graduate education has itself become a focus of more systematic study which can inform policy-making. Consequently the function of the research supervisor is being reconceptualised, with growing pressure on supervisors to embrace both the educational and research dimensions of their role (Pearson and Brew, 2002). Moreover more attention is being paid to the learning opportunities provided by the research communities – the communities of practice (Lave and Wenger, 1991) in which postgraduate students carry out their research and construct their theses (Pearson and Brew, 2002, Henkel, 2004). These learning contexts are significant not only for sharing tacit knowledge and developing

technical competence, but also for development of understanding of how communities of practice operate, what values are embedded in practice, and how contradictions and conflicts are negotiated and resolved (Henkel, 2004).

Henkel brings the two themes together in the following quotation:

The combination of introducing more system and structure into research education with a heightened awareness among students and supervisors of the range and variety of learning required provides new opportunities. In particular, it means that there is a framework in which students can be made aware of the different contexts in which they are pursuing their individual research pathways, of openings that these provide, of the boundaries they cross and of the conflicts of value and interest they entail. In this way they may be more prepared to confront the political changes in the world of research, a task for which they will need skills not just of presentation, but of argument that can incorporate the perspectives of multiple worlds (*ibid*:179-80).

Thus Henkel sees the need for research education to prepare students for the complexity of the environments that they will work in as academics or researchers. Young researchers need to be exposed to the multiple roles of knowledge producers within different social worlds. In their working lives, they will need to be able to see and utilise opportunities, cross boundaries between different worlds, be sensitive to different values and interests of stakeholders in research, and be able to negotiate their own role in relation to this.

Research centres are well placed to provide students and young researchers with exposure to these multiple worlds. However, research training needs to provide sufficient structure and scaffolding which will assist individuals with negotiating the ongoing complexity which they will encounter in their careers.

Both Rip and Henkel make observations and projections about research education within the framework of an increasingly distributed and dispersed system of knowledge production, where HE institutions are interlinked in complex relations with other research institutions and stakeholders in society. Both understand research education to be influenced by the important role played by strategic research.

Rip moves even further from traditional views of research education. He argues that “training in a scientific/scholarly specialty as traditionally defined is not relevant anymore” (*ibid*:160), and that there is a need for a cognitive diagnosis of developments in

“knowledge production, transfer and utilisation” (*ibid*) in order to restructure training. He sees traditional disciplinary departments remaining in universities as part of a heterogeneous set-up. However, he envisages a doctoral student wending his or her way “through the various types of locations that are present, just as s/he is expected to do in his or her later career” (*ibid*:159). He proposes that centres of research excellence and relevance take on a more widespread role as key locations for research training. This cannot be applied uncritically to the South African context, bearing in mind the stark contrast between large research groupings in first world European countries and research groupings in South Africa in terms of size, funding and researchers. Rip also raises questions about the traditional form of the PhD.

The analyses and projections made by Rip (2004) and Henkel (2004) about research capacity development within changing knowledge contexts are far-sighted, thought-provoking and highly relevant for understanding knowledge production and research capacity development within application-oriented research centres. Henkel’s argument that a more pedagogical, systematised approach to research education is needed, is particularly appropriate for the South African context. Some of Rip’s long-term suggestions are controversial and may be seen as far removed from the current realities in South Africa. Both Rip and Henkel question the traditional mode of organisation of doctoral education, the role and form of the doctorate, and the relevance thereof for changing knowledge contexts.

4.8 Organisational forms of RCD programmes

One can categorise the different models of RCD or forms in which RCD processes are organised along a number of axes. Models of RCD range from formal to informal, structured to unstructured, and collective to individual in orientation. Becher *et al* (1994) use the term *individual apprenticeship* to refer to a model of research training relying on a close mentoring relationship between student and supervisor. They also refer to a more *collective* form of organisation of research training. I have discussed the tendency to more collective organisational forms of postgraduate education in the natural sciences compared to the more individual approach associated with the social sciences, and have also indicated that there are increasingly forms of organisation of RCD that do not fit into this dichotomy.

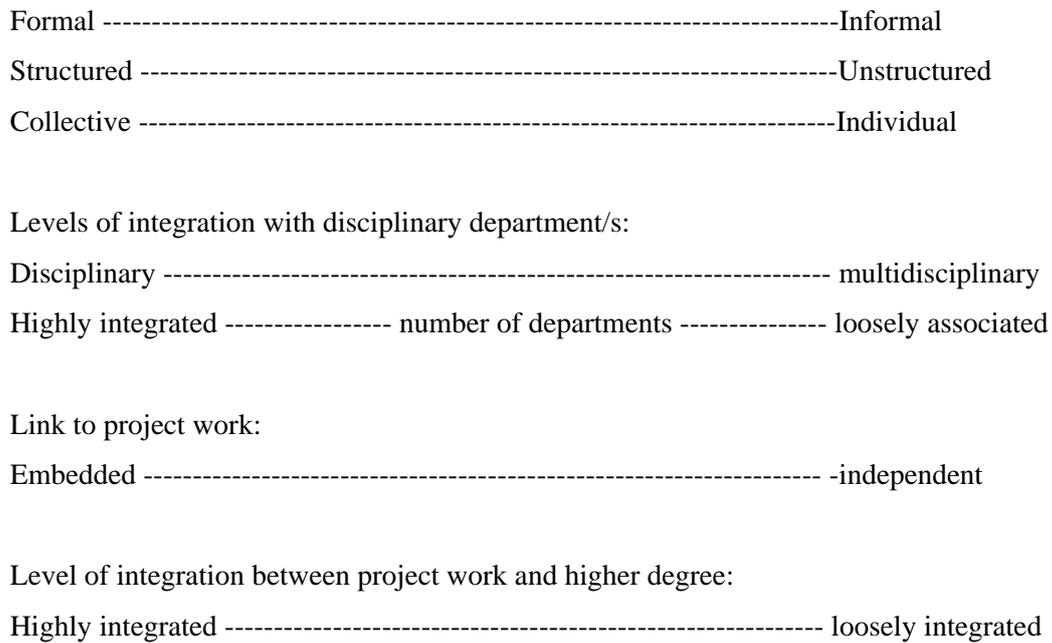
This study has not focused on developments in American postgraduate education associated with the graduate schools. These have had an impact on recent restructuring of organisational forms of some of the major universities in South Africa. Modes of organisation of doctoral study in the United States have developed which are large-scale, highly structured, comprising a significant coursework component, and there has been a move away from reliance on a close, intensive individual apprenticeship model (Gumport, 1993a). None of the models of RCD investigated in this study have been located within a South African 'graduate school' context, which is why I have not pursued this area of the literature extensively.

There has been a proliferation of coursework masters programmes offered by South African universities. These programmes tend to be linked to a professional field of practice. They consist of a number of courses and a half- or mini-thesis that need to be completed. Interns on the Sociology of Work Unit (SWOP) programme did a coursework masters degree.

There are a number of axes along which organisational forms of RCD can be located in application-oriented, multidisciplinary research contexts. One of these axes is concerned with the level of integration with traditional disciplinary departments. For example the internship programme at SWOP was closely linked to the Sociology Department at University of the Witwatersrand. In the more hybrid multidisciplinary research centres, there were different levels of interaction with various disciplinary departments at the universities concerned.

A further axis concerns the extent to which RCD organisational forms are embedded in research projects of the centre. Modes of RCD can range from high levels of embeddedness to peripheral linking to projects to independence from projects. At the Programme for Land and Agrarian studies, the *work-study* model is located towards the embedded side of the range, whereas the *fully funded PhD* model tends to be conducted more independently of projects. The integration of project work and higher degrees in the *work-study* model ranges from high levels of integration to low levels, which will be discussed further in Chapter 8.

Figure 3: Axes of organisational forms of RCD



It is necessary briefly to comment on the role of the doctorate in changing international knowledge contexts. The traditional model of the doctoral education involved the completion of a thesis and was aimed at educating an expert in a discipline, capable of furthering disciplinary knowledge. The purpose was to educate further generations of university researchers.

There have been various debates about the nature and suitability of the doctorate for current and varied knowledge needs. These debates have focused on issues such as the narrowness of the traditional form of doctoral education, and its inadequacy for preparing graduates for a wide range of employment opportunities. Professional doctorates have been introduced in a number of fields, which aim to enhance candidates' professional development (Bailey, 2001). The appropriateness of traditional forms of doctoral education as the central model for research capacity development is being challenged, as reflected in reference to Rip (2004) and Henkel (2004) above.

4.9 Conclusion

I conclude by recapping what has been covered in this chapter, and considering the questions that the theory reviewed here raises about the contexts provided by research centres for postgraduate education and RCD.

In the first part of the chapter, I reviewed literature on socialisation which helps to conceptualise research capacity development as a process of socialisation into organisational, social and epistemological contexts. The literature focused mainly on postgraduate education within single-discipline departments. Thus the organisational contexts were traditional departments and the phenomenon being studied was socialisation into traditional disciplines.

The central argument tracked in this section was how the organisation of knowledge production in particular disciplines and knowledge domains relates to epistemological dimensions of these disciplines and knowledge domains. Furthermore the implications of organisational and epistemological dimensions of disciplines for postgraduate education and research capacity development were examined. The concepts of critical mass and pedagogic continuity have been discussed, and the role that they play in settings for research capacity development and for long-term reproduction of the scientific workforce in particular research fields.

The theoretical elements outlined above are gleaned from literature on socialisation, postgraduate education and research capacity development and are used as part of the framework for analysing RCD in this study. However, they are derived from research on RCD within traditional organisational and epistemological forms of knowledge production. There has not been much empirical research done on RCD within changing contexts of knowledge production, either internationally or in South Africa.

In order to develop a theoretical framework for analysing RCD within application-oriented, multidisciplinary research centres, I have reviewed literature on global shifts in the organisational forms of knowledge production and the associated epistemological changes in modes of knowledge production. I have found arguments about an emerging regime of

strategic science (Rip, 1997, 2000, 2004, Henkel, 2004) particularly convincing. These theories contribute to my theoretical framework for analysing shifts in modes of knowledge production as they manifest themselves in the research centres in the study. However, they cannot be applied uncritically to South African contexts.

I have woven together a framework to analyse the epistemological dimensions of knowledge production in the centres, in relation to a continuum from basic to applied research. I have identified elements of multidisciplinary which exist in the research centres to varying degrees and in different forms.

In the study I will use this framework to examine the settings provided by the research centres, in terms of the organisation and location of the research centres in the university contexts, as well as in terms of the organisational and epistemological dimensions of knowledge production in its research fields. I will consider how these factors impact on the contexts which these centres provide for postgraduate education and research capacity development.

This study of research capacity development within these application-oriented, multidisciplinary research centres contributes to an area of research that is beginning to emerge on RCD within changing contexts of knowledge production. The possibility for increasing stability of organisational and epistemological settings for conducting research that is both relevant and excellent; and the creation of conditions for pedagogical continuity will be important long-term themes within this area of research.

In this study, various components of the overall theoretical framework are used to generate more understanding about the processes of research capacity development of the researchers and postgraduate students in the centres; the types of settings which research centres can provide for RCD; and the conditions conducive to the achievement of this crucial task.

CHAPTER FIVE: 'FINDING HER ACADEMIC SELF': RESEARCH CAPACITY DEVELOPMENT AS A PROCESS OF IDENTITY FORMATION

5.1 Introduction

In Chapter 1, I outlined the understanding of research capacity development (RCD) which I have reached over the course of this study. I view RCD as a process of identity formation and socialisation, in which various elements of knowledge and competence are acquired within organisational settings and within social (relational) contexts. Processes of research capacity development are shaped by the disciplinary or multidisciplinary dimensions of the research field in which the individual is being socialised. Knowledge and competencies are integrated into the individual's repertoire of resources as part of her identity. Associated with the process of integration is a simultaneous process of application and contextualisation, as the researcher applies the integrated knowledge and competencies appropriately within situated practices in particular organisational, social and epistemological contexts.

This chapter examines elements of the processes of identity formation described in the narratives of the researchers and postgraduate students interviewed in the study. Identity formation processes are investigated in the social contexts of communities of practice (Lave and Wenger, 1991), in the research centre and in the context of the individual's relationships with a supervisor or mentor.

I argue that identity formation consists of dual processes of identification and individuation and explore this within the context of supervision or mentoring relationships, research centres, and the development of an individual's research area. I explore how processes of identity formation and socialisation are shaped by the disciplinary or multidisciplinary nature of a particular research field as well as the educational background and disciplinary route taken by the individual.

These epistemological dimensions of RCD will be developed further in Chapters 7 to 9. The building of confidence is closely intertwined with an individual's capacity development process, and the impact of undermining and affirming voices on individuals'

confidence about their contribution to knowledge production will be discussed. Lastly, the process of how researchers understand and construct their role as researchers is considered with reference to the narratives.

5.2 Conceptualising identity formation

In this section, I outline some theories of identity which have informed my understanding of identity formation in this study. One of the conceptions which was prevalent in the past was a view of identity as the essential centre of a person's self. This has its roots in the Enlightenment philosophy (Hall, 1992:275). The Enlightenment subject was based on a conception of a human "as a fully centred, unified individual, endowed with the capacities of reason, consciousness and action, whose 'centre' consisted of an inner core" which unfolded in the course of the person's life, while remaining essentially the same (Hall, 1992:275).

Another concept of identity is referred to by Hall (1992) in terms of the "sociological subject". This approach viewed individuals as being "formed subjectively through their membership of, and participation in, wider social relationships;" and conversely, processes and structures were seen as being sustained by the role which individuals play in them (Hall, 1992:284). Thus, identity of the subject was not autonomous and self-sufficient, but "was formed in relation to 'significant others', who mediated to the subject the values, meaning and symbols – the culture of the worlds he/she inhabited" (Hall, 1992:275).

Henkel (2000) in her study of academic identity drew on communitarian moral philosophy (MacIntyre, 1981, Taylor, 1989) to conceptualise identity in the following way. An individual is seen as both *distinctive* - the subject of a unique narrative history - and *embedded* within communities and institutions. The *distinctive individual* is located in a chosen moral and conceptual framework, and is identified by the goods that she has achieved. The distinctive individual is also an *embedded individual*. She comes from, works within and contributes to "communities and/or institutions with their own languages, conceptual structures, histories, traditions, myths, values, practices and achieved goods; communities and institutions provide the bounded space within which the individual works" (Henkel, 2000:16). She fulfils a range of roles which are strongly determined by the communities and institutions of which she is a member. The concepts of distinctiveness

and embeddedness are seen as compatible, and mutually reinforcing within communitarian philosophies (Henkel, 2000:16).

It has been argued in this thesis that academics and researchers form identities in relation to disciplinary communities, research fields, institutions where they work and the department or centre in which they are located, which provides a link between the research field and the institution. At a micro level, communities of practice and significant relationships facilitate processes of identity formation. In this way they form identity as *embedded individuals*. As part of the process of identity formation the individual also defines and strengthens her *distinctive* identity in relation to the communities in which she is located. The dialectical relationship between distinctive identity and membership of communities in the process of identity formation can be linked to the theory of structuration (Giddens, 1979, 1984). It is through social practice within societal groupings that people internalise elements of social structure, but developing a distinctive identity can only be possible because people have agency, within the context of social structures that are both constraining and enabling. In this chapter I analyse processes of identity formation of researchers and students as processes of *identification* with communities, disciplinary and research fields and organisations, and *individuation* (forming a distinctive identity) in relation to these social, organisational and epistemological contexts.

There are different views about the stability and coherence of the individual's identity processes during their life course. Taylor (1989) argues that while identity is not fixed and may undergo substantial changes, the possibilities for reconstructing identity are limited. Some stability and coherence in identity arises out of embeddedness of the individual in institutions or communities. Identity involves continuity and belongs to "a single, whole human life, as perceived by and accounted for by the individual whose life that is" (Henkel, 2000:15).

There is a contrast between the continuity underlying the conceptions of identity discussed so far and postmodernist or poststructuralist approaches to identity. The latter approaches are firmly opposed to the Enlightenment concept of identity as a central essential core and rejects the notion of a "coherent self" (Hall, 1992:277). The poststructuralist subject is conceptualised as having no fixed, essential or permanent identity. People are seen to "live webs of multiple representations of class, race, gender, language and social relations;

meanings vary even within one individual” (Lather, 1991:118). Self identity “is constituted and reconstituted relationally, its boundaries repeatedly remapped and renegotiated” (Scott, 1997:17; in Lather, 1991:118). An individual occupies different and often conflicting subject positions. Poststructuralist theories view the subject as being bombarded by conflicting messages in consumer society, and see the subject as being constituted and reconstituted by discourses of power. Lather argues that there is a need for theory which recognises this, but also recognises that people are involved in discursive self-production and meaning making where they “attempt to produce some coherence and continuity” (Lather, 1991:118-120).

Giddens (1991) expresses a similar view that it is people who create coherence and continuity in their lives and he sees identity as a project.

In the post-traditional order of modernity, and against the backdrop of new forms of mediated experience, self-identity becomes a reflexively organised endeavour. The reflexive project of the self ... consists in the sustaining of coherent, yet continuously revised narratives ... (Giddens, 1991:5).

According to this view, internal coherence does not exist in an individual’s life, independent of subjectivity. Rather, the individual seeks for coherence, as part of her ongoing, reflexive, identity project. A person’s biography needs to continually integrate events which occur in the outside world into the ongoing story about the self. It relates to the past and also the future.

Feelings of self-identity are both robust and fragile. Fragile, because the biography the individual reflexively holds in mind is only one ‘story’ among many other potential stories that could be told about her development as a self; robust, because a sense of self-identity is often securely enough held to weather major tensions or transitions in the social environments within which the person moves (Giddens, 1991:55).

There is a clear link between the view of identity as a reflexive project – an ongoing narrative and the use of methodology centred on biographical, narrative data. The biographical narrative interview gives the inquirer access to one or a number of the narratives through which the interviewee makes sense of her development in various social environments. This provides a rich source of data about the individual’s process of development within particular social contexts. When biographical narratives are elicited from different interviewees in shared contexts or from those who are moving through

parallel processes, and when this is related to other sources of data about the contexts, further layers are added to this richness.

Aspects of identity formation regarding values, commitments and participation in communities of practice are tackled from communitarian philosophical approaches. In his discussion of identity formation, Taylor (1989) introduces a set of spatial metaphors in the form of horizons and frameworks, “which constitute a bounded and defining space within which to forge an identity” (Henkel, 2000:15). For him these frameworks are moral.

To know who I am is a species of knowing where I stand. My identity is defined by the commitments and identifications which provide the frame or horizon within which I can try to determine from case to case what is good, or valuable, or what ought to be done, or what I endorse or oppose. In other words, it is the horizon within which I am capable of taking a stand (Taylor, 1989:27).

Taylor sees identity as orientation in moral space. He argues that in order to be a functioning human agent, people need to be oriented to the good, that is “what they see as good, or of crucial importance or of fundamental value” (*ibid*:42). Identity is essentially tied up with what one is committed to and what one values highly and strives for.

Identity is formed in relation to ‘defining communities’, and is linked to “obligation to others; fulfilment or meaningfulness and a range of notions concerned with dignity, respect and self esteem” (Henkel, 2000:15). Values are formed in the context of identification with what is valued within communities, and through a sense of respect for members of the community. An individual’s sense of self esteem and notions of what is fulfilling and meaningful to achieve are linked to these values. Achievement of ‘goods’ that form part of this framework of values in turn reaffirms and builds the individual’s sense of identity in relation to defining communities.

A central theme of the conceptual framework developed in Chapter 3, is that identity formation takes place through participation in the *practice* of communities. MacIntyre (1981) enriches the notion of practice, which he describes as a “coherent and complex form of socially established co-operative human activity” (MacIntyre, 1981:175 in McLaughlin, 2003:2). It is constituted by “activities with such features as coherence,

complexity, internal goods²¹, invitation to a certain kind of self-involving and self-transformative co-operative engagement” (McLaughlin, 2003:345). In McIntyre’s view of practice, activity needs to be guided by “a *coherent, overall, holistic vision* of the activity in question” (McLaughlin, 2003:345, original emphasis).

This view of practice extends the concept of practice used by Lave and Wenger (1991) by shifting the emphasis on the *values* involved in practice. Both views recognise that participation in practice involves being influenced by values inherent in the practice, and both emphasise the necessity of new members developing an overall vision of the practice. Where they differ is that Lave and Wenger view the knowledge and values of participants as embedded in the *habitus* of members of a community, without necessarily being conscious. They view self-transformation of the participant largely in terms of becoming a full, knowledgeable skilled member of a community of practice. The subtle difference introduced by McLaughlin, following MacIntyre, is that there needs to be a *conscious*, transforming vision inherent in the overall practice, which is ethically charged and shared by members of the community. In this thesis, I argue that there is a need for such a vision in research capacity building programmes, and I frame this within Simon’s concept of a ‘project of possibility’ (Simon, 1992), which is discussed below.

5.3 ‘Saturday school’: a case of identity formation within a project of possibility

... the best days of my life were spent there, if I were to classify them, both socially, even academically because those days, they signify ... the making of the person who I am today (TS par. 105).

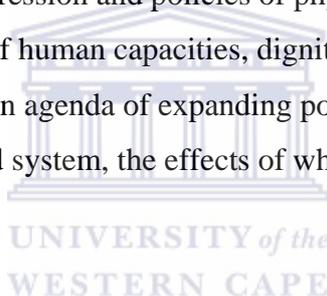
I have adopted the concept of a ‘project of possibility’ from Roger Simon, an educationalist from a critical tradition (Simon, 1992). Simon critiques a dominant approach to the development of potential of students in North American schooling contexts. This approach, which he calls a ‘self-realisation’ approach, conceptualises individual choices regarding life opportunities in the following way.

Choice “is assumed to be an open structure of possibility through which one makes what one wants of oneself, assuming the necessary knowledge and skills for independent action

²¹ MacIntyre (1981) distinguishes the internal goods of a practice from those goods externally and contingently related to it such as prestige, status and money. Goods internal to a practice are inextricably linked to that practice and only accessed through participating in the practice (McLaughlin, 2003:345)

have been acquired” (*ibid*:18). In contrast to this view, he sees individual’s opportunities and choices as being constrained by unjust social systems, which the education system is implicated in. He argues for the adoption of a ‘pedagogy of possibility’, which would support the creation of specific social forms that would expand the range of possible identities people may become and enable development of diverse human capacities, as opposed to social forms which deny, dilute or distort these capacities. He refers to this as a ‘project of possibility’, an activity which is determined by both real and present conditions *and* certain conditions which are part of a vision of the future which it is trying to bring into being.

The concept of a ‘project of possibility’ has strong relevance for educational practice in South Africa, with our history of an unequal education system, which has entrenched race and class differences and roles in society. This, together with factors such as economic and legislative forms of oppression and policies of physical and symbolic violence, have contributed to suppression of human capacities, dignity, and self esteem amongst certain groupings in society. Thus an agenda of expanding possibility is particularly relevant for transition from the apartheid system, the effects of which continue long after a change of government.



In this section I develop an argument about the embeddedness of learning in identity formation, socialisation and participation in communities of practice. A concurrent theme is as the profound influence of a particular community, which I identify as a project of possibility, on an individual’s identity trajectory. I do this through analysing an extract from the narrative of Thabo Sephiri, a graduate of the SWOP internship programme.

The extract is about Sephiri’s experience of involvement in a school tutoring programme, which he refers to as ‘Saturday school’ first as a student and later as a tutor. I will examine how Sephiri developed a vision of possibility that extended beyond the bounds of his experience in his family, school and ‘community of origin’ (Taylor, 1989). Furthermore he was able to engage with academic knowledge in an active and motivated way. He grew to value education, and made a commitment to his own process of education. He developed generic capabilities within a context of practice. All of these factors, as part of his identity formation process, laid a foundation for Sephiri to pursue tertiary education later, and contributed to his success.

Thabo Sephiri grew up in a working-class home in Soweto. One of the experiences that greatly influenced him when he was at high school was his attendance and involvement in a Saturday school project. The Saturday school, called the Student Upgrading Project, was founded by university and technikon students. Its mission was to stimulate an interest in education amongst students from disadvantaged areas, and to encourage them to pursue tertiary education.

The quotation below illustrates a number of aspects of what the Saturday school provided for Sephiri:

... it was a very interactive process and one of the things that they used to encourage very seriously was participation in class. That was - if anything, it was the key - the number one issue, that they encouraged, and they also encouraged some kind of formation of the ... school SRC²², and because we were very active students, and we were very committed and very passionate about our work there, and about being there, because it was not only just going to another Saturday school, and coming back. It was - our lives were formed around that Saturday school. Some of my friends are married to the students that they met there - I mean that's how serious it got ... So it became some kind of a family - a network, a community if you like (TS par 89).

Here elements begin to emerge that are significant in my view of research capacity development as a process of identity formation. These are participation in communities of practice, commitment and passion for a particular work or study practice. The meaning of the Saturday school for Sephiri needs to be understood in the context of his experience of township life, family and education, apart from the Saturday school. Sephiri saw township life as “a reproduction of poverty”, “a never-ending ... vicious cycle”. In BNIM interviews it is relevant to take note of what informants talk about and what they do not mention, and Sephiri hardly mentions his secondary school experience at all, apart from the Saturday school.

Sephiri was first attracted to the Saturday school as a social space to interact with other young people, while at the same time improving his school performance. However, he became increasingly drawn into the practices of the organisation. At Saturday school, the students were encouraged to participate in class and develop an active, critical approach to

²² Students' Representative Council

learning. Sephiri gave the example of a History tutor who used to say:

... “don’t tell me what the textbook say, tell me what do **you** think about what the textbook is saying, and please consult different sources”. ... That’s when I started ... reading different types of [sources] because ... you know in high school, you have a prescribed book and you simply just use it. (TS par. 101)

They were provided with role-models of tutors who were excited about education, and wanted to share that excitement with them. The tutors were closer to them than were their school teachers, and the students could relate to them as to more advanced peers. Moreover, the tutors had crossed over the boundaries of township life and had experienced life outside. Through this contact, the students were exposed to new world views. Sephiri said the tutors exposed him to a culture of valuing education, and working for it, without material gain. He said “they used to do it without any funding - so ... they sacrificed **heavily** for that - both their own resources, their time ...” (TS par. 89)

Sephiri elaborated further on the role of the tutors in communicating a particular value system, and with that an alternative model of what one could become. He explained below:

And then it was also the need to run away from the materialism, like people respect you if you have material things. If you don’t have material things, then they talk below you. They judge you otherwise, you know. And the tutors in our school - they were something completely different from that. They didn’t represent **any** of those **images**. And for me, they provided an alternative that you could be, you know, a **normal** person, a better person - doing something better, without going to end up being in jail, without necessarily ... wearing nicer clothes. They were not materialistic. They were committed to what they were doing, and that for me fit in with what I wanted at that point like a key in a lock - correct one of course. And I ran along with that idea, and with that influence since then (TS par 113).

For Sephiri, the tutors provided role models with different values from those which students encountered in their families, schools and communities. In Sephiri’s family the dominant values were religious. Moreover, his family were Jehovah’s Witnesses and discouraged studying after matric. He contrasts the values of the tutors, with their emphasis on education, with the materialism that he encountered in his township community, as well as the pull of criminal activity. Thus the tutors, through their practice and interaction with the students, broadened their vision of possible life choices.

The organisers of the Saturday school encouraged past students to come back as tutors. Sephiri describes how, while they were still students, some of them were invited to be observers at the programme's meetings, and parents were also involved in the meetings. The students formed a student representative council (SRC). From his observation of meetings, his involvement on the SRC and his later role as a tutor, he learned valuable organisational skills.

... and so we learned ... how to conduct meetings, how to write minutes, how to argue (small laugh), how to put your point across, how to make a lesson plan, you know, for the week, how to make a year plan, you know those little things - you learned them. And those skills you later - you used them later, for example, now, you have some kind of a year plan, you're used to planning your things ... and that, you know, still was derived from the earlier training we gained (TS par. 97).

He describes the development of generic capacities, which were learned in a contextualised way, through participation in tutoring and involvement in the SRC within the communities of practice within the Saturday school. They were learned initially through observation and then participation, in the context of the activity with a coherent, overall vision of the activity (McLaughlin, 2003). Learning, through contextualised practice, laid the groundwork for consciousness around the need to plan, and students developed planning abilities within those particular contexts. However these abilities were not necessarily transferable to a different context (Lave, 1988). When Sephiri went to university he still struggled with the particular literacy practices needed there, and had to develop those literacies in new social and epistemological contexts.

Sephiri also notes the organisational conflicts that took place in the Saturday school context, and intellectual arguments related to them:

There were many conflicts along the way ... and they called local, respected people to come, you know, quell down the fighting. And the way in which they were debating ... you know, they were doing it in such a way that their arguments ... were flowing and very clearly. ... they wouldn't say anything without supporting evidence and counterarguments and you'd even spot people who were sort-of like the middle road-takers, who were trying to bring them together amongst the tutors irrespective of the local authority figures ... who were there (TS par. 91).

Sephiri, in his narrative, emphasised the structure and skill of the arguments regarding the

future of the Saturday school that he was exposed to. He related this to the structuring of argument that he needed to develop later at university. In addition to this, the exposure to organisational processes, conflict and attempts at conflict resolution were significant for Sephiri's development of generic capabilities for understanding and participating in organisational processes and conflict management.

The Saturday school operated on a number of levels for Thabo Sephiri. At one level, it was a programme to upgrade students' abilities in their school subjects, to help them to do better in matric, and to encourage them to go on to tertiary education. At another level, it provided a number of communities of practice and exposure to an overall vision, centred on encouraging students from disadvantaged backgrounds to become excited about education, and develop a desire and ability to pursue tertiary education.

In this way students like Sephiri became more centrally involved in participation in the organisation. The encouragement of students to attend organisational meetings and to set up a Students' Representative Council gave them exposure to the organisational processes of the Saturday school, and they gained organisational experience and abilities. In addition, they were provided with models of dealing with conflict in an organisation, and were exposed to processes of debate and argument.

I am not putting forward Thabo Sephiri's involvement in the Saturday school as a process of training for being a researcher or even as a thorough preparation for studying at university. In each context that Sephiri moved into, he had to work hard to learn what was required and develop those abilities - in his undergraduate studies, his research internship, and subsequent employment in a labour research NGO. In his postgraduate study, he entered into a supportive community of practice through the internship programme of SWOP, which facilitated his development as a researcher in the field of Sociology of Work.

Taylor (1989) sees identity as providing a frame determining what is good or valuable and what has meaning and importance to one. Sephiri's involvement in the Saturday school influenced his sense of identity and future life trajectory. He was exposed to the vision, encapsulated in the Saturday school project, which valued education, critical thought and debate. He developed a passion about education, and a sense of his own agency, which

could be asserted through involvement in a communal project. He was exposed to practices of the community, both in terms of organisational processes and discursive practices. One could argue that the vision that Sephiri committed himself to helped him to sustain his motivation to persist with his own studies under what were often extremely adverse conditions. His participation in the Saturday school laid the basis for developing significant academic, social and organisational abilities later on in his studies and career.

In section 5.4.1, I will further develop my argument about commitment, vision and goals in relation to the research areas and communities of practice in the study.

5.4 Identification and individuation

Analysis of the processes of identity formation of researchers and postgraduate students in this study has revealed elements of identification with communities of practice and individuation in relation to such communities. In this section I discuss the process of identity formation as a researcher in terms of growing identification with a research centre and a research field, as well as individuation as the individual develops her own intellectual, academic identity and research area. The dual processes of identification and individuation relate to Henkel's concepts of 'embeddedness' and 'distinctiveness', discussed in section 5.2. Henkel argues that an individual is both embedded in communities and institutions, and distinctive in that she is "the subject of a unique narrative history" (Henkel, 2000:16). She sees these two concepts as compatible.

While identification and individuation are both part of identity formation, it is possible to locate individuals' processes of identity formation within a tension between identification and individuation. Drawing on the narratives in this study, I analyse the processes of developing *own* identity in the context of a relationship with a supervisor or mentor, and in relation to a research centre. Most of the examples that I use here relate to young researchers and postgraduate students. Nevertheless, there are elements of identification and individuation at various points in any process of becoming a researcher.

5.4.1 Identification, commitment, vision and goals

The link between a vision of practice, commitment to achieving goals and the development of competencies is described by Heather Davies-Coleman, from the Unilever Centre for Environmental Water Quality (UCEWQ) below:

I think that you need to be an organised person and ... self-motivated. You've got to want the bigger goal, and the bigger goal, whatever that may be, whether it's a piece of research or a Master's thesis, has got to be your driving force. So ... there has to be a vision in research, and then your goals will be to reach that vision and the competencies must come with ... being able to reach that vision. If you are not competent and able to do things ... in whatever that vision entails, then you won't be able to reach the end goal and ... embroiled with that is that ... because of the bigger vision ... you've got to be willing to do a lot of things that you may not want to do (HDC 2 par 48).

According to Taylor, identity is “defined by the commitments and identifications which provide the frame or horizon” (Taylor, 1989:27) within which one can determine what is valuable, or ought to be done, or within which one can take a stand. It is a frame which enables action. One can draw a link between this and Davies-Coleman's idea of a “bigger goal”, a vision, which provides a driving force. She spoke of competencies developing out of pursuing the goals “to reach that vision”. This can be applied to learning to be a researcher within a research organisation in the following way. Having a goal or a vision both require commitment. The goal may be personal or collective, such as the goal of an organisation, community, or group of practitioners. A personal goal such as a thesis or a research paper fits into the broader collective goals of the organisation, which needs successful graduates and research outputs.

At the same time in order to successfully undertake a thesis or research paper, a young researcher needs to incorporate elements of the broader vision of the research community into her individual work, in terms of disciplinary sources of knowledge and conceptual frameworks, approaches to knowledge production and possibly ideological approach. Delamont et al (2000) argue that disciplines are productive in that they “make possible what is thinkable and ‘do-able’” (Fujimura, 1997, in Delamont *et al*, 2000). “Disciplines and their paradigms thus furnish academics and researchers with ‘do-able’ research projects and programmes. They permit individual researchers and research groups to project their work into wider frames of references and significance” (Delamont *et al*,

2000). Research centres are sites where disciplines are drawn on to guide and frame research practice in particular developing research fields.

This is not to say that a young researcher should uncritically take on the dominant disciplinary approaches and ideological positions in the centre. Nor is a research centre a homogeneous entity. The tension between socialising students and young researchers into particular approaches within a research field and the need for young researchers to develop their own critical, original perspective is discussed below in 5.4.3.

A number of the postgraduate students and researchers referred to a point at which they became aware of developing a sense of direction and commitment to working in a particular academic field of study. Two of the graduates of the SWOP internship programme identified this shift occurring at the point where they applied for the internship programme (at an honours level), having had exposure to the academics in the centre and their work in the Sociology undergraduate programme.

Tshidi Letsepe, one of these graduates, framed this realisation in terms of developing a fascination for research. She said that at that stage she had decided to do her doctorate, and would have pursued that direction even if she had not been accepted into the internship programme. At another point in the interview, she stressed that she did not enter the internship programme by default, but because she was clear that that was what she wanted to do.

Significantly both researchers mentioned their mentors, when discussing the point at which they experienced a sense of identification with the work of the research centre, and the particular disciplinary field. This highlights the important role that a mentor can play in inspiring a student or a young researcher to develop an interest in or a commitment to a particular field.

At that stage, these two researchers entered into a situation where they became peripheral participants in a community of practice. Wenger has indicated that communities of practice are not reified, formalised units (Wenger, 1998:7), and also that individuals have multi-membership in different communities of practice (Wenger, 1998:158-9).

I see the internship programme at SWOP as fitting the concept of a community of practice as developed by Lave and Wenger (1991) and Wenger (1998), but there are also other communities in SWOP and linked to SWOP. By entering the internship programme the researcher becomes a legitimate participant in that community of practice, and is placed in a position to gain access to other communities to differing degrees, and in different ways. These would include a possibility in the future of becoming a member of SWOP or of the broader field of research and practice that SWOP is involved in, both locally and globally. The issue of peripheral participation in communities of practice in SWOP and the broader field of Sociology of Work is developed further in Chapter 7.

It is accepted in the higher education field that one of the major sources of identity for a researcher is identification with a disciplinary field (Clark, 1983, Henkel, 2000). Furthermore developing knowledge and competence within a particular research area is an important part of academic identity formation. One of the elements of identity formation within a research field is the issue of topic selection. In Chapter 4, I discussed trends concerning selection of research project and thesis topics in the natural sciences and social sciences. In general, topic selection in the centres were consistent with the findings of Becher *et al* (1994) and Delamont *et al* (2000) in that topics were allocated to students in the natural sciences and were formulated by the individuals concerned in the social sciences. However, in both the natural and social sciences, the activities of negotiating a topic, conceptualising a project, and making it one's own were an important part of the identity formation process, although these processes took different forms in the different knowledge domains. I will explore this issue more thoroughly in the case studies.

For some of postgraduate students in the social sciences, finding their own area of interest in research, involved positioning themselves outside of the central sub-disciplinary field or research field of centre, where they were located. This was made possible because of the tendency for research education to be organised along individual apprenticeship lines, with a more individual approach to topic selection. While this could happen at a postgraduate level in a natural science discipline, it would be less likely, because of the role of postgraduate students in knowledge production and the way that topic selection is structured.

I return to Davies-Coleman's quotation with which I started this section and develop the link that she draws between having a broad vision of research practice within the research community, working towards 'the bigger goal' and developing capacity. She says:

... because of the bigger vision ... you've got to be willing to do a lot of things that you may not want to do. If it means you've got to have clean glassware all the time, then such is life. You sit and damn well wash all that glassware (HDC 2 par 48).

The repetitive washing of glassware that she refers to has parallels in all areas of research. There are elements of practical labour involved in developing research capacity that are physically demanding or tedious and there are the rigorous demands of intellectual labour, which many of the researchers in this study foregrounded. Developing research capacity requires persistence and commitment to doing tasks which often are not exciting, whether it is hours of laboratory work, fieldwork, entering statistical data, transcribing interviews or writing and rewriting drafts of texts. A number of researchers refer to academic writing as a painful, long, slow and lonely process. It is demanding in terms of mastering the craft involved, and it involves intellectual labour.

As Sakhela Buhlungu (from SWOP) says, "research is not about ... the glamour ... it's about very mundane, basic, boring, lonely things ..." (SB par 35). Needless to say, doing research and learning how to do research has extremely stimulating, exciting and rewarding dimensions. However, the process of becoming competent in a number of aspects of research requires time, hard work and persistence. Thus forming an identification with and commitment to communities conducting research and particular research fields, and developing and maintaining a vision of 'the bigger goal' is extremely important in generating the motivation for young researchers to persevere with these activities and develop the repertoire of capacities that are needed.

I have introduced an argument that identity formation as a central part of RCD takes place through dual, related processes of identification and individuation. In this section, I focused on the role of the individual's *identification* with particular communities of practice in research settings and research fields in the development of research capacity.

I argued that postgraduate students and young researchers need to form a commitment to working within a field of practice or disciplinary field. Being exposed to the practice of the community enables them to develop a holistic vision of practice in the centre or in the research field. Researchers need to have their own goal/s which intersect with the goals of the community of practice they are located in, and it is through committed pursuit of these goals and through their engagement in the practice of the community, that they develop and integrate the competencies to become a researcher in that field of practice. In the following section I will explore the interrelationship between identification and *individuation* in the identity formation process.

5.4.2 Identification and individuation in the context of postgraduate study

Wenger's concepts of *negotiability*, *ownership of meaning* and *economies of meaning* (Wenger, 1998) are helpful for theorising processes of individuation within academic and research contexts. I will discuss Wenger's concepts within the context of a relationship between a postgraduate student and supervisor, and within the context of research centres. According to Wenger, identity formation takes place within a tension between *identification* - investment in various forms of belonging - and *negotiability* - one's ability to negotiate the meanings that matter in those contexts (*ibid*:188). Negotiability refers to the ability and legitimacy to contribute to, and "shape the meanings that matter within a social configuration" (*ibid*:197).

Meanings are negotiated within a broader *economy of meaning* in which "different meanings are produced in different locations and compete for the definition of certain events, actions, or artefacts" (*ibid*:199). The notion of economies of meaning implies that some meanings have special status and legitimacy. Status or legitimacy of particular meanings within communities is assessed in relation to criteria arising out of the values of communities. In academic fields, some theories or bodies of work are seen as more significant, powerful or generative than others. However, values are not uniformly held within communities but are often competing and contested.

Negotiability is shaped by relations of *ownership of meaning* – that is the degree to which "we can make use of, affect, control, modify, or in general, assert as ours the meanings that we negotiate" (*ibid*:200). As mentioned above, there is a plurality of perspectives involved

in the negotiation of meaning. Meanings have different degrees of currency; and participants can have various degrees of control over the meanings that a community produces and differing abilities to make use of and modify them (*ibid*).

Having a claim to owning the meaning of a piece of text is being able to come up with a recognisably competent interpretation of it, that is recognised as such by an interpretive community (Fish, 1989, Wenger, 1998:201, 296). According to Wenger, ownership of meaning “refers to the ways meanings, and our ability to negotiate them, become part of who we are” (Wenger, 1998:201). In an RCD context, if a young researcher or postgraduate student has a different interpretation from an experienced academic, the interpretation of the latter has more value and legitimacy in the academic community. Increasing negotiability and ownership of meaning, using Wenger’s terms, play an important role in a young researcher’s growing ability to assert her own academic identity in relation to a mentor or community of practice.

At an early stage of a postgraduate programme, a young, inexperienced student’s ideas and interpretations do not have much currency in the “economy of meaning” or in relation to the unstated “rules” of a interpretive communities in academia. In this study, most of the young postgraduate students, who were at an early stage of their studies, remained close to the ideas and preferred approaches and methods of their supervisor. They recognised the academic authority of the supervisor, based on her knowledge, and achieved identity within the academic community, and her position as part of the interpretive communities that determine what constitute valid claims to knowledge in the field. However, some of the students and young researchers, particularly those at a higher level of study, experienced conflict arising out of the unequal power which they perceived to be entrenched in the student-mentor relationship.

One of the doctoral students expressed the need to assert her own identity as distinct from that of her supervisor, who had also supervised her Masters thesis. She saw this as a shift from working within the frameworks favoured by the supervisor, where she was supporting his arguments and research agenda, to developing her own arguments and own agenda. She argued that even if she were making similar claims to her supervisor, she needed to develop enough confidence in her own grasp of legitimate meaning-making in

the field, so that she could make those claims on the basis of her own interpretative processes.

Eddie Webster, the Director of SWOP, broached a similar issue from the point of view of a supervisor. Speaking of students publishing their work, he said, “so much of the work that [postgraduate students] do ... arises out of your input as a mentor”. In some cases:

... the supervisor’s work is so clearly shaping their work, and when is it their work, and not your work? ... What are the boundaries between those?
 ‘Specially when it’s mainly through the second language and they’re struggling and ... I think one constantly has to check oneself. Am I not doing too much for this student? (EW 2 par. 67).

These two perspectives can be located within the tension between a directive approach to supervision, where the supervisor strongly asserts her academic authority and closely frames and guides the work of the student; and a less directive approach, where the student is given more space to assert her own identity. Models of socialisation within different knowledge domains characterise postgraduate education in the natural sciences as more directive than in the social sciences, with positional forms of social organisation (Bernstein, 1971, Delamont *et al*, 2000). (See section 4.3.2.4 on ‘Positional and personal modes ...’.) Thus choice of topic, research design and methods are to a large extent determined by the research programme of the department or research group, throughout postgraduate studies up until doctoral level. However, in this study it was evident that framing and supervision of postgraduate studies in the social sciences can be directive and structured through authoritative modes of social relationships, although this may be less overt than in the natural sciences. Furthermore, an argument can be made for more hierarchically structured modes of postgraduate studies in the social sciences, with more overt recognition of the legitimate authority of the supervisor in the early stages of research capacity development. (This will be explored further in Chapter 8.)

As part of the progression of conducting a postgraduate degree, a student needs to move towards developing her own academic identity, and grow towards independence from the structure imposed by the supervisor. The two scenarios above refer to the tension that arises: in the latter case, where the student does not make this shift; or, in the former case, where the supervisor does not sufficiently recognise the student’s increasing capacity and

adjust her mode of mentoring accordingly. In the former case, the doctoral student recognised that one could learn from different mentoring styles. She acknowledged that she had learned much from the directive style of her supervisor in the past, but she had reached a stage where she was more confident about her own ideas and needed a more open-ended, yet supportive approach to supervision.

Interpretation of accounts of mentoring relationships in the data raised interesting questions about the complexities of negotiation of power in such relationships. The power of a senior academic or researcher in a mentoring relationship can be channelled in ways that facilitate development of research capacity or can be met with resistance on the part of the student. Often, both of these tendencies co-exist in relationship. A supervisor is required to have legitimate authority based on knowledge, experience, her own research capacity and established membership of an interpretive community in the field. This needs to be accompanied by pedagogical authority in facilitating a pedagogical path towards the outcome of the process (Shalem, 1997).

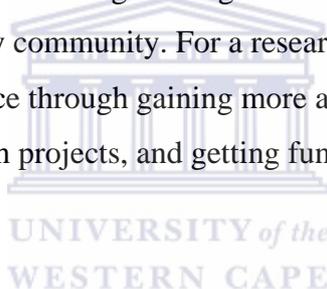
Tensions may emerge in a relationship where the supervisor does not assert pedagogical authority and expects too much independence from the student without inducting her into the research process. In the case described above, tension was generated for the opposite reason. The supervisor asserted pedagogical authority, which was appropriate at first, but did not adapt her pedagogical approach in relation to the student's growing academic identity, capacity and pull towards independence.

In a South African context, in cases where students are part of social groups that have been suppressed in the past because of class, race or gender, and the supervisor or mentor is from a previously privileged group, students may resist being in a role which they perceive as subordinate to the mentor. Although power relations may be unequal, students need to recognise that they also have agency, to varying degrees, to influence the nature of the relationship, or at least the role that they play in the relationship. The role of social modes of relating and the mediation of academic and pedagogical authority by mentors and young researchers will be explored further in the case studies.

The tension between identification and individuation in processes of identity formation and socialisation play themselves out both within traditional settings for academic socialisation

and in research centres in the case of postgraduate students located there. Although I have discussed this tension with reference to the relationship between a postgraduate student and supervisor, it could also be applied more loosely to the relationship between a young researcher and a mentor, outside of the context of formal postgraduate studies.

I have argued that to gain a greater degree of ownership over the meanings that a community produces, a student or young researcher has to gain both the confidence and ability to formulate original ideas and interpretations, have a thorough understanding of claims that are made in the community of practice and their epistemological origins. Furthermore she needs to begin a process of gaining recognition within broader communities of practice in her research field. This would take place through exposing her work in seminars or at conferences, through journal articles and through presentation of the thesis. There is a reciprocal relationship between the growth of internal strength, confidence and ownership of meaning-making and the processes of exposure to and feedback from a disciplinary community. For a researcher, developing one's own academic identity would also take place through gaining more autonomy in research projects, beginning to initiate research projects, and getting funding and successfully implementing projects.



5.4.3 Academic identity formation of researchers employed at research centres

There are three issues that I will draw attention to in this section: firstly, the lack of permanence and security offered by research centres; secondly, opportunities for growth and development in application-oriented research, and thirdly, individuation and negotiability of meaning in the context of research centres.

Firstly, research centres are characterised by the employment of researchers on short contracts, which are funded by donors or clients. These range between one and five years (Cooper, 2004). Consequently, there is a lack of permanence and security, and these centres do not offer a long-term career path. Tshidi Letsepe, a researcher employed at one of the centres in the study expressed this concern, and perceived there to be a 'ceiling' reached in a research career generally.

A second related issue is the extent to which involvement on demand-driven research

projects offers opportunities to young researchers to grow and develop. Letsepe said:

I have friends who are in research units or organisations, where it's just tender after tender, research after research and they are not learning anything. No, maybe they are, they are learning something, but it's just the frequency of those projects inhibits their growth in some ways. And I guess I'm fortunate to be where I am now [a university-based research centre] - to have projects, but projects which at some point I'm interested in, but also that I feel they are good for me as an academic (TL par.172).

There are a number of factors which may contribute to the concern being expressed here. Referring mainly to research organisations that are not located in universities, Letsepe emphasises the frequency of the research projects as the main factor constraining the growth of young researchers. However, the limitation of young researchers' development may also be linked to the type of research conducted at applied research centres and whether its purpose is to generate knowledge for a particular purpose required by a client (pure applied research), or whether it is closer to the basic end of the continuum of types of research, where there is a more long-term aim of knowledge production providing a reservoir of knowledge "for others to fish in" (Rip, 2004).

There is a strong potential at research centres linked to universities to develop their own research agenda within the constraints of the need for application-oriented research. Such an agenda would include contributing to knowledge production which can be drawn on for real-world problems, but which is furthering the disciplinary field in an academically grounded way. This is important for the reproduction of researchers and academics in the field, the promoting of higher quality application-oriented research, and the academic growth of individual researchers, as Letsepe implied above. However, one cannot make strong generalisations about the type of RCD at university-located research centres, compared to independent research centres. I discuss in section 7.5.3 on 'Thabo Sephiri', the ongoing academic development of Sephiri, by then a graduate of the SWOP internship programme, during his employment at an independent research centre.

Research centres have the potential to provide communities of practice for research capacity development that are strongly embedded in application-oriented and academic research practices. A criticism directed at communities of practice theory is that it depicts learning and development primarily as a one-way movement from the periphery, occupied

by novices, to the centre, inhabited by experienced masters of the given practice. This implies homogeneity of experienced practitioners and practice. “What seems to be missing is movement outward and in unexpected directions: questioning of authority, criticism, innovation, initiation of change. Instability and inner contradictions of practice are all but missing ...” (Engeström and Miettinen, 1999:12). However, Lave (1996) noted a development in social practice theory which emphasized the heterogeneity of actors engaged in activity together. She argued that “conflict is a ubiquitous aspect of human existence” which follows since “people who are helping to constitute a ‘situation’ together, know different things and speak with different interests and experience from different social locations” (Lave, 1996:15). There is a plurality of perspectives in any community and some perspectives tend to be dominant. In a research centre, certain perspectives, whether academic or ideological, tend to be dominant, since they are held by people with more power in the research centre, the university, or in relation to powerful interests in the broader society.

Lungisile Ntsebeza, an experienced researcher at PLAAS, expressed concern about how much space there was within a research centre context, for young researchers to develop their own intellectual identity, contribute to, and “shape the meanings that matter” (Wenger, 1998:197) within the broader economy of meaning of the research centre. Based on his experience at two rural development research centres, he believed that there were pressures to follow certain lines of thinking that existed in the centres. He felt that young African researchers were particularly vulnerable to being used to give legitimacy to the programmes and dominant approaches within a research centre. This view had been informed by his experience in a previous research centre, where he felt that the white director of the centre wanted his viewpoint to be expressed by Africans, to provide more political legitimacy.

Ntsebeza said:

... it’s worse for people who enter this kind of environment without any independent position, without having explored the various frameworks, paradigms, theories and so on, and who **feel** (sighs) - who feel vulnerable, you know, **disagree**, but can not express their disagreement. They cannot **argue** their disagreement. They’re overwhelmed, you know. The **other** (small laugh) - usually the boss, I mean, who knows the theories, is articulate, can summarise things and so on ... I mean people feel overwhelmed. They can’t

argue against - and the context of the academic world - if you disagree with an argument, you must **counter-argue**. You must come up with your own argument, and if you are incapable of doing that, and you under very strong - you have to write, you have to publish, and people end up publishing what they don't believe (LN par. 73).

PLAAS provided a more open and respectful environment than the previous work context. However at PLAAS, Ntsebeza experienced more subtle, pressures to fit in with PLAAS's intellectual and ideological positions. At the same time, he understood that, "if you are running a unit, you want this unit to project a certain image, so whoever is there must further that agenda for the unit" (LN par. 77). The 'lines of thinking' that Ntsebeza refers to are mainly ideological, but in research centres at universities, there may also be differing approaches in relation to disciplinary or sub-disciplinary perspectives, and theoretical approaches.

Ntsebeza believed that in an academic environment, there should be more space for a free flow of ideas and debate, in which young researchers could be exposed to a diversity of perspectives. He said that there was a danger of exposing young researchers "to a particular way of thinking whilst not alerting people to other sort-of lines that may be in contradiction to your line of thinking" (LN par. 85). He felt that supervisors and research centres working with students and young researchers should provide opportunities for them to be exposed to different perspectives and give them space to develop their own ideas. As a supervisor, he recognised that he had his own agenda, meaning his own political perspective, but would be open about that with students at the same time as exposing them to other viewpoints.

I do not believe that there is in most cases an intentional strategy on the part of supervisors or research centres to impose particular academic or ideological ways of seeing onto students or young researchers. It is a tendency that is unconsciously embedded in processes of socialisation. However Ntsebeza's insights point to a need for awareness of this possibility, and a conscious attempt to expose students to different perspectives, and to encourage them to develop their critical thinking abilities and their own approaches to knowledge in the field.

The tension that is played out between identification and individuation in identity formation processes is linked to the tension in socialisation processes discussed in section 4.2 on 'Socialisation'. This is the tension between the newcomer taking on and reproducing the ethos, recurrent practices, values and rules of an organisation, and their reinterpreting and contributing actively to reconstructing the culture of the organisation (Tierney and Rhoads, 1993, Trowler and Knight, 2000). As individuals are socialised into a research centre, disciplinary or research field, they are influenced by the contexts that they are in, but also reconstruct themselves within those contexts. Individuals' contributions to changing the culture of an organisation cannot take place without any element of enculturation into dominant cultures, nor without a process asserting their own identities within the organisation.

5.4.4 Ownership and autonomy

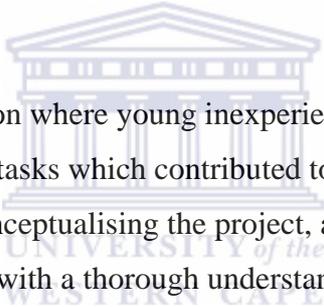
In the study, autonomy and ownership emerged as important themes in identity formation and research capacity development within research centres. Ntsebeza thought that some of the problems that he referred to in relation to research capacity development in research centres were based on the centres in question not being *training* organisations, but organisations that *employed* researchers.

... in some cases they employ researchers to **do** certain things. I mean to employ a person not to **develop** a proposal but to **implement** - I mean ... ownership of a project ... implies that you are part of the operation from day one, and if you are not part of the conceptualisation, and you come in raw to implement the project, can you be a *contributor* (unclear)? I doubt it. I mean in my experience, I don't think it has turned out to be a *meaningful* (unclear) project. They either complain that they cannot do it, or just feel dissatisfied even if they have a product. They don't have a sense of **ownership** sometimes (LN par. 87).

Sometimes young researchers feel alienated from the project as a whole or do not feel fully engaged with the meaning and purpose of the whole project. Ntsebeza said that sometimes researchers could not engage with what they had written, and at times final reports had been edited by someone else to the point where it was completely different from earlier drafts.

Schön's theory of *problem-setting* in professional practice is helpful for analysing the

development of autonomy and ownership within research activities. I introduced Schön's argument (in section 4.4.3.1 on 'Learning by expanding') that in "real-world practice, problems do not present themselves to the practitioner as givens. They must be constructed from the materials of problematic situations which are puzzling, troubling and uncertain" (Schön, 1983:40). The ability to construct and frame a problem is a central aspect of research capacity. Engeström (1987) distinguishes between undertaking a whole task and a component of a task that is allocated in a hierarchical division of labour. This is based on Seidel's distinction between a 'closed problem' and an 'open problem' (Seidel, 1976, in Engeström, 1987). Where researchers are allocated with tasks within a project, to a certain extent, they are presented with closed problems. However a researcher has to develop the ability to construct and define a research problem. She needs to consider a number of multi-dimensional factors when defining the research problem, *frame* the problem, formulate research questions and conceptualise a design for finding answers to those questions.



Ntsebeza described a situation where young inexperienced researchers employed in research centres were given tasks which contributed to a bigger research project, but they had not been involved in conceptualising the project, and did not have a vision of the research project as a whole, with a thorough understanding of the role that their contribution played. In a situation where there are researchers with different levels of expertise and experience, it makes sense for there to be hierarchical organisation of the project, with inexperienced researchers being allocated tasks within the project. However, in order for there to be capacity building within the research activity, it is necessary for young researchers to be imbued with a vision of the overall purpose and rationale of the project to as great an extent as possible. As young researchers become more capable, they need to have opportunities to experience a sense of increasing autonomy over research projects and to lead projects. Furthermore, attention needs to be paid to scaffolding within research projects to assist young researchers to develop autonomy in conceptualising a project as a whole, and implementing it.

Tshidi Letsepe, who was conducting her doctoral study while employed at a research centre, also stressed the importance of ownership and autonomy as part of the process of academic identity formation. She said that she experienced different levels of autonomy in different research projects and described her involvement on a project in which she

experienced a great deal of autonomy. It was a core project for her, which she was using for her performance appraisal, and, together with a colleague, she led the project through a whole project cycle.

...I did it jointly with a lecturer at the department. So, I guess, at that level we were, both ... equal ... and we could talk about ideas at that equal level, and we spoke about a lot of things about the project and how we wanted the project to move on. I had a lot of work. I couldn't do a lot of interviews. So, I hired two research assistants. So, they did the work and I had to evaluate their work and I had to coordinate the whole project. But, I guess, the whole project was just my baby. I had to coordinate and have the final product and it was done and I was happy with how it was going, because, at that point, I felt it was - it was me calling the shots, in a way. I knew what I wanted from that project and I knew how I was going to get the information and put it all together, which worked very well. And the paper was done. ...I guess ... that's the first tangible project that I feel I had autonomy over, other than my PhD of course ... (TL par. 26).

Letsepe focused on her ability to take charge of the research project through the whole project cycle. Although, it was lead collaboratively with another academic, the fact that it was an equal relationship was significant to her, and did not subtract from her sense of autonomy over the project. She emphasised her role in conceptualising, managing, coordinating, evaluating work in the project and writing up the findings. She expressed satisfaction with the alignment between the goals of the project and the outcomes.

In the following section, I will discuss two forms of identity formation and socialisation in application-oriented research fields that I have identified in the data.

5.5 Disciplinary socialisation: single stream or meandering river?

I have discussed models of socialisation in natural science and social science in Chapter 4. I will explore the relationship between organisation of knowledge production in the research centres, epistemological dimensions of research, and research capacity development in the case study chapters. From analysis of the narratives in this study, I have identified two main forms of socialisation and identity formation in relation to disciplinary field. I refer to these categories as a 'single stream' and 'meandering river'. The 'single stream' of socialisation and identity formation occurs within predominantly single-discipline research fields, in this case the sub-discipline of Sociology of Work. The

'meandering river' mode of identity formation and socialisation has been identified largely in the narratives of the researchers and postgraduate students at the Programme for Land and Agrarian Studies. In the multidisciplinary field of Water Quality Studies, there were cases where identity formation and socialisation processes of individuals fitted more with the meandering river, and cases where they tended more towards the single stream, even though in a multidisciplinary context.

5.5.1 Single stream within a sub-discipline

Sociology of Work is predominantly a single-disciplinary field which is a specialism of sociology. However, as discussed in section 4.6.3 on 'Disciplinary and multidisciplinary knowledge production', it is a discipline with weak boundaries, which can incorporate perspectives, theories and methodology from other disciplines. Research which is application-oriented often requires the configuration of different disciplinary resources, which encourages sociologists to cross disciplinary boundaries.

Postgraduate students and researchers in the field of Sociology of Work outlined similar patterns of undergraduate and postgraduate study. They all studied Sociology, most of them majoring in Industrial Sociology. The majority of them did their undergraduate degree at Wits. Thus I assume that there was a relatively stable progression throughout the curriculum, building students' knowledge of theories and conceptual frameworks within the discipline and sub-discipline. Graduates of both Universities of Cape Town and Witwatersrand did a research project in their third year, which was their first experience of research. I describe in Chapter 7 the transition that postgraduate students at SWOP made from undergraduate studies to honours, through to masters and sometimes to doctoral studies. Through this process they built their disciplinary knowledge in the field of Sociology of Work. At SWOP the interns (postgraduate students) conducted their masters project on a similar topic to their honours project, extending the project in various ways, which involved building their knowledge and competence in conducting research in a steady stream. They built on conceptual and theoretical frameworks that they were mastering throughout the transition period. In some cases students did a doctoral degree in a similar area to their masters degree.

The research projects that they did through the different stages of their postgraduate studies involved a process of developing an area of interest and developing a level of expertise within that area. This is not to say that they were necessarily developing a research area for their career. (Furthermore, some of them did not become researchers or academics, but became employed in organisations associated with the labour movement or in government.) Many of the students who continued doing research work would be involved in diverse types of research projects in their future careers. However each student's process of research development during that period was focused on a particular area of inquiry, through which they could strengthen and extend their research capacity. Traditional conceptions of disciplinary socialisation such as those focused on by Delamont *et al* (2000), would be based on 'single-stream' socialisation.

By characterising identity formation processes within the field of Sociology of Work, I am noting a trend that emerged in this research. There were students that entered the SWOP internship programme from different disciplinary routes, particularly after a restructuring process where SWOP became affiliated to the School Social Sciences at Wits and not just Sociology. Furthermore I certainly do not aim to discount the rest of the life experiences that inform the identity and capacity of researchers in a single-discipline field. More experienced researchers tended to speak more about their lives prior to coming to university. For example, Sakhela Buhlungu, the deputy director at SWOP, spoke of how his background in a rural community that was a source of migrant labour, his work and study experience in the 1980s, and the political climate of that time, all deeply affected his identity and his career as an academic and researcher. I have discussed an extract from Thabo Sephiri's narrative above where he spoke of an early experience in his life which contributed to his identity formation process, and to his identity as a researcher. All researchers interviewed who had been through the internship programme at SWOP, identified their involvement in the programme and in SWOP generally as an extremely formative experience.

5.5.2 Meandering river: narratives of diverse disciplinary routes

The field of research of the Programme for Land and Agrarian Studies (PLAAS) was a specialisation of the broad category of Development studies, a multidisciplinary field. It draws on a number of disciplines, including anthropology, sociology, agriculture, geography, economics and law. Researchers at PLAAS spoke of working within a broad

social science development orientation as distinguished from a framework such as natural science, or development economics. In their project work, social scientists at PLAAS did not work strictly within the boundaries of a 'primary' social science discipline such as anthropology or sociology. However, those involved in postgraduate study appeared to locate their work more strongly in relation to disciplines. Within PLAAS there is a focus area on coastal and marine resource management, which does not fit neatly into the 'land and agrarian studies' frame, but which overlaps with the development concerns of PLAAS. While the research field of PLAAS is a multidisciplinary field, it is not necessarily the case that researchers in this field have taken a 'meandering route' of identity formation.

However, each of the four researchers and postgraduate students that I interviewed at PLAAS (about their own research capacity development) came to PLAAS from diverse disciplinary routes. In this section I discuss the research journeys of three of the researchers - Thembela Kepe, Moenieba Isaacs, and Lungisile Ntsebeza, focusing on the winding route that they took, and the elements of coherence that each of them perceived in the process.

I will also highlight some aspects of their experiences which helped to equip them with particular competencies that were needed in their respective fields of Development research. I choose not to isolate development in mastering disciplinary knowledge and practice from identity formation, social aspects of development, and development of generic research abilities.

All three of these researchers underwent a research journey of involvement in different disciplines and various types of work, community, and, in Ntsebeza's case, political struggle contexts.

I agree with Giddens' argument that in a period of modernity, individuals *seek* for coherence, as part of their ongoing, reflexive identity project (Giddens, 1991). While I recognise that individuals construct coherence in their biographical narratives, it does not make this coherence less 'true' or 'valid' in these cases. Although, as the researcher in this study, my perception of the events and experiences in their lives has been filtered through their shaping of their stories, a clear sense of coherence emerges out of the intersubjectivity between their construction of their narratives and my interpretation. I see the coherence

which they have constructed in their ‘meandering’ research careers as a significant factor in their identity formation process as researchers.

Both Kepe and Isaacs communicate a sense of the “round circle of my life”, though the phrase was used by Isaacs (MI par. 3). Kepe does this in terms of research field and his return to a passionate interest in grasslands and its application in his doctoral study. Isaacs refers to her upbringing in a fishing community, and her research journey into the field of fisheries and communities in a Development context. Her entry into academia was through different vocational and disciplinary orientations but her interest in communities emerged as a coherent element, and she developed valuable experience through working with communities. Ntsebeza’s narrative is powerfully centred on the integration of his identity as a political activist and intellectual, driven by his vision for transformation of South African socio-economic and political structure. He discusses his engagement with theory that sharpened his analysis of South African society, struggle, and transformation, and the disciplines which informed his intellectual development. All three researchers grew in knowledge and research abilities throughout their journeys, which they brought to the respective research areas that they developed. In the light of this the metaphor of a spiral may be more appropriate than a circle.

It is important to recognise the value of the contribution that these three researchers have made and will continue to make, both to forms of basic research in their fields and to application-oriented research. This is not in spite of their backgrounds, but is enriched by their backgrounds and the diverse life experiences that have contributed to their identity formation and their capacity as researchers and academics. Their contribution to research in their field in a South African context is undoubtedly enriched by their experience, and the local and contextual knowledge which they have acquired experientially. The same principle applies to Zola Kabane, whose narrative will be discussed in the following section.

5.5.3 Disciplinary routes in water research

Environmental water quality studies is a multidisciplinary field in that it draws on different science disciplines such as chemistry and the biological sciences, including zoology and entomology and it draws on theoretical knowledge, methodologies and techniques from

these disciplines in an integrated way to conduct application-oriented and use-oriented basic research.

Progression from undergraduate through to postgraduate education does not follow a 'single stream' model as in the case of study in a single discipline. While students recruited to do postgraduate studies in Environmental water quality have majored in a broad range of science disciplines, they need to have done a Bachelor of Science degree, and thus will have studied chemistry, at least at first year level. If they studied life sciences, they would have a major in zoology or botany. In these cases, and in cases where students had studied hydrology, their processes of socialisation would be close to a 'single-stream' model. They would draw directly on the theoretical knowledge that they had acquired in these courses, as well as utilising and extending the laboratory and fieldwork skills which they had developed in their undergraduate degree.

In this study, I interviewed both students and researchers who had undergone this type of life sciences and chemistry route as well as students and researchers whose research path fitted into the 'meandering river' model. An element of identity common to all of the students and staff members interviewed, was their desire to contribute to the long-term sustainability of the natural environment.

In Chapter 9 on the Unilever Centre for Environmental Water Quality (UCEWQ), I focus mainly on the masters programme, where students had all done a BSc, most of them in life sciences. Zola Kabane, a researcher whom I interviewed, had done her masters degree through the Institute of Water Research (IWR), with Tally Palmer as one of her supervisors. Kabane, had taken a meandering route to the field of water quality studies. Kabane was drawn to academic research through her interest in a real-world problem which she wanted to investigate. This led her to doing a masters' degree with the IWR. Kabane did her masters before UCEWQ became a distinct centre within the IWR, and before it started taking on a group of masters students at a time. She studied as a part-time student. In these ways her experience differed from that of the full-time masters students.

I will outline her story to illustrate her journey through different experiences and different fields of study. It struck me that aspects of her story came together through the catalyst of her pursuing her project, although she did not emphasise this continuity in her narrative.

She initially trained as a nurse, because of limited funding and knowledge of career options. She practised nursing and later accompanied her husband to the United States, while he was doing his doctorate. She had the opportunity to study at a university in the US, and was encouraged by one of her lecturers to do a BSc in chemistry.

After Kabane came back to South Africa she worked as a laboratory technician for the Department of Public Works in the former Ciskei. She was monitoring the quality of a stream running into the Buffalo River, which flowed into the dam providing drinking water for the people in Bisho and the townships in the Ciskei. She became aware that effluent from factories was being discharged into the stream. She was outraged, and noted that the dam being polluted was the one that supplied the black areas, whereas the dam supplying the white town in South Africa was higher upstream.

She decided to do a study of the discharge of effluent into the Buffalo River. She said:

... and interestingly ... I didn't know exactly what I wanted to do, but I knew that I wanted to do something [that would reveal] what is it that is actually happening, but to say I had to do toxicity or I had to do chemistry or something, I didn't know (ZK par. 91).

She described going to Rhodes University in Grahamstown. She approached the departments of Geography and Chemistry, before being referred to Professor Tally Palmer at the IWR. Palmer specialised in conducting toxicology studies on freshwater sites, and in fact, was involved in doing research on the Buffalo River.

I am struck by how different strands of Kabane's life experience, values, perspectives and competencies came together at this point to make the project of conducting research on the Buffalo river a passionate project for her. Firstly, she had a highly developed sense of political inequality of resources and anger at injustice because of her experience of apartheid oppression, forced removals and unequal schooling when she was growing up. There are strong references indicating this awareness in her interview. Thus it makes sense that the pollution of the water supply for black areas, within the differentiated homeland system, would anger her and drive her to respond. She decided to equip herself to make a study of the particular problem. As a former nurse, she was concerned with health issues. Her job doing laboratory work made her aware of the discharge of effluent into the stream in the first place. Her foundation in chemistry helped to prepare her for research into water

quality. These factors coincided with her being at a point where she wanted to extend herself through doing a masters' degree.

All of these aspects of her identity contributed to her mobilising her energy to take on the goal of researching the effluent discharge, and learning the abilities needed to succeed in her masters project. Her masters research influenced her career direction. She subsequently became a senior researcher in a government research centre on water quality. Her research expertise was directed at shaping national policy and practice in water quality management, rather than conducting and disseminating research for an academic audience. As in the cases of the researchers at PLAAS discussed above, it is likely that the knowledge and awareness that Kabane gained, through the varied experiences in the course of her life, enriched the contribution that she made as a researcher in this context.

5.6 Gaining confidence and the impact of undermining and affirming voices

The issue of building self-confidence emerged from the narratives as an important element of overall capacity development in researcher's identity formation processes. A number of researchers spoke of voices that they encountered in their postgraduate and research experience which impacted on their development of confidence. Some referred to specific people and the role that they played, whereas others spoke of generalised undermining voices. Many of the black researchers in the study expressed concern about race and gender prejudice that they experienced in university contexts. This has not necessarily been in the research centres where they worked, and often not in an overt form. Tshidi Letsepe discussed a stereotyped view that she experienced at the university where she was located, that positioned black women as fieldworkers rather than as researchers:

Generally in South Africa, generally in the knowledge production arena, we are looked at as the best field workers. Go out to the field, you speak the language, you know that culture. But we're not highly placed in terms of writing. So, you just get that fieldwork done, and then bring back the work and someone who - who feels that he's, he or she - and in most cases it's he - feels that he is in authority to write and you're not in that category, you know, and you are in a better place to write because, I don't know, because, you know, you are fascinated by ideas (TL par. 12).

Letsepe felt that in the social sciences in South Africa there has been a gap between who does the fieldwork, and who writes the books and articles, and it is often racially based.

There is a different value attached to doing fieldwork and writing. (She said that a fieldworker would just be acknowledged in the form of a footnote at the end of a book). She argued that in some collaborative relationships there were unspoken, entrenched inequalities over “who has command of these ideas, and who writes, who produces knowledge, and on what terms” (TL par. 40).

As discussed above in 5.2, Taylor (1989, 1991), sees identity formation as taking place in dialogue with others, “in agreement or struggle with their recognition of us” (1991:45-46). The dialogue with others through which identity is negotiated is partly overt and partly internalised. He argues that denial of recognition “can inflict damage on those who are denied it ... The projecting of an inferior or demeaning image on another can actually distort and oppress, to the extent that it is interiorized” (1991:50). In Letsepe’s narrative, she responds to voices which have a strong presence in her journey of identity formation as a researcher. She attributes the voices to those white, established academics, who perceive blacks and particularly black women as incapable of becoming good researchers or academics. It is a point of view which positions black female researchers as lacking access to negotiation of meaning or ownership of meaning. She mobilises a determination to succeed in opposition to these voices. Fighting against these prejudices in academia, forms part of Letsepe’s commitment to succeeding as a black, female researcher in the social sciences in South Africa. At moments when she feels discouraged with research and considers giving it up, she asserts that “that would defeat my whole agenda of being in this field” (TL par. 56). She says, “I would have confirmed one thing in my head – that ultimately all those people were right – I’m not interested in ideas. I don’t know how to write” (TL par. 56).

The powerful voices which are present in a person’s consciousness have their origins in lived experience. In this case the voices have been formed through Letsepe’s experience of social relations as a young, black woman in an institution which has been part of the race, class and gender oppression of the past in South Africa, and there are still residues of these oppressive views, perhaps not conscious, in individuals. In her consciousness, these voices are layered over other undermining voices from experiences preceding university. Letsepe’s narrative (and those of other interviewees with similar concerns) demonstrates the internalisation of unrecognising, and thus undermining voices. She is especially vulnerable to their power in her inner dialogue at times when she is experiencing doubt

about her own ability. These voices are linked to discourses which construct young, black (women) researchers in a particular way. As Letsepe articulates, researchers have to fight against being constructed in that way, and against constructing themselves as being predisposed to fail.

Researchers who were interviewed also mention the profound effect of affirming, constructive voices in building their confidence. Development of confidence as an academic and researcher is one of the issues that Thembela Kepe stresses in his narrative. He says that in his early period of working at PLAAS he was getting feedback that his confidence was brittle.

Then I started thinking about history and ... growing up in the township, on the farm first, where white farmers abused my grandparents and also us - verbal abuse, physical abuse, and so on, and thinking that you - you're **nothing**. So, this was all the baggage that I carried into my career, always doubting yourself ... So I think working with those people from England²³, who believed that I could do this thing, and of course Ben [his director and supervisor] saying, "Ah, Thembela, you can do that. You can manage that" ... It sort of helped me to gain confidence... (TK par. 55).

Building knowledge and awareness and recognition of their own knowledge played a significant role in researcher's growth of power in dialogue with others, and the associated development of confidence. This is illustrated by a comment by Ntsebeza about his engagement with Marxist literature, and later the discipline of philosophy.

I read a fair amount of Marxist literature and it's dense philosophy, and when I did formal philosophy and I **understood the context** of Marxism from Kant - Hegel tradition then I understood ... so I mean engagement with Marxism ... strengthened my confidence. I never felt inferior when I came across **professors, doctors** and so on (LN par. 53)

Recognition of one's own knowledge does not only refer to academic knowledge. One of the turning points for Moenieba Isaacs was when she became aware of the advantage of her experiential and contextual knowledge about fishing communities in South Africa, when she assisted a foreign researcher with fieldwork and translation.

²³ He refers here to his relationship with senior researchers on an international research project, which is discussed in depth in section 6.3 on "'breaking through' and mediation".

Malehoko Tshoedi recalls the support that her supervisor, Sakhela Buhlungu, gave her when she was presenting a paper at a national conference for the first time. He allayed her extreme anxiety, by assuring her that “it’s your work, you’ve done the interviews, you’ve done the reading, so you know better than anybody else”. She said that:

... just keeping that thing in my mind that, OK, it is my work ... like he gives you the authority that whatever you’re doing, that’s how you should feel, no matter even if those people are professors or whatever, but **you’ve** done the work and also you should be able to defend your work ... (MT par. 45).

Tshoedi generalises the affirming voice to “he gives you the authority that whatever you’re doing, that’s how you should feel”. That voice becomes a resource to draw on generally in her working life. It becomes a resource within herself.

The effect of undermining or constructive voices on self-esteem needs to be seen as interrelating with a range of other factors. Kepe tells the anecdote above in the context of the growth of his research career. Working on a large-scale international project, crossing barriers in his doctoral work, developing more autonomy, doing consultancy work and getting recognition in his field all helped him to gain confidence. However, those constructive, enabling voices are an indispensable part of each researcher’s story, just as the undermining voices are inevitably there to be struggled with.

5.7 Finding and constructing one’s role as a researcher

In their narratives, many of the researchers spoke about tension that they had experienced in clarifying and defining their role as a researcher, as distinguished from other roles which formed part of their identity. This emerged in the social science research centres particularly, and in some cases was influenced by the application-oriented nature of the research being conducted.

A number of researchers and postgraduate students (mainly but not exclusively women) spoke of the conflict that they experienced, when interviewing people from poor communities, arising from the informants’ expectations that they would *do* something for them. In some cases informants perceived that the researcher was there for the purpose of addressing particular problems, and providing them with something concrete, for example fishing quotas in the case of informants from fishing communities. Some researchers

experienced conflict within themselves about the role that they were playing, when faced with such pressing needs.

Researchers with these concerns found ways of addressing these tensions. These included the following strategies: very clear explanation of the purpose of their information gathering, at initial contact with interviewees; providing informants with useful information to assist them in addressing their own needs; using participatory research methodology, or through forms of ongoing involvement with the communities concerned.

Young researchers also needed to clarify the relationship between application-oriented research and implementation, both for themselves and when communicating with informants. Tshoedi said:

... that's the first question you get from people when you're doing interviews or you're doing research - I mean from a lay person. They would ask you, "How is it going to benefit me?". And I mean really how do you answer that kind of question, if you're doing an academic research? – 'cause it's not like you're going to write that thing and then things will change immediately. It's difficult to explain those things to a lay person ... (MT par. 70).

Buyiswa Maseko experienced a similar tension about her role in academic research, and related it to her own work satisfaction. She had worked for the Department of Land Affairs on the implementation of land restitution policy before undertaking doctoral study at PLAAS. She struggled with the isolated, sedentary and laborious nature of doctoral work, compared to what she saw as more of an activist role in her previous job.

Some of the researchers who were studying impoverished communities defined their own identity as researchers in relation to commitment to such communities. Tshidi Letsepe expressed this as a commitment to her informants, a need to speak for those "who can't speak for themselves" through her writing (TL pars. 56-58). Sakhela Buhlungu, a senior researcher at SWOP, was inspired to tell the story that's "never been told".

... It's a story about ... a very important section of the population in the country. ...it's a similar story about the village that you come from ... and you think gosh - here's a story that's never been told **or** here's a story that's been told in a **very** distorted way, **completely** distorted way (SB par. 41).

He felt that many social science researchers were “cynical” in their use of informants and did not ensure accuracy in representation, or develop an in depth understanding of the lived realities of the informants (SB par. 45).

Many of the black researchers in the social sciences felt that they were in a strong position to do research in South Africa because of aspects of their identity and experience. I have mentioned Moenieba Isaacs’ recognition of the valuable resource of her experiential and contextual knowledge about fishing communities in South Africa, since she had grown up in one. A number of black researchers were aware of their own strengths related to their experience in certain communities; their knowledge of languages of informants, in some cases; and contextual knowledge about South African society. This is not to say that people should mainly do research on their own communities of origin, but rather that knowledge production is strengthened by knowledge producers from a diversity of backgrounds.

An important research role that was mentioned by Tally Palmer, the Director of the Unilever Centre for Environmental Quality, was that of making science accessible to the public, and she explained how the postgraduate programme built awareness and ability in this area. In an increasingly accountable international knowledge context, one of the roles of researchers is interaction with societal and community needs and concerns (Nowotny *et al*, 2001, Rip, 2004). Interaction with various communities concerned with and affected by water quality issues, provides a step towards what Rip (2004:157) refers to as ‘social robustness’.

5.8 Conclusion

This chapter foregrounds identity formation as a lens for examining processes of research capacity development. I conceptualise identity formation as involving dual processes of identification with communities and the practices of these communities; and individuation, the forming of *own* identity in relation to communities, organisations and social institutions. Identification involves a process of developing a vision of the whole practice of a community, and forming values in relation to those held by members of the community, which inform action. Identification may involve aligning one’s goals with those of particular communities in the context of their fields of practice. It may involve visualising one’s own life trajectory in relation to the world views, values, and fields of

practice of a community or social grouping. I have argued that as part of research capacity development, identification with particular local communities of practice or research fields provides the motivation for the intellectual and practical labour that is needed to develop a repertoire of capacities needed to be a researcher.

I have explored how the dual processes of identification and individuation can play themselves out in the relationship between a student and a supervisor within the context of postgraduate study, and within the context of research centres. Within the context of a relationship between a student or a young researcher and a supervisor or mentor, these dual processes can take the form of identification and negotiability in relation to economies of meaning (Wenger, 1998). Negotiability involves the young researcher developing her own access to legitimate meaning-making processes within the research area. As part of the process of RCD, a young researcher needs to move along the axes from identification towards increased negotiability and from dependence to autonomy. These processes of shifting identity take place within a mentoring relationship that is facilitative, and one where the researcher or students also takes responsibility for her development process.

Within research centres I examined the tensions between enculturation into disciplinary, theoretical, ideological and social value systems and practices, in the context of diversity of values and practices and the conflict inherent in communities of practice. In such contexts there was a tension between a young researcher 'toeing the line' and asserting and developing their own identity as an academic and researcher. In processes of research capacity development within research centres, there needs to be a progression from constrained, structured involvement in research projects to increased autonomy and ownership of projects. To facilitate the development of these processes of transition both within mentoring relationships and within RCD programme, there need to be structured processes of mediation and scaffolding which I will explore more in Chapter 6.

I have identified two forms that processes of identity formation and socialisation can take within application-oriented context, which I have called the 'single stream' and the 'meandering river' models, and I have observed how researchers strive for coherence in their narratives. Furthermore I suggest that this ability to create coherence is linked to the ability to integrate knowledge, capacities and experience from different disciplines and contexts and mobilise an integrated repertoire of resources in one's research practice.

I began the chapter with reference to a project of possibility, which strives to create the conditions for developing human capacities to contribute to realisation of a vision of the future. Section 5.6 on ‘affirming and undermining voices’ shows how oppressive social structures, in the form of voices, can be internalised and undermine an individual’s identity formation process. This underlines the importance of the agency of individuals to manage their relationships and roles in organisations in a way that will facilitate their development and their overall growth of confidence, knowledge and capacities. Furthermore, they need be conscious of the voices which represent elements of social structure within themselves and fight against their own internalisation of these voices. They need to actively construct themselves, rather than allow themselves to be constructed because of a lack of consciousness. The power of undermining voices to affect individuals also emphasises the need to build organisations and capacity development programmes, framed by a project of possibility.



CHAPTER SIX: MEDIATING THE TRANSITION FROM POTENTIAL TO REALISATION

6.1 Introduction

This chapter discusses processes of mediation of the transition from the potential of young researchers to the realisation of their abilities. The first section focuses on the role of mentoring and supervision in processes of research capacity development. This section draws on literature as well as on insights reached from an analysis of the data. In the second section I analyse an extract from the narrative of Thembela Kepe, who described his experience of how he learnt to do independent fieldwork, and the role played by senior researchers in mentoring and mediation of this process. In the final section I present an overview of the thesis so far, pulling together the main conceptual elements of the argument.

Traditionally postgraduate education has relied mainly on an ‘apprenticeship’ model, referring to a metaphor of “apprentices learning from a master craftsman to become independent craftsmen themselves” (Becher *et al*, 1994:55). Doctoral education was seen as preparation for an academic career, centred on research and scholarship. I have discussed models of research training in the natural sciences and social sciences, where it was found that in the natural sciences, particularly in laboratory-oriented disciplines, research training was conducted through a collective apprenticeship model, whereas in the social sciences, it tended to be through an individual apprenticeship model (Becher *et al*, 1994, Delamont *et al*, 2000). Individual apprenticeship relies on a close mentoring relationship between student and supervisor with the goal of enabling students to become independent academics.

In the 1980s and 1990s research education policy came under review internationally (Pearson and Brew, 2002, Enders and de Weert, 2004, Henkel, 2004). One of the aspects of research education that was criticised was the heavy reliance on the individual apprenticeship model of research training (Pearson and Brew, 2002, Henkel, 2004).

On the one hand there has been pressure on supervisors to take a more systematic, pedagogical approach to supervision. On the other hand more attention has been paid to the

learning opportunities provided in the contexts in which research students carry out their research and construct their theses (Pearson and Brew, 2002, Henkel, 2004).

There is a growing recognition that the relationship with a supervisor or mentor should not be the sole structure to facilitate research capacity development. Increasingly in literature on postgraduate education, attention is being paid to supplementary means of RCD, such as structured postgraduate programmes and more distributed forms of mentoring within an organisation. The role of factors such as existence of a postgraduate culture in a department or institution, a critical mass of researchers in a particular field, peer interaction and communities of practice are being considered. In spite of all of these factors, one-on-one mentoring relationships still play a fundamental role in research capacity development, and the role of supervisors and mentors is discussed below.

6.2 Role of supervisors and mentors

I provide a brief outline of the role of a supervisor and a mentor, drawing mainly on Becher *et al* (1994) and Pearson and Brew (2002). They are not distinct separate roles but overlap with each other. I will not go into details about the responsibilities involved, but frame the discussion in relation to the purpose of a supervisor and a mentor, and how this shapes their role. In this section I will discuss supervision and mentoring as overlapping roles with a different emphasis in the context of postgraduate study. Generally in the thesis I refer to a supervisory relationship as a formal relationship of supervision of a postgraduate student, and a mentoring relationship as an informal relationship between a more senior and a less experienced researcher. However, in some contexts I use the terms ‘mentor’ and ‘young researcher’ in a general sense²⁴ to refer to relationships both within and outside of formal postgraduate structures.

There has been growing recognition in research policies internationally that doctoral education needs to prepare students for a wider range of occupations requiring research or systematic inquiry, than just academia (Henkel, 2004). Thus, the overriding goal of a supervisor is to facilitate the student becoming an independent researcher in her field, capable of adapting to various research arenas which may be in the university, industry, government or in non-governmental organisations. In South Africa, a postgraduate degree

²⁴ In the SWOP chapter, the informants use the term ‘mentor’ to refer to supervisor.

(masters or PhD) is still largely centred around completing a thesis, though it may be a half- or mini-thesis in the case of a coursework and thesis masters. Supervising the student through the process of conceptualising and completing the thesis and related tasks is the primary role of the supervisor. The secondary role of a supervisor, which could be seen as more of a mentoring role, is related to the broader intellectual and career development of a student. This could entail involvement in the student publishing her work, attending conferences, facilitating networks, access to funding and development opportunities and broader discussion about the student's career path.

Both of these roles – the academic supervisory and mentoring role – are involved with identity formation of the student. There is a strong projection of the student's identity into the activity of conceptualising the thesis, conducting research, analysing the data and writing up the research. The mentoring role of involvement with the broader career direction of the student is concerned with identity formation of the student, as the mentor provides support to the student's development as a researcher at a broader level than just the completion of the thesis. Mentoring can also involve supporting students with the emotional dimension of their experience. I discuss in Chapter 7 how the Sociology of Work Unit's (SWOP) internship programme provides students with pastoral support. The staff at SWOP are aware of the particular problems related to financial and family issues that many working-class, black students experience with postgraduate studies. They see it as part of their role to support students in dealing with these issues. This shows how in a situation where there is a supportive context for postgraduate study, aspects of a mentoring role can be decentralised into organisational structures and provided by staff involved in postgraduate study and not only an official supervisor. This is what I referred to above as a *distributed* form of mentoring.

Pearson and Brew (2002) comment on the demands for supervisors to improve their practice as part of international pressures for research education to be conducted more effectively. However, it would not be appropriate to impose a prescriptive model of supervisory practice on postgraduate study, firstly because of the different research education needs of different disciplines (Delamont *et al*, 2000), and, secondly because the supervisory relationship and programme of study needs to be negotiated between student and supervisor to meet their individual needs (Pearson and Brew, 2002).

While there is negotiation between student and supervisor about the mentoring relationship, this is influenced by the power relationship between them, and the level of negotiation depends on how aware and assertive the student is about her needs, and how open the supervisor is to negotiation. (I have discussed this in more depth in 5.4.2 on ‘identification and individuation ...’) Becher *et al* (1994) found that key issues for doctoral students about supervision were “the role of the supervisory relationship in providing structure, a reduction of the uncertainties and isolation that were, to some extent, inherent in the research enterprise and a balance of responsibility and freedom” (*ibid*:144). They argue that one of the major difficulties that doctoral students experience is “managing a process of transition that entails personal investment and risk” (*ibid*:146).

Part of this process of transition is involved in setting out to do an activity – a research project, a thesis, the scope of which is greater and more complex than tasks which the student has mastered in the past. There is much uncertainty in this process, and students often experience a loss of confidence in themselves. This loss of confidence is often associated with “an inability to form an overarching conception of the enterprise” (*ibid*:146). An important role of a mentor is to support students in managing this process. Delamont *et al* (1997b:75) see a thesis as an act of faith. The “research student and supervisor alike have to embark on the research project as an act of ... faith – believing that the research is possible, that new results can be obtained, that a serious contribution to knowledge will be the outcome” (*ibid*). During periods of uncertainty, the supervisor needs to help the student maintain that level of belief. However, in order to do this, there needs to be a relationship of mutual trust between student and supervisor.

6.3 A narrative of ‘breaking through’ and mediation of research practice

In this section I analyse an extract from the narrative of Thembela Kepe, where he described an experience, in which he “really learned about ... high quality academic research” (TK par. 41). This experience was highlighted in his narrative as a turning point in his process of developing research capacity. In my analysis I focus on his initial inability to meet the demands of the research activity, which were just beyond the bounds of his integrated capacity. Arising out of this ‘need state’ (Engeström, 1987), and assisted by the mediation of his practice by senior researchers in a mentoring role, he was able to break through to being able to do the research and thereby shifting into a higher level of learning.

In this chapter the extract from the narrative is analysed using theory on mediation of learning and cognitive development. (I develop the analysis in relation to the multidisciplinary of the applied research field, and the location of the academic component of Kepe's research within disciplinary theoretical and conceptual frameworks in section 8.5.2 on 'Multidisciplinary ...'.)

Kepe, a black researcher, came from a poor, rural background in the Eastern Cape. He had studied Agriculture at the University of Fort Hare and had obtained a scholarship to do a masters study at the University of Guelph in Canada. He had experience of teaching, worked as a journalist in Canada and had worked at a research centre in South Africa for a year. When he started working at the Programme for Land and Agrarian Studies (PLAAS), he immediately became involved in an international study led by academics from the University of Sussex. The research project was on 'Livestock, social institutions and entitlements' (PLAAS, 1999b), with case studies in India, South Africa and Ghana. (He subsequently referred to it as the Entitlement project). Kepe spent three months at the University of Sussex, being inducted into the research project. Most of the time was spent discussing a methodological framework for the project, and Kepe attended a basic course in sociology, since he did not have a background in the social sciences. The group of researchers jointly developed a proposal for their case studies.

Kepe came back to South Africa, and started doing ethnographic research on his own in a village in Pondoland. He lived in the village and tried to implement the research project as planned, but struggled for the first two months till Ian Scoones and Robin Mearns, two of the leaders of the project, came to visit him. I include the extract below:

41: But I stayed in this village - the first two months, I felt I was fumbling until Ian and Robin came. To me, I can say today, this was next to my masters research, this was like the first time, where I really learned about research - academic research - high quality academic research, because those guys came and said to me, "Thembela, what have you done?" I showed them. They were nice, they didn't say, "Crap!" but they said, "Thembela, you can improve this." Along the way I realized that they were saying that this was pure crap - this - what you've done so far - it's basically nothing. So they said, "OK, Thembela, ask us questions." So I told them about my frustration, guidance and so on not being there. So we went out - in fact we spent two days just designing what I can do - day by day - we planned every single day. Like, Thembela, this week from day one you can do this and that and that and [I would] say, OK, what about that?,

42:

43: because now I had two months in the village, so I knew the village. OK, but my - all those things - I tried to transplant what they had taught me in England to here and they were just not implementable. So now that they were here, I told them, no, no, no - that just doesn't work here because people here don't do that, you know. People here don't do that. Aagh, this one is only done er in the former Ciskei. Here, this is the Pondoland - that doesn't work. No, no, no - they don't have those kind of trees here, no, no, no - they don't go worship in the forest here. They - you know, I had enough knowledge, so I was able to - And we designed it week by week. And then - now they said, Thembela, let's go out. They trained me in wealth ranking. They trained me in several - several things. I said, Wow, this is great that they brought material with them. They said, Let's go out. Let's do it. So, they would ask questions. Then I would translate them, say aah - it's OK for that line of thinking. There's no more - we'd go to life histories. When you do a life history, you do it like this. I say, Aah ... So we did a life history, [I] was taking notes, and then they say, When you do a social history, you do it like this. When you do a livelihood analysis, you do it like this. When you do an ecological site history, you do it like this. So, we went through the research components and in two days, I felt, gee I'm ready to do this thing.

44:

45: And so when they left, Ian Scoones, who's very - I mean he's basically my mentor - Ian Scoones. He said, "Thembela, I want you to **write up everything**, write up the research programme that we designed, and I also want you to write up all the notes, that you took in the village. When we did life histories, write up life history of Mr So-and-so, like we did it." So I wrote this thing, sent it to him, and he said, ja ja, that's good. So, to me this was **real** training. After they left, I don't know how long they stayed - two weeks, I felt ready because it was not purely - it was not something very new but - it sort-of helped me to fit things - things fell into place, gaps in my knowledge and skill and so on fell into place.

The questions that I consider in my analysis of this extract are the following: Why is it that Kepe found it difficult to apply the knowledge that he had 'learned' in the training course in the context of actual research practice? How did the visit of the senior researchers help him to "fit things ... into place" and enable him to develop the capacity to meet the demands of the research project? How did this experience relate to his overall process of research capacity development?

I return to Schön's (1983) construct of problem-setting here, and his assertion that "in real-world practice, problems do not present themselves to the practitioner as givens. They must be constructed from the materials of problematic situations which are puzzling, troubling and uncertain" (*ibid*:40).

Kepe had been exposed to a vision of the overall purpose and rationale of the project and formed a sense of identification with the project. He had undergone a training process in the methodological approach. Thus he had a framework to guide him in how to approach the subject of research. He had guidelines for constructing specific problems from the materials of the situation, which would enable him to identify the necessary tasks and carry them out. He had learned techniques to use in doing this. However, when he came to do research in the village in Pondoland, it was not a matter of applying the framework and guidelines to the subject of research. He had to assemble a framework for doing the research in a new context *for himself*. In doing this, he had to relate the conditions of the new context to the framework of the project approach in a meaningful way. It was this reconstruction of a frame for action to fit the new context which he found so difficult to do.

Kepe described his response when he came to conduct his case study in the following way: “... after three months I left [Sussex] with the proposal - **thick** but in retrospect, it was a pile of **crap** (small laugh) because I came to South Africa and I just put it out there, said, ‘Let me do this.’” (TK par. 39). He highlighted the contrast between the intensive preparation, training, conceptualising and planning of the project in the abstract, with the experience of being faced with the task of doing the research in the research setting. He said, “I tried to transplant what they had taught me in England to here and they were just not implementable” (TK par. 43). At that stage the knowledge about the project which had been codified into the written text of the proposal was put aside. He immersed himself in the activity of doing research, having begun to acquire relevant knowledge, which was not yet fully integrated. He relied on the knowledge and capacities that he was able to access and implement and resorted to what Engeström identifies as habitual responses and ways of thinking. This is referred to by Bateson (1972) and Engeström (1987) as level 11 learning.

At that point Kepe encountered a ‘double-bind’ situation (Bateson, 1972, in Engeström, 1987:93), where he was not able to meet the demands of the problem context with his previously integrated repertoire of knowledge and capacities (level 11 learning). He felt that he “was fumbling” (TK par 41) and experienced frustration and a need for guidance. Engeström describes this as a ‘need state’ (1987:112). In a need state a learner may revert to old habitual responses, which neither resolve the situation nor lead to development of the learner. Alternately, he may ‘break through’ to a higher level of learning (level 111),

which throws the “unexamined premises [of level 11 learning] open to question and change” (Bateson, 1972:303, in Engeström, 1987:92). He learns to control, and direct his Learning 11 and along with this, develops greater cognitive flexibility (*ibid*).

As mentioned in Chapter 3, there are various interpretations of what it is that enables an individual to break through to a higher level of learning, theorised as a shift into level 11 learning (Engeström, 1987) or ‘double-loop learning’ (Argyris and Schön, 1974). (See Chapter 3.) Brockbank and McGill understand the “changed trajectory from single- to double-loop learning” as arising out of emotional energy, which fuels the orbit into double-loop learning (Brockbank and McGill, 1998). Engeström’s interpretation implies that emotion plays a significant role as a catalyst for this shift, with his attention to the ‘need state’ of the learner. However, his central argument is that the shift into a higher level of learning is facilitated by collective activity. In his narrative, Kepe communicates his emotional experience of ‘fumbling’ and frustration. Furthermore, the energy and enthusiasm he felt as he began to grasp the challenge of the task, is communicated both directly, and through the tone conveyed in his utterances, for example when he says, “I felt, gee I’m ready to do this thing” (TK par. 43).

I have used Engeström’s theory of ‘learning by expanding’ selectively, focusing on his model of individual cognitive development, without taking on his theory of collective learning in activity systems in its entirety. However in Kepe’s narrative, the role of collective activity in the mediation process is emphasised. The collective activity in this case took the form of joint practice of research tasks with the senior researchers. It is significant that the activity was engaged in by the senior researchers with the specific aim of mediating Kepe’s learning and integration process.

The activity required of Kepe was located within his zone of proximal development (Vygotsky, 1978), discussed in section 3.4.1 on ‘Vygotsky’s theories of mediation ...’. The problem-solving activity was in advance of what he was able to achieve independently with his current level of ability, but it was within reach of his potential ability, and could be achieved through collaboration with more capable practitioners. Vygotsky argues that the only ‘good learning’ is that which is in advance of development. Learning awakens a variety of internal development processes that are initially able to operate only when the learner works collaboratively with more capable others. In this case collaborative practice

with the senior researchers constitutes the learning process referred to by Vygotsky. Over time, external, interpersonal processes (between people) become internalised and are reconstructed as part of the learner's independent development achievement (*ibid*).²⁵

The intervention of the two senior researchers with Kepe's research practice and their mediation of his process of development, can be analysed using Collins *et al*'s (1989) model of 'cognitive apprenticeship', discussed in section 3.6 on '... cognitive apprenticeship'. This model was developed as part of a process of applying theories of socially situated learning to pedagogic practice. It explicated methods that teachers used to facilitate development of complex, cognitive abilities of learners. As mentioned in Chapter 3, Collins *et al* developed this theory in the context of classroom teaching and problem-solving at a basic level. However, the principles of *how* mediation can take place are applicable to adult learning and to complex open-ended problem-solving. Furthermore, these processes are not only confined to a formal learning and teaching situation, but can be applicable to any learning process that is being mediated by a more experienced practitioner. There are mentors who use aspects of this approach intuitively, as part of their mentoring practice, without necessarily having been exposed to learning theory about it.

I will use these concepts to unpack the processes that occurred in the interaction between Kepe, and the senior researchers who were in a mentoring role. (Kepe clearly described Scoones as his mentor, while Mearns in this situation was playing a mentoring role together with Scoones. However, for ease of description I will refer to the two senior researchers as 'mentors', and to Kepe as a 'learner'.)

The core of cognitive apprenticeship consists of three methods – *scaffolding*, *coaching* and *modelling* (Collins *et al*, 1989).

One can describe the overall role that the two senior researchers played during the site visit as one of providing scaffolding for Kepe's learning process. *Scaffolding* refers to the action of providing temporary supports to help a learner perform a task. This can consist of co-operative problem-solving activity by mentor and learner. Scoones and Mearns provided temporary supports to Kepe through working jointly with him in planning the rest of his

²⁵ This is a brief, simplified explanation of Vygotsky's theory of internalization, and is used here as a heuristic in relation to my overall theoretical framework, rather than a tool for close analysis.

research programme, and through conducting research together with him, using the various methods that were being employed in the research project. The support was by its nature temporary, because the visit was only for two weeks, and the aim was to capacitate him to continue with the research on his own.

Collins *et al* (*ibid*) describe *coaching* as a process of observing learners carrying out a task and giving feedback which aims to bring their performance closer to expert performance. Kepe does not specifically describe an incident of the mentors observing him and giving feedback. However, I interpret the term ‘coaching’ more broadly in the sense of (informally) assessing how he had been coping with the activity of research, and acting on the basis of that assessment to coach him with the aim of building his capacity to do the research.

They did this by asking him about his experience, what he had been doing, and how he had been approaching the research. He was able to express his emotions about the experience, talk about his frustration and need for guidance. He communicated with them about the areas in which there was lack of fit between the socio-cultural and geographical terrain of the subject of research, and the theories and methods embedded in the research approach. On the basis of what he told them, they were able to make an initial assessment of the gaps in his knowledge, and identify where there was lack of fit between theory and practice. This gave them insight into how to proceed with their task of assisting him to integrate his knowledge about the research approach of the project in the practice of doing fieldwork.

They gave Kepe feedback in a gentle way, framing it as “you can improve this” (TK par. 41), but he knew for himself that he was floundering at that stage, and he interpreted their feedback as a confirmation of this. They went on to address his learning needs through collaborative work, modelling of expert practice and further training in research methods, carried out in conjunction with application of methods and interaction about these processes. Thus he learnt “through doing and through critical reflection on that experience in conversation with experts, who can draw on their extended repertoire of skills and strategies” (Pearson and Brew, 2002:140).

Modelling of expert practice was integrated into collaborative work. Collins *et al* define modelling in the following way:

[it] involves an expert's carrying out a task so that students can observe and build a conceptual model of the processes that are required to accomplish the task. In cognitive domains, this requires the *externalization* of usually internal (cognitive) processes and activities – specifically, the heuristics and control processes by which experts make use of ... conceptual and procedural knowledge (*ibid*:481, my emphasis).

I argued above that Kepe had to reconstruct a framework for conducting the research in the context of the research site. Through participation with the senior researchers in planning and designing his research programme in the context of the research site, Kepe was able to observe and build a conceptual model of the processes required. This assisted him to continue to conceptualise and implement the research programme independently, once the senior researchers had gone.

As part of building a conceptual model of cognitive processes, students are encouraged to externalise their own learning processes through *articulation* so that they can develop metacognitive abilities – gain conscious access to and control of their own problem-solving strategies by articulating and reflecting on their knowledge, reasoning or problem-solving processes. There is not direct evidence in this extract of the externalisation of internal cognitive processes, but there are rich opportunities for this in collaborative work and in modelling of expert practice.

I will diverge from Kepe's narrative briefly to explore this issue of externalisation further. Tally Palmer, the director of Unilever Centre for Environmental Water Quality (UCEWQ) spoke about her approach to supervision and her involvement with her students in the practice of doing fieldwork.

... I always used to be in the field with students asking questions, asking students to justify what they were doing, what their thoughts were, challenging them as to why they were doing things in a particular way ... and revealing my own uncertainties and questions, you know, why are we doing this? What test organisms are we choosing? What concentrations are we choosing? What do you need to think about? The kind of mental dialogue that I subject myself to, in planning an experiment or thinking through, I would articulate and go through with the student (TP 2 par 114).

Here Palmer is referring to a practice of asking students to articulate the cognitive processes underlying their actions, as well as explicating her own cognitive processes – the “kind of mental dialogue” that she subjected herself to. Through dialogue, linked to collaborative work, she was coaching the students in problem solving as well as problem setting (Schön, 1983). She was attempting to share tacit knowledge underlying expert practice, including cognitive processes of framing questions and constructing the problem and the means of solving it from the “materials of problematic situations which are puzzling, troubling and uncertain” (*ibid*:40). According to a Vygotskian perspective, through a series of developmental interactions over time, these interpersonal dialogues would be internalised by the students and would be reconstructed as part of their independent cognitive functioning (Vygotsky, 1978).

Another aspect of Kepe’s experience that came through strongly in the extract was Kepe’s active involvement in the learning process. Kepe participated in the mentoring process that he experienced in an active way through sharing his knowledge of the research context with the senior researchers. His experience of doing research in the village on his own for two months played an important role in the interaction he described. It provided him with valuable resources to bring to the learning process.

Brown and Duguid, (2001) emphasise the role of practice in circulation between explicit and tacit knowledge, arguing that “knowledge runs on rails laid by practice” (*ibid*:204). Kepe’s hands-on experience in the research context, both his acquisition of knowledge about the village and his experience of difficulty and lack of fit, made him more receptive to the learning facilitated by mediation. His prior experience assisted him with integration of formal learning of explicit knowledge with tacit knowledge acquired through experience, and through collaborative practice with expert practitioners.

The experience described in the extract was a turning point, the beginning of a new phase in Kepe’s process of identity formation and research capacity development. It awakened a variety of developmental processes, which continued to be expanded and integrated throughout the project and subsequent research practice.

Brockbank and McGill (1998) explain their understanding of single- and double-loop learning. In phases of single-loop learning (Learning 11), progress is made through “day-

to-day learning, meeting goals and altering practice on the basis of experience” (*ibid*:44). In double-loop learning, where learners push through into a higher level of learning, assumptions are challenged and paradigms may be shifted. Brockbank and McGill believe that learners move between single- and double-loop learning. Learners then return to the single-loop orbit with “a new understanding of the discipline, a potential development in conception of self and values, and an emergent intention to act” (*ibid*:45). Thus this process manifests itself not only in cognitive development, but as part of the identity formation process of the individual.

My understanding of the return to the single-loop orbit or the continuation of the learning process subsequent to the breakthrough to level 111 learning is that it is a period where expansion and increased flexibility of cognitive functioning is integrated into the individual’s ongoing day-to-day functioning, as her overall research capacity develops.

There is a pointer in the extract to Kepe’s ongoing mentoring by Scoones. This is Kepe’s description of writing a report of all the planning and research that was done during the site visit and sending it to Scoones. Writing up the experience, would have required him to reflect on the processes and incidents that took place, in this way consolidating the learning process. Recontextualising the experience into a written codified form provided a further tool and a resource for mediating his learning, both through the process of reflection and writing, and through the production of a text, which would give Scoones feedback on how Kepe had been processing the learning experience. Kepe would return to this text in further reflection on the research process. He had ongoing interaction with Scoones throughout the project, and Scoones became a significant mentor for him.

The transition from development of research capacity within a context where scaffolding is provided to integration of competence demonstrated in independent work is captured by Kepe’s reference to a subsequent three-year project.

[I] started a new project in ’97 on a slightly different topic, but I chose to remain in the Wild Coast. But now, Ben was busy with other things and I was not working with people from Sussex. I was on my own in this project. A little nervous at first but I had confidence that I can do research. I can write. So I did that ...competently in that project. I wrote two research reports, presented a few conference papers and I managed to get at least four refereed journal articles from that project. So the pace was **picking up ...** (TK par. 59)

Kepe went on to conduct a doctoral study, linked to the Entitlement project (analysed above) using some of the data gathered in the project. Scoones was one of his supervisors. At the time of the interview, he had achieved his doctorate and had become a successful researcher in his field, contributing to application-oriented and basic research at a national and international level.

I will conclude this section by considering some the implications of this analysis for understanding and practice of research capacity building generally. These relate to the following key themes

- the challenge of integrating formal learning into application in practice
- experiences of breaking through to higher levels of learning within a researcher's long-term process of development
- the need to conceptualise and integrate mediation processes more systematically into research capacity building practice
- the emotional dimension of challenges to established ways of thinking, and the implications for research capacity building programmes.

In analysis of the extract of Kepe's narrative, I have discussed the challenge of integrating explicit codified knowledge with application in practice, and the difficulty of applying new knowledge and conceptual frames to a task rather than resorting to 'habitual' ways of thinking and doing. These are central issues for investigation into the role of formal research methodology training in RCD. In this study I consider research methodology training within the capacity building programmes of the research centres, but do not study this issue extensively.

The experience of breaking through to higher levels of learning, described in Kepe's narrative, needs to be located in relation to a researcher's overall process of research capacity development. In this extract, the experience of a 'double bind' situation caused by cognitive dissonance, acted as a catalyst for Kepe's launch into expanded cognitive ability. This process was facilitated by the mediation of expert practitioners in collaborative practice. From my reading of the narratives in this study, and drawing on my own

experience, I understand that there are many points in the development of research capacity, where the researcher faces extensive cognitive challenges. These challenges need to be overcome, facilitating breakthrough to new levels of cognitive awareness, control and flexibility. Programmes of research capacity building and postgraduate education implicitly contain mediation processes, through supervision, laboratory practice, seminar programmes, and in some cases, collaborative work in conducting fieldwork and analysis.

However, practice of mediation and scaffolding in research capacity building programmes needs to be more theoretically informed and well conceptualised. More systematic attention should be paid to these practices in supervision, mentoring and in organisation of research capacity building programmes and settings. This thesis, through analysis of practices of mediation of learning in RCD contexts, does provide substantial insight into the importance of mediation and the forms that it can take. These include mediation by a mentor or within a group context, various forms of scaffolding, sequencing of learning experiences, and building increasing complexity into learning activities.

While this section of Kepe's narrative was about research practice and mediation in the context of anthropological type fieldwork, the analysis of the learning and developmental process as well as the mediation of practice by mentors has broader relevance for research capacity building practice than just the fieldwork context. In the extract the intervention described was a costly one in terms of financial and time resources, made more costly because of the distance travelled by the senior researchers. The context of this was a large-scale international well-funded research project. I am not arguing narrowly for replication of this type of intervention. However, analysis of this extract, within this study as a whole, shows the crucial role played by processes of mediation, and indicates that time and resources for implementation of scaffolding needs to be incorporated into the overall budgets and fund-raising activities of research capacity development programmes. However, I qualify this by adding that the principles of mediation of practice underlying the intervention described can be achieved through various creative means and do not necessarily involve huge financial expenses.

Another issue arising out of the challenge to existing cognitive processes and conceptual frameworks inherent in the demands of research practice, is the emotional experience that accompanies this. Kepe's initial feelings of frustration and inadequacy in relation to doing

the fieldwork for the project are expressed in the following terms - “I felt I was fumbling ...”; “... this was pure crap ... it’s basically nothing”; “ ... they were just not implementable ...” (TK pars 41-43). The tone of the narrative in the description of the mediation of the mentors shifts to one of relief, recognition and emerging confidence – “things fell into place, gaps in my knowledge and skill and so on fell into place” (TK par 45).

Brockbank and McGill argue that “paradigmatic activity cannot be sustained on the edge all the time by virtue of the fact that level 111 or double-loop learning involves ‘shifting’ a person’s reality and involves changes which may be disturbing” (*ibid*:44). They argue that there is a need for containing or holding the process, which they see as taking place through the coping mechanisms of the learner, in her return to the routine and stability of single-loop learning. Moreover, an understanding of learning through cycles of breaking through to higher levels of learning (Argyris and Schön, 1974, Engeström, 1987, Brockbank and McGill, 1998) and the potentially unsettling and destabilising nature of the intense cognitive and emotional challenge entailed in this, needs to be recognised in research capacity building programmes.

The cognitive and emotional challenges inherent in the shift to higher levels of learning are evident in Kepe’s narrative. However, the implications for RCD programmes depends on the nature of the RCD programme and the level of researchers of postgraduate students within the programme. At the time of the experience described, Kepe was mature in terms of his life experience, although I have categorised him as a “young researcher” at this point in his history. He expressed a level of self confidence, assertiveness and resilience (although elsewhere in his narrative, he confided about an inner lack of confidence that he had had to overcome). Kepe was at a stage where he needed opportunities for involvement in high quality research; training and mediation to facilitate his development and supportive relationships to encourage and sustain his developmental process and his motivation. However, I do not see him as needing ‘pastoral support’.

In contrast to this, in the narratives, there were a number of younger postgraduate students or researchers, who had far less resilience and self confidence. In cases, where the stresses of postgraduate study and research demands were compounded by personal, social and financial problems, there was even more of a threat to the possibility of success in

achieving their goals. This combination of factors points to the need for stronger support structures and a component of pastoral support to be integrated into research capacity building programmes. I will continue to explore the above themes in the case studies.

6.4 Conceptual overview of the thesis so far

I have reached a transition point between the first part of the thesis and the case studies of the research centres. The thesis so far includes the theoretical framework, methodology chapter, and a general empirical section drawing on the study as a whole. At this point I will draw together the main elements of the conceptual framework, which has been formed through a reiterative process between data analysis and a weaving together of theory. This will lay the conceptual groundwork for the case study chapters.

I have located the study within the context of transformation in South African history from the system of apartheid to a process of reconstruction. Research capacity development has been situated in relation to knowledge needs for reconstruction as well as innovation within a global context, and with regard to the drive towards equity and redress. Furthermore, RCD has been located in relation to global shifts in modes of knowledge production, with knowledge being produced within complex organisational networks, and taking on new epistemological forms.

I have identified research centres as local sites for research capacity development, which mediate between individuals and the broader contexts summarised above. Furthermore, the range of modes of research that they conduct, their location at universities and in relation to networks of government, industry, civil society and funding organisations make them interesting sites, positioned within changing modes of knowledge production. This manifests itself not only in organisational forms, but also in epistemological dimensions of knowledge production in these contexts. Furthermore there are particular ways in which knowledge production is organised and epistemological dimensions in different disciplinary fields and knowledge domains. Thus knowledge production and RCD in application-oriented fields is constituted by the disciplinary orientation of the research field as well as the application-oriented nature of the research practice. Much research has been done on organisational and epistemological dimensions of knowledge production in traditional departments in the natural sciences and social science, and the relationship of

research training to these dimensions. This body of research contributes to a conceptual framework for analysing RCD in the research centres in this study, which are application-oriented and to varying degrees multidisciplinary.

I have constructed an account of the individual *process* of research capacity development within these centres as a progression of identity formation and socialisation into communities of practice, organisations and disciplinary and multidisciplinary research fields. I have argued that through exposure to holistic practice of communities, identification with communities and research fields, involvement in socially situated practice, and long and hard practical and intellectual labour, researchers need to develop an integrated repertoire of capacities, which can be applied appropriately in a range of contexts.

From the data, I have observed two main forms of identity formation and socialisation of the researchers in the study, which I have referred to as a ‘single stream’ and ‘meandering river’ model. I will study the models of research capacity development in the research centres, analysing the links between the organisational form of a programme, its location in relation to academic departments, and the disciplinarity or multidisciplinary of the research field. I will explore how individuals’ paths of development intersect with the models of RCD that they experience. Although the processes of individuals are each unique, I have observed a trend that research capacity building programmes in SWOP tends to work with individuals being socialised within a ‘single stream’ model. In contrast to this the research field of PLAAS tends to be composed of individuals on a ‘meandering river’ path. Such a path of identity formation and socialisation poses particular challenges for RCD programmes. I will analyse this in more depth in the case studies.

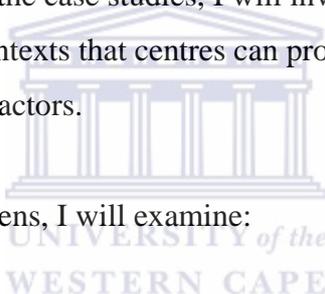
A central theme in this thesis is concerned with how transitions are made from:

- being a newcomer to an expert practitioner in a research field
- theoretical knowledge to integrated application in practice
- limited to enhanced levels of cognitive control and flexibility
- dependence in a mentoring relationship in relation to knowledge and frames of meaning-making to independence

- a limited role in knowledge production to greater autonomy, ownership and authority.

These processes of transition are reflected in the narratives of postgraduate students and researchers and have been analysed in relation to theory on mentoring and other forms of mediation of learning. These include concepts such as mediation in the zone of proximal development (Vygotsky, 1978), breaking through to higher levels of learning (Engeström, 1987), and various forms of scaffolding (Bruner, 1986, Collins *et al*, 1989). I will consider to what extent the research centres have been able to provide structured and supportive contexts for RCD, in which learning processes are mediated in a systematic way.

Research centres provide rich opportunities for capacity building to prepare individuals to conduct research in the complex contexts in which knowledge production takes place. However, there are also particular challenges inherent in the organisational structure and location of these centres. In the case studies, I will investigate the opportunities and challenges that affect the contexts that centres can provide for RCD in each of the centres, in relation to the following factors.



Through an *organisational* lens, I will examine:

- the organisational structure of the research centre, the nature of its location in the university and relationship with academic departments
- its location in relation to a network of organisations outside of the university, and sources of funding
- the broad approach/es to RCD in the centre and particular RCD and postgraduate programmes being implemented.
- its capacity to provide coherent communities of practice for socialisation into the research field, and how this is achieved or not achieved
- its ability to provide mentoring for students and young researchers.

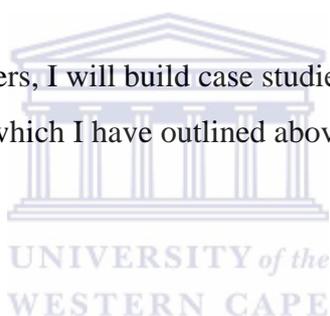
Through an *epistemological* lens, I will examine:

- the range of types of research conducted in relation to a continuum from basic to applied research

- forms of multidisciplinary of the research fields of the centre
- the impact of the types of research conducted and disciplinary or multidisciplinary of the research field on RCD
- particular elements of research capacity needed in the research field and how they are developed.

In each case I analyse extracts from the narratives of the researchers and postgraduate students and explore how these factors manifest themselves in these individuals' experiences of RCD. I consider the impact of the combination of these dimensions of each of the research centres and their RCD programmes on the context that they are able to provide for research capacity building. Furthermore, I assess the potential for the research centres, in each case, to build conditions for pedagogical stability in their fields for the long-term reproduction of researchers.

In the following three chapters, I will build case studies of the three research centres, drawing on the framework which I have outlined above.



CHAPTER SEVEN: THE SOCIOLOGY OF WORK UNIT (SWOP)

7.1 Introduction

The Sociology of Work Unit (SWOP) is a research unit²⁶, located at the University of the Witwatersrand, a historically white university. The research capacity building programme which I focus on in this case study is the SWOP internship programme. This is a small-scale programme which articulates closely with an honours and masters programme located in the School of Social Sciences (formally in the Sociology Department). Among the case studies, SWOP is distinguished by a number of factors. It provides a context for RCD in a field which is a sub-discipline of sociology, the Sociology of Work. Although sociology is weakly bounded, Sociology of Work is closer to a single-disciplinary field than the strongly multidisciplinary research fields of the other two centres. Socialisation into the research field tends to take place through a 'single-stream' model. SWOP is relatively well-integrated into university structures, both organisationally and financially. I will investigate how these factors impact on research capacity development.

I will consider the range of types of research conducted at SWOP, and how the internship programme is situated in relation to these. Furthermore, I will trace the development process of one of the SWOP graduates from his experience of postgraduate study to employment in a research unit, considering the extent to which his research training prepared him for the challenges encountered.

A large focus of this case-study is on the supportive and structured approach of the internship programme. I will analyse the communities of practice which are generated in the programme, and the forms of mentoring that are provided. I will begin by discussing the origin and early development of SWOP, locating it in a historical and political context.

²⁶ I refer to SWOP as a 'research unit' rather than a 'research centre', since it is consistently referred to as a unit by its staff and students.

7.2 Organisational aspects of Sociology of Work Unit (SWOP)

7.2.1 Origin and early development of SWOP

The origin and early development of SWOP laid the groundwork for the type of context which it provides for RCD. I outline some of the relevant factors in the life of Professor Eddie Webster, who started SWOP, and weave in some of the broader historical and political context, which influenced the direction in which SWOP developed.

In relatively small and new organisations such as the research centres in this study, the personality, belief systems, and organisational approaches of people in leadership roles and other staff members make a significant contribution to shaping the ethos and culture of the organisation (Chamberlayne and Rustin, 1999:3). Clearly the predominant values and culture being asserted in an organisation are important for the type of context that it provides for research capacity development. The director of SWOP, Professor Eddie Webster, came from the Eastern Cape, where his parents were teachers. He too taught at a high school in South Africa, before studying Politics, Philosophy and Economics at Oxford. He observes that his interest in labour studies began when he took a job in a car factory in England in 1970 after his studies at Oxford. He said:

I was struck by the power that shop stewards have as representatives of the shop floor to disrupt production ... I had become interested in Marxist work on alienation and I think those two experiences of theoretical work on Philosophy and practical experience made me become interested in the possibility of **labour** as an **actor** to transform society (EW 2 par. 5).

This was during the height of apartheid. The armed struggle had been initiated but was not making a significant impact, and many people, including Webster, were becoming aware of the potential role that collective organisation and mobilisation of workers could play in a non-violent transformation of South African society (EW 2 par. 5). He returned to South Africa in the wake of the Durban strikes, which took place at the beginning of 1973. He started his lecturing career at University of Natal and then moved to the University of Witwatersrand, a historically white, liberal university, which I will refer to as 'Wits'. During the 1970s and 1980s the political struggle in South Africa had a great influence on some academics and students in the liberal, white universities. Space opened up, particularly in certain social science departments such as Sociology, for leftwing

academics to orientate research and teaching towards facilitating social change, and there was an interest in Marxist theories in various fields, which could only be pursued legally within an academic context.²⁷

Webster conducted his doctoral study on the changing workplace and its impact on workers' lives in the foundries. This brought him into contact with the field of Occupational Health and workplace organisation by workers. At Wits, there was a national Centre of Occupational Health in the Medical School, and a strong Engineering faculty. In 1983 Webster was approached by a group of graduate students from both of these faculties, who wanted to work together on research activities. Webster initially appointed one researcher to work on a project on safety in underground mining, which became the researcher's doctoral study. In the early stages of SWOP, its goal was to “do research that helped the black labour movement build capacity, but it evolved since then with the coming of democracy” (EW 2 par 9). Webster captured the continuity and change in the identity of the research centre when he said that the work of SWOP had shifted and diversified.

[However] it's retained that **core** focus on the world of work and focuses on the question of productivity, on investment, industrial policy and covering a wide range of forms of work from the motor car industry to the textile industry and call centres at Telkom, household appliances, gold mining, sex work ... wherever people work, we're looking at the social relationships (EW 2 par 9).

This will be discussed in more detail in section 7.5 on 'Epistemological dimensions ...'.

In the course of the eighties, the student composition of Wits began to change, and in the nineties this accelerated with a growing number of black students entering white institutions. In 1990 SWOP formed a research unit in the university, and in 1996 it became a Centre for Science Development (CSD) unit. The CSD described research units as comprising “researchers and postgraduate scholars engaged in ongoing specialised research programmes under the guidance of directors who are proven authorities in their field at national and international levels” (CSD Annual Report 1997/1998:5). Apart from

²⁷ This point was emphasised by Nsebeza from PLAAS, who referred to a trend in the eighties particularly, of activists setting up research units and NGOs linked to universities. Two reasons for this was that it provided a safer context within which to work, as well as “legitimate” access to literature that was banned at the time.

the modest financial boost that the relationship with CSD provided, it was significant in terms of recognition and prestige derived by the unit.

In 1996 the CSD suggested the introduction of research internships to their units and indicated that they would be willing to provide funding for this. SWOP implemented an internship programme and “took it well beyond their [the CSD’s] initial intentions” and “made it a key part” of their activities (EW 2 par. 31). One of the points in the mission statement of SWOP is to “develop research capacity in areas compatible with the unit’s area of expertise through teaching, supervision and training” (SWOP, 2002a). This shows the significance attributed to research capacity development in the mission of the unit. I will discuss how the unit deals with the internship programme in practice below in section 7.3.

Webster’s narrative about his history and the early history of SWOP shows an identification with the emancipatory knowledge-constitutive interest (Habermas, 1972). The emancipatory interest is concerned with knowledge generated by critical theory, leading to *empowerment* of individuals and groups, and their ability “to take control of their own lives in autonomous and responsible ways” (Grundy, 1987). Although the orientation of SWOP to research is likely to have broadened and shifted in relation to the changing international and national knowledge context, there is still a strong element of the emancipatory approach which has carried through into the research unit’s approach to the internship programme. (See further discussion in 7.3.)

7.2.2 Location, structure and funding

SWOP has established a place for itself in the University of Witwatersrand, whereby it has achieved more security and long-term stability than the other two research centres in this study. In 2000, SWOP had an annual budget of approximately one and half million, one third of which came from the university. The main sources of income were from contract research, the National Research Foundation (NRF) and donor funding. University income was partly generated by teaching in the Sociology department, and publications. SWOP was closely linked to the Sociology department at Wits, and later to the School of Social Sciences when the University was restructured into schools.

In 2002, the year in which the fieldwork was done for this case study, SWOP received funding from the university for the posts of director, executive administrator, administrative secretary and two out of five researcher posts. Apart from the director's position, these were permanent posts, funded by the University Research Committee. The other two and a half research posts were funded by an international development organisation, a CSIR fund for research on mining, and an international donor (SWOP, 2002/3). These were contract posts. The deputy director is a senior lecturer in the Sociology department, and his salary, as well as that of the director, is funded by the Sociology department. The deputy director plays a role in teaching and administration in the department as well as in SWOP. SWOP received a significantly higher proportion of its funding from the university than the two other research centres in this study. The relatively high level of financial support and stability provided by the university, as well as SWOP's synergistic relationship with the Sociology department, indicates a close link to the 'academic heartland' of the university (Clark, 1998). This has implications for the predominant modes of research conducted in the centre, which will be discussed further in section 7.5.1.

The breakdown of SWOP staff in terms of race and gender in 2002 was as follows:

Table 2: Representation of race and gender of SWOP staff in 2002 (SWOP, 2002/3)

	Black			White			Total		Total staff
	Female	Male	Total	Female	Male	Total	Female	Male	
Research staff	2	2	4	0	2½	2½	2	4½	6½
Admin staff	2	0	2	0	0	0	2	0	2
Total	4	2	6	0	2½	2½	4	4½	8½

One of SWOP's long-term goals, stated in its Annual Report, was to "develop a research unit that was more representative of the population of the country" (SWOP, 2002a:6). At the time of the fieldwork, SWOP had employed two graduates of the internship programme as researchers on contract positions. This was consistent with their commitment to meeting this goal.

It is more difficult to assess the class composition of a unit, than its composition in terms of race and gender. However, I do know from the interviews that I conducted, that the two black males reflected here, both originated from poor socio-economic backgrounds. One is from a working-class background, and the other from a poor rural background. At least one of the female researchers was from a working-class background and the executive administrator is from an urban, working-class background. This is significant in that staff from a diversity of backgrounds bring different perspectives to the organisation. Furthermore, staff from disadvantaged backgrounds are likely to have an understanding of the experiences and realities of students from similar backgrounds, and they provide important role models. Apart from organisational composition, one needs to consider how much space there is in an organisation for people from a diversity of backgrounds to thrive and to influence the culture of the organisation. This will be discussed further in section 7.4 on 'Organisational culture'.

7.2.3 Relationship with 'real world' contexts and problems

One of the potential strengths of a research capacity development programme, linked to a research centre, is that it increases the opportunities for young researchers to become involved in 'real world' research projects:

As Webster argues:

... young researchers need to be linked up to real research problems, not just abstract ones. So Sizwe Phakathi actually goes underground and has to come up with recommendations about how to increase productivity and he gets exposed to that and ... you know I think that research is not something that you get from a textbook, but you get from actually going out into the field and doing it and I think one of the great advantages - you're connecting young people to actual research projects, not just seminars where you discuss them (EW 2 par. 91).

Learning to do research in 'real world' contexts relates both to organisational and epistemological aspects of RCD. The research centre provides an organisational context that enables students and young researchers to access research projects and relationships with other organisations in the field. At an epistemological level, the application-oriented and often multidisciplinary nature of the research conducted has an impact on for RCD, which I will discuss further in section 7.5 on 'Epistemological dimension ...'.

Ian Macun, who had been deputy director of SWOP from 1994 to 1998, reflected on a previous experience of doing his masters while working at the Industrial Health Research Group (IHRG), a research unit at the University of Cape Town. His masters thesis was on Regulation of Occupational Health and Safety in South Africa, and was related to his work in the unit. Macun said:

... you will probably find the same theme in SWOP and other organisations that the emphasis was very much on promoting attaining high qualifications, but in research that was directly relevant to the work that people were doing. So that was how I did that as well, and it was incredibly valuable, because it wasn't just like undergrad or immediate university-based research. It wasn't unconnected from the real world, and I think that gives a certain set of experiences that require certain competence that you don't necessarily get ... through doing a straight thesis at university.

It requires one to think about policy and real-life applications of that research and I think that adds a different dimension to what one's actually learning as a skill in research. It's not just the skill of formulating questions, of working with the literature, of developing a good methodology and writing a coherent thesis or a long paper. It actually takes that a step further into addressing real-life and policy concerns and trying to ensure a relevance of the research [which is] important in the sorts-of sets of competencies that are required as part of becoming a researcher (IM par. 11).

At the same time research for academic qualifications needed to be underpinned by disciplinary theoretical knowledge ("engaging with the theory and evolving state of knowledge about the area" (IM par. 55). (See section 7.5.2 on 'Modes of research ...'.) Macun said that doing his masters on research that he was conducting in the IHRG had significance, firstly, because the topic was a real world problem that had effects in the workplace, and secondly, because he had practical exposure to role players such as trade unionists and shop stewards. It was valuable to sit in meetings with them, trying to work out ways of dealing with health and safety problems. He felt that it was important "to get a perspective on a research question, in that quite grounded experience" (IM par. 41).

It gives people that exposure to practical situations of actually sitting in a meeting with - in SWOP's case - employers or unions or other institutions, who require research on something, and getting really exposed to what is it that people want to know, and what is it about their situation, that the research needs to speak to, and I think that exposure, which I got through fortunately a working situation, but you can get the same thing, maybe not quite in as much depth, but through the internship (IM par. 43).

Thus an internship programme such as the SWOP programme can provide interns with exposure to real world research projects and contexts in a limited and supported way. This exposure is invaluable in preparing interns for the applications-oriented research work that they will most likely be required to do after they have graduated.

Fakier, the executive administrator of SWOP, stresses the importance of a researcher's work forming part of a greater project, or being part of a particular focus. She argues that:

... research, while at one level could be very lonely, ... is also part of a team effort and - maybe it is a bit of an idealist view - but ... one individual project can be seen in the context of many other layers, in terms of your own development, the development of the unit, the development of certain goals within the South African context and as such it has effects and is affected by different forces, and that is what I meant by it on a more abstract level, but on a more concrete level, the research project, no matter how small, that an intern embarks on, is of value to SWOP as a unit itself ... (KF par. 74)

She gives an example of a project that one of the interns, Portia, was working on. Her project was on the involvement of South African multinationals in Zambia.

A few months after Portia started on **her** project, we were invited by London School of Economics (LSE) to look at certain issues in the region as well, and Portia's project then does not only benefit her and her development. Although her project does not form part of the project with LSE, it informs it. Her findings will be recognised or will influence the way we then look at other issues in the region and this project with LSE is to do with how globalisation impacts on or influences institutional capacity and that project again forms part of a certain focus area in SWOP and that focus area then forms part of the bigger SWOP, and that is how - in a sense you try to impart, that what you do has an impact, and you are not doing this in isolation. Other people are doing it to support you and your work is valid in the sense that it supports other people as well (KF par. 76).

Lebala's small-scale project overlapped with the bigger SWOP project both in terms of the topic and also the geographical area being investigated. She could therefore benefit from contact with the researchers involved in the bigger project. In addition, she had the opportunity to make an authentic contribution to knowledge production within the broader research activity of the unit. Interns' involvement in research projects was however very contained and small-scale. The priority which was clearly communicated to interns was to

focus on their thesis, and do the research required for this. This was in contrast to the case of the researchers employed at the unit, who were doing higher degrees. In their case, their first priority was seen as delivering on the project commitments, and their studies were seen as their own responsibility (EW 2 par. 71). This model of RCD, which I refer to as the ‘work-study’ model, is discussed extensively within the context of PLAAS in section 8.4.2.

7.2.4 Relationships with academic departments at Wits

I will briefly outline how the internship programme is structured in order to discuss organisational aspects of SWOP which have an impact on research capacity development. The programme has two streams of students – one group of students who are studying at honours level, and one at masters level. It is able to accommodate four students at honours level and masters level respectively. The internship programme is offered as a complementary programme to the postgraduate course which the interns are doing in the department and is geared towards building their research capacity while fitting in with the demands of their course of study.

I have mentioned that SWOP was closely linked to the Sociology department, and later to the School of Social Sciences. Webster believes that the relationship between teaching and research facilitated by an organisational link between a teaching department and research organisation is extremely important. He argues that SWOP has an organic link with young students in the teaching context in the university. Thus SWOP academics are able to make contact with undergraduate students and recruit those who show potential and are interested in doing research in the area of Sociology of Work. He said that there was a synergy between the academic department, the interns and SWOP. SWOP was able to provide the students with access to their research projects, and to the institutions being researched, as well as to international research contacts (EW 1). Webster believes that a research unit also benefits from having postgraduate students.

I think it’s a global thing that the best research entities ... are involved with graduate students. You get lively, independent minds and it really pushes you forward. I **don’t** believe it’s possible to build research excellence without a relationship with bright, young graduate students. And that’s where for me something like the HSRC is flawed. I mean they can produce good user research but they cannot engage in the kind of innovative, creative work that can only come from that combination. Young, bright people engaging

established researchers and they can do that, by institutionally linking a teaching department with a research entity (EW 2 par. 91).

This approach draws on a belief in the reciprocal relationship between research, learning and teaching, which Clark emphasises, locating its origins in the views of Wilhelm Von Humboldt in 19th century Germany (Clark, 1997). Through the close relationship between SWOP's internship programme and the Sociology department at Wits, in its early stages, it was organisationally reinforcing the research-teaching-learning nexus.²⁸ The Humboldtian ideal views both teacher and student as being involved in the common pursuit of knowledge and they are seen as co-researchers (Clark, 1997: 244-5). There are elements of this in SWOP's approach to the internship programme. According to Fakier, Webster "has the capacity to always learn from the interns as well and to be aware that they bring a different perspective to things" (KF par. 68). Webster and Fakier both acknowledge the contribution that postgraduate students make to the production of knowledge as has been mentioned above (Smith, 2000, Pearson and Brew, 2002), and the contribution that students make to the research culture of an organisation.

The shift to being linked to the School of Social Science as opposed to just the Sociology department, broadened the relationships that SWOP had with departments. From 2001 onwards SWOP opened their recruitment for the internship programme to the whole School. SWOP co-ordinated the mentorship of their interns and made contact with academics outside of Sociology and Industrial Sociology to mentor some of the interns. The multidisciplinary nature of some of the research projects meant that mentors²⁹ needed to be drawn from a wider pool of disciplines. Humboldt conceptualised the research-teaching-learning nexus within *disciplines*. However, in spite of the restructuring of the Faculty of Social Science at Wits, the research-teaching-learning nexus still existed within the practice of the internship programme, albeit within a more multidisciplinary context.

7.3 Approach to research capacity building: The SWOP internship programme

From my exposure to the origins, history, and ongoing work of SWOP, I have deduced that the SWOP's work in the early stages of its existence was firmly located within a critical

²⁸ Humboldt conceptualised the research-teaching-learning nexus within *disciplines*. However, although the Sociology was restructured to exist within a School of Social Science, the research-teaching-learning nexus still existed within the practice of the internship programme, albeit within a more multidisciplinary context.

²⁹ In SWOP the term 'mentor' is used to refer to a supervisor.

approach to research and education. Critical theory is associated with the emancipatory interest, one of Habermas' three knowledge-constitutive interests which influence how knowledge is constituted or constructed (Grundy, 1987). Emancipatory approaches to education are:

... concerned with empowerment, that is, the ability of individuals and groups to take control of their own lives in autonomous and responsible ways ... At the level of practice the emancipatory curriculum will involve the participants in the educational encounter ... in action which attempts to change the structures within which learning occurs and which constrain freedom in often unrecognised ways (Grundy, 1987:19).

I have introduced Simon's concepts of 'pedagogy of possibility' and 'project of possibility' in Chapter 5 (Simon, 1992). A pedagogy of possibility refers to a "practice devoted to enhancing possibility" through transforming relations between social forms and human capacities, and hence expanding "the range of possible identities people may become" (*ibid*:22). He frames this within a 'project of possibility', an activity which is determined by both real and present conditions *and* certain conditions which are part of a vision of the future which it is trying to bring into being. While the work of SWOP was originally located in a critical tradition, this is likely to have shifted and diversified with changes in the social sciences, the field of sociology, and in the broadening of the range of research work conducted by SWOP. However, there is still a strong critical, emancipatory thread in SWOP's approach to research capacity building, which is infused with a sense of opening up possibility.

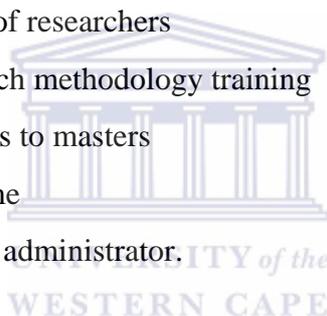
I have argued that research capacity building in South Africa needs to be a project of possibility, since the long-term goal being worked towards is an equitable, representative workforce of knowledge producers who are capable of meeting the demands of national knowledge needs, as well as contributing to high quality research in the global arena. However, the "real and present" context in which capacity building is taking place is one in which the inequities of the past and the reconstruction challenges of the present still reside within social structures and within the identities of individuals.

In order to develop research capacity, an individual needs to undergo a process of identity formation, expanding her knowledge and understanding within a disciplinary area as well as her range of capabilities. This process is influenced by past and present experiences of

the individual and conditions in which she has formed an identity. In this context, a project of possibility is that which brings into being an individual's journey of becoming a capable researcher with a broad repertoire of abilities. From interviews that I conducted with informants from SWOP, I understand the dominant approach to RCD to be one which aims to open up 'possibility' for potential researchers, particularly those from socially and educationally disadvantaged backgrounds.

In this section I will describe how the SWOP internship programme functions, and investigate how it works as a project of possibility. I do this in relation to the following themes:

- the origin of the programme
- participation in communities of practice
- building a critical mass of researchers
- the role of formal research methodology training
- scaffolding from honours to masters
- the mentoring programme
- the role of the executive administrator.



7.3.1 The origin and structure of the internship programme

The SWOP internship programme was started in 1997. It expanded to accommodate four interns at honours level and four at masters level. It was funded first by the CSD, the NRF, and the Friedrich Ebert Stiftung consecutively. Interns received a small amount of money (it was R15 000 per intern per year in 2002), which was to pay for research activities. The allowance did not cover costs such as living expenses and university fees. It is noteworthy that when SWOP received funding for a specified number of interns, they would take on more interns, by stretching the funding or acquiring more from other sources. Webster described the programme as a very cost-effective way of building research capacity (EW 2 par. 43). The success of the programme relied on factors other than high funding input. These included the relationship with the Sociology department; the exposure to real-world, application-oriented research, combined with a grounding in disciplinary research; and the building of a structured and supportive context for RCD.

The purpose of the internship programme was to build a new generation of social researchers in the field of Sociology of Work, and, in particular, to develop a culture of research amongst students previously disadvantaged by the apartheid education system (SWOP, 2002a:23). By 2002 a total of 23 interns (either honours or masters students) had been through the internship programme. They had all attained their degrees, and with the exception of two students, had become employed by research organisations, universities, or were pursuing higher degrees. Two were doing their doctorates at overseas universities (SWOP, 2002a:23).

The internship programme articulated with the honours and masters courses in the Sociology department in the following way. It was geared towards supplementing the interns' studies in the department, and provided support and capacity building for the research aspect of their study programme. Khayaat Fakier, the executive administrator of SWOP, emphasised that there was a conscious attempt not to burden interns with too much extra work in addition to their studies. The masters students did a coursework programme with a half-thesis through the Sociology department. The honours students in the internship programme needed to do a research project as a requirement of the programme, although it was not a requirement of their honours course. However, their project was linked to a research essay which was a requirement of the honours course. Each of the interns or past interns, whom I interviewed, had developed her masters thesis from her honours project. It was on a related topic, but handled with more depth or complexity. Thus the students had an opportunity to define, open up and explore a topic in the first year and extend and deepen it in their masters year. This will be developed further in 7.3.5

The internship programme was specifically oriented to training *researchers*. In selection interviews, an important criterion for selection was the applicant's interest in research as a career opportunity. One of the goals of the programme was to develop research skills which would benefit the interns in their studies as well as in their further careers. At the time of the interview SWOP had only taken on black interns. Webster said that this was not a fixed policy, but in cases where white students had applied, it had been decided that it was more of a priority to select black students. They had continued a working relationship with the white students who were interested in working with them (EW 1). Over half of the interns over the years were women, and the three interns who had gone on to do doctoral studies were women. Recruitment and selection of students and young researchers for

research training has a significant influence on the success of programmes. This was not closely studied in the SWOP case study. However, the high success rate of the internship programme suggests that, along with the other contributing factors, the selection process was effective in terms of gauging interest in research and potential for developing research capacity.

7.3.2 Participation in a community of practice and a community of peers

I have argued in Chapter 3 that not all research centres constitute communities of practice or provide communities of practice which facilitate RCD. However my interpretation is that SWOP *does* provide overlapping communities of practice into which newcomers are socialised through a process of increasingly central participation (Lave and Wenger, 1991). Lave and Wenger refer to this form of participation as legitimate peripheral participation. It depends on legitimate access to ongoing community practice. They see peripherality as a positive term, indicating the interested involvement of the actor. “It suggests an opening, a way of gaining access to sources of understanding through involvement “ (Lave and Wenger, 1991:37). Peripheral participation is about being located in the fields of participation defined by a community, and changing location and perspective are part of actors’ learning trajectories.

... legitimate peripherality is a complex notion, implicated in social structures involving relations of power. As a place in which one moves toward more-intensive participation, peripherality is an empowering position. As a place in which one is kept from participating more fully – often legitimately, from the broader perspective of society at large – it is a disempowering position. Beyond that, legitimate peripherality can be a position at the articulation of related communities. In this sense, it can itself be a source of power or powerlessness, in affording or preventing articulation and interchange among communities of practice (Lave and Wenger, 1991:36).

The internship programme at SWOP provides a structured location of legitimate peripheral participation in which interns begin a process of socialisation as researchers in the field of Sociology of Work. Most of them will not end up working as researchers at SWOP, but through the internship process, are exposed to various communities of practice in the field, such as other research units, disciplinary communities and groups of academics, both national and international. They begin to develop identities as researchers in the field, together with capacities which enable them to gain access to these communities.

Communities of practice are not homogeneous and organisations are regarded as a “community of communities of practice” (Brown and Duguid, 1991:14). Within SWOP the internship programme constitutes a smaller community of practice, a structured location for legitimate peripheral participation. I refer to this as a “community of peers” because it is largely composed of the interns in the organisation, as well as the members of SWOP who are responsible for guiding the interns and facilitating their development. Lave and Wenger stress that legitimate peripheral participation is both empowering and disempowering. It provides access and blocks access. The setting up of a group structure for postgraduate students works to create a supportive space where they can participate more fully in the practice of becoming a researcher, in the legitimate and safe space of the peer group structure, developing confidence and competencies.

I have emphasised the structured and supportive environment for RCD provided by the internship programme. Furthermore, the culture of the organisation and way of relating to the students appears to be relaxed and friendly. However, notwithstanding this relaxed atmosphere, I identified elements of a *positional* mode of social organisation within SWOP. (See section 4.4 on ‘Positional and personal modes of socialisation’.) To a certain extent this goes with the structured organisational form, in which interns at honours or masters level are in a clear position in a hierarchical structure, compared to lecturers and professors. This can be contrasted with the social organisation in the PLAAS case study, discussed in section 8.4.3.3 on ‘Social modes of organisation’, where researchers tend to be treated as equals, irrespective of their level of expertise, formal qualifications or amount of experience. The elements of a *positional* mode of social organisation identified within SWOP, diverge from the characterisation of social science departments having *personal* social modes of organisation in Delamont *et al*’s ‘ideal types’ (Delamont *et al*, 2000).

Some supervisors approach supervision relationships through a more directive, authoritative style, which is linked to a positional social mode. One of the informants alluded to an unintended outcome of a structured, and at times authoritative approach to RCD at SWOP, where the growth of an individual is not recognised to the extent that relationships are not adapted and redefined on more equal terms. This can take place either in a supervision relationship, or at a stage where a researcher progresses from being an intern to a doctoral student or staff member. In such a case the individual has been in a

position of legitimate peripheral participation, but is (perhaps unconsciously) blocked from attaining more central membership of the community of practice.

An argument is being developed in this thesis in favour of implementing structured and supportive approaches to RCD programmes. This needs to be accompanied by consideration of the value of more positional, authoritative, even hierarchical social modes of organisation. However, a delicate balance needs to be reached between positional, authoritative structure and social forms that encourage the unfolding of human capacities. I will argue that these are not contradictory positions, but that structured relations are an essential component of organisational forms that build capacity. I explore this issue further in Chapter 8 and also consider the sensitivity of social modes which are perceived as hierarchical in a South African context.

In the remainder of this section, I will discuss the substance of the structured and supportive context provided by a 'community of peers' in the SWOP internship programme. Both SWOP and the Unilever Centre for Environmental Water Quality (UCEWQ) offer programmes which provide a structure for postgraduate students, encouraging them to interact with each other academically and socially. The SWOP interns are part of another grouping in their honours or masters class in Sociology, where they are engaging with each other in relation to the discipline of sociology or industrial sociology. As members of the SWOP internship programme, they form a tighter community of peers. In addition, the following types of support and mediation are provided by the SWOP staff. Students are given assistance at the beginning of their course of study with structuring their work programme. There is coordination of mentoring and supervision that students receive (which will be discussed below in section 7.3.6). Furthermore, the setting of deadlines and the monitoring of progress necessary for conducting a thesis are integrated into group processes.

Fakier has regular monthly meetings with the interns, which achieve the following purposes:

[They provide] students with a forum to discuss problems and so on, and it is also to share positive experiences, and a way of fostering a group feeling among interns so that it could be possible for them to engage with each other without our presence, to form a sort of support group. We have found that the

students get very lonely in their research and they tend to learn so much better from their peers and from the knowledge that they are not alone in experiencing difficulties and can learn from the innovation of others (KF par. 20).

Thus the meetings provide a close knit forum for mutual engagement by the interns, both about the process of doing a research project, and for interaction about relevant disciplinary knowledge, approaches and research methods within the field of Sociology of Work. This interaction is sometimes mediated by staff members, who provide extra guidance and support, but the student grouping develops its own momentum.

I introduced Wenger's three elements of coherence of practice which a community can achieve in Chapter 3 (Wenger, 1998). These are: firstly, *mutual engagement* of participants in practice whose meanings they negotiate with each other; secondly, negotiation of a *joint enterprise*, which creates relations of mutual accountability among participants; thirdly, development of a *shared repertoire*, which over time constitutes resources for sharing meaning. The concepts of mutual engagement and joint enterprise are closely linked, and I will discuss these first.

I have identified three broad areas in which a group of postgraduate students experience mutual engagement and negotiate a joint enterprise:

1. In relation to the discipline or sub-discipline, where they discuss concepts, theories and methodology.
2. Although students are working on separate research projects, they share the experience of working on a research project in the disciplinary field with each other, and relations of mutual accountability develop.
3. Students can be collectively engaged in negotiating the practical, material aspects of their research programme, such as acquiring funding and resources which enable them to do the research.

These aspects of practice are linked to each other, for example, discussions on methodology are related both to the discipline and to the experiences of actually doing the project, such as setting up interviews or conducting interviews. The financial and resource aspects of conducting research are clearly part of the broader experience of doing a research project.

Through engagement with each other in the practice of doing research in the field of the unit, the students develop a sense of mutual accountability. Students indicated that the experience of sharing the goal of conducting a research project, and mutual support in relationships with fellow interns provided a strong motivating force to work hard and complete the project. The sense of being involved in a joint enterprise, and having relations of mutual accountability is also conveyed by Thabo Sephiri, a past SWOP intern. Speaking of the relationship between the members of his internship group, he said:

... when we were still at university [the relationship] was a very close one, a very, very close one, and we'd read each other's drafts and make comments on those and we'd give each other tips. We'd have caucus meetings to discuss how to get Khayaat ... our administrator ... to buy us new computers (TS and AD laugh). Ja, you know, and we would negotiate, and it was always a team effort (TS, par. 167).

Here Sephiri refers to all three of the aspects of mutual engagement on the task of conducting research projects. On the one hand he refers to reading each other's drafts, which relates both to engaging with the concepts and discourse of the discipline, and to negotiating one of the central practices of doing research, which is writing. Through reading each other's chapter drafts or papers and giving feedback, the students are engaging in a joint enterprise of writing up research, reviewing and discussing the writing with each other. On the other hand managing the acquisition of resources for research to facilitate the success of the project are equally important. Sephiri comments on how the interns were able to work co-operatively and strategically to acquire resources to sustain their academic studies.

Wenger's third element which distinguishes a community of practice is the development of a shared repertoire. "The repertoire of a community of practice includes routines, words, tools, ways of doing things, ... symbols, genres, actions, or concepts that the community has produced or adopted in the course of its existence, and which have become part of its practice" (Wenger, 1998:83). He argues that over time, the joint pursuit of an enterprise creates resources for negotiating meaning.

This can be linked to the concept in activity theory of *tools* or *instruments* which are used to mediate between the subject and the object (Engeström, 1987), in this case the students

and the research work that they are engaged in. Students are exposed to, and need to engage with *tools* which are used to mediate academic practice and construction of knowledge in the discipline. These tools include theoretical and conceptual frameworks and methods of data collection and analysis. Through the practice of doing research, applying these tools and engaging with each other, the interns develop a shared repertoire, which provides a resource for further negotiating meaning.

In his study of socialisation of postgraduate students, Gerholm (1985) identified a category of tacit knowledge which was “generated by the students themselves as they try to make sense of what they are experiencing in the graduate studies program” (in Becher and Trowler, 2001:50). He was referring to the knowledge which students generate privately as they process their learning experience, which was used as “a guide for action” (*ibid*). Another dimension of this type of tacit knowledge emerges where students, interacting in a group, share their emerging knowledge of the discipline. They make their own emerging understandings explicit and open to feedback. Thus a group develops a joint repertoire, which would include ways of doing things, understandings, tools, humour etc, which would provide resources for further negotiating meaning. Sephiri’s experience of his group reading each other’s drafts is an example of developing a shared repertoire to further negotiate meaning. The students were all writing up their own research, thus developing their own individual repertoires. Moreover, by sharing their writing with each other, they were providing resources for further negotiating meaning, as they discussed the chapters and gave feedback to their colleagues.

7.3.3 Building a critical mass of researchers

I discussed the concept of critical mass within the context of research policy in section 4.4. In this case study, I consider the application of the concept of critical mass in a South African social science context, and discuss how the RCD programme at SWOP seeks to provide qualitative elements of critical mass, although the programme is small.

Harris (1996) viewed quantitative dimensions of critical mass as depending on the collection of a significant volume of active researchers and funded research projects, focusing on aspects of a particular research area, within a single research site. Qualitative dimensions of critical mass were linked to degree of coherence in the research programmes

pursued by those researchers (in Delamont *et al*, 1997a). The emphasis on critical mass draws attention to the research environment within which postgraduate students and researchers work on shared problems, “with shared intellectual and material resources” (Delamont *et al*, 1997a:6).

Edward Lahiff from the Programme for Land and Agrarian Studies (PLAAS) discussed the value of having a strong critical mass within an environment for postgraduate study, in terms of large numbers of academics and students at different levels of study, and an active research culture. He stressed the role played by more experienced students in enculturating younger students.

... if you're coming into the university not really having a strong sense of what it is to be a PhD student or what it is to be a full-time researcher, you can quickly learn from those around you. There are others in the same boat, there are second-years who you can look to, there are junior lecturers who maybe have recently completed their PhDs, there's a variety of academics that you can draw from. So that's a strong, optimal – strong, positive environment where you can learn what it means. Because it is a big culture shock, I think getting a PhD is quite a distinct community - or professional orientation - you can't expect people to be familiar with it before they come in (Lahiff, par. 46).

It is a challenge for South African universities to achieve the quantitative aspects of critical mass, since there are generally fewer resources for research than, for example, in the UK context, and also smaller numbers of postgraduate students and smaller academic departments. The qualitative aspects of critical mass are more within reach, particularly in research units, where there is likely to be a coherence in research programmes, broadly related to the unit's mission within a particular research field. Postgraduate students thus have the opportunity to link up to research agendas and projects of the unit. Coherence also needs to be consciously created in an organisation, through building and strengthening internal relationships, and providing links with outside organisations working in the field. SWOP works to create a coherent research milieu, and although there are not large numbers of students on the internship programme, it draws on different elements in the broader field of Sociology of Work to create a stimulating environment for the students.

At SWOP, although there are not a large number of students, there is a practice of encouraging students to make contact with other researchers and practitioners in the field, particularly graduates of the SWOP internship programme. One of the ways of doing this

is through the breakfast seminar which is run every year specifically for interns to present their research findings and to welcome a new intake of interns. (SWOP runs breakfast seminars on a monthly basis). Sephiri said:

SWOP has a kind-of like a family of researchers, and often when you have an intake of new researchers, they would invite all the research interns and the previous ones to attend ... and to speak about what they did, and about what the new interns should expect, you know, what are the demands, and so on and so forth. So, it stretches from those you came in with, to the previous interns and to the ones that are coming (TS par. 167).

Past interns and other key stakeholders are invited to this seminar. Thus the SWOP interns are exposed to graduates of the programme who have been employed by organisations such as research NGOs, the trade union movement and the Department of Labour. Thus they become aware of some of the career options that are open to them, they see successful role models, and are given a sense of being part of a larger community of people working broadly in the field of research on labour issues. It also gives new interns insight into the kind of research projects that are conducted at SWOP.

It is commonly recognised that attending conferences offer vital opportunities for postgraduate students to be exposed to developments in the field, receive constructive criticism on their work, and make contact with other academics in the field (Becher *et al*, 1994, Becher and Trowler, 2001). The conferences, networking and journals associated with professional bodies provide one of the ways in which postgraduate students are inducted into their disciplinary field (Delamont *et al*, 2000). Developing networks through attending conferences is also a way of inserting oneself into a critical mass of researchers and practitioners, which is distributed more broadly than the institution where the students are located.

Thabo Sephiri explained that becoming part of a network of professionals and researchers in the field was significant not only as part of his learning process at university, but also in his work experience after university.

...the network amongst the researchers themselves ... was also very important in terms of keeping us going throughout that process to this day, and it's the network that you form from university, and also in ... conferences and so on

and so forth. As a student and even afterwards and those networks still exist to this day (TS par. 33).

It can be argued that the principles associated with “critical mass” can be built into an environment where there are not large numbers of postgraduate students at different levels of study in the postgraduate programme, and where there is not necessarily a great amount of funding. In the SWOP internship programme there is an awareness about the principles of critical mass, and a conscious attempt to link interns with researchers and professionals in related research communities, through facilitating contact with past SWOP interns, access to research projects, and through encouraging attendance of conferences. This can be seen as part of a process of building up a critical mass of researchers in the field of Sociology of Work in the future, and in the meanwhile, providing some of the elements of critical mass for the developing researchers.

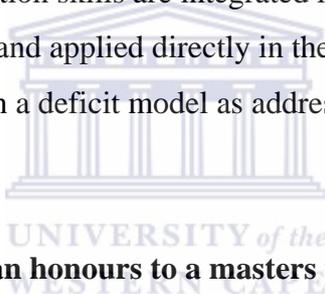
7.3.4 The role of research methodology training

When considering the role of formal research methodology training in SWOP, one needs to take into account the internship programme’s close relationship with the mainstream postgraduate programme in the Sociology department. The curricula of the undergraduate, honours and masters programmes in Sociology contain theoretical components, which aim to build students’ knowledge of the theoretical and conceptual frameworks of the discipline of sociology, (and the specialisation of industrial sociology). From third year, research methodology courses are included, and these different strands of the curriculum need to be applied and integrated in students’ research projects, starting with a long essay in third year, a research paper at honours level, and a mini-thesis at masters level.

The training in research methodology conducted within SWOP’s internship programme, is supplementary to that which is included in the mainstream Sociology curriculum. Fakier describes it as “a more intensive form” of training (KF pars. 16-18). There are core courses in research and generic abilities that are seen as necessary for all interns. In addition, the programme tries to meet the different needs of students, and this is enabled by the small scale of the internship programme. The core courses which are run every year are on writing, presentation skills and research methodology. When students and mentors are consulted about students’ particular needs, there is often a need expressed for training in computer programmes, such as a word processing programme or a specialised statistical

programme like SPSS or SAS, and Fakier organises for the students to go on appropriate training course. Courses on writing and presentation abilities are integrated with the students' academic programme, and sequenced in relation to stages of the programme such as proposal writing and presentations.

Formal training of the SWOP interns in research methodology takes place mainly in their academic programme within the Sociology department, supplemented by their involvement in SWOP. I have described this type of socialisation process of researchers in terms of a 'single stream', where disciplinary knowledge is built up systematically within undergraduate and postgraduate studies. Supplementary methodology and generic skills training is aimed at meeting the needs of the specific cohort of SWOP interns, who a) have a particular interest in and potential for pursuing a career involving research; and b) have been disadvantaged by the racial, class and gender inequalities in society. Generic abilities such as writing and presentation skills are integrated into the programme, in such a way that they are contextualised and applied directly in the practice of the interns. Furthermore, they are not presented within a deficit model as addressing deficiencies or incompetence on the part of the students.



7.3.5 Scaffolding from an honours to a masters project

The progression from an honours to a masters project in the SWOP internship provides a form of *scaffolding* for the interns in the process of learning how to do academic research. I have discussed (in Chapter 3) Vygotsky's theory of learning within the zone of proximal development (ZPD); the mediation of cognitive development (Vygotsky, 1978); and the concept of scaffolding, which was developed to address the question of *how* learning takes place through mediation, and its application to pedagogical practice (Bruner, 1986, Collins *et al*, 1989).

Scaffolding in a research training context can take a number of forms. These include coaching by a mentor or supervisor, peer mediation of learning processes and sequencing of learning activities. The SWOP interns do their honours and masters research project on a similar topic, and develop their masters thesis as an extension of the honours project. In this way the honours project provides a form of scaffolding to prepare the student for the

masters thesis, and the learning process in both projects are mediated through supervision, as well as other means of mediation that have been discussed.

I have found Collins *et al*'s principles of sequencing learning activities (introduced in section 3.6 on 'cognitive apprenticeship'), useful for analysing this aspect of the postgraduate programme. The two principles which were particularly relevant for this were those of *increasing complexity* and *increasing diversity*. *Increasing complexity* refers to the construction of a *sequence* of tasks and environments, where increasingly "skills and concepts necessary for expert performance are required" (Collins *et al*, 1989:484). *Increasing diversity* refers to a sequence of tasks in which an increasingly wider variety of strategies or skills are required. This is linked to increasing complexity of the problem-solving activity, as it requires more factors which need to be considered, in order to succeed in the activity. The honours project was a smaller, less demanding project, containing less complexity in the design and less conceptual complexity. The scope of the masters project could be on a larger scale, incorporating more sources of data to be integrated or a more complex research design.

Malehoko Tshoaedi conducted both her honours and masters project on gender inequality amongst trade union officials. She said that she only did a few interviews with women for her honours project, whereas for her masters project, she did more interviews with both women and men. This may seem like a small increase in complexity and diversity. However, from the context of her narrative it was clear that the synthesising of diverse sources of data was a learning experience that she grappled with, and that interviewing male trade union officials was particularly challenging for her at that point. The honours project fulfilled some of the functions of a pilot project. For example she mentioned that she was able to reread the interviews she had done the previous year and learn from her mistakes (MT par. 16).

In some cases, the honours project had a broader focus, and the masters thesis examined a smaller aspect of the honours topic in more depth. For example, Portia Lebala used the same company, Steers, in Zambia for a case study, in both projects, but shifted from a broader focus to investigating the lives of the workers in the Steers franchise in Zambia, and how their work impacted on their lives. Thus her honours project familiarised her with the broader context of the research and the particular case being researched. Conducting

her masters project within the same area, and on the same case, allowed her to focus and deepen her investigation. In such a case there would also be an increase in conceptual complexity.

In each of the intern's postgraduate programme, the fact that the two projects were on similar subject matter meant that she did not have to grapple with conceptualising a totally new project and new material, but could extend her work from one level to another, consolidate and further her cognitive development within the discipline. The activity of the honours project set learning processes in motion which laid the foundations for the masters project. In the internship programme, both honours and masters projects relied on a similar theoretical body of knowledge, and similar research methodology was used. Thus the interns could focus on extending their theoretical knowledge, using the research methodology more effectively and achieving a more complex and demanding project, without having to manage completely new theoretical and conceptual knowledge, new methodological approaches and a new research site. The practice of building one higher degree on the foundation of the work done for a previous higher degree will be picked up again in Chapter 8 in relation to a masters and a doctoral study. I will consider cases where it may be advantageous for students' postgraduate studies to be mediated in this way. SWOP's approach to supervision in the internship programme is discussed in the following section.

7.3.6 Mentoring programme

One of the significant features of the SWOP internship programme is that the interns are not only allocated with supervisors, but there is co-ordination of the mentoring programme. There are clear guidelines about what the role of the mentor is, as well as what the mentor should expect from the intern.

As outlined in an internal document:

The intern/mentor relationship does not only include academic supervision but should initiate the intern into a culture of research by working closely with an academic within an established academic organisation. The mentor will provide the intern with a special insight into the specific area of interest, provide the intern with access to a research network of contacts and experts and assist the intern with important research skills that fall outside the ambit of

the academic coursework or additional training provided by SWOP (SWOP, 2002a:2).

The view of the role of a mentor described above resonates with a socially situated approach to learning. It recognises that much of the knowledge needed to do research is tacitly acquired and mediated by a mentor or supervisor (Delamont *et al*, 2000). The mentor enculturates the intern into a community of practice, initiates the intern into the research field and into a culture of research. She provides the intern with access to research networks, that is to other communities of practice that the intern needs to access at a certain level in order to do the research project as effectively as possible. The mentor is also expected to assess the overall needs that the interns have in terms of research abilities, and to assist them in the acquisition of these abilities. She helps to mediate the process of integration and application of research competencies learned.

The mentors are not paid for their role, but they can get research assistance from the student being mentored, though only for a limited number of hours per week. The assistance has to be research-related work, from which the student can learn. Thus there is some concrete incentive, apart from the satisfaction that mentors get from the mentoring process (KF par. 66-68). This is a further example of the ethos of the RCD programme being implemented in SWOP. The programme is not based on a major injection of funding, but on developing commitment to the values and goals of the project and on the basis of reciprocal relationships.

Pearson and Brew (2002) argue that supervisors need to develop “a repertoire of knowledge and understanding about different aspects of supervisor practice” (*ibid*:146). They add that supervisors need to be able to have critical conversations about supervision with colleagues and students. SWOP provides support for the mentors to assist them with supervisory practice and relationships with interns. This is provided through a mentoring forum, which is run twice a year for mentors to “share their experiences and reflect on difficulties and progress of their mentoring relationships” (SWOP, 2002b:2). Fakier, the executive administrator has individual meetings with the interns, one of the aims of which is to provide a space for them to be able to talk about their relationships with their mentor, if they need to. The mentors also have the opportunity to talk to Fakier about problems they may encounter with the students. Thus there is a structure provided for support of

mentors and discussion of supervision issues, and there is space for one-on-one conversations about particular mentoring relationships.

7.3.7 Role of the executive administrator

The role that the executive administrator of SWOP, Khayaat Fakier, plays in the internship programme is crucial in helping to provide a supportive environment, which can meet the needs of the interns apart from narrowly-defined academic needs. I have referred to the co-ordination role that she plays in the internship and mentoring programme.

Fakier also helps the interns to develop the *organisational* and *financial* skills needed to do research. She said, “just like the mentor mentors the intern into an academic environment, I would like to think that my role mentors the intern into a research environment and into the whole process of doing research” (KF par. 36). Her role in the broader SWOP organisation includes tasks like project management, project co-ordination and funding proposal writing. She said:

... each intern’s project is dealt with as a fully fledged project. Because it is smaller and does not necessarily entail a lot of money, does not mean that the basic way of how the project is done is different from other projects. So just like any other research project would go through the different phases of planning, implementation and evaluation etc, so would the intern’s project, and in that sense we would sit down and plan every project ... (KF par. 36)

She distinguishes between the role of an academic mentor in relation to a student’s research project and her role. An intern would discuss with her supervisor what types of data collection she would need to do to address her research question. Fakier’s role would be to help the intern to think through the practical aspects of how to go about doing the research. She said:

... we will have a discussion on “you need so many interviews, how are we going to phase them?, how are we going to go about setting it up and where is your research taking place?, how are you going to get there?, how are we going to pay for this?”, for example. “How much time do you need?, how will you fit this in into your planning, seeing that you have lectures to go to? - that kind of thing, and most of the tasks will be done by the intern but my role will be in terms of guiding the student on how best to do this (KF par. 36).

Fakier's description of the type of dialogue she would have with an intern can be analysed as a process of cognitive apprenticeship (Collins *et al.*, 1989), in that it involves scaffolding, coaching and modelling of expert practice. In the extract above, Fakier is externalising cognitive processes that are usually internal, through the activity of joint planning and dialogue with the interns. She plays a mentoring role, coaching the students in the organisational and financial aspects of doing research. She also talks about trying to develop the interpersonal abilities of the interns, to assist them to negotiate access to their research sites, and interact with research informants (KF par. 38). Thus through the formal teaching programme, the academic mentoring, peer interaction and coaching in practical aspects of doing research as well as more subtle aspects of interpersonal communication, the programme helps to develop many aspects of the repertoire of knowledge and capacities needed to be a researcher.

I have mentioned in chapters 3 and 6 the need to consider the role of *emotion* in learning (Brockbank and McGill, 1998). The SWOP programme is based on a view of education that considers the student as a whole. It takes into account the socio-economic background that the student comes from, and the particular problems and needs as well as the strengths that arise from this. Fakier plays a pastoral role for the students in that she is concerned with their general wellbeing, and not only their academic work. Through the individual meetings that she has with them, a space is provided for them to discuss any problems that they may have, and she also makes it clear that she is available for them to talk to. She feels that it is important that if the student is experiencing a serious personal problem that the academic mentor knows about it, so that she can understand the student's situation and respond appropriately

Fakier said of herself and Anthea, the previous executive administrator:

We know what kind of pressures there are on black students studying and we both bring that sensitivity into the relationship. There is a sensitivity obviously from the mentors, but I think we bring an additional sensitivity and also an understanding. I mean one particular issue is **money**, the fact that sometimes the parents of interns don't appreciate fully what research is about, about the need for it and the need for postgraduate study. Nine times out of ten our interns are first generation university students and there are certain expectations - there's financial expectations that the intern will, after doing a degree, go out and work and support other siblings to do their studies and there are also other expectations, someone with a degree should be driving a smart

car and postgraduate studies is then a sacrifice that the student has to make, but also there is negotiations at home about studying further, and you know you discuss this with your parents and a decision is made that you will go and do postgraduate studies, but that does not mean that the pressure ends there. Things happen in the family, family circumstances change and so on, and I try to be a support for the intern at a time when it seems that no one else understands (KF par. 34).

A number of the interns or past interns in their interviews referred to difficulties that they had had during their internship and the support and encouragement that they had received from the SWOP staff, particularly from Fakier, Buhlungu and Webster.

Fakier described how she assisted students with problems that they experienced either in their academic programme, or in their relationship with their supervisor.

If a student, for an example, has a problem on a particular course it does not necessarily mean that I would step in and do something about it, its more about imparting skills on how to deal with those problems and to deal with the problems themselves, and also to give an insight into my experience working with academics and my understanding of working with them but it is also providing a space for students to discuss problems that they have (KF par. 22).

Talking about problems between interns and mentors, she said:

... problems arise from a whole range of issues, misunderstandings, different expectations, interns not being aware of the whole academic culture and just different styles of dealing with people, cultural insensitivity and so on ... (KF par. 24).

Interns often find it difficult to discuss problems that they have with their supervisors directly with the supervisor at the outset. Fakier assists the interns to solve the problem themselves, although she says that she would intercede if she felt it were necessary. This is another example of coaching the students in subtle aspects of interpersonal communication. This is particularly valuable since the mentoring relationship plays such a central role in the process of research capacity development. Fakier encourages the students to feel a sense of responsibility and ability to negotiate aspects of the mentoring relationship, and she assists them to develop the resources to be able to do so.

On the one hand, Fakier plays an important role in providing a supportive environment for the interns, in relation to their academic, social, financial and emotional needs. She assists

them to cope with challenges which may pose a threat to their studies in any of these areas. She also plays a role in enculturating students into an academic research environment, sharing tacit knowledge that is needed to become part of this environment and helping them to develop the abilities to be a researcher. She supplements the role of the student's supervisor in helping the student to manage the "process of transition that entails personal investment and risk" (Becher *et al*, 1994:146).

This is not just a case of Fakier being a nurturing and caring individual. It is a fundamental aspect of SWOP's approach to research capacity building policy and is linked to organisational culture. The executive administrator's role in creating a 'holding' environment for the research interns, has been a crucial element in the success of the SWOP internship programme.

7.4 Organisational culture

As discussed in section 4.2 on 'Socialisation', organisational culture in a university has been characterised, according to a functionalist view of culture, as comprising the values, ethos and organisational saga of the university (Clark, 1972, Van Maanen & Schein, 1979, cited in Knight and Trowler, 2001:56). According to this view, new entrants come to learn these values and "re-enact pre-existent recurrent practices, which themselves instantiate taken-for-granted values, attitudes and assumptions" (Knight and Trowler, 2001:56).

Alternative approaches see culture as being dynamic, heterogeneous and constructed as well as enacted (Alvesson, 1993, Grbich, 1998, Tierney, 1997, Knight and Trowler, 2001). Knight and Trowler (2001) describe a HE institution as "an open system, with sets of values, assumptions, recurrent practices and attitudes brought into the daily life of workgroups by the individuals who compose them and influencing in important ways the processes of cultural construction and enactment [and] identity formation ... " (57). Knight and Trowler use the term "workgroups" to refer to localised communities of practice, which they see as "important sites in the acquisition, enactment and creation of culture and knowledgeability" (Trowler and Knight, 2000:28).

Like the university as a whole, workgroups are open natural systems, that is, their members and the context which they work in are subject to influence from cultural, ideological,

technical and other characteristics of environments beyond the group and the organisation. Individuals operating within a workgroup bring with them characteristics from their backgrounds, sets of values, attitudes, assumptions and recurrent practices that may or may not be similar to or compatible with others flowing into the group through its other members (Knight and Trowler, 2001:57).

SWOP has been influenced by the dominant cultures of the university in which it is located, as well as by oppositional streams of culture. It has also been shaped by forces in the broader society, the liberation struggle in South Africa, and trends in the labour movement. Furthermore, it is affected by academic developments in the fields of sociology, Sociology of Work and the social sciences more broadly, both nationally and internationally.

An article by Buhlungu and Metcalfe, reflecting on the SWOP internship programme, identified one of the roles of the programme as to make interns “feel at ease and included in the prevailing intellectual environment” of the University of the Witwatersrand (Buhlungu and Metcalfe, 2001:81). The history of the university as a historically white university in the apartheid context has left a legacy where most of the academics are still white and black students often feel alienated. Thus the authors call for an organisational culture at SWOP which enculturates the interns into the dominant intellectual environment, but where “cultural and racial diversity issues have to be fore-grounded and changes have to be made to the way things are usually done and communicated” (*ibid*). They also stress the need for SWOP “to operate in a spirit of openness, which makes it possible for the interns to influence the culture of the organisation” (*ibid*). So while recognising the need to enculturate black students into the dominant intellectual environment, they argue that SWOP needs to involve itself in the process of transformation of organisational culture, starting with its own practices.

In my discussion of organisational culture, I focus mainly on three of the individuals, whom I interviewed, who have shaped the culture of the research unit. These are Eddie

Webster, Khayaat Fakier and Anthea Metcalfe, the previous executive administrator of SWOP.³⁰

I have mentioned Eddie Webster's interest in the role of the labour movement in transforming society, and his work for change in South Africa. Webster is deeply committed to capacity building, and to helping people to fulfil their potential. When I interviewed him he reprimanded me for not asking him what made him so interested in **mentoring**. He said "for me the core idea behind education ... is the development of potential ... and I think for me teaching is more of a vocation than a career" (EW 2 par. 91). He mentioned that both of his parents were teachers at an African high school in the Eastern Cape. His involvement in mentoring was not just the development of the internship programme in the 1990s, but was part of a broader approach to philosophy of education that carried a set of guiding values for him (EW 2 par. 91). Webster's emphasis on the development of potential of individuals within a vision of social transformation forms a central thread in SWOP's 'pedagogy of possibility' (Simon, 1992).

I was struck by the reflections of the current and previous executive administrators of SWOP on the personality and role of Webster in the organisation. Khayaat Fakier and Anthea Metcalfe both portrayed Webster as a leader who picked up on the interest and abilities of staff members and encouraged them to take ownership of new and challenging areas. Metcalfe said of Webster, "you show a little interest – before you know it the project's on your lap" (AM 6/9/02).

When Webster described the inception of the internship programme, he acknowledged the role of Anthea Metcalfe in developing the programme.

But the person who made it something serious was Anthea Metcalfe, who at the time was the executive administrator - is a trained schoolteacher, had taught in the Cape flats, so she had a commitment to capacity building and education, and she ran with it. So it depended really on that commitment (EW 2 par. 31).

³⁰ Undoubtedly, there are other individuals who have played a formative role in SWOP, for example, Buhlungu, the deputy director. However, my discussion focuses on the three individuals in management roles, whom I interviewed specifically about SWOP.

A committed approach to the programme was sustained by Fakier, the current executive administrator, whose role extends far beyond administration, as discussed above in 7.3.7. She too has made a substantial contribution to shaping the internship programme, and to building a mentoring culture in the research unit. Her commitment to capacity building is rooted in her own experience of being a black working-class student in the 1980s. Referring to herself and Anthea Metcalfe, she says, “We were both students in the ’80s as well. We know what kind of pressures there are on black students studying and we both bring that sensitivity into the relationship” (Fakier par. 34). This also applies to Buhlungu, the academic co-ordinator of the mentoring programme.

Fakier sees capacity building as being a core part of SWOP’s work, which all staff are involved in. She says:

... capacity building is part of our mission, so in that sense - I don’t want to put it too crudely, but in that sense it is not negotiable ... the understanding in SWOP is that capacity building is an integral part of the unit’s mission and **everyone** - Shamien our Secretary - she’s involved in the internship programme as well, and so is everyone else within SWOP ... (Fakier par. 68)

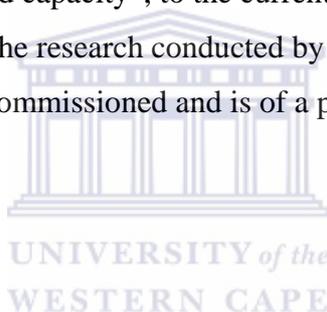
I have woven together extracts from narratives of three staff members of SWOP who have been central to the development of the internship programme, to show how individuals contribute to the culture of an organisation, and build on the work of others. In SWOP a culture has developed which values capacity building, where individuals are given responsibility to shape the roles that they play and to contribute to building the organisation. The organisational culture as well as the structures that have been developed for interaction and communication, have contributed to an organisational space that is highly conducive to research capacity development. This is certainly the case at the honours and masters level which is the focus of the internship programme. Webster also acknowledges the value of the contribution that postgraduate students make to the research culture of an organisation by bringing new perspectives and engaging with experienced researchers who are immersed in the disciplinary field.

Knight and Trowler (2001) use the metaphor of a river to capture the organic and fluid nature of organisational culture (57). I have depicted SWOP as a smooth-flowing river,

without major conflict of flow. However, I need to acknowledge that there are tensions in all organisations and there may be undercurrents that I have missed.

7.5 Epistemological dimensions of RCD in SWOP

I have discussed how SWOP originated during a period of growth and increasing militancy of the trade union movement. It was also a time of unprecedented co-ordinated anti-apartheid struggle waged by organisations in various sectors of society. SWOP was formed out of recognition of the need for sociological research to contribute to addressing problems and possibilities arising out of the workplace and the labour movement. Early in his career, Webster had identified a need to draw on academic theory to conceptualise and contribute to transformation of society. There has been a transition in the identity of SWOP from the early stages of its history, when its main goal was to “do research that helped the black labour movement build capacity”, to the current period, where it was estimated by Webster that about 80% of the research conducted by SWOP was “self-initiated basic research and about 20% is commissioned and is of a problem-solving kind” (EW email 31/08/06).



In this section:

1. I briefly discuss the discipline of sociology internationally, and in South Africa, and characterise it as a discipline with permeable boundaries.
2. I discuss the modes of research conducted by SWOP in terms of the purpose of the types of research and their location on a continuum from basic to applied research.
3. I consider the how these dimensions of SWOP’s field of research affect research capacity development in the centre.
4. I use these epistemological lenses to analyse the narrative of Thabo Sephiri’s path of development through his honours and masters projects as a SWOP intern, and then his work experience at a research NGO.

7.5.1 SWOP’s location within the discipline of sociology

The field of Sociology of Work is a specialism that has developed internationally as a sub-discipline of sociology in response to specific needs of governments, management in

industry and trade unions, and in response to particular challenges in society posed by globalisation. Sociology itself is a discipline that is relatively new, having received recognition as an academic discipline in about the 1950s (in Britain), and is one that is informed by different disciplinary perspectives.

Tracing the development of sociology in Britain, Becher *et al* (1994) argue that for a long time the empiricist, quantitative tradition was dominant. “Having rejected positivist conceptions of knowledge and the concept of objectivity, they [sociologists] have found in reflexivity a more productive approach to the study of society” (*ibid*:76). This has encouraged links with philosophical, literary and cultural theory. Sociologists draw on a wide range of disciplinary perspectives, and are informed by a wide range of cross-cutting perspectives such as Marxism, critical theory, feminism and a range of postmodernist theories. At the same time sociologists work at the boundaries between their own discipline and other disciplines (*ibid*).

In terms of Bernstein’s theory of *classification* and *framing* (Bernstein, 1975) (discussed in 3.5.3), sociology can be seen as a discipline with weak classification. Its boundaries with other disciplines are flexible and permeable, as conveyed so clearly by Becher *et al* (1994) above. I referred to a tighter and a looser concept of multidisciplinary. The tighter concept refers to collaboration between different disciplines, using their own disciplinary frameworks and methods (Gibbons *et al*, 1994, Chachage, 1999, in Webster and Fakier, 2000, Delamont *et al*, 2000). The term ‘multidisciplinary’ is also used more loosely to refer to knowledge production and dissemination, within the context of a discipline like sociology. Sociology has weak boundaries, where academics draw on various disciplinary perspectives and theoretical approaches *within the framework of their discipline*, or where they work at the boundaries of their discipline. SWOP is involved in research in both of these modes of multidisciplinary.

Involvement in application-oriented research increases the potential for multidisciplinary, in both senses of the word. An example of the tighter form of multidisciplinary is where a problem in occupational health requires collaborative research from sociologists and medical researchers, each participating from their own disciplinary perspective. An example of a looser version of multidisciplinary is the development of a specialised area of health sciences, which draws on social science theory and methods of inquiry to address

knowledge needs of community health practice. In this case there is a certain extent of integration of knowledge from both disciplinary areas. The research area may develop in terms of academic quality, with reference to an international body of knowledge in this speciality. It exists at the overlapping boundaries of two disciplines, and could be located in a health Science faculty or a social science faculty.

7.5.2 Modes of research on a continuum from basic to applied research

This section is framed by the transition in identity of SWOP from its inception to 2002. Initially SWOP's identity was constructed largely in terms of responsiveness to societal needs, more specifically the needs of the burgeoning labour movement and demands for improving workplace conditions of workers. It has grown into an established research unit conducting high quality, cutting-edge research within the international disciplinary specialism of Sociology of Work.

There are elements of continuity and change in the modes of research conducted, both by SWOP and research units in related areas. Ian Macun described the research unit doing an "incredible range" of work, including consultancy-based research on demand, applied and pure research. He pointed to a similar trend in two other labour research units in which he had worked. He described much of the work of the units as "providing information for key stakeholders, trade unions in most cases" (IM par. 9). There "was always a strong emphasis, in both those units, on applied work, responding to requests of trade unions, and then at the same time, ongoing, pure research projects that were defined by the units" (IM par. 9).

This supports Cooper's findings about the range of types of research undertaken by research units (Cooper, 2004). Macun's understanding of the modes of research conducted in the context of the research units are illuminating for understanding these concepts within the context of an application-oriented research unit which is located at a university.

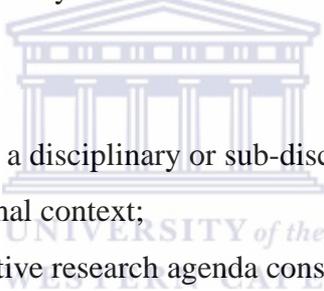
Grappling for a term to describe what I have subsequently labelled as 'basic' research, he characterised this form of research in terms of a number of key factors:

I suppose pure is maybe the wrong word, but ... it would be more **academic** research in the sense that you identify areas or questions that are important in

the field in which one is working, whether it's occupational health or labour relations or the Sociology of Work ... and to pursue a research agenda, the outcome of which is academic in the sense that it leads to publications, it contributes to knowledge and the understanding of certain issues in the academic community (IM par. 55).

While they “were always ... looking at sharing that knowledge with others outside the academic environment”, the *key* focus was sharing the information with the academic community, in the form of academic output through journal publications and conferences. He argued that research with a primarily academic orientation went beyond investigating “interest-driven questions or topics or experiences in the real world that needs one to shed light on it”. It involved “grappling with the ... bigger issues around the area in which one is working and engaging with the theory and evolving state of knowledge about the area” (IM par. 55).

Thus according to Macun, the key characteristics of this form of basic research are the following:

- 
- It is orientated towards a disciplinary or sub-disciplinary field of inquiry, within a national and international context;
 - It is driven by a pro-active research agenda constructed with reference to those contexts;
 - It contributes to fundamental knowledge and understanding of issues within the academic community;
 - It is disseminated through academic outputs.

Macun referred to research which was located at the extreme end of the application-oriented spectrum as “pure applied” research.³¹ This research was “client-driven or demand-driven from external networks that one could be involved in, either as an individual researcher or in a research group setting” (IM par. 63). An example of this type of research was a project which aimed to advise Spoornet (a rail transport provider which was being privatised), on how to determine staffing levels in specific provinces. Thus it was a project with a specific, localised goal, and with no element of unlocking fundamental knowledge.

³¹ Macun uses ‘pure applied’ to mean extremely applied. Here ‘pure’ does not refer to disciplinary knowledge which has not been applied.

Involvement in pure applied research played a role in his overall development of research capacity. In the Spoornet project, the main stakeholders had diametrically opposed interests. Management's agenda was to improve the way work was being done and to try to reduce staffing levels in the depots, and the workers were trying to defend their jobs. Thus he had to face these challenges in formulating the research project and implementing it within a participatory framework. He said:

... sometimes it's just not possible to satisfy all interests and to formulate research in those situations is ... difficult. I mean not only d'you have to formulate the research, get agreement to your methodology, and the way you're going to do it, but it requires a participatory way of working, that's quite unique to applied research and I think that's an important part of that research experience (IM par. 51).

The abilities need to work within a participatory framework, form part of the repertoire of competencies that a researcher, in an application-oriented context, needs to develop. Within the microcosm of a project such as this, researchers need to confront conflict of values and interests between different social worlds, negotiate between these worlds, within a particular political context. At the same time she needs to provide research-based evidence that can help to address the problem.

A thorough external evaluation of SWOP was conducted in 1999, in terms of the conditions of funding by the NRF. A self-criticism expressed by SWOP staff generally was that "the unit was beginning to be dictated by events – requests to engage in interesting and lucrative short-term research – rather than being guided by a well-considered strategy" (SWOP, 2002a:2) The evaluator recommended that SWOP set itself the target of becoming a world class research centre. In developing a strategy for achieving this SWOP formulated a research agenda which centred around "developing a core long term research programme on work and social citizenship in a globalising Southern Africa" (SWOP, 2002a:24).

I conclude this section with two comments about the implications of the modes of research conducted at SWOP for research capacity development. Webster conceptualises the relationship between research (applied and basic) and post-graduate training as a synergy which is mutually reinforcing. The opportunities which research centres provide for students to become involved in 'real world' research and the potential benefits of this were

discussed in section 7.2.3.

At the same time, interns are expected to produce high quality academic research in their projects, and are supported in this process. The way that the internship programme is structured and located, with its overlap with the Sociology postgraduate programme, as well as the continuity in the interns' process of disciplinary socialisation from their undergraduate through to postgraduate education, is conducive to the interns' development of capacity as researchers in the field of Sociology of Work.

Through SWOP's relative stability in the university, its close link to the academic heartlands of the university, as well as its own developing identity as a world-class research centre in the field of Sociology of Work, it has significant potential to provide long-term pedagogic stability for training future generations of researchers in the field. SWOP's introduction of a fulltime programme for doctoral students in 2006 (KF email 02/08/06) was another indication of SWOP's movement in this direction.

7.5.3 Thabo Sephiri: from intern to researcher

In this section I trace Thabo Sephiri's path of development through his honours and masters projects in his internship, and the early stages of his work experience in a research NGO. Through analysis of the extract, I unpack the elements of capacity that developed and the impact of his internship at SWOP on his development.

Sephiri did his honours project, as a SWOP intern, on the role of white intellectuals in the trade union movement in South Africa, and subsequently did his masters project on black intellectuals in the trade union movement from the 1980s to the 1990s. Sephiri's methodology was to analyse the articles in the *South African Labour Bulletin (SALB)*, using it as his main source of data. He supplemented this with interviews with a number of people who had edited the SALB over the years. He drew on international and South African sociological literature to inform his study. He mentioned using South African literature on the labour movement to provide a background to the study, and for biographical information about individuals.

He said that his starting point was “to look at the *South African Labour Bulletin* as an intellectual project of white intellectuals, which they used to exchange ideas and material” (TS par. 19). He read through all of the volumes of SALB looking at the way in which the authors reported on labour issues, the type of issues that they dealt with and the changes and trends over the years. He identified trends which related to the broader political changes in the country, particularly concerning the labour movement. During the 1970s the SALB was largely dominated by white contributors, but in the 1980s “more and more black trade union leaders [were] contributing articles and ideas on what direction should the labour movement take” (TS par. 21). Sephiri decided to do his masters project on the role of black intellectuals in the labour movement, and was able to build on the work that he had done in his Honours project.

Sephiri said that reading through all the issues of SALB was “an enormous task” (TS par. 159). At the beginning he wasn’t sure what to look for, and he had to read through “a decade of Labour Bulletin” to identify a trend (TS par. 159). The pace was extremely slow in the beginning and the analysis was detailed and sometimes difficult for him to relate to. He found it difficult because the kinds of articles changed over time, so “what you thought you were looking for, it’s no longer there, it’s something else” (TS par. 161). He joked about how the earlier design and layout of the SALB was unpleasant and the quality of the paper of the earlier issues affected his sinuses. “But as you read and as you go along, the quality of the paper improves and your condition also improves. So it became better and better” (TS par. 159). Although Sephiri was joking about the paper, it was also a metaphor for the emerging clarity of his reading and analysis.

Sephiri said that while reading, he was looking for common trends in political thinking that united groups of contributors, and also, where there was conflict, what the lines of conflict were. He also looked at how they were writing and what audience was for which they were writing. When he interviewed the editors from the periods of SALB that he was analysing, he got more insight into what their aims and perceptions were at the time, and also how they reflected back on what they had been trying to do. “... in some instances ... it’s like they were laughing at themselves about their ideas ...” (TS par. 161). In Sephiri’s masters project on black intellectuals he said he had to shift his own view of intellectuals, which was that they were educated professionals, to include intellectuals who had less than a matric qualification. He used literature to categorise types of intellectuals, for example,

“organic intellectual” and “union-made intellectual” and created some of his own categories (TS par. 21).

The competencies that Sephiri developed from doing his honours and masters projects as an intern in SWOP, were general competencies needed to do qualitative research in the social sciences. These were: the ability to analyse trends, in this case in the writing of contributors to the SALB; to locate these in relation to broader societal changes in a particular arena; and triangulate different sources of data – such as written documents, and interviews with the editors. Furthermore, he needed to develop a competence in doing historical research based on written texts, a research approach commonly used in social science studies. He drew on literature to categorise his data, and also developed his own analytical categories arising out of the data. Through engagement in these projects, there was a continuation and deepening of his socialisation into the academic cultures and ways of seeing within the social sciences, and sociology in particular.

His location within a centre in the field of Sociology of Work influenced his choice of topic, and the particular sub-disciplinary perspectives that were brought to the study by Sephiri in negotiation with his mentor. The research was not conducted with a specific application in mind. It was a project of mobilising sociological theory and methodology in the activity of analysing social and historical processes. Through this study he gained insight about the various social groupings that were represented and discussed in the SALB over the years that he did his study – the various trade unions, COSATU and related organisations. In his masters study he focused on the National Union of Metalworkers of South Africa (NUMSA) and through this, he learned about the trade union, and also made contact with the union.

When Sephiri had finished his masters degree, he became employed at FAFO, a Norwegian Social Science Research Institute with a branch in South Africa. The first project that he was involved in was a study of the capital equipment sector for NUMSA. Capital equipment is heavy-duty machinery, such as trucks, forklifts and earthmoving machinery used in the construction, engineering and mining industries. At first glance there seems to be little linking this with research on the role of intellectuals. However, an important link between this commissioned project and his masters project was NUMSA. He said, “one of the reasons I think I was taken on board was because I did my project,

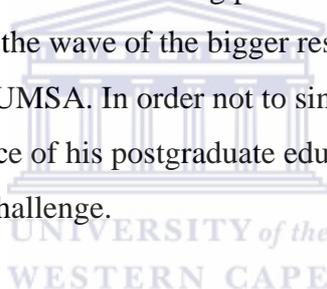
using NUMSA as my case study for intellectuals, and that project was also for NUMSA, and I fit into the programme and the kind of research that they wanted” (TS par. 29). Sefhiri was familiar with the history of NUMSA, had made contact with members of NUMSA, and could demonstrate that he understood their concerns and needs.

Sefhiri found the project extremely challenging at a number of levels. He had moved from the sheltered space of legitimate peripheral participation at SWOP (Lave and Wenger, 1991, Wenger, 1998). As an intern he had been in a supportive mentoring relationship, and in the SWOP communities of practice there was a level of social tolerance for error, which is inevitable as part of the learning process. He had taken a role as a researcher employed in an organisation and he had to deliver. At a social- intellectual level, Sefhiri felt challenged. He was part of a team of four researchers who were investigating different sectors within the metal and engineering industry. They went to reference group meetings every month to report on the research to representatives from NUMSA. He said “those people are very sharp and they ask very deep questions and very critical questions,” (TS par. 45). One of the researchers on the team was a SWOP researcher who had been one of his lecturers. He felt daunted by having to be “on par” with his ex-lecturer “in terms of doing the work and being subjected to the same questions” (TS par. 45).

Sefhiri said “it was *the* most challenging project that I ever did. It was my first project but I don’t think I have done any one that matched the standard” (TS par. 45). He said that he had to ask himself “some serious questions as to whether do I really want to be a researcher” (TS par. 45). There are elements of similarity of this aspect of his narrative with the extract from Thembela Kepe’s narrative, discussed in 6.3. Like Kepe, Sefhiri initially experienced a ‘double-bind’ situation, which he had to overcome in order to be able to do the research (Engeström, 1987). The research project was conceptually challenging and the subject of research was new and unfamiliar. It differed from the types of research that he had previously done. In his narrative, Sefhiri did not go into details about the nature of the conceptual challenge of the project. However, my interpretation from what he did say is that he needed to grasp the overall concept of the bigger project. Although he was involved in the conceptualisation of the bigger project, it was led by more experienced researchers on the team. He also needed to construct the problem of his own aspect of the project (in Schön’s sense of problem-setting), in order for him to be able to do the research (Schön, 1983). (See section 3.4.3.1 on ‘Learning by expanding ...’) However,

there was a lack of fit between the demands of the research problem, and his own integrated knowledge and competence. Through practice over the course of the project, he was able to mobilise the resources to do the research. He said that after he completed the project, he felt gratified, and it confirmed that he wanted to be a researcher at that stage of his career, and also confirmed his commitment to doing research for labour and on labour issues. Integral to the process of overcoming the challenges of the project, was a simultaneous process of developing more cognitive awareness, control and flexibility. This experience was a landmark in his growth of competence, confidence and shift to forming an identity as a professional researcher in the field of labour issues.

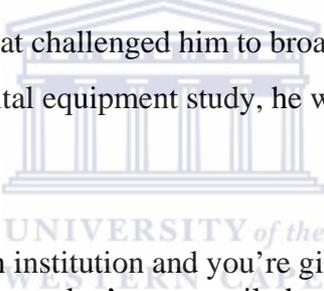
Sephiri does not go into details about how he was able to overcome the double-bind to be able to do the problem. One could investigate this in terms of whether his involvement in a collective process facilitated the shift (Engeström, 1987). In this case the nature of the collective process was not an overt mentoring process as in Kepe's narrative. Rather he was carried and buffeted by the wave of the bigger research project, and the critical engagement of the client, NUMSA. In order not to sink, he had to swim. However my main focus is on the influence of his postgraduate education on his ability to mobilise the resources to overcome the challenge.



A number of writers argue that mode 2 knowledge production depends upon a sound mode 1 disciplinary base (Jacob, 2000, Muller, 2000, Usher, R, 2002, in Enders and de Weert, 2004). In Sephiri's postgraduate studies he did not learn a range of competencies for doing applied research through the research projects that he did. He developed broad competencies necessary for social science research as well as a building a foundation of disciplinary knowledge in sociology. However, the social context in which he did his postgraduate studies played an important role in preparing him for involvement in the type of application-oriented work that is prevalent in the organisations outside of the university which were potential employers. He was located in the community of practice of SWOP and also gained access to networks of researchers and practitioners in the field. Through this he gained insight into the organisational and political, and to some extent epistemological dynamics in the broader context that SWOP was situated in. When required to do applied research for clients and stakeholders in a work environment, he was able to develop the particular abilities necessary, based on having a general orientation to the bigger picture of the field and the type of contexts that he was likely to find himself in.

The findings of this thesis strongly support Henkel's argument for a combination of introducing more system and structure into research education as well as creating a heightened awareness among students and supervisors of the range and variety of learning required (Henkel, 2004). Furthermore, the SWOP internship programme is an example of an RCD initiative that achieves both of these objectives. The narratives of staff and current and past students at SWOP indicated that SWOP provided a framework in which students could be made aware of the different contexts in which they were "pursuing their individual research pathways, of the openings that these provide, of the boundaries they may cross and of the conflicts of value and interest they entail" (Henkel, 2004:180). This provided them with resources with which to meet the demands of future work contexts within a changing world of research.

Sephiri found that over a period of time at FAFO he had been involved in a variety of different research projects that challenged him to broaden and diversify his knowledge and abilities. Apart from the capital equipment study, he worked on two research projects on HIV and AIDS. He said:



You get into a research institution and you're given a project to do on something that you ... you don't necessarily have any background on, but if you've done research before, that's the challenge to find and to develop new knowledge and new concepts to explain the different - . So that had its own challenges as well. Hence I'm saying that I'm becoming some sort of an all-rounder (TS par. 37).

In this way Sephiri demonstrated what Castells calls a "self-programmable" ability. Castells argues that the new global economy requires individuals who have "the built-in capacity to generate value through innovation and information", and have the ability to reconstruct themselves throughout their careers on the basis of this education and information (Castells, 2001). Sephiri developed an ability to take on a project in an area that was new to him, and work out what information was required, access it, and develop a conceptual framework to address the research problem. On the one hand he was able to apply generic research abilities to a new context. On the other hand, he was able to recognise when the social science knowledge and theoretical frameworks that he had built up at university were not sufficient to conduct research on a particular project in the way that he would have liked to. This happened when he was working on the project on the

capital equipment sector for NUMSA. He realised that he would have been able to provide a more in-depth theoretical analysis of the development of the sector if he had had a background in development economics.

In response to this knowledge gap, Sephiri was motivated to register for a masters in Management Research (a second masters' degree). He said in relation to the project:

... even if I successfully gathered that information that would be required - employment trends, productivity, you know those kinds of things, there was no in-depth theoretical analysis of the development of that sector, and that's what I'm trying to do in my MA (TS par. 39).

Many research organisations outside of universities are involved in conducting commissioned research, which are not necessarily undergirded by theory. Some young researchers employed in these organisations felt their growth was being inhibited by the frequency of projects, "where it's just tender after tender, research after research" (TL par. 172). However, Sephiri demonstrated his agency in facilitating his own development, through his recognition of his need for more theoretical knowledge and methods of analysis, and the commitment and effort that he exerted in order to acquire this knowledge.

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At the time of the interview, Sephiri was planning to start a PhD in a year or two, but was considering carefully what to do it on. Some of the options that he was considering were to pursue and develop one of the research areas from his work experience, or to do a project combining sociology with philosophy.

I have observed that disciplinary hybridity can result from real-world demands for knowledge. It also arises out of academic work between the boundaries of disciplines arising out of curiosity and desire for knowledge. In Sephiri's narrative he refers to both of these sources of boundary crossing in Sociology. In his work at FAFO, he was motivated by his involvement in research that was driven by the knowledge needs of a trade union, to extend his analytical abilities by studying development economics. He has also been motivated by his own interest and desire for knowledge to do research work at the boundaries between sociology and philosophy.

7.6 Conclusion

Insights arising out of the case study of the Sociology of Work Unit (SWOP) can be grouped in terms of two main arguments. The first argument is about the structure and support that SWOP provides in its internship programme. This has been investigated through the lenses of social and organisational dimensions of research capacity development. The second argument is that SWOP's location and relative stability, combined with its approach to research, can build an environment of long-term pedagogical continuity for postgraduate education in its research field.

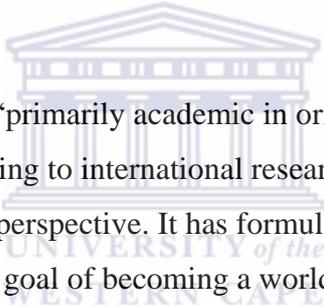
The first argument that I have developed is that the effectiveness of SWOP's model of research capacity building is facilitated by the structured and supportive environment that it provides for the interns. SWOP provides a broad community of practice for the interns as well as access to other academic communities and civil society groupings. Through socialisation into the communities of SWOP, interns begin to develop an identity as a researcher in the field of Sociology of Work, while building on their foundation of disciplinary knowledge, and developing competence to do research. The internship programme creates a community of peers amongst the interns, a structured location for legitimate peripheral participation, which works as a supportive learning environment. Mediation of learning takes place through a number of means, including individual mentoring, structured peer interaction, and the way in which honours and masters projects are structured.

The internship programme is run on a low budget, and creative means are employed to provide the supportive structure and mentoring needed. These include a distributed form of mentoring, where mentoring is provided by various staff in the unit, and a co-ordinated programme of academic supervision, where supervisors are provided with training and support. Furthermore, SWOP strives to provide some of the qualitative elements of critical mass in the research environment, although the programme is on a small-scale.

I have argued that SWOP's approach to RCD constitutes a 'project of possibility' (Simon, 1992), setting up social forms which open up possibility for the realisation of capacities of the students. The socio-economic backgrounds of the interns are taken into account. Interns are black and working-class or from rural backgrounds with a slight majority of women.

There is awareness of the need to provide students with emotional and practical support, in the demanding process of transition that they are making. SWOP strives to build an organisation culture that enabling of transformation processes and a nurturing environment for realising potential.

The second argument is that SWOP has positioned itself in relation to the university, and through its close relationship to the Sociology department, in such a way that enables an effective research capacity development programme in the long term. SWOP has developed a relatively secure position in the university, and receives more financial support from the university than other research centres in this study. Through its close relationship to the Sociology department and the School of Social Sciences, and through the location of the internship programme both within SWOP, and the Sociology department, SWOP has further strengthened its relationship to the ‘academic heartland’ (Clark, 1998).



SWOP has defined itself as “primarily academic in orientation” (SWOP, 2002a) and has committed itself to contributing to international research within the field of Sociology of Work from a South African perspective. It has formulated a proactive research agenda in order to achieve a long-term goal of becoming a world-class research centre. At the same time, SWOP has retained its involvement with civil society organisations and other stakeholders who have interests in SWOP’s programme of knowledge production, and its graduates. Underlying SWOP’s programme is a vision of research excellence that is inextricably linked with teaching, and particularly postgraduate education. The combination of long-term stability, sustainability, integration with the academic heartland, and strengthening of SWOP’s location in an international field of research, has the effect of building long-term pedagogic continuity for developing new generations of researchers in the field of Sociology of Work.

I have defined sociology as a discipline, with permeable boundaries, but nevertheless, it provides a primary discipline for socialisation of postgraduate students and researchers. The individuals interviewed in this study were essentially engaged in what I have referred to as a steady stream of socialisation and identity formation.

The two other research centres in this study are located in multidisciplinary research fields. Socialisation of researchers and postgraduate students within the multidisciplinary fields of these centres is one of the areas of inquiry that will be pursued in the following two case studies.



CHAPTER EIGHT: PROGRAMME FOR LAND AND AGRARIAN STUDIES (PLAAS)

8.1 Introduction

The Programme for Land and Agrarian Studies (PLAAS) is a research centre located at the University of the Western Cape (UWC). The field of Land and Agrarian Studies is a focus area within the multidisciplinary field of Development Studies. It is located broadly within the social sciences, although it draws on a number of disciplines and disciplinary fields, including those outside of the social sciences. Thus the selection of PLAAS adds a different epistemological dimension to the study of research capacity development.

The case study on PLAAS differs from the other cases in this study in that I focus mainly on doctoral students and researchers conducting doctorates, while in the other case studies, the focus is mainly on programmes for masters students.

There are also commonalities in the organisational features and epistemological dimensions of knowledge production at PLAAS, compared to the other two research centres. The inclusion of this case study adds to the insights gained into types of context that research centres can provide for RCD.

In this chapter I draw mainly on the narratives of four of the researchers or students interviewed, as well as interviews about RCD in the centre, and annual reports and other documentary evidence. The aim of the analysis, as in the other chapters, is to gain insight into the type of context the centre provides for RCD, through organisational, epistemological and social lenses. Thus attention is paid to the following aspects of PLAAS:

- organisational form and location
- the types of knowledge production conducted
- the models of RCD which have been implemented
- ways in which social relations are structured.

The development paths of the individuals in the study are analysed as they intersect and interact with the context and models of RCD encountered in PLAAS. In analysis of their processes of identity formation as researchers, the following factors are taken into account:

- their socio-economic, educational and disciplinary backgrounds
- individual qualities
- levels of experience and maturity
- ability to proactively shape their own capacity development processes.

8.2 Origin and early development of PLAAS

I introduced the South African historical context, in which the research centres originated, in Chapter 1. Prior to the change to a democratic government there was an urgent need for research to inform the incoming government's policy and planning in the sector of land reform, redistribution and rural development. Furthermore implementation of programmes required rigorous research and there was a need for training of practitioners working in the field, as well as capacity development of researchers. While there were a number of NGOs working in the land sector, there was a gap for an organisation which could respond to these needs in a coordinated way, and could conduct "rigorous academic research with an involvement in the real world of policy and implementation" (BC 2 par 15) . This opportunity was identified by Professor Ben Cousins, who established PLAAS in 1995.

I will briefly outline some relevant details of Cousins' life experiences which have shaped the focus, organisation and forms of knowledge production at PLAAS. Cousins had left South Africa in the early 1970s, after being detained for 5 weeks and charged under the Suppression of Communism Act for involvement in what he termed "basically ... student political activities" (BC 2 par 5). He had been studying Town and Regional Planning, but dropped the course before completing it. He studied Horticulture in England, worked in Swaziland teaching Agriculture at high school, and then helped set up an agricultural training centre for school leavers. He then moved to Zimbabwe and worked in the extension service of the Department of Agriculture, writing training courses.

Cousins then registered for an MPhil at the University of Zimbabwe in 1986, and chose to do his thesis on the management of communal grazing. He was located at the Centre for

Applied Social Sciences (CASS) which was a centre of excellence in Africa for applied social science research. He raised funding for his research project and was employed at the university to conduct the research, which was on the same subject as his thesis. He upgraded the MPhil to a PhD, which he completed after his return to South Africa. When he came back to South Africa in 1991, he was employed as a lecturer in Anthropology at the University of the Western Cape (UWC), and became involved in policy debates and research on land reform in South Africa.

Cousin's doctoral study was on land tenure and management of common property resources, specifically communal grazing resources. He chose the topic for its relevance to the policy domain in Zimbabwe, in South Africa and more broadly in Africa. Cousins said that right from the beginning the research that he did:

... was only partially academic in character. It was very much connecting to the real world of policy and programme implementation and so on. And basically, I've continued to try and combine serious, rigorous academic research with an involvement in the real world of policy and implementation and have ... one foot in the ivory [tower] and one foot in the real world, and ... this background, this particular history of mine has very much influenced how I have conceived of PLAAS and the kinds of models of researcher training which I took into PLAAS (BC 2 par. 15).

While teaching in Anthropology at UWC and doing a number of consultancy projects in land reform, Cousins began to envisage a centre at the university that could do applied social science research – similar to CASS at the University of Zimbabwe. Cousins made contact with the director of the new School of Government being established at UWC. The School of Government had been established in 1993 as part of a broad initiative to meet the education and training challenges of a post-apartheid society. It aimed to provide professional and academic training for the public sector, for NGOs, trade unions and related organisations. Its purpose was also to engage in research, consultancy and policy formulation activities (PLAAS, 2000). The centre envisaged by Cousins was identified as a suitable programme to become part of the School.

In 1995 Cousins was seconded from the Anthropology department in order to establish PLAAS as a centre in the School of Government. He received a grant of \$150 000 from the Ford Foundation as “seed money” for the first two years. Cousins began to raise funds for

research projects and recruit researchers to do them. In the early proposals, the vision for PLAAS was to respond to the following needs that were identified. Firstly, there was a need for policy-relevant, rigorous academic research on issues to do with land reform, on rural livelihoods, rural development and institutional restructuring. Secondly, there was a dearth of black social scientists in the sector, and thirdly, there was a need for training of people working within the sector of land reform.

Cousins said that:

the idea of PLAAS was to respond to those needs by creating an applied social science research centre who would train up a new cadre of black social scientists to work in the centre, but also to begin to work closely with government and NGOs in providing training, and I suppose that at the back of my mind was the idea of an independent centre, who would monitor and evaluate the process of land reform by working closely with others, would be independent and able to critically assess progress (BC 2 par. 23).

The unit expanded rapidly and by 2003 had become a "leading centre for research and teaching on land reform within the Southern African region" (PLAAS, 2003:3).

8.3 Organisational aspects of PLAAS

8.3.1 Location, funding, management and sustainability

PLAAS received core funding from the Ford Foundation up until 2003 and was able to raise funding from diverse sources including from overseas donors for collaborative research projects, and from contract work, often for the Department of Land Affairs.

Cousins observed that PLAAS was well placed to raise funds for various projects because it occupied a niche. He said:

There're various other Development studies institutes or centres or rural ... community development programmes, but they all cast their net much wider than we do. Even though PLAAS does cast its net fairly wide, we're talking about land reform and rural poverty and community-based natural resource management. That's already quite a spread of issues, but they are closely related. It's more focused. So in a way we occupy a niche which makes funding not a major problem (BC 2 par. 23).

The Ford Foundation grant covered the salaries of director, core administrative staff and other administrative costs. Apart from office space, no core support was received from the university. In the first five years of the centre's existence, there was "a shortage of already qualified experienced senior staff, who could play a mentoring, supervision role for others at the **same time** because they were all on soft money, producing a lot of research output themselves" (BC 2 par. 35). Two of the researchers, Thembela Kepe and Lungisile Ntsebeza, were doing their PhDs as well as working full-time and did not have much time to take on a mentoring role.

In 2001, the centre reached sufficient funding stability so that it could appoint more senior researchers and develop more coherent management structures.³² PLAAS was able to appoint six senior researchers, all of whom had research, teaching and supervision responsibilities as well as a role in the management of the centre. At that stage it emerged that the management of the centre was too informal, that there was not sufficient clarity in terms of status of staff, fit with university salary scales and policies and procedures. There was a process of tightening up of management structures and procedures.

These changes, along with the sharing of management responsibilities, facilitated a process of reflection on the centre's approach to research capacity development. It is likely that both the employment of more senior researchers in the centre, and the implementation of more formal management structures and procedures in the organisation would have had a beneficial effect on the centre as a context for research capacity development. However, because of the timing of my research, it was too early to observe whether these changes affected RCD in the centre.

Funding stability is one of the conditions for developing pedagogic continuity (Delamont *et al*, 2000), and creating a stable environment for socialisation of researchers. In 2003, Ford Foundation closed their Environment and Development portfolio in Southern Africa and PLAAS had to confront the issue of long-term institutional sustainability. There was recognition that the centre could not rely solely on donor funds for research and needed to get more core support from the University, as well as to raise funds that would be more sustainable (PLAAS, 2003:4).

³² In 2002, PLAAS had 19 staff members – the director, 12 academic staff and 6 administrative staff members. There were 2 fulltime doctoral students (PLAAS, 2002).

In the 2003 School of Government Review, the sustainability of PLAAS' teaching function was seen as being insecure due to a lack of university lecturing posts. There was also a threat to the long-term sustainability of its research programme, due to uncertainty about funding. The authors argued that "research and policy engagement are central to the existence of an institute such as PLAAS, and ensure that its teaching and supervision functions are of a high international standard" (PLAAS, 2003:4). This reflects an underlying conception of a mutually enriching relationship between research and postgraduate teaching.

PLAAS was strongly networked with national and international research contacts. This demonstrates PLAAS' involvement in a research field which was growing both within national and international contexts. According to a PLAAS report, it was beginning to be recognised as playing a leading role in research in the areas of land and agrarian reform and community-based natural resource management in the Southern African region (PLAAS, 2003).

PLAAS had many links with international research bodies and academic departments. In a number of cases, projects were facilitated through partnerships between PLAAS, an international funder and the Department of Land Affairs (DLA). In such cases the funders expected findings of the research to have an impact on rural development programmes implemented by the government, through the involvement of the DLA. Research partnerships of this kind fit into a pattern of strategic research identified by Rip (1997) and Henkel (2004). Some projects were part of international collaborative projects with departments or institutes at overseas universities. An example of this was the 'Entitlement project' conducted with the Institute for Development Studies (IDS) from Sussex University, England, which was influential in Kepe's development, discussed in 6.3. PLAAS' relationship with several Norwegian universities, which included a scholarship funding agreement, was also particularly significant for the development of doctoral students interviewed in this study.

The University of the Western Cape was originally established under apartheid as a 'university for coloured students'. It grew into one of two 'historically black universities' (HBUs) in South Africa, which for historical reasons achieved a stronger capacity in

teaching and research, particularly focused in certain departments and centres. During the 1980s, UWC became known as a ‘home of the left’, attracting many progressive and radical intellectuals, who stimulated a culture of critical debate. A number of centres were established at UWC which were in opposition to policies of the Nationalist government, and later were involved in work in various spheres aimed at reconstruction. Academically, in the long term, UWC remained focused largely on undergraduate teaching and professional training, with flourishing pockets of research excellence and innovation. This history has influenced the type of context which PLAAS has provided for RCD. The lack of a strong postgraduate culture at UWC has had a significant impact.

At UWC, PLAAS had links with Anthropology and Sociology, which were merged in 1994. One of the doctoral students had a co-supervisor who was an anthropologist and one of the PLAAS researchers was supervising a masters student in Sociology (PLAAS, 2003). PLAAS ran a Postgraduate Diploma and MPhil programme in Land and Agrarian Studies. This was a multidisciplinary programme, taught by PLAAS researchers, lecturers from the History and Economics departments at UWC and other local universities, and the Legal Resources Centre, an NGO involved in legal practice and research. However, in comparison with the other two research centres in this study, the levels of integration between PLAAS and academics from related disciplines at UWC were not strong.

8.3.2 Staff composition and race and gender issues within PLAAS

At PLAAS, there was a high level of awareness about race and gender issues. The following table represents the composition of staff in 2002.

Table 3: Representation of race and gender of PLAAS staff in 2002 (PLAAS, 2002)

	Black			White			Total		Total staff
	Female	Male	Total	Female	Male	Total	Female	Male	
Research staff	1	7	8	1	4	5	2	11	13
Admin staff	5	1	6	0	0	0	5	1	6
Total	6	8	14	1	4	5	7	12	19

In PLAAS 8 out of 13 research staff were black. There was a very high proportion of male researchers (11 out of 13), with a majority of black males. All seven senior researchers, including the director, were male and four were white. In 2001 both Thembela Kepe and Lungisile Ntsebeza, black researchers, had been promoted to the level of senior researchers on the basis of the quality of their work, although they had not yet completed their PhDs. There was a high level of sensitivity about race and gender stereotyping amongst staff and students at PLAAS whom I interviewed. As I understand it, the stereotypes do not necessarily emanate from the research units, but are linked to discourses in society which permeate organisations.

Researchers like Kepe argued for the need to interrogate discourses such as those discussed below and to guard against using them uncritically, and in this way, perpetuating stereotypes. He strongly resented being labelled a “young, emerging, black” researcher, which he felt was part of a post-apartheid discourse, drawn from a reconciliation, affirmative action approach. He said that he and Ntsebeza were in their late ‘30s and ‘40s respectively, and they were not young. According to Kepe, this kind of discourse had been commonly used in funding proposals, for example, the phrase that PLAAS has “young, black, bright researchers”. He had been very outspoken against that for the years that he had been at PLAAS, and gradually that type of language had been discontinued in funding proposals. He argued that if PLAAS was applying for funding and the funders required there to be young, black researchers in the organisation, it was understandable to highlight that aspect of the organisation, but apart from that, it was unnecessary.

The concerns raised by Kepe need to be heard and responded to, and in the case of PLAAS, he has been able to communicate these concerns and make an impact on discourse used in the organisation. As argued by Kepe, it is patronising to assume that all black researchers have a deficit in capability and need special treatment. Furthermore, researchers find it patronising when they perceive race or gender composition being used to promote the organisation where they are located, as if it is the numbers that matter more than the quality of research that they are doing. However in terms of research capacity development, one has to recognise that there are disadvantages that researchers from black working-class or rural backgrounds have experienced, and there are particular issues which women face, which are likely to make them more in need of a supportive and structured learning environment. One should not go to the other extreme and ignore these differences,

but one needs to be aware of them in order to address the needs of researchers from disadvantaged backgrounds, and achieve transformation of research organisations in the long run.

In PLAAS there has been a gender imbalance since the beginning of the project with more male researchers and more female administrators (BC 3 par. 50). Cousins said that they had identified it as an issue that needed to be addressed. Their affirmative action policy tended to emphasise, firstly employing black researchers, and secondly also taking gender into consideration. However, it had been difficult to recruit many women to work on rural or land issues. Possible reasons for this were put forward by Cousins:

... the conditions of the fieldwork make it not easy - long-distance driving, lack of security in the field, possibilities of harassment, just generally being out there and you're on your own and you have to cope. It's not that easy (BC 3 par. 52).

The difficulties of fieldwork experienced by Buyiswa Maseko (a doctoral student, whose story is discussed in 8.4.2.1) supported Cousins' view expressed above (BM par. 162). Maseko pointed to a pattern of a number of young female researchers failing in PLAAS. To her this indicated a failure in the organisation to accommodate and develop women. Cousins acknowledged that there were a number of women researchers who had worked at PLAAS and had had difficulties, and said that they were trying to address this issue. However, he argued it was not necessarily only a gendered problem:

... its not totally biased to say that we've tried to appoint our researchers to difficult jobs, the failure rate is to some extent inevitable. I think it's a little bit unfair in a way to cast it as we're having particular difficulties about female researchers - given the nature of our enterprise, many are likely to not succeed (BC 3 par. 56).

He did recognise that "female researchers do have some specific issues and problems to face, perhaps in relation to fieldwork, but perhaps in relation to issues of confidence and self-image" which needed to be understood as gendered, and addressed (Cousins 2 par 68).

Issues of class position and origins are interwoven with race, and gender identities, and contribute to constructive interactions as well as tensions within organisations. As mentioned before, class backgrounds of individuals are less visible on the surface and more

difficult to access in research. However, many of the researchers identified their class origins as one of the important factors shaping their identities in their narratives.

I have explored the issue of class identity, organisational culture and reproduction and transformation in organisations more fully in the SWOP case study, and will discuss it further in the concluding chapter.

8.4 Approaches to research capacity development and narratives within these approaches

According to Cousins the approach to research capacity development at PLAAS is based on two central underlying principles:

- A combination of rigorous academic research with involvement in the real world of policy and implementation, as stated by Cousins in 8.2
- A pedagogical approach of ‘learning by doing’.

I focus here on the ‘learning by doing’ aspect of PLAAS’ approach, and discuss two models of RCD that PLAAS was implementing at the time of my research. I will examine the modes of research conducted by PLAAS and the implications for RCD in sections 8.5 and 8.5.1 on ‘Epistemological aspects ... ‘ and ‘Modes of research ...’.

Cousins explained the ‘learning by doing’ approach, referring to his own experience of learning to do research. When he was studying through the Centre for Applied Social Sciences (CASS) in Zimbabwe, the model of research training “was basically learning by doing, getting funding to do full-time field research and stumbling along, working with a supervisor, and finding out how to do it in practice” (BC 2 par. 17).

Cousins said of research methods:

... my experience is the way that you really learn to do it is through doing it, and you’ve got a practical task in front of you - you’re going to collect survey data. Well, how do you go about doing that? You get some advice, you do it. How’re you going to analyse the data? You need to know something about statistics, you have a crash course in statistics to do it, and then see if ... So, this is not ... the only way to do it, its not necessarily the best way, but ... for me, its worked. It’s influenced me ... (BC 2 par. 17).

The concept of ‘learning by doing’ draws on the theory of experiential learning (discussed in Chapter 3). Kolb (1984:27) sees learning as a “continuous process grounded in experience” where “knowledge is continuously derived from and tested out in the experiences of the learner” (*ibid*). The models of RCD in all of the research centres in this study are centred on the principle of ‘learning by doing’, which forms an essential component of all research education.

I examine *how* this process is facilitated in the various research centres, through structured programmes, peer group settings, mentoring and other forms of mediation. PLAAS’ approach to facilitation of ‘learning by doing’ is foregrounded and critiqued in this chapter. This is, firstly, because PLAAS is the only centre which uses the term specifically to describe the centre’s approach to research capacity development. Secondly, I will argue that at PLAAS there was a lack of structured support within an overall RCD programme to facilitate the process of ‘learning by doing’.

One cannot assume that because a young researcher or postgraduate student is immersed in a situation that is rich in learning opportunities, that ‘learning by doing’ will take place. Furthermore, the correspondence between work on a funded research project and postgraduate study is not intrinsically smooth and seamless. Individuals’ ability to learn independently from immersion in research experience depends on a number of factors, including educational background, level of research experience, maturity and personal qualities.

The analysis of Kepe’s experience of learning to do field research in the research site (in Chapter 6) shows that a complex range of factors were involved in his process of development. Kepe at the time of the experience concerned was a mature researcher with a relevant educational background and research experience. He had undergone a substantial training process to prepare him for his work on the research project. However, making the shift to *doing* the research, using a methodological approach that was new to him, needed to be facilitated by a process of coaching, modelling and scaffolding provided by senior researchers on the project.

It will be argued that ‘learning by doing’ needs to be carefully conceptualised within an overall RCD programme, with attention paid to matching individuals with suitable RCD programmes. The relationship between project work and postgraduate study in Kepe’s experience will also be examined.

PLAAS has implemented a number of different models of research capacity development over the years. In this case-study, I focus on two main models that were being used at the time of my fieldwork in 2001, with a number of other variations. The first model, which I call a *work-study* model, involved the employment of a researcher to work on one or more projects in the centre, while at the same time pursuing a higher degree linked to one of the projects. This model is most directly associated with what Cousins calls the “learning by doing” approach. The other model being implemented was a *full-time funded PhD* model, in which students were on full scholarships funded by a Norwegian university.

In 2001 PLAAS had started a Postgraduate Diploma and MPhil programme in Land and Agrarian Studies. This programme was aimed at enhancing the capacity of practitioners working in the field of land reform policy and implementation. The MPhil was specifically aimed at developing *research capacity* in the field of Land and Agrarian studies (PLAAS, 2001). At the time of conducting my fieldwork, the programme was new and there had not yet been a cohort of students who had progressed to the MPhil programme. Consequently, I could not use this model as part of my case study of PLAAS.

In the sections on the work-study and full-time funded PhD models, I discuss the model in question, and then analyse the narrative of an individual who is located within that model. In the case of the full-time funded PhD model, I discuss the experiences of two PhD students. My aim is not to evaluate the model on the basis of three individuals’ narratives. Rather, I examine each of their experiences of the RCD model in question in order to understand more about the strengths and weaknesses of these models for individuals at a particular stage in their capacity development process. Furthermore, I analyse their experience of the models in relation to the organisational and social dimensions of how the model is implemented in the PLAAS context.

8.4.1 The work-study model

When Ben Cousins started PLAAS, he reproduced the model of research training that he had experienced first-hand at CASS. This entailed training researchers who received fulltime salaries while conducting fully funded research projects. The intention was that the researchers would be producing outputs of high quality for the sector and meeting the demand from donors that they produce those outputs, thereby building PLAAS' reputation as a productive centre which produces high quality work. At the same time, they would be pursuing a degree, a masters or a PhD (BC 2 par. 31). This model is suitable for older, more mature students, and particularly those with family responsibilities who cannot afford to spend time without a salary in order to complete a thesis. International research on doctoral study has found that increasingly doctoral candidates are mid-career professional with families and other responsibilities (Evans, 1998:3, in Bailey, 2001:13). The trend of postgraduate students who need a substantial income is even more pronounced amongst researchers from black, working-class families in South Africa for a number of reasons, including responsibility for immediate and extended family members.

This model needs a mature, experienced and self-regulating person in order for it to succeed. The researcher needs to be able to work towards the two overarching goals identified above – producing high quality output for the sector and framing research in an academic mode, in their production of a dissertation (BC 2 par. 31). This puts tremendous pressure on the researcher. Consequently, recruitment of a suitable candidate is crucial. There have been cases of success and failure of this model. In this section I identify Thembela Kepe as an example of a researcher working within a work-study model who was very successful. Kepe was already a mature researcher when he came to PLAAS. In his narrative he mentioned many aspects of his experience prior to working at PLAAS, which laid the foundations for, and contributed to his competence as a researcher. Coming to PLAAS, he was ripe to learn “the finer skills of being a researcher” and to learn more about writing and publishing academic papers (TK par. 68).

Kepe acknowledged that working at PLAAS was extremely beneficial to his development and career. Through PLAAS, he gained opportunities, such as the formative experience he had on the ‘Entitlement’ project with the Institute for Development Studies (IDS) at Sussex University, referred to in Chapter 6. He acknowledged the support, confidence, thesis

supervision and promotion that he had from the director, Cousins, as well as the mentoring of Scoones, from the IDS. He also acknowledged the influence of his colleague, Lungisile Ntsebeza. Kepe learned from talking to Ntsebeza about his experiences in the political struggle, from engaging with his extensive knowledge, and from his critical, questioning approach to rural issues and questions such as the way “social science has dealt with the problems of poverty in South Africa” (TK par. 133). Although Kepe was mentored, supported or stimulated by certain *individuals* within, and linked to PLAAS, he felt that the centre did not provide a *system* of structured mentoring and support. However, he said at the time of the interview, that PLAAS was trying to address that and that he was pleased to be currently mentoring a colleague and masters student.

Ntsebeza was another researcher whose career thrived while he was at PLAAS. However, in his narrative, PLAAS is viewed more as a space in which he could do the type of research work that he wanted to do, rather than as having provided a programme to facilitate his development. This was appropriate for the level of experience and expertise of these two researchers when they came to PLAAS. Ntsebeza also did his doctorate while at PLAAS, but through another university. Both Kepe and Ntsebeza were individuals who had a strong ability to take up opportunities for learning and growth and make opportunities for themselves.

During preliminary interviews and interviews during the fieldwork of this study, I was informed about a number of young researchers undergoing a work-study model of RCD who did not succeed in developing the level of competence required to do independent research at PLAAS. Although I did not interview these researchers, I gained the following impression about their experiences at PLAAS.

In each case, they had potential to do research, a number of them did excellent fieldwork, but they were not able to get beyond that level of participation to develop the ability to conceptualise research projects, analyse research data, and write up research findings in an analytical way. The evidence of their lack of success took the form of not completing higher degrees or not having their contracts renewed because of lack of adequate performance in projects. In retrospect, it would have enriched this case study, if I had also interviewed a younger researcher who was working within the integrated work-study model and did not succeed.

An important aspect of the work-study model is the relationship between the academic thesis and the research project that it is linked to. The ideal situation is where there is a high level of integration between the thesis topic and the research project, which was how Cousins described his doctoral study at CASS. However, in most cases there is a divergence between the project and the thesis, either in the scope of the study, or in the disciplinary approach. The topic of Kepe's doctoral study arose from the formative 'Entitlement' project, mentioned above. Kepe said that at the stage when he was immersed in his thesis, he became very involved in a PLAAS research project in the same geographical location but on a different topic from his PhD topic. While the new project "had to do with politics of development projects, the special development initiatives, land reform, stuff on conservation, conflict between conservation and other things" (TK par. 68), his PhD was on grassland vegetation and rural livelihoods. It had an Ecology focus and was linked to his disciplinary background in Agriculture. The fact that both projects were in the same geographical area was helpful. He said, "So I didn't travel to the case study area [on] separate occasions. I would go there to do my PLAAS work, and then, say, 'Ah', take my other notebook and say, 'by the way ...?' (*said in raised voice*). So it was neat that way and I soon gained confidence," (TK par. 68). However, he became frustrated because he had to focus all of his attention and energy on his PLAAS project, and prioritise writing reports for it. He didn't have time to work on his PhD, and at that stage strongly regretted that he had chosen a PhD topic with a different focus to his PLAAS project.

From interpretation of the narratives, it became clear that there are a number of intrinsic differences between research centre project work and research for a thesis. There are different time frameworks determined by funding cycles or client needs, in the former, and the demands of a rigorous academically grounded piece of work, in the latter. Thus convergence is something to be aimed for, rather than something one is expected to achieve seamlessly. Moreover, there are differences between the epistemological basis of application-oriented and academic research writing, which needs to be more closely and explicitly related to a disciplinary base. For a higher degree, it is important to choose a topic that one is passionate about, and that will not necessarily completely overlap with a project which is answering a particular societal need, recognised by funders. For, example, in Kepe's case, although at times he regretted that his PhD topic was different to his work project, he expressed a passionate connection with this topic.

But I was more closer to my PhD because was linking more to my background ... in Agriculture, and also the project that we did with Ian Scoones. My PhD was about grassland vegetation and rural livelihoods and so on. **Grasslands** (voice excited) - my training at Fort Hare was like aah (strong breath out). I just enjoyed looking at grasses and seeing people use this for this and that, and this grass is a *Themeda triandra* or *Cymbopogon validus*. I just felt comfortable with the Ecology stuff because, you know, I studied Pastoral Sciences at Fort Hare, and then of course, working in rural Transkei, I had to link this to livelihoods and so on. So I was more close to that (TK par. 66).

The integrated work-study model of research capacity development has the advantage of linking academic research for a higher degree with real-world authentic research projects, and providing a rich experience of “learning by doing”. It is suitable for mature researchers who need to continue working and earning a salary while pursuing a higher degree. However, it was recognised from experience at PLAAS that it takes a highly capable person to manage the pressure of working towards (at least two) different and demanding goals simultaneously. It is preferable for there to be a close convergence between the topic of the research project for the centre, and the topic of the researcher’s thesis. However, there are structural (organisational) and epistemological differences between research centre project work and an academic thesis. Furthermore, there may be a divergence between the client- or funder-driven topic of a research project, and the disciplinary affiliation and passion of the researcher. Thus this convergence is an ideal to be aimed for, while recognising these areas of divergence.

8.4.2 The full-time funded PhD model

PLAAS set up partnerships and collaborative relationships with several Norwegian universities, and through these partnerships, it was able to access funding from the Norwegian Universities Fund, which was allocated for PhD scholarships in developing countries. The scholarships were offered at PLAAS from 1999 onwards, with the following conditions. The students were required to do a doctoral study, and were not expected to take on research centre work or contribute to outputs, unless they chose to publish from their thesis. They received a “reasonable stipend”, equivalent to a salary. They were located at PLAAS, required to work in their offices at PLAAS like staff members and participate in staff activities.

There were three students who took up these PhD scholarships, two in 1999 and one in 2000. I interviewed two students, Buyiswa Maseko and Moenieba Isaacs. Of these three students, only Moenieba Isaacs was successful in completing her PhD, graduating in 2004.

In the following section, I will reconstruct the outline of their narratives, focusing on the most relevant aspects for this study. In my reconstruction, I try to capture the coherence and inner structure of the narratives. Thus my analysis takes into account the broader life course of the individual, their previous experience and individual qualities. It does not focus narrowly on the individual's experience of a particular model of RCD. I begin by discussing Maseko's experience of postgraduate study at PLAAS.

8.4.2.1 Buyiswa Maseko – learning to be a researcher outside of a community

Maseko was awarded a scholarship to do a doctoral study in the field of Land and Agrarian Studies in 2000, and was located in PLAAS. Her experience was one of extreme loneliness and lack of support. After approximately one and a half years she was advised to downgrade to a masters degree, became disillusioned, and, after some time, left the research centre without completing her masters, although it was at quite an advanced stage. I have analysed her narrative, on the one hand, in terms of the social and organisational aspects of her experience, that is, what type of context PLAAS provided for her development, and, on the other hand, in terms of her individual preparedness, expectations and agency or lack thereof in the situation. Maseko has more recently qualified the views that she expressed about her experience at PLAAS, as the interview was done at a time when she was disillusioned and vulnerable. She subsequently said that she learned a lot from her experience at PLAAS (BM telephone conversation 3/10/05). This does not invalidate her interview as a source of data, because it represents how she perceived her experiences at that time. However, her comments need to be understood in the context of her disillusionment and are triangulated with other perspectives. Her narrative is informative about the qualities needed to do doctoral studies and the types of contexts conducive for identity formation of a researcher and for successful research capacity development.

Maseko did a Bachelor of Arts, majoring in Geography at the University of Fort Hare. She did a Higher Diploma and then a Masters in Development Planning at the University of

Witwatersrand. After working on short term contracts for two NGOs, she worked for the Department of Land Affairs for two years on the implementation of land reform policies in the Free State province. She responded to an advertisement in the newspaper, for the scholarship at PLAAS, and it was awarded to her.

One of the setbacks that Maseko experienced was that when she started her study, Edward Lahiff, the staff member who was to supervise her, had not yet taken up his post, and so she received temporary supervision from Cousins, the Director of the centre.

Maseko said, “So, I came here and I was given a desk and a computer and they said fine, we want a proposal in six months” (BM par. 53). She seems to have felt intimidated by Cousins’ knowledge and experience, saying, “He’s at a different level altogether, you know, he’s very experienced and he has twenty years experience in his field and he talks at this level and you are at this level [*gesturing with her hands*]” (BM par. 53). She felt that she had very little support when writing her research proposal.

Another issue that Maseko referred to was her choice of topic for her doctoral study. When she applied for the scholarship at PLAAS, she had had experience in the field of land reform, and had particular interests and expectations of what she wanted to achieve in the doctoral process. She said that the advertisement for the scholarship that she applied for specified the field and possible areas of research, but stated that the topic for the doctoral dissertation would be the student’s choice. She had a topic in mind, on livelihood options in QuaQua, that she wanted to develop for her thesis, but when she came to PLAAS, she was told that a study had already been done on that topic. According to Maseko, she was given another topic, which was to research commonages in the Free State. Unfortunately, she was not sufficiently interested in this topic, and her interest did not increase as she progressed with the study.

Maseko said about her original idea:

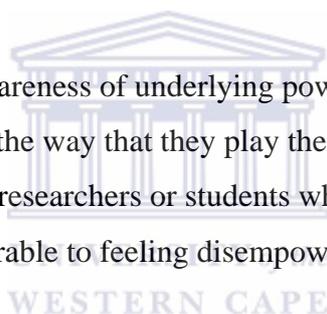
“I didn’t have anybody to help me to develop my idea into a proposal, so I think that was another weakness at the time. I didn’t have enough support in order to develop what I had in my mind” (BM par. 47). “I mean they never even looked at other options to say, let us look at this angle. It’s only now that I’m still here, that I’m thinking wow, I could have done this study but do it in this angle. But I didn’t have anybody to say that,” (BM par. 90).

Cousins, the director of the centre, and Lahiff, Maseko's supervisor, had an opportunity to respond to an earlier paper in which I discussed Maseko's story (Dison, 2003). Cousins responded to Maseko's comments about her topic in the following way:

Buyiswa was not "given" a topic. The idea of researching commonages in the Free State was suggested and discussed, and then agreed with [by] her. If she felt unable to articulate or argue for her own interest in another topic, this may reflect on the power relations at work, but the explicit frame of reference of the discussions was one of "negotiation" (BC email 23/09/03).

Thus there were two different perspectives on the issue of Maseko's thesis topic. As Cousins noted in his response, the underlying power relations at work may have accounted for one party to the interaction seeing it as negotiation, while the other party perceived it as being given a topic.

There is a need for more awareness of underlying power relations in research capacity programmes generally, and the way that they play themselves out. Power relations play a role in all relationships, but researchers or students who are young in age and confidence levels are particularly vulnerable to feeling disempowered in relationships.



One way of addressing this could be to provide a structured space to talk about relationships with supervisors or other aspects of students' experience if necessary, such as SWOP provides in the meetings between interns and the executive administrator (See section 7.3.7). In this way, students can become more conscious about these implicit interpersonal issues, and thus be in a better position to deal with them.

Maseko recognised that she "came at a bad time, at a bad time, when things were like very relaxed ..." (BM par. 58). This corresponds to the time when there were fewer senior researchers, and a flatter structure to the organisation, with less managerial structures and procedures, to which Cousins referred. Maseko said there had been an incident of a young, black, female researcher failing to deliver and being dismissed after three years of employment. She said:

And I think that was when they began to realise that there was no support, no academic support at PLAAS. So I think her experience actually led to changes

that maybe I benefited from at the end. I think like at the beginning you were just thrown in the deep end. You either had to sink or swim. It was up to you and up to your own abilities. And I think the most unfortunate thing about this whole thing was that, they said they wanted to bring black researchers, so they would target specific black people and they wanted to develop them, to empower them, to give us a chance, but you get here, you're just given a desk and an office and a computer, and you're told ... and a budget, fine, do the work. And you just don't understand, you know, these two things just don't blend, you know. You take a person who's disadvantaged and after that you just say, fine, just because I give you an office and a computer and a budget, you're just gonna be like me. You're just gonna be like me, and you know ... there are also like *so-called* black senior researchers but I think even the relationship between us, was not that much of mentoring and support, it was just you know "Hi Hi" in the corridors. So, you know, you're just sitting in your office and thinking [*outburst of breath*] "what am I supposed to do?" (BM par. 60).

From these quotations, one can infer that Maseko's perception of the underlying model of research capacity development was that it relied mainly on provision of resources - a salary, office, computer and so on. In her case, both she and the approach to RCD failed for various reasons, amongst others - her supervision starting late, her lack of interest in her topic and her isolation. Her comments about empowering black researchers ("you're just gonna be like me") has an ironic tone and reflect her extreme disillusionment. In this case these comments have clearly not been made by senior researchers at PLAAS, but Maseko is projecting what she sees as their views into her utterance. To her the failure of the research training model is intensified because it is a system that has been put in place to empower and capacitate disadvantaged black and female researchers, but without sufficient mentoring and support being supplied.

At the time there were two other students on similar scholarship programmes at PLAAS. However, it was clear from interviews that I did with Maseko and Isaacs (as well as an informal discussion with the third student) that they were not able to provide a sense of community for each other. Maseko felt that every staff member was doing his or her own work in their offices and there was a lack of exchange of ideas. She said that at lunchtime the staff of PLAAS would meet in the seminar room to have lunch and they would talk about their personal lives, but not about work, so she did not experience immersion in talk about activity in the research field. At the time of the interview, she chose to eat her lunch in her office, thus perpetuating her isolation from the rest of the staff. She also expressed anger in the quotation above about the lack of mentoring and support from the senior black

researchers. I have mentioned that at that period in PLAAS there was a shortage of qualified, experienced senior staff, who could play a mentoring role. All of the staff, except the director, were employed on soft money and were under pressure to produce research outputs. The two relatively senior black researchers were in this situation and were also involved in doing their own doctoral work, so, at that stage, they were not available to assist others (BC 2 par. 35).

In Cousins' response to my paper (Dison, 2003), he said that there were responsibilities both on the part of the organisation and on the part of the individual to work at providing opportunities for interaction.

Personally, I think that there's an irreducible amount of loneliness in doing a PhD that you're never going to get rid of. It's a personal project, it's a huge investment of time. You have to do it yourself, struggle through it. But I think it's important, particularly in an organisation like ours to reduce - to alleviate the loneliness, and I think we have real potential for doing that by embedding people in an organisation working on a broadly related set of issues and creating occasions for sharing or learning from each other, through solidarity, through people going through similar kinds of experiences. And I think that is an organisational challenge, but it's also a challenge for the individuals to not allow themselves to be too isolated to reach out from their particular individual project and connect with others (BC 3 par. 38).

He felt that Maseko's isolation was also exacerbated by:

... her way of relating to others in the organisation - her practice in the larger community. I have a feeling that she didn't make sufficient opportunities [or] make use of the opportunities to sit down with colleagues and have discussions about issues of substance, issues of research methods or issues of common property theory or issues of debates in the land reform circuit. And I've observed other colleagues making a concerted effort to get out of their little project boxes and talk to other colleagues, to engage with them, either informally or to say, "Can I schedule a meeting with you? I think we have got some issues in common, can we talk about it?" And so that individual is taking responsibility for not letting herself be isolated. It's not easy, and obviously you need an organisational context that supports that and promotes it and facilitates it (BC 3 par. 42).

Edward Lahiff described the situation with Maseko as a "mutual failure". He said:

... in terms of what a typical PhD student needs, in terms of institutional support, Buyiswa did not get it. She was not in a well-defined arrangement, plus it was not well set up to deal with PhD students in general and particularly when they're struggling PhD students (EL par. 34).

He said that once he was employed at PLAAS and had taken on Maseko's supervision, he met with her often.

But I was the only person she met with, and it wasn't enough, there was no way that it was enough - because she needed lots of other things, that wouldn't normally come from a supervisor. You'd normally pick them up in your methodology classes, in your seminars, and so forth. You don't look to your supervisor as your sole source of information. So it was a bit of an over-intense relationship. She depended heavily on one person (EL par. 50).

I will draw together the different perspectives on Maseko's perception of lack of support. Maseko experienced a deep sense of lack of support and isolation in PLAAS. Cousins stressed Maseko's role in the situation, her under-preparedness, the choices that she made, and her lack of initiative in facilitating interaction with colleagues. He emphasized the number of resources and support mechanisms that PLAAS *did* provide for her. Maseko had a supervisor, who was available for regular consultation. Once he accompanied her on a week-long field visit to her research site. Maseko spent several weeks at a partner institution (Noragric) in Norway, where she received feedback on her research. She attended a PLAAS summer school on research methods. She attended a writing course at UWC, and a writing consultant was employed to assist her with her academic writing abilities. However, Cousins observed, "whether or not there were effective means of support is another question altogether" (Cousins, 2003). Lahiff was critical of the environment that PLAAS provided for PhD students, in terms of lack of institutional support and a structured programme, the lack of research culture of the broader university and critical mass of postgraduate students.

Both Cousins and Lahiff felt that Maseko was underprepared for doing a doctoral study. Lahiff thought that Maseko's background and previous experiences had not prepared her to do a PhD. The effect of learners' backgrounds on their approach to learning is widely recognised in education literature (Boud *et al*, 1993). Boud and Walker (1990) use the term, "learner's personal foundation of experience" to refer to the cumulative effect of learners' personal and cultural history and how the events in their lives have helped to form them and their responses to the world (cited in Boud *et al*, 1993:11). Here the phrase "learner's personal foundation of experience" is significant. While students form approaches to learning within socio-cultural contexts, there are a complex range of

influences that shape their socialisation processes. I do not use the term culture to box people into static racial or ethnic generalisations. Rather I see cultural influences as diverse and fluid.

Lahiff said that Maseko was bright and would have been at the top of her class at school and in her undergraduate classes. However, as Cousins pointed out, she had done a masters degree with a mini-thesis and had not had sufficient background in doing research. Lahiff felt that Maseko's previous experiences had not prepared her for the demands of a PhD. She did not have an idea of the extent of work and difficulty a doctoral study entailed.

[Maseko did not have experience of a context] where ideas would be debated, where your positions would be criticised freely in an environment where you don't take it personally, where you go home and you know nothing about a subject today, but you're told to come back in 48 hours and to have read the three articles that you had to tell me... which is a part of an academic culture - a kind of hothouse of PhD life in other universities where you would expect to have a very steep learning curve (EL par. 54).

When discussing an individual's preparedness for doctoral study, one needs to keep in mind the difficult and demanding nature of doctoral study, and remember that it is a minority of educated individuals who are suited to fulfilling the demands of a doctorate - intellectually, emotionally, and in terms of organisation and staying power. Maseko confirmed that nothing in her experience before beginning her doctoral studies at PLAAS had prepared her for the experience of doing a PhD. She agreed with Lahiff's interpretation that age and maturity played a role in her difficulty in meeting the demands of the doctoral study, stating that "if today I can be put in the same circumstances I would respond differently" (BM email 24/08/06). The insights into Maseko's lack of preparedness for doing a PhD, which were communicated by Cousins and Lahiff, raises a question about recruitment and selection of researchers for RCD programmes.

Socialisation of students into the culture of disciplinary fields as well as into a culture of enquiry, should play an integral role in undergraduate curricula, although this is not always the case. However, postgraduate research programmes have a responsibility to socialise students into the specialised culture of research and higher levels of study in their research fields. Lahiff thought that Maseko's lack of understanding of "what it was to be a PhD student" was exacerbated by a lack of role-models who were near-peers (as discussed in

section 7.3.3 on ‘Critical mass ...’). There were potential role models at PLAAS who were experienced researchers in advanced stages of their doctoral study, but Lahiff thought that Maseko didn’t see them “as speaking to her”, in other words, she didn’t find it easy to relate to them (EL par. 56). He said that “there was an enormous cultural divide ... Buyiswa looked at [them] with a kind of reverence and awe” (EL par. 54). He attributed this to gender, class, and age differences.

Buyiswa didn’t see herself as on par with them, she saw them as...they’re there up there and I’m down here ...age perhaps, you know, two married men with children, ... 10 to 15 year age gap, and she did not relate to them as equals. She was a young student and they were mature men. So they wouldn’t have been her peer group (par. 54).

... There are role models that you have where you say, “That’s what I want to be like in 10 years”, but you need people just one, two, three years ahead of you to give you that idea of stepping-stones. So for whatever reason it was, with the ... ‘junior’ PhDs ... they just weren’t enough, you know. Three individuals don’t make a group. They all have their differences. They didn’t bond properly horizontally, and I think the vertical bonds were also really not happening (EL par 56).

As discussed in the SWOP study, it is an advantage for postgraduate students to have near peers at different stages of their degrees, and at different levels of competence, which would occur if there were a critical mass of students and researchers in the organisation. In relation to doctoral study, Lahiff argues that PhD study is such a distinct cultural phenomenon that “you can’t expect people to be familiar with it before they come in” (EL par. 46). Thus near peers at different stages of membership in disciplinary and research communities play an important role in the socialisation of newcomers.

Lahiff’s general perception was that within PLAAS, the three doctoral students on scholarships didn’t bond horizontally, that is they did not bond with each other to form a community of peers, nor did they bond vertically, that is with senior researchers or more advanced peers to the extent that was needed. From my research, it was evident that there was not sufficient cohesion (neither structured nor informal) between the three students for them to provide support for each other. In the case of Maseko, there was also inadequate interaction with more advanced researchers in the organisation. Although she appears to have developed an interactive and involved relationship with her supervisor, Lahiff, it happened too late and was not sufficient to counteract the many problems with her studies

that I have discussed above. Isaacs, on the other hand, did develop a number of “vertical” relationships; with her supervisor in Norway; with Andries du Toit, a senior researcher at PLAAS, and she also interacted with other researchers at PLAAS in relation to areas of common interest. These relationships and interactions contributed to her success in her doctoral study.

I mentioned in section 8.3.1 on ‘Location, funding ...’ that UWC had limitations in terms of the overall research culture and number of doctoral students, although there were departments and centres which had excellent research programmes. Lahiff argued that at universities with a stronger research culture, “there may be one department that can’t generate a culture of that kind ... the PhD culture, but typically, PhD students across departments would group themselves at faculty-level”, but at UWC, “there are very few PhDs in most departments - in many departments there are no PhD students, they haven’t had one for years ... so if they’re not getting it in PLAAS, they’re not going to get it in the wider university either, and that doubles the problem” (EL par. 52).

I have drawn on interviews with Maseko, Cousins and Lahiff to reach insight into Maseko’s failure to complete her PhD at PLAAS, and subsequent choice not to complete the masters which she had downgraded to. I have analysed and triangulated Maseko’s narrative from a social and organisational perspective, in terms of her experience of lack of access to a community of practice, and lack of bonding with peers, both at her level of study and with near peers at later stages of progress. I have acknowledged the contributing factors which arose out of her individual background and qualities. These were her lack of preparedness for doing a PhD, the lack of fit between her concept of doctoral study and her supervisor’s and her lack of initiative in facilitating her own access to communities of practice and forging relationships that would contribute to her success. Thus the interplay between individual, social and organisational factors compounded the situation.

I would like to return to the model of the fulltime funded PhD and discuss one more issues, which is that of the perception of “the PhD as a job” created by the PLAAS model. Students were provided with an office, a computer, a monthly salary and, in some cases, a car. They were required to report to the office during office hours, to participate in staff activities and be subjected to processes such as performance appraisals. There are many advantages to having sufficient funding to be able to provide such resources for doctoral

students. However, Maseko, Isaacs and Lahiff were all critical of the implications of a PhD study programme being conducted “like a job”. Lahiff felt that “it sent out a message that your main requirement was to turn up, be in the office, and perhaps distracted attention from what doing a PhD is, which is about taking a massive amount of personal responsibility” (EL par. 24). While acquiring sufficient funding to provide fulltime scholarships for doctoral study is very desirable, considerable attention needs to be paid to providing a supportive and structured context to facilitate doctoral study, over and above provision of resources and the traditional individual apprenticeship model of supervision.

8.4.2.2 Moenieba Isaacs – managing complexity

Moenieba Isaacs started her doctoral study in 1999 on a similar scholarship programme to Maseko, based on Norwegian funding. She subsequently completed her doctorate and graduated in 2004. In this section I discuss Isaacs’ experience of doing her doctorate, and highlight areas of difference between her experience and Maseko’s. Individuals vary in their levels of maturity, preparedness, ability and motivation, which affect how well placed they are to do such a demanding enterprise as a doctoral thesis. However, there were also differences in the contexts in which Maseko and Isaacs were working, and in each of their abilities to influence their learning environments and make them more conducive to their success.

Isaacs came from a working-class, coloured community in Ocean View, a fishing village in Cape Town. She studied to be a teacher, and while teaching she continued her studies at UWC in Human Ecology, and then began a masters degree in Health and Public Administration, through the School of Government at UWC. While doing her masters, she attained a scholarship to start a new masters project on fishing communities through Trömso University in Norway. Her topic was on three fishing communities in Cape Town and the strategies that they were implementing to get access to fishing rights. After that she did a doctoral study on the implementation of the new fisheries policy in four fishing communities along the coast of South Africa, ranging from the Western to the Eastern Cape. Thus the study broadened in scope. Although Isaacs did not speak much about this masters in her narrative, it is significant that she did a masters on a similar topic to her PhD, but on a smaller scale, in the same way that the SWOP interns developed their masters research projects from a smaller-scale honours project.

Isaacs was jointly registered at the University of Trömso and UWC and she had a Norwegian supervisor, Björn Hersoug, who had also been her supervisor for her masters degree. She spent six months of the year in Norway, and was located at PLAAS for six months. Isaacs said that when she completed her masters degree, she knew that she wanted to do a PhD but did not feel ready. She was approached by Hersoug, who asked her if she wanted to proceed to doctoral study. She communicated to him that she was not ready, and that she would need support in the areas of analytic methods, writing, and wanted to gain more experience in publishing. It was agreed that she would be provided with support in those areas. This shows a significant level of self-knowledge and reflexivity on the part of Isaacs. From her experience of previous studies, she had gained a broad understanding of what level of expertise was required for a doctorate, and she knew where her weaknesses were. Furthermore, she was active in asking for the support to develop these competencies as a precondition for agreeing to do the PhD, rather than just expecting that she would get it.

PLAAS employed a language consultant at different times to assist both Isaacs and Maseko, but the circumstances under which this took place in each of their cases, and their perceptions about using a language consultant were different. I mentioned that Isaacs said from the outset of her doctoral studies that she needed assistance with developing her writing. An interaction with the writing consultant made a strong impression on her and led to a shift in her thinking about her own conceptual development and academic writing in English. The writing consultant said to her, “Your concepts, your ideas, your thinking is the most important thing of writing. If you are able to kind of conceptualise your ideas on **paper**, there are always experts to assist you with the writing,” (paraphrased by Isaacs in MI par. 13). In her previous studies in South Africa, she had often found that lecturers focused on the language errors that she made as an Afrikaans speaker, for whom English was a second language, with less attention being paid to conceptual aspects of the task. The awareness that she developed about this is supported by research findings on academic writing that focussing too much on correctness of English during the development process and not enough on conceptual processes can be counterproductive (Nightingale, 1988, Taylor, 1988). Isaacs felt confident about her ideas and the contribution that she wanted to make, and the shift in awareness arising out of her interaction with the writing consultant motivated her to feel more confident to take on the challenge of a doctorate.

This can be contrasted with Maseko's experience of assistance with writing. In Maseko's case, towards the end of her second year of studies, when she had downgraded to a masters degree, she was unmotivated and wanted to give up her studies. Lahiff, her supervisor, persuaded her to stay, and a support strategy was agreed on and a writing consultant was employed to give her feedback on her writing, so that she could improve it before giving it to her supervisor. However, Maseko found this humiliating, as expressed in her tone, when she said, "So, imagine that person had to be employed. This person is actually employed at PLAAS to do that... to listen to **me** and to talk about my work, and decide how we can [inaudible] it up in a most presentable way" (BM par. 172). The central difference in these two cases is that in Isaac's case, the request for assistance with her writing was initiated by *her*, and the consultations with the writing expert began pre-emptively from the start of her doctoral studies, as a formative process. In Maseko's case, the support of a writing consultant was introduced late, after she already perceived herself as failing, and it became another one of many elements that compounded her sense of failure.

Isaacs felt she had a good relationship with her Norwegian supervisor and describes an openness in her relationship with him and others with whom she worked at the University of Trömsö. She could communicate about her needs and problems and they were consistently supportive (MI par. 21). Isaacs' relationship with PLAAS is complex to describe. On the one hand, she was critical of PLAAS's approach to research capacity development. She described it as being based on a "sink-swim philosophy" (MI par 25).

... you get a good scholarship and you get a fairly good salary, you could live a comfortable life. Besides that there are other benefits that PLAAS provides you with ... an office and a computer... [but] you need so much more in terms of developing, in terms of mentoring, in terms of guidance (MI par 25) .

However, she herself derived great benefit from PLAAS, although her experience there was not without tension because her research area was in the field of fisheries which was outside the mainstream of the land-based work in which PLAAS was involved. Although she found this tension frustrating, she engaged with it constructively instead of being defeated by it. She participated in seminars and tried to find points of commonality and ways that she could contribute to the research that PLAAS was doing more broadly. She also participated actively in PLAAS meetings, raising issues and contributing to discussion

on practices of the centre in relation to issues such as recruitment, approaches to research capacity development, and tensions related to class, race and gender within the centre (MI par. 29).

Isaacs was located in two broad communities, and here I use the term community loosely to describe a group of practitioners who provided a community for *her*.³³ These were the Trömsö community, particularly her supervisor and other staff and students that she interacted with there, and the community that she interacted with at PLAAS. She was able to manage her relationship with the two communities in a skilful way, deriving benefit from both communities, and where necessary supplementing the inadequacies of or difficulties with one community, with resources from the other. On the one hand, Hersoug provided a mainstay of support, guidance, mentoring and direction. On the other hand, through her relationship with PLAAS, she kept in touch with South African thinking and debates in the Development field.

Developing her theoretical framework and later analysing her data in relation to it presented challenges for her, and she realised that she needed extra assistance to supplement her supervision from Hersoug in this area. She raised this with PLAAS, and Andries du Toit, a senior researcher there, was requested to help her. She found her contact with du Toit “extremely helpful”, not only because of his grasp of theory but also because of his ability to “put aside his viewpoints and let your ideas develop and direct you into which frameworks to go” (MI par. 103).

The support of Isaac’s Norwegian supervisor, helped to locate her in a secure position in relation to her doctoral study, and strengthened her motivation and sense of identity in relation to her field, in an environment where she was surrounded by researchers focused on a different area. It needs to be recognised, however, that it takes a capable, mature person, with self-knowledge and strategic ability to manage the fairly complex structure in which she conducted her doctoral study. Isaacs also had strong social skills which enabled her to build and draw on relationships to facilitate her development.

³³ The development of such a community requires work from the individual rather than in the sense of being provided with a ready-made community.

8.4.3 Further issues arising out of analysis of RCD at PLAAS

In this section I discuss two issues arising out of my analysis of models of research capacity development at PLAAS. These are, firstly, the transition from masters to doctoral study in a multidisciplinary field, and, secondly, the issue of hierarchical versus ‘egalitarian’ social modes of organisation of postgraduate study and research capacity development.

8.4.3.1 Transition from masters into doctorate

I mentioned that Isaacs did a masters degree on a similar topic to her doctorate, and that she extended and deepened the scope of the study for her doctoral thesis. I also noted in Chapter 7 how interns at SWOP build their masters thesis on the foundations of their honours projects, as they are working within the same area of study, but they make changes such as the scope of the study or by shifting the focus or research problem. Cousins noted that Maseko had done her masters in Development Planning at the University of Witwatersrand. It was a coursework masters with a mini-thesis, which required a “very minor piece of work” (BC 2 par. 52). This is one of an increasing number of “professional market related” masters qualifications in South Africa, which consist of coursework and a mini-thesis (Kraak and Koen, 2005:4). (Two thirds of masters students in South Africa are registered for masters qualifications of this type (*ibid*)). Cousins argued that coursework masters are inadequate as preparation for a PhD as a student needs to learn how to do independent research, prior to doctoral study. He said that he “would not recommend anyone but the most exceptional student to go straight from a coursework masters to a PhD”. He added that in the field of Land and Agrarian Studies, researchers need to do very demanding field research, and that “the **traditional** masters where you do quite a weighty thesis - independent thesis - is a much better preparation for a PhD” (BC 2 par. 52).

Cousins said that because of this understanding on his part (though initially he was not aware of the extent of the low-key nature of the Development Planning mini-thesis), he had suggested at an early stage that Maseko do a research masters degree, which could be upgraded to a PhD. She was unwilling to do this, which was understandable from her perspective, since she already had a masters degree, and had been accepted for a

scholarship to do a PhD. In retrospect, it seems that this would have been preferable, since upgrading from a masters to a PhD is a positive achievement, whereas a PhD that is downgraded to a masters thesis is perceived as a failure.

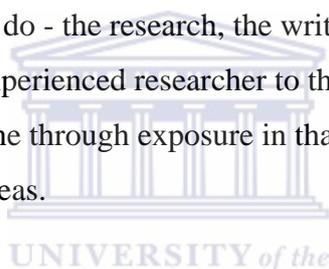
In cases where students attempt a doctoral study and fail, resources and time, both on the part of the institution and the individual student, are wasted. Furthermore there is substantial damage to the students' self-esteem (as well a sense of failure on the part of the supervisor and others involved in the programme). Thus it is important that suitable students are recruited and that doctoral programmes are set up to maximise their chances of success. This needs to be fitted to the needs of individual students. In cases where students are found not to have sufficient research experience or background in the disciplinary knowledge and methodology needed to undertake the doctoral study that they wish to, then it may be appropriate for them to do a second masters in the research area that they are committed to, with the possibility of upgrading to a PhD. This may also be advisable in the case of some students entering multidisciplinary doctoral programmes, who may not have a strong enough background in relevant theory that would enable them to conduct research in the multidisciplinary field.

The need to anticipate and address potential problems of this type are particularly relevant since investment in doctoral studies is extremely costly, particularly when they are conducted fulltime. Furthermore there has been increased emphasis internationally and in South Africa on efficiency and throughput in doctoral study in a prescribed period of time, such as three years. Many doctoral scholarship programmes in South Africa provide funding for a three-year period. Clearly the suggestion of a second masters does not reduce expected time-to-completion, but if a student is not adequately prepared for conducting a study, it will take a longer time and there will be a heightened risk of drop-out or failure. A serious constraint to implementing this suggestion is that it would be very difficult to persuade students of its value at the outset, although they may feel differently with hindsight. Furthermore, it could not be applied uniformly on the basis of students' previous qualifications or background on paper, but would need to be carefully assessed on an individual basis. I need to emphasise that I am not intending this suggestion to be considered for *black* postgraduate students, but for *all* postgraduate students in the categories that I have described.

8.4.3.2 Social modes of organisation of postgraduate study and RCD

The issue of social modes of organisation of postgraduate study and RCD was highlighted for me by a proposal for a particular model of research training outlined in an internal discussion document at PLAAS (Hall, 2004). Although this model was not formally implemented in PLAAS, it is worth mentioning because of an interesting point raised about social modes of organisation of RCD in South Africa.

The *apprenticeship* model is one of two models proposed in the document. It involves the employment of a young researcher to work as an apprentice to an established researcher on a project. This would be for a specified period of time in order to learn the “tools of the trade” (Hall, 2004:2). The new researcher would not be expected to deliver any products in the first year. Lahiff proposed a possible three-year period of apprenticeship (EL par. 150). He argued that if he had one or more apprentices working with him “they would be exposed to everything that I do - the research, the writing ...”. Thus there would be a transfer of skills from the experienced researcher to the apprentice(s). “The learning [would] mainly be one-to-one through exposure in that area,” but the apprentice would also attend courses in relevant areas.



Interestingly, Lahiff argues for a more hierarchical form of social organisation to be implemented through an apprenticeship model. By this he means that it needs to be explicitly recognised that a senior researcher has more knowledge and experience, and that a junior researcher can learn from working as an apprentice to the senior researcher. This relates to the concepts of *positional* and *personal* modes of socialisation and sources of identity, used by Delamont *et al* (2000) (discussed in section 4.4). It is generally accepted that senior academics exercise authority in both the natural and social sciences. However, Delamont *et al* argue that in the natural sciences, control is more clearly hierarchical and overtly structured, and the mode of socialisation is *positional*. In the social sciences the system of control is more implicit and more negotiable and the mode of socialisation is *personal*. When the mode of socialisation is more personal, the student or young researcher’s own status is less explicit, and is derived from individual negotiations with significant others – especially the supervisor.

Delamont *et al* recognise that hierarchical relationships (and power relations linked to this) do exist in the social sciences, but to some extent are masked by the egalitarian face of social relations. They argue that a personal mode of socialisation is not necessarily comfortable, and can cause uncertainties and isolation. The claim of the correspondence of positional and personal modes of socialisation to natural and social sciences respectively cannot be accepted uncritically and needs to be investigated in relation to each of the research centres. Having said this, the approaches to research capacity development at PLAAS *are* characterised by the features of a personal mode of socialisation, i.e. social structures of academic authority are not hierarchical and overtly structured and an individual's status is more negotiable. This is supported by Lahiff's comments included below.

Lahiff said he had encountered "strong resistance to anything that seems to be hierarchical", but he thought the pendulum had swung to too much autonomy in PLAAS's approach to RCD. He captured this attitude with the projected utterance, "You're a junior researcher in your first year, we **totally** respect you, please, we respect your autonomy, off you go, do your work, we'll treat you as an equal" (EL par. 156). This approach assumes levels of capacity and autonomy that in most cases have not yet been developed. Lahiff felt that this approach had the effect of setting a young researcher up for failure. He suggested that the resistance to hierarchical approaches may be a reaction to the inequalities that were imposed during the apartheid era in South Africa, and sensitivity to this is heightened when the senior researchers are white and junior researchers are black.

The argument for social forms of organisation of RCD programmes which have more clearly structured, ascribed roles, is one that should be considered carefully. A more positional mode of social organisation need not be imposed in an oppressively hierarchical way, and RCD programmes with more clearly structured roles may be more effective for developing research capacity of young researchers, and contributing to achieving equity goals of organisations in the long run. Such an approach would need to be implemented in a sequenced, developmental way, taking into account growth of agency, capacity and autonomy of researchers or postgraduate students at relative points of development.

In this section I have discussed two of the approaches to RCD being used at PLAAS at the time of my fieldwork. I have drawn on the narratives of three researchers working within

these approaches in order to provide more insight into the implementation of these approaches, and the interaction with particular individuals' qualities, prior experience and identity formation processes.

In brief, my observations and findings on models of RCD at PLAAS have been the following:

The underlying approach of 'learning by doing' is essentially how learning takes place in all research capacity development, but it is not sufficient to rely on learning by immersion in project work as a mode of research capacity development. The ability to learn in this way depends on the qualities, abilities and prior experience of the individual and for most young researchers there is a need for substantial structure, guidance and mentoring to support the learning process.

The related 'work-study' approach relies on a highly capable individual to succeed, and the issue of convergence between the academic thesis and the research centre project needs to be carefully considered. The "fulltime funded PhD" model provides a valuable opportunity for a student to undertake a PhD without the tensions between work and PhD study that most South African doctoral students face. However, in PLAAS, it had varied results, linked to the context that PLAAS was able to provide for postgraduate study, as well as the suitability of the candidates concerned.

8.5 Epistemological aspects of RCD in PLAAS

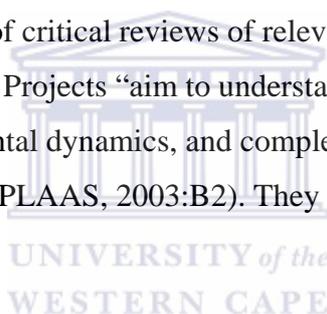
In this section I will investigate modes of research being conducted at PLAAS, and how postgraduate education and research capacity development are affected by the types of research being conducted. I consider modes of knowledge production in terms of where research is located on the spectrum from basic to applied research, as well as investigating how multidisciplinary is being practiced in the research field.

As mentioned above, PLAAS was established soon after the first democratic elections when processes of land reform and restitution were being initiated, and there was a need for research to inform these processes and for training to equip staff working in land reform. Cousins explained his approach to research in the field of land and agrarian studies

as “very much connecting to the real world of policy and programme implementation”, combining “serious, rigorous academic research with an involvement in the real world of policy and implementation. The research has “one foot in the ivory [tower] and one foot in the real world” (BC 2 par. 15). This understanding of research strongly influenced the dominant mode of research (and models of researcher training) which have been conducted at PLAAS since its inception.

8.5.1 Modes of research conducted at PLAAS on a continuum from basic to applied research

In a self-evaluation report for a UWC School of Government Review in 2003, the research that PLAAS conducted was described in the following way. The bulk of the research projects undertaken by PLAAS are field-based, informed by relevant conceptual frameworks, and seek to draw policy lessons from in-depth case studies. Case study data are analysed in the context of critical reviews of relevant policy frameworks and implementation procedures. Projects “aim to understand social, economic, political, institutional and environmental dynamics, and complex interactions between them, at both the local and wider levels” (PLAAS, 2003:B2). They are generally two to three years in duration.



It was argued strongly in the report that while the research has an ‘applied’ character, this is not in the narrow sense of purely seeking to meet a client’s need for technical information. The objective of research conducted at PLAAS is “generally to develop an in-depth understanding of complex processes relevant to structural reform or development processes being implemented by government and other actors” (*ibid*:3).

The report uses Cooper’s (2003) concept of ‘fundamental-applied’ research, locating the research that PLAAS does within this category. They argue that the bulk of their research investigates problems which arise from a context of application, but that it “combines an element of ‘curiosity research’ with an element of ‘application-oriented’ research” (PLAAS, 2003:B3). In other words the research has an element of unlocking fundamental knowledge. The category of ‘fundamental-applied’ has more recently been reconceptualised by Cooper as ‘use-oriented basic research’, discussed in 3.5.2 (Cooper, 2006). This mode of research is distinguished from ‘pure applied’ research, which focuses

on “developing the application of knowledge with a clear, actual project context in mind” (Cooper, 2003:12).

PLAAS staff sometimes undertook short contracts or consultancies for clients in government or civil society, which would be classified as *pure applied research*. However, the majority of these requests were turned down, because of PLAAS’ strategic policy on selection of projects and because of time constraints.

It was argued in the report that the emphasis on ‘fundamental-applied’ research was appropriate, and that it had been possible to sustain this research agenda through successful fund-raising. Furthermore, projects of this kind created “opportunities for both relevant and socially useful scholarship and for postgraduate training that aims to nurture a new generation of black applied social scientists” (*ibid*:3).

There appears to be some fit between the funding and organisation of research at PLAAS and the emerging strategic science regime identified by Rip (1997, 2000, 2004). As discussed in 8.3.1, the research is enabled by linkages which PLAAS has built up with societal institutions that require knowledge such as state departments (mainly the Department of Land Affairs), civil society organisations and international donors.

The main source of funding for relatively long-term projects comes from international donors. While two to three-year projects are not extremely long-term, they allow research to be conducted which can form part of long-term knowledge production programmes, aimed at unlocking fundamental knowledge, as opposed to shorter term projects aimed at generating knowledge for a particular direct application. However, these relationships need to be managed strategically so that the centre continues to develop and further its own research agenda, while satisfying the needs of the funders and sustaining relationships with them.

The *type* of research being conducted fits with the concept of strategic research in that it combines relevance and excellence (Rip, 2004). The research conducted is a form of basic research in that it has a long-term orientation, is aimed at unlocking fundamental knowledge and is conducted in relation to international research fields, literature and theory. It cannot be categorically stated that the research problems originate either “within

the context of application” (Cooper, 2003) or as part of an agenda of basic research with “an eye out” for its potential use (Cooper, 2006). It is probably more accurate to describe the research projects as originating from a process of *negotiation*. Research projects emanate from a process of negotiation between the needs and concerns of international funders, state and civil society organisations and the research agenda of PLAAS. This agenda is also influenced by developments in national and international research fields.

The predominant modes of research conducted at a research centre have a strong influence on the type of context which the centre provides for RCD and postgraduate education. I will discuss the experiences of two researchers at PLAAS, focussing on their negotiation of different modes of research, in relation to their processes of research capacity development. I also examine the relationship between basic and commissioned research in the Development field and the need for strategic management of research practice, with reference to the insights of a researcher associated with PLAAS.

Kepe and Ntsebeza referred to experiences of doing research which was mainly driven by a particular funder or client, but which could be used for a number of purposes, and disseminated in different forms to various audiences. I identified the main mode of research as a form of basic research, which could be drawn on to serve different purposes.

In his narrative, Kepe described how experiences of conducting different types of research and different forms of dissemination played a role in his development as a researcher with a broad repertoire of capabilities. He emphasised how his confidence grew with these experiences. I discussed Kepe’s experience of learning to do in-depth ethnographic field research through involvement in the ‘Environmental entitlements’ project in Pondoland on the Wild Coast with the Institute for Development Studies (IDS) at Sussex University (discussed in section 6.3 on ‘... breaking through...’). There were two experiences which he described, which took place after the completion of his fieldwork on the ‘Entitlement’ project which boosted his confidence and extended the range of his repertoire of capabilities. One incident was when he presented his work-in-progress to provincial government officials at Bisho³⁴. His work was complimented by members of the audience who said, “this is rich stuff, detailed stuff” (TK par 51). The second experience was a

³⁴ The provincial government of the Eastern Cape is located in Bisho.

consultancy for the Department of Land Affairs (DLA) on a land claim in the Pondoland area. The consultancy job was acquired through the support of Cousins. It was commissioned research for a particular local application, and thus it fitted into the category of pure applied research.

In addition Kepe described a number of experiences of conducting and disseminating research which tended more towards the form of basic research described above, around this period of his development process. He registered for a doctoral study which drew on some of the fieldwork that he had done for the 'Entitlement' project. He presented an academic paper based on this project at an international conference in Canada, where he networked with many academics in his field. He also started a new large-scale project, which was on "a slightly different topic" to the 'Entitlement' project, which he chose to conduct in the Wild Coast area (TK par. 59). It was a three-year project, generously funded by the International Development Research Centre (IDRC). Kepe conducted the project on his own, without involvement of his co-researchers in the previous project. He wrote prolifically on the research conducted, disseminating the findings through research reports, conference papers and refereed journal articles.

In his narrative, Kepe showed how involvement in different types of research practice and dissemination contributed to his development of a repertoire of research capabilities, and his overall growth in confidence and competence as a researcher. The profound developmental process facilitated by his involvement in the 'Entitlement' project, was extended through a number of different ongoing experiences, including presenting work-in-progress to government officials. Receiving a favourable response from these government representatives affirmed the value of the research, and its potential for influencing policy formulation and implementation. He channelled work from this project into a number of academic outputs, including his doctoral study; an article in a high-quality academic publication, which was co-authored by his mentor, Scoones; and the paper presented for an academic audience at the international conference mentioned above. The experience of doing short-term commissioned research also contributed to his repertoire of capabilities and growth of confidence in his abilities.

Kepe's narrative shows how through involvement in a combination of projects, drawing on long-term and short-term funding, Kepe was able to acquire different types of research

experience, and gain practice in dissemination of research for different purposes. His location at an application-oriented research centre based at a university, with its involvement in a spectrum of modes of research, provided him with a opportunities to gain experience in a range of types of research. He was able to use these opportunities strategically to develop diverse capabilities as well as to shape and strengthen his own research area and field of expertise. However, as I mentioned in section 8.4.1 on ‘The work-study model’, he experienced tension between the research for his doctoral study and the project that he was doing at PLAAS at the same time.

Insights about the relationship between application-oriented research and research for an academic audience can also be gleaned from the narrative of Ntsebeza, where he discussed the role of ideological differences in prohibiting uptake of research for policy. Ntsebeza conducted an in-depth project, funded by a development agency, on land reform, traditional authorities and rural local government (PLAAS, 1999a). The Department of Land Affairs (DLA) was a partner in this project, and findings of research were fed back to the DLA. Ntsebeza was critical of the emerging policy of the DLA, especially their policy on local authorities. On the basis of empirical research, he identified contradictions in the policy of the DLA, which “claimed to be fighting for a democratic dispensation, but at the same time [was] saying that it is possible to work with an institution that is inherently undemocratic” (LN par. 79). Ntsebeza pointed out that although his research was written up in reports provided to the DLA, the research was sidelined and never used because it conflicted with the dominant ideological position and political interests of the DLA. His early research reports were not promoted or published, either by PLAAS or the DLA. Because Ntsebeza was mature and had knowledge of the academic research field outside of his immediate environment, he used other avenues for publication in academic journals. Ntsebeza used his research on local authorities for his doctoral thesis, which he was awarded in 2004. He subsequently published a book through an international-local publishing partnership based on his doctoral study³⁵.

³⁵ Ntsebeza, L. (2006). *Democracy Compromised. Chiefs and the politics of land in South Africa*. Cape Town: HSRC and Brill Academic Publishers.

Another perspective on the relationship between basic research and commissioned research was provided by Andrew Ainslie, a researcher in the field of rural and agrarian studies.³⁶ Ainslie expressed a cynical view of much commissioned research, although he recognised the need for it. As an anthropologist, his view of academic research was of in-depth study of communities through long-term engagement, located in a historical context. In relation to client or funder-driven research, he said, “funders, project managers, senior bureaucrats, are not very interested in paying you to go and do a year’s research. They want you to do a survey on something and release the results in a few weeks”. Funders were interested in quick-fix results (AA par. 48). He said that if he were employed to do a contract project on the geographical area that he had done in-depth research on, the client could draw on “eight or nine years of experience” (AA par. 48). Moreover, funders and researchers doing contract work “will lean on anthropological type data or information presented by anthropologists in an area previously, rather than them having to fund that research” (AA par. 48). He implied that it would be referred to for credibility and then “footnoted into some other person’s work”, without necessarily taking into account the complexity of the issues (AA par. 48). The type of commissioned researchers that Ainslie refers to is research of the ‘pure applied’ kind. For researchers or centres in need of funding, there is clearly work of this type available. However, Ainslie’s views highlights the choices that a research centre such as PLAAS needs to make in taking on project work, and negotiating the work that it does.

Ainslie’s comments demonstrate how researchers need to develop their own strategies for maintaining their integrity and agency in the contexts in which they work. Ainslie described a situation where he negotiated with a client to do contract research that he believed was more viable and worthwhile than the project that they had requested. In brief, he was offered a contract to do research in twelve areas in a few months, and he negotiated to do the research in one area, which was the area that he had been researching for many years (AA par. 46). Thus he was able to do a more in-depth study than requested, which was built on extensive empirical work conducted previously. However, a researcher needs to have developed enough recognised authority in her field and strategic abilities to be able to negotiate the scope of contract research in this way.

³⁶ I interviewed Ainslie for my study because of his close, though informal relationship with PLAAS, as well as his own process of development in the research field of rural and agrarian studies.

It can be seen from the three narratives discussed above that an important part of research capacity development in application-oriented contexts, consists of developing strategic abilities to work in a research environment where continued employment is linked to available funding and funding often comes tied to agendas of the clients, funders or strategic partners in the process. Individual researchers and research groupings collectively need to develop strategic abilities to use opportunities in such a way that they can do research which they deem most valuable, and to build their own research area and expertise in the process. Both Ntsebeza and Ainslie emphasised their own agency in experiences where they had made use of funding opportunities and negotiated space to do research with integrity. In the incidences described they were able to resist bowing to political or client pressures, solely determined by clients' needs and agendas.

What can we learn from these issues discussed in the narratives that can inform research capacity development programmes? The narratives of Kepe and Ntsebeza point to the wealth of experience that can be gained at a university-located research centre, in the light of opportunities to conduct different types of research. The types of projects which are funded for relatively long-term periods such as three years, which require in-depth research which is not aimed at immediate application in particular contexts, seem to be most beneficial in terms of facilitating learning of participating researchers.

More short-term commissioned research also forms part of the research context, and through participating in such projects, researchers add to their repertoire of abilities. However, when reading the narratives of Kepe and Ntsebeza, it needs to be clearly born in mind that they were both mature and independent professionals, with substantial life and research experience when they started working for PLAAS. PLAAS provided an environment where they each pursued their research careers successfully and, in each case, made substantial transitions to become world-class academics and researchers. Kepe refers specifically to guidance and support that he received from the director of the centre and from various other mentors in his life about strategic aspects of research capacity development such as marketing oneself and publishing.

Application-oriented research centres at universities have potential to provide environments conducive to students and young researchers developing the elements of research capacity discussed above. However, the narratives also point to the challenges of

negotiating different types of research experience, and sustaining space to pursue what one understands as worthwhile research, while simultaneously developing one's own area of speciality and expertise. This supports Henkel's argument that development of awareness and capabilities in these areas need to be structured into research education programmes (Henkel, 2004).

8.5.2 Multidisciplinarity in the research field of PLAAS

PLAAS has identified the following four main focus areas: land and agrarian reform, community-based natural resource management (CBNRM); social and economic aspects of coastal and marine resource management; and research on chronic poverty (PLAAS, 2003). These are grouped together under the umbrella of Land and Agrarian studies³⁷. Land and Agrarian studies constitutes a niche area within the broader field of Development studies. In many cases informants refer to development studies as the field that their research draws on. The research field of PLAAS is an application-oriented, multidisciplinary field, which draws on anthropology, sociology, geography and agriculture amongst other disciplines. The research that PLAAS does is located in the social sciences, but project research may have dimensions that are more inclined towards the natural sciences such as environmental science or the field of agriculture. Some projects draw on the analytical tools of economics, or on knowledge of legislation and legal principles.

The work of PLAAS fits into what I have referred to (in section 4.6.3 on 'Disciplinary and multidisciplinary ...') as a tighter definition of 'multidisciplinarity'. Multidisciplinary research in a general sense (looser definition) is viewed as a collaboration between different disciplines in researching the same general subject or problem. A tighter use of the term includes the concept of collaboration between disciplines described above. However, individuals from each discipline are viewed as using their own disciplinary concepts and methods in their approach to the research (Gibbons *et al*, 1994, Chachage, 1999, in Webster and Fakier, 2000, Delamont *et al*, 2000). Gibbons *et al* (1994) characterise multidisciplinary as maintaining the autonomy of the various disciplines, without changes arising "in the existing disciplinary and theoretical structures" (29) The

³⁷ As mentioned in Chapter 5, the focus area of 'coastal and marine resource management' is not strictly bounded by the 'Land and Agrarian Studies' frame, but overlaps with the social development concerns of PLAAS.

research conducted at PLAAS fits with these understandings of multidisciplinary, but with an important qualification. I will explain this below, beginning with a quotation from Cousins.

I think we've tended to let people come at the research projects with their own particular disciplinary interests, capacities, theoretical frameworks. And the practice of multidisciplinary has been rather vague and diffused. It's the kind of questions which we raise in our rural livelihoods, which raises questions about production and how do you measure production - it's an economic dimension, or it might be around natural resource management, so it's got a natural science dimension. We haven't tried to force this and make it a very strong emphasis and I think the reason for this is because the social science of 'development' allows you to be a generalist in terms of social science without requiring you to be a natural scientist at the same time, and allows you to collaborate with natural scientists without forcing you to become something you're not (BC 3 par. 74).

Cousins described multidisciplinary in PLAAS in terms of researchers engaging in projects from their own disciplinary backgrounds ("particular disciplinary interests, capacities, theoretical frameworks and perspectives"). This is consistent with a tighter use of the term. He explained how different focus areas within PLAAS were at the boundaries between the social sciences and other knowledge domains such as economics and natural science. For example, projects conducted on rural livelihoods had an economics dimension, and natural resource management projects had a natural science dimension.

One can infer from this that researchers working in the area of rural livelihoods need to have some knowledge about theory in development economics and have a grasp of quantitative methodology, which is derived from development economics. Similarly, researchers working on natural resource management would need some knowledge of ecology, environmental science or agriculture. However, in both cases they would not be required to be specialists in the (economic or natural science) fields because their main focus would be on the social science dimension.

Researchers at PLAAS are all primarily social scientists. Some have done degrees in development studies specifically, while some have backgrounds in disciplines such as politics, agriculture and natural science disciplines. When Cousins and Lahiff speak of researchers working within their own disciplinary frameworks, they are speaking of a broad social science development studies orientation, as distinguished from a natural

science or economics orientation within development studies. Thus in the project work that they did, researchers at PLAAS generally did not work strictly within the boundaries of a 'primary' social science discipline such as anthropology, sociology, or politics. As Cousins said above, "the social science of development allows you to be a *generalist in terms of social science ...*" (BC 3 par. 74, my emphasis). Cousins saw the field of Development as a broad, cross-cutting field, which was not strongly disciplinary. This "allows for a kind of looseness, and rigour then comes not so much from a particular disciplinary orientation and set of methods and set of approaches, but rather from ... a requirement that you be theoretically informed, empirically rigorous and analytically sound (BC 3 par. 76).

From the semi-structured interviews conducted, it was evident that there was no sense of transdisciplinarity (Gibbons *et al*, 1994) emerging in the research projects at PLAAS. Rather researchers approached projects from their own disciplinary frameworks, and collaborated with researchers from other disciplinary perspectives.

Delamont *et al*'s tentative findings about doctoral study in multidisciplinary settings (discussed in section 4.7 on 'Perspectives on knowledge production') provide a useful starting point for analysing research capacity development within the multidisciplinary field of Land and Agrarian studies. They suggest that generic difficulties faced by research students can be compounded in multidisciplinary settings, particularly the isolation experienced by many doctoral students within the social sciences. They found that multidisciplinary departments tended to lack a well-defined group structure and that there was fragmentation arising out of diverse intellectual interests of academic staff. (Delamont *et al*, 2000).

Delamont *et al* found that research training in multidisciplinary departments was more effective in cases where students worked from within a single-discipline base, which occurred most frequently. In contrast to this, a lack of disciplinary base or framework could expose PhD students to too many theoretical options, which could be confusing. PhD candidates who had done their previous studies in a multidisciplinary context, and saw themselves as essentially multidisciplinary, were seen to pose more of a problem, because they could not easily relate to any particular body of knowledge (Parry *et al*, 1994, Delamont *et al*, 2000).

Delamont *et al*'s argument that academics in multidisciplinary settings tend to work within their single-discipline frameworks is supported by Lahiff's and Cousins' views (quoted above) that researchers in the centre work from their own disciplinary perspective. There is evidence that some postgraduate students within PLAAS experienced the exacerbated isolation described. For example, the isolation experienced by Buyiswa Maseko was exacerbated by the structure of PLAAS, where individuals were working on their own projects in their separate focus areas, and she was not located within such a community of practice. Delamont *et al* argue that where students came from single-disciplinary backgrounds, the discipline of origin provided a framework for the research. Furthermore, issues such as research topic, theoretical allegiance, choice of supervisor and methodology were guided by the disciplinary framework, and students' background and experience in the discipline (Delamont *et al*, 2000). This is consistent with what I have referred to as a single-stream of socialisation (in section 5.5 on 'Disciplinary socialisation ...').

While Delamont *et al* qualify their initial findings in this area as tentative, the insights that they provide are valuable and need careful consideration. However, in considering their arguments, one needs to bear in mind the tentative nature of their findings and the fact that the research that they did was on academic departments and not research units or centres.

I will explore how the multidisciplinary research field of PLAAS affects postgraduate study in the centre, and will critique Delamont *et al*'s arguments about multidisciplinary and postgraduate study below.

Using Bernstein's constructs of classification and framing, Parry *et al* (1994)³⁸ observed that "where doctoral work was described in terms of disciplinary tradition, framing was strongest. Where doctoral work was presented in terms of the overriding research problem or topic, then framing was at its weakest" (*ibid*:41). In other words, where framing was strong there were definite boundaries which defined what counted as appropriate disciplinary work. Where framing was weaker, disciplinary boundaries became blurred and disciplinary, theoretical content was subjugated to the research task at hand.

³⁸ This article reports on the same study as Delamont *et al*'s (2000) book, and comprises the same group of authors.

From my study of the broad research field in which PLAAS is involved and the focus areas clustered within it, I have made the following interpretations. The broad research field has weak classification in that it is multidisciplinary and framing is also weak in that there is not a strongly bounded disciplinary canon that students need to be taught or within which research is located. Research projects are framed by a current or potential societal problem or issue which need to be informed by research-based knowledge. Appropriate theory and methodological approaches are mobilised and applied to researching this problem. The research could be conducted within one disciplinary framework, or it could draw on theories and methods from a number of disciplines. Moreover in the case of social science disciplines, there is overlapping and intersecting of theories and methodologies, which is alluded to above in the discussion of researchers' identities as *generalists* in the social sciences.

In the case of postgraduate students' theses, research topics are framed by a topic addressing a social or economic issue, as opposed to the frame of researching an application of an aspect of the theoretical canon, as may be the case in a more strongly classified, pure discipline. However, there is variation as to whether students approach the thesis within the theoretical and methodological framework of a single discipline (or sub-discipline), such as sociology or anthropology, or whether they take a more multidisciplinary approach. This is influenced by the nature of the research problem, the disciplinary background of the student, and of the supervisor. A thesis would most likely framed by a multidisciplinary approach which has a particular focus such as 'community based natural resource management' or livelihood studies'. These approaches are linked to an associated theoretical framework and methodological and analytical set of tools.

The doctoral theses of Kepe, Ntsebeza and Isaacs all reflect aspects of the nature of multidisciplinary of the research areas at PLAAS. Thembela Kepe (in section 8.4.1) described how the project research that he was doing in the same research site as his doctoral research was on the politics of development projects, land reform and conservation. His thesis, on the other hand, was on grassland vegetation and rural livelihoods. The disciplinary and theoretical basis of the thesis was firmly located within an ecological stream of development studies, which was also reinforced by his co-supervisor, Scoones, a specialist on grassland vegetation within a Development studies context. Lungisile Ntsebeza's thesis provided an example of a study which was framed by

a problem in society – the role of traditional authorities in rural governance in South Africa’s transition to democracy. Ntsebeza was extremely knowledgeable about South African politics, drawing from his experience and extensive reading. He was not located within any one social science discipline though, having majored in Politics and Philosophy, and done honours and masters in South African Economic History. He chose to register his doctoral study within a Sociology department. This demonstrates how various social science and humanities disciplines were drawn on by Ntsebeza to provide him with the analytical tools to research political and social issues about which he was passionate.

Moenieba Isaacs’ thesis was on policy implementation in the fishing industry in South Africa, and the involvement in this process of four fishing communities. As I mentioned, Isaacs had studied Human Ecology, and she did not have a background and socialisation in a social sciences discipline with a strong theoretical base. She described the challenge of developing a theoretical framework for her masters and doctoral studies, to inform her research, analysis and interpretation of data. She found that the theory underlying the existing international literature on fishing communities was not able to explain “the conflicts, politics and finer issues within the communities” that she studied (MI par. 41). Nor did they incorporate or explain the influence of globalisation on the communities. She also felt previous research conducted did not adequately theorise *communities* in South Africa (MI par. 43). She said:

I’ve tried to mix and match theories that best suit this current situation, and I’ve felt that it’s been incredibly difficult, a huge challenge for me to do that. As the background - I don’t have a solid background in theory. And I guess if I had a solid background in theory it would have been easier ... (MI par. 45).

Her consultations with Andries du Toit, a sociologist, during her PhD assisted her in meeting the theoretical challenges of the study.

The need to draw on different theories and to construct a theoretical framework, which enabled Isaacs to provide a useful and nuanced explanatory account of the cases that she was researching, is a necessary part of studying a new area in a changing context. For a doctoral study to make a contribution to theory-building is exciting and extremely valuable. The process that she describes would have been challenging even for a doctoral student who *had* been immersed in sociological theory since their undergraduate studies.

However, the difficulty was exacerbated for her because of her lack of thorough grounding in social theory in her previous experience of academic study.

All three of these individuals developed research capacity through what I have referred to as a 'meandering river' process of identity formation (in Chapter 5) and each of them had to draw on different disciplinary frameworks in the conducting of their thesis. A question that I did not pursue is to what extent location of a research project within a coherent framework such as 'community-based natural resource management' or a 'livelihood study' lends itself to stronger pedagogical framing in the mediation of the research process.

I return to Delamont *et al*'s view that doctoral studies conducted through a multidisciplinary approach, or undertaken by students from a multidisciplinary background, is *a problem*. One can accept that both of these cases are likely to be more challenging both for students and for supervisors. However, the underlying flaw in their argument arises out of two factors. Firstly, the assumption underlying their work is that the purpose of doctoral study is to reproduce academics within disciplines and to perpetuate and further academic disciplines. This is in spite of a widely accepted view that the purposes of postgraduate study are increasingly more diverse than the reproduction of academics. Furthermore, their analysis is insulated from the profound changes taking place in the international context of knowledge production and the effect of these changes on postgraduate study.

I have noted the diversification of entry routes to disciplinary fields internationally (Becher and Trowler, 2001:47). Furthermore, researchers working in a multidisciplinary field such as development studies tend to come from different disciplinary backgrounds. In addition to this, in the South African context, many black researchers from disadvantaged backgrounds have become involved in postgraduate study in a particular field through a circuitous route, often due to limited school education, finances for further study or knowledge of what career options are available (largely due to lack of career guidance). For example there were a number of black, working-class researchers in this study, who began their tertiary education by doing a teaching or nursing qualification because of lack of knowledge of other career options and because they could get bursaries in these vocational areas. Black researchers, including those from a middle-class background who grew up and studied in the apartheid era, were also affected by the wide-ranging

limitations of a legislated unequal education system. There were also cases of academics such as Ntsebeza, whose university education was disrupted by political instability and his own activism and political repression that he experienced. In his case, his political experiences ultimately had a profound influence on his becoming an academic and the direction that his academic and research career took.

It is necessary to acknowledge the particular challenges that are faced in RCD and postgraduate study in multidisciplinary fields. The nature of these challenges needs to be understood more thoroughly in order to structure RCD programmes to meet these challenges effectively. Through my analysis of individuals' processes of research capacity development in multidisciplinary, application-oriented contexts, my thesis contributes to an understanding of these challenges and begins to construct analytical tools for further research.

It needs to be stated strongly that RCD in multidisciplinary fields and in the development of individuals, whose academic identities are multidisciplinary, cannot be typecast as a problem, or as something to be avoided. To do this would be to ignore the realities and career paths of many researchers and academics. Furthermore it disregards the value which researchers with diverse and rich life experiences can bring to the production of knowledge which is needed for deep-rooted transformation of South Africa, as well as to academic knowledge in their research fields internationally.

8.6 Conclusion

In PLAAS, many of the tensions inherent in current South African society and in South African universities manifest themselves. I have outlined the centre's development from its inception as an initiative to meet the needs for research and training for transformation in the land and agrarian sector, to a point where it has become a leading research centre in the academic field of Land and Agrarian studies in Southern Africa.

It has been successful in its aim of combining "rigorous academic research with an involvement in the real world of policy and implementation" (BC 2 par. 15). Although RCD of black researchers has been identified as one of the objectives of PLAAS, it has consistently been a problematic area. This also needs to be seen in the light of PLAAS

being a relatively new organisation, and still in a formative stage. (It had existed for seven years at the time that interviews were conducted.)

This study of PLAAS, together with the other cases, shows how a research centre can provide a rich context for RCD. On the one hand, there are strong possibilities for RCD, opened up by the nature of the research that PLAAS does, and its networks to various government, civil society organisations and academic groupings (both local and international). The case shows how PLAAS as a research centre has a special potential for facilitating RCD in application-oriented and strategic or use-oriented basic research. In the period of study, there was also evidence of serious constraints for RCD. Issues of funding and sustainability, made it difficult to build up a critical mass of young researchers and postgraduate students. The structure of PLAAS, which is composed of individuals and small groupings working on different projects, funded by different sources, has made it harder to achieve a sense of coherence and support in the centre. In some cases it has been difficult for students or researchers to access communities of practice that would facilitate their socialisation as a researcher. There has also, in the period of the study, been a lack of a structured, pedagogically informed approach to postgraduate study.

The organisational context of the research conducted at PLAAS fits into what Rip (2004) describes as a strategic science regime. It uses funding derived from partnerships with donors and clients to conduct research which contributes both to societal needs and to academic fields within the umbrella of land and agrarian studies. The ways in which research is funded, conducted and disseminated has had both positive and negative effects on RCD at PLAAS.

On the one hand, the policy of PLAAS regarding research has been to concentrate on relatively long-term projects, which combine relevance and excellence and are aimed at unlocking fundamental knowledge, as opposed to those projects which are aimed at addressing a problem in a particular context (pure applied research). Involvement in research of this kind has provided substantial learning experiences for researchers. On the other hand, the fact that PLAAS has mainly relied on funding from international donors and contract work, which has been tied to delivery of outputs, has meant that there has been insufficient dedicated funding, staff time and responsibility allocated to RCD (with the exception of the funding for the PhD scholarships discussed above).

The both models of RCD investigated in this case study have had successes and failures. The '*work-study model*' has been successful in cases where the researchers concerned already had a high degree of maturity and research experience. Similarly in the '*fully funded PhD*' model, the student who succeeded in her doctorate had a strong ability to use opportunities and to make an environment as conducive to her development as possible.

PLAAS has repeatedly had to ask itself hard questions about recruitment of researchers. It has had to question whether it has the capacity to train young researchers effectively, or if it needed to recruit researchers who were already competent in the field. It is, however, significant that PLAAS has provided a stimulating context that has enabled and encouraged the further development of already competent and talented researchers in the research field.

As Ainslie asserted, "PLAAS offered incoming researchers ... an oasis of personal respect and professional support", during a period where there were few research contexts that provided this (AA email 16/08/06).

In the period since my initial fieldwork was conducted, there have been small moves towards more integration with the university of PLAAS and its RCD programmes, including more (but still limited financial support) from the university, and integration through the further development of the Diploma and MPhil in Land and Agrarian Studies. This may go some way to providing more stability to PLAAS' RCD programmes.

If PLAAS is to provide a consistent and effective context for RCD and postgraduate study in the future, which it is well placed to do, it will need to be based on more financial stability and integration with the university. Furthermore PLAAS will need to make an unambivalent commitment to RCD and find creative ways of realising this, through dedicated funding, staff time, and more pedagogically informed and structured programmes for postgraduate study and RCD.

CHAPTER NINE: THE UNILEVER CENTRE FOR ENVIRONMENTAL WATER QUALITY (UCEWQ)

9.1 Introduction

The Unilever Centre for Environmental Water Quality (UCEWQ³⁹) has been established within the Institute for Water Research (IWR) at Rhodes University, a historically white university in Grahamstown in the Eastern Cape. The centre was chosen for this study because of its particular concern with research capacity development within its field and its thoughtful approach to postgraduate education. The Unilever Centre adds an important comparative dimension to the study because it is located in the natural sciences.

I will argue that the way that knowledge production is funded, facilitated and organised through the centre's linkages and partnerships with government and industry fits closely with a strategic science regime (Rip, 1997). Furthermore, the centre has similarities with the two social science centres in the study in that its work is application-oriented and geared towards informing policy development and implementation. The research field is multidisciplinary, which has implications both for how the centre is organised and for research capacity development.

In this chapter I will discuss how UCEWQ originated, and give an account of relevant aspects of the career history of Professor Tally Palmer, the director who established the centre. I will outline the organisational factors which influence the context that UCEWQ provides for research capacity development. This will be followed by analysis of UCEWQ's approach to postgraduate education, focusing on its masters programme. Epistemological dimensions of research capacity development in the field of Water Quality studies will be examined, and related to the projects of two of the masters students, which were described in their narratives. Lastly, UCEWQ's relationship with academic departments at Rhodes will be examined in terms of organisational and epistemological factors.

³⁹ Pronounced U-sec

9.2 Origin of the Unilever Centre for Environmental Water Quality (UCEWQ)

UCEWQ is a centre within the Institute for Water Research (IWR) at Rhodes University. The IWR was formed from an amalgamation of the Institute for Freshwater Studies in the Zoology Department and the Hydrological Research Unit in the Geography Department at Rhodes University in 1991. The resulting Institute for Water Research was “a multidisciplinary, but primarily hydrological and ecological institute” (TP 2 par. 36). It had four main sections – Ecology, Hydrology, Wetlands and Social Stakeholder Interests, and Water Quality. The Water Quality section became a distinct centre, with its own director, in 2000.

Professor Tally Palmer, the director of UCEWQ, said that she decided to structure the Water Quality section in this way for two specific reasons – one professional and the other personal. I will focus on what she terms the professional reason here, and what she terms the personal reason in 9.2.2 below. When the Water Quality section of IWR was formed as a distinct centre, it was called Centre for Aquatic Toxicology. Aquatic Toxicology, which involves experimentally exposing animals to different levels of pollutants, was being used widely internationally as a legislative tool for Water Quality, but not in South Africa. The centre was developing aquatic toxicology within a South African context. Palmer said:

I wanted to be able to identify the work that we were doing very strongly, and also to attract funding [in order] for someone to own an entity or to contribute to a known entity and to use that in selling the concept of aquatic toxicology (TP 2 par. 45).

Palmer felt that she would be more effective at getting funding and promoting aquatic toxicology as a separate centre with the field of toxicology as its main focus. Thus what Palmer referred to as a professional reason for creating a distinct centre, could also be seen as a strategic decision to promote and develop a particular research field and attract funding in order to do that.

9.2.1 Tally Palmer’s career history and the origins of UCEWQ

I discuss relevant aspects of Tally Palmer’s career history because of her role in establishing the centre, and because she has played a central role in the development of the

field of Water Quality Studies in South Africa. This is consistent with my interest in the relationship between identity formation processes of individuals and the organisations which they build or in which they are located. Palmer had developed an interest in Marine Biology before going to university, and wanted to study Estuarine Ecology. She did a degree in Biological Sciences at the University of Natal, and went to Rhodes University to do Honours in Zoology, and then masters in Estuarine Ecology. She married, had two children and taught high school Biology for eight years. During this time she started a PhD on a part-time basis at Rhodes. She said there were two male academics who had a great influence on her. They “both had a real record in accepting women students and the vagaries - particularly with children and small children ...” (TP 2 par. 20)⁴⁰. These were Dr Brian Davis, her masters supervisor, and Professor Jay O’Keeffe, the director of the then Institute for Fresh Water Studies.

Palmer had been attending the South African Society for Aquatic Sciences (SASAQS) Conferences. At one of these conferences, she heard Davis present a paper on an American theory – the river continuum concept – and he raised the question, “Did this theory apply in Southern Africa?” She recognised this as a theoretical framework within which she could do a PhD. Davis put her in touch with O’Keeffe, who was already doing fieldwork related to this. She began doing her PhD with O’Keeffe as her supervisor. She started by studying part-time in addition to teaching at high school and bringing up two children under three. She did the fieldwork while she was still teaching and then resigned from her teaching job and did the PhD fulltime for three years. Palmer says of her switch to fresh water studies:

It was always going to be water, and what happened with my PhD was that Jay was a freshwater river ecologist. When I did my first fieldtrip for my PhD, I’d never seen a fresh water animal. I plunged into water so deep I didn’t know where the bottom was, which is a recurring theme of my career [*laughing*] but, you know, I just really enjoy aquatic systems and ecology (TP 2 par. 24).

When Palmer was close to finishing her PhD, O’Keeffe suggested that they write a proposal together to the Water Research Commission.

⁴⁰ I am aware that I have not mentioned marital history or children in relation to the careers of the male directors of research centres. These were not mentioned as significant factors in the career histories of the male directors in their interviews.

... at the time he was involved with the Kruger Park rivers program and they had come across the problem that, although there was an emerging literature on what riverine animals needed in terms of **flows**, there was no information about indigenous South African organisms in terms of what they required in terms of water quality and in terms of their responses to the quality of water that was required, and he suggested I start doing work in that field (TP 2 par. 30).

Exposure to international developments in theory on environmental river flows, combined with recognition of the need for research methods and instruments for water quality research and management in the South African context, opened up a gap into which Palmer moved. The central need was for the study of South African indigenous freshwater organisms in the light of emerging theory and methodology related to the functioning of rivers. This introduces an important theme in South African research in the field of water quality studies. This is the application of emerging international theory in water quality studies in a South African context, as well as contribution to an international research field. Palmer's doctoral research and ongoing research on the study of river organisms to assess the quality of water in the rivers steered her career direction and provided the impetus to develop this strand in water quality studies. After an initial research proposal in which O'Keeffe was named as the project leader, she was able to submit proposals herself and raise funding and became a project leader within the Institute for Water Research (IWR).

I have mentioned the strategic aspect of the decision to establish a separate centre in the IWR in order to raise the profile of and generate funding for research in aquatic toxicology specifically. I will briefly discuss what Palmer referred to as the personal reason here. I interpret this aspect of the change in organisational structure, as being based on personal and professional reasons. It had implications for the way the centre was organised and its approach to postgraduate education and research capacity development.

The directorship of the IWR was held on a rotating basis by two senior academics, including O'Keeffe, who had been Palmer's supervisor. Palmer said that she became increasingly interested in contributing to the management of the IWR and approached the directors with a request that she also become part of the pool of rotating directors. They declined her request, and after much consideration of different options, she came to the following realisation:

I realised that instead of wanting to leave, what I really needed to do was to create the space for doing what I want to do, and that's really where the idea for the centre was born. So although there was an objective need for it and an objective reason for motivating it as a centre, the energy for actually making it happen came out of quite a high degree of frustration and a real need to have the space to express the leadership that I wanted to express. I wanted to have the space to do things in my way and the way I would manage something would be different from the way both Jay and Dennis approach leadership (TP 2 par. 50).

Palmer chose to establish the centre within the broader IWR. There were “enormous advantages” to remaining within the IWR, such as continuing to work collaboratively with her colleagues there and benefiting from the IWR's relationship with the university management and the Dean of Research's office. She found that the centre's relationship with the university could be conducted smoothly with ease of communication, and in fact as far as the university management was concerned, the centre was still seen as simply part of the IWR.

Her responsibility for the running of the centre enabled her to contribute more fully to the management of the IWR. She said:

... in being prepared to take responsibility for the centre and find the money for it, I was much less critical of the way the Institute was being run ... both Jay and Dennis were very much more open to treating me as an equal. I was immediately asked to join the Institute executive and was included in decision-making, all of which I'd fought for unsuccessfully before that. So that made quite a difference to my role within the Institute as well as within the centre (Palmer par. 60).

9.3 Organisational aspects of UCEWQ

9.3.1 Focus of UCEWQ and funding

The Institute for Water Research (IWR) received little direct financial support from the university. Rhodes provided office accommodation for and funding for two posts in IWR, for the director and one other administrative post. All other posts and funding were generated by members of the centre through donor funding, contract research and consulting. In the first three years of its existence, UCEWQ was funded by Lever Ponds, a multinational company that is known for manufacturing detergents and cosmetics. For the next funding cycle, the centre was fortunate to become a flagship project of Unilever South

Africa, also a manufacturer of detergents, and later of the Unilever Foundation for Education and Development. Unilever offered to supply one third of the centre's income as 'unencumbered funding', with the possibility of renewal every three years.

At that stage the centre shifted their focus to environmental water quality more broadly, with aquatic toxicology being one of the areas of focus along with water chemistry and biomonitoring. (I discuss the multidisciplinary nature of the field of Environmental Water Quality studies in 9.5 and further explain the disciplines and modes of enquiry which it draws on.) In exchange for funding, Unilever required that the centre be named the Unilever Centre for Environmental Water Quality (UCEWQ) and the work of the centre needed to coincide broadly with the vision and goals of the Unilever Foundation.

The objective of the IWR was to contribute to the understanding and sustainable management of water resources in Southern Africa. UCEWQ aimed to contribute to this objective through:

- a research focus on environmental water quality, specifically through the integration of the three approaches mentioned above: water chemistry, biomonitoring and ecotoxicology⁴¹.
- consulting services offered to solve specific problems
- training and teaching at a tertiary level
- capacity building by making applied science accessible (particularly to communities, local government and water users); and
- contributions to national policy development and implementation (IWR, 2002/2003: Projects 23)

The objectives of the Unilever Foundation were broadly compatible with those of UCEWQ in that they were concerned with capacity building and community development. They also required that the Centre did work for government, in this case the Department of Water Affairs (DWAF), with the funding that they provided, so that they were profiled to the Department in a positive way (TP 2 par. 46).

⁴¹ My understanding is that aquatic toxicology, ecotoxicology and toxicology are all used to refer to the same approach within an environmental water quality context.

Apart from Unilever and the Department of Water Affairs, the main clients and funders of UCEWQ research and postgraduate scholarships were the Water Research Commission⁴² and Eskom.⁴³ Palmer explained how the collaborative relationship of the Centre with government bodies and industry worked:

[An industrial company] will contract us to do work, but also because the Department [of Water Affairs] wants their policies to be taken up by and acceded to by industry, and so very often we offer industry the opportunity to be in the forefront of policy development, by collaborating in research projects and that then exposes the industry to the developing policy. It allows the Department to work with industry and **research is the vehicle** by which that partnership develops and that has proved to be very helpful (TP 2 par. 64).

The set of relationships established between the university-based research centre, industrial groupings with an interest in the environmental impact of their products, and government bodies in the field of water management fit with the forms of organisation of knowledge production characterised as ‘strategic science’ (Rip, 1997, 2004, Henkel, 2004, Cooper, 2005). Henkel (2004) notes that as universities have opened up their boundaries and become active players in the public and private sector, they can undertake leadership and co-ordinating roles in areas of development (173). In this case the research centre was able to play a co-ordinating role in policy development in the field of Environmental Water Quality Studies. The provision of ‘unencumbered funding’ by Unilever is an example of industry providing funding to sustain knowledge production, on the basis of ‘promise’ from the HE institution to provide relevant research in future (Rip, 1997, Mouton, 2001). Henkel argues that what “many industries want from their connections with universities is early access to scientific advance” (*ibid*:175). Thus university research groupings are able to utilise these relationships and the funding that they acquire from them to sustain and pursue their research agendas.

Heather Davies-Coleman, the research co-ordinator at UCEWQ, described the relationship between the conducting of basic research and the demands of research-users at UCEWQ in the following way. She said that much of the research conducted at UCEWQ was basic research “in many aspects”, but that it was “mostly driven by an analysis of the policies and seeing, in our eyes, what was needed to fulfil that policy. Here Tally’s contact and role

⁴² The Water Research Commission is a statutory body whose mandate is to support and co-ordinate water research and development.

⁴³ Eskom is a public-private company which is the sole mass energy provider in South Africa,

as the Water Research Commission Council member came into play as she had her finger on the pulse too” (HDC email 18/09/06). I will discuss the different types of research conducted at UCEWQ further in 9.5, and will also consider the implications of the types of research conducted for RCD and for pedagogical continuity.

I have mentioned in Chapter 1 that responsiveness in higher education research was initially seen in the literature as responsiveness to the knowledge needs of industry to contribute to private sector economic development and global competitiveness (Gibbons *et al*, 1994, Etzkowitz and Leydesdorff, 1997). Subsequently there has been increasing attention paid to the need for social accountability in knowledge production internationally (Nowotny *et al*, 2001, Gibbons, 2005) and in South Africa (Subotzky, 2000). Much of the work of UCEWQ was influenced by social concerns. Firstly, the policy-related research was concerned with meeting social needs in relation to conserving the environment and meeting national needs for access to clean water. Secondly, in relation to policy changes, there were initiatives from government and industry to communicate with the public and with people working in industry about water policy and sustainable water quality. This was particularly emphasised during the period after the passing of the National Water Act of 1998. As part of their involvement in this process, UCEWQ produced an accessible document about the need for sustainable water ecosystems, the interaction between people and water resources (Palmer *et al*, 2002). One of the competencies that UCEWQ expected their students to develop was “to make science relevant and accessible” (TP 2 par. 84), and development of this competency was integrated into the postgraduate programme.

9.3.2 Structure, leadership and staff

When UCEWQ went into a three-year funding contract with Unilever from 2003, it was able to employ more staff members, although it remained a relatively small centre. Thus, apart from the director, there were two researchers, a senior technical officer, a research assistant and a research co-ordinator, who made a significant contribution to research capacity development.

Palmer described her style of leadership in UCEWQ and how it related to the way the Centre was structured. She did this by comparing it to the leadership style of Jay O’Keeffe, the Director of the IWR. I refer to these comments because they provide insight

into the structure and leadership of the centre, and not for the purpose of making value judgements about either style of leadership described. Palmer characterised O’Keeffe’s leadership style as being “almost totally hands off”.

In other words anybody who has the energy and drive and enthusiasm and vision to make something happen - he’s perfectly happy to allow them to do that and even to make space for them to do that, and to be helpful and advising, but he does not interfere at all and he does not take personal responsibility for direction and moulding ...

... I’m a much more hands-on involved research leader than Jay is. And so the staff and the centre - I want to **know** what they’re doing, to have a centre vision. I want to have all the posts and projects - to be integrated to a long-term goal, where things interrelate and support each other. I’m much more prepared to take on people who will want to do the **work** and I will take responsibility for finding the money and finding the direction - making a place ... And so Jay is much more likely to attract independent people, so its not surprising that the Institute comprises this group of satellite interests - each with their own leadership, whereas the centre now is quite a big group of people working together on a particular set of goals to reach something - so it’s a bigger integrated group of people and that’s a real reflection of our different styles of research leadership (TP 2 pars. 50 - 52).

Palmer’s characterisation of different leadership styles in UCEWQ and the IWR shows a relationship between different leadership styles and different organisational forms of research groupings. As discussed above, the IWR was a broad institute which did research, teaching and consultancy on different aspects of freshwater studies, Within the IWR, UCEWQ was also involved in these three areas. However, as a research entity, it resembled a research group in the natural sciences (as described by Clark, 1993, Becher *et al*, 1994, and Delmont *et al*, 1994) in that all of the research projects in the centre were integrated and related to a central long-term goal, as explained by Palmer above. The model of organisation of the IWR was similar to that of PLAAS, where the research centre provided an umbrella for a number of different research areas and research projects, and researchers within the centre had to raise their own funding for projects. The tightly integrated nature of UCEWQ, with the staff members, students and projects linked to a central long-term goal was conducive to providing a coherent and supportive context for research capacity development. I will discuss this more in section 9.4 on ‘Approach to postgraduate education’ below.

The role of the research co-ordinator, Dr Heather Davies-Coleman, was crucial in

facilitating the integration that Palmer spoke of. Davies-Coleman provided co-ordination between the director, staff, postgraduate and postdoctoral students about the use of the laboratory facilities and the laboratory cultures. She also played a co-ordination role with the group of masters students. Although she was not the official supervisor to any of them, she assisted with their supervision, and facilitated weekly seminars. I will discuss her role with the masters students more in 9.4 below. Another aspect of Davies-Coleman's role was to co-ordinate and oversee the end-products of research and their delivery to clients.

We work on Water Research Commission projects and Department of Water Affairs contracts and other contracts, and my job will be to make sure that the end products demanded from ... that money that's been given, are produced and ... it's quality research and it's on time (HDC 2 par. 6).

In terms of supervision, the intention was for Davies-Coleman "to take the brunt of the niggly problems away from the supervisor" (HDC 2 par. 22). In a general sense in the centre, she was fulfilling some of the roles of the director, in ensuring the smooth running of the centre, and delivery to clients, thus freeing Palmer to focus on other aspects of her role. Davies-Coleman had a PhD in Zoology, which she had done using the approach of aquatic toxicology, with Palmer as her supervisor. In order to play her co-ordinating role effectively, she needed to keep extremely well-informed in the discipline and was also required to contribute to research in the centre.

9.3.3 Staff composition in terms of race, gender and class

Table 4: Representation of race and gender of UCEWQ staff in 2002

	Black			White			Total		Total staff
	Female	Male	Total	Female	Male	Total	Female	Male	
Research staff	1	0	1	4	1	5	5	1	6
Admin staff	½		½	0	0	0	½	0	½
Total	1½	0	1½	4	1	5	5½	1	6½

UCEWQ had a majority of white, middle-class women, and the one black female researcher, indicated in the table, was in fact a research assistant. The 'whiteness' of the centre was not raised by staff or students as an issue. Some of the reasons for this lack of

concern could be because of the centre's location at Rhodes University, a historically white university, which still had a majority of white academic staff. Thus it was part of a broader institutional norm. Rhodes was not actively implementing an Employment Equity policy, and the transformation process had been slow, both with regard to changing the staff composition at the university and in terms of institutional cultures and practices. Rhodes University's location in a rural area meant that there was a smaller pool of candidates to draw from who were prepared to move to a rural university. UCEWQ was small and relatively new, and previous black postgraduate students were located in different areas of the country, some of them working for government. It could be that the racial composition of the unit was not mentioned by black students because they perceived it as a supportive environment, and the racial identity of the academics did not matter to them.⁴⁴

There was a strong awareness amongst the staff about the centre being a female-dominated working environment. Heather Davies-Coleman said:

... we work extremely well as a team together and I've never ever felt that there are - obviously, we've all got different personalities, but we tend to **complement** each other as opposed to rub each other [up] the wrong way, whereas, if there were a whole lot of men, you know, this is such a general thing, but men often like to be king pins and - the boss, and I don't know if they would work so well as a team together (HDC 2 par. 163).

On the one hand, one needs to be careful not to generalise about men and women's behaviour in organisations, which Davies-Coleman herself acknowledges. On the other hand, the positive teamwork experienced in this organisation and the successful leadership and working together of women was significant. The culture of the organisation was a supportive one for its postgraduate students. The gender composition of the centre may also have played a role in this.

... I think women do do things differently to men, and I'm just thinking of the support structure for the students ... certainly in our case, I think we are also very concerned with the well-being of the person and their financial situation and everything ... (HDC 2 par. 137).

⁴⁴ The fact that the researcher in this study was white, may also have had some influence on what was said or not said in this regard.

This view is supported by research findings that women in academia tend to define work more broadly to include a range of supportive responses to colleagues, students and the university (Acker and Feuerverger, 1996). In UCEWQ and in the Sociology of Work Unit (SWOP), there were certain qualities and concerns that women brought to the organisation. Women such as Palmer, the director of UCEWQ, and Davies-Coleman, the research co-ordinator, as well as Fakier, the executive administrator of SWOP, considered the students as a whole, not just their intellectual needs, and were sensitive to the backgrounds that they came from and the specific problems they had. However, this cannot be generalised as an innate quality of women, but rather needs to be understood in terms of the culture of the organisation, the values and concerns of the individuals involved, their role in the organisation, and how much power they have to influence the practice and culture of the organisation.

The issue of class was not mentioned in relation to the staff of UCEWQ. This may have been because the majority of staff were middle-class, and this was taken for granted. The class background of two of the students was mentioned indirectly in relation to their educational backgrounds. This is discussed in section 9.4.3 on 'Dealing with diversity'.

9.3.4 Organisational culture

I discussed above how Tally Palmer had a particular vision of leadership that she wanted to assert, and how this motivated her to set up a separate unit within the Institute for Water Research (IWR). She explained her experience of support and mentoring in her career as a woman scientist below. She aimed to develop in her students an interest in supporting other people. Providing an enabling and supportive learning context was also a strong part of the ethos that she aimed to develop in the research centre. She said:

... along the way I've experienced people acting as collegial mentors, people who will really try to open a door for you and make an opportunity available for you or will motivate you for an award or nominate you to serve on a committee. Now all of those activities take time and effort and there is something that I think you have to - have to encourage people to be committed to and to raise their awareness of. It's really important to be one of the people who motivates, and to be aware that you can facilitate someone else's career, that you can be part of an emerging successful group of people in the whole country, and I've experienced that mainly among other women. I think there's a very strong sense of support among women in science. I don't think that

that's exclusive in any way and I've certainly met that across both genders but I think that that - that is another face of mentorship and leadership that you want. I want the students that come through our centre to go and be available to other people (TP 2 par. 142).

The interviews that I did (with Heather Davies-Coleman and masters students, Ketse and Lerotholi) confirmed that the centre provided a supportive, enabling culture for research capacity development. Palmer fits into what Subotzky (2001) describes as “a new cohort of women academic and managerial leaders” who are “beginning to act as change agents” (65). These women leaders describe their contribution as “making a difference” not simply by “fitting in” (assimilation) but by challenging discriminatory and unjust practices and creating new practices (transformation) (Wyn et al, 2000:236, in Subotzky, 2001:66). They make a difference by “actively fortifying women’s different ways of being academics, managers and leaders and making their difference count“ (Wyn et al, 2000:435, in Subotzky, 2001:66).

As part of Palmer’s argument about the importance of developing a mentoring culture, quoted above, she says that it’s important to “be part of an emerging successful group of people in the whole country” (TP 2 par. 142). It is significant that she sees her own identity as a successful academic and researcher, not only in terms of her individual achievements. Her concept of success has a collective component in that it involves facilitating and supporting the success of others. She emphasises that this aspect of identity is not gender specific and that she has encountered it in both women and men. She adds that an interest and ability in mentoring and supporting the development of others is an aspect of leadership that she aims to develop in the postgraduate students at the centre. In this way the approach of the centre to RCD can be framed as a project of possibility. It is not only aimed at realising the potential of the particular staff and students within the centre but also at raising consciousness of individuals about the need to build an enabling environment for the development of others. This cultivates qualitative aspects of long-term critical mass which will enable research capacity development.

9.4 Approach to postgraduate education

There have been two broad models of postgraduate education that have been implemented in UCEWQ. In the years before 2003, the centre took on individual masters and doctoral

students. For example, Kabane, whose narrative was discussed in Chapter 5, did her masters, and Davies-Coleman did her doctoral study with Palmer as a supervisor. The model of postgraduate study, at that time, was through an individual relationship with a supervisor, or two co-supervisors. A number of these students were studying part-time and working fulltime elsewhere.

In 2003, the centre took on five masters students, and because of a more stable funding situation, and the employment of Davies-Coleman as a research co-ordinator, it was able to provide a collective structure within which the students were able to conduct their masters research. Four of the students were doing a research masters and one of them was taking a coursework masters in Environmental Biotechnology and doing her research component in Water Quality Studies with UCEWQ. The centre did not teach a coursework programme at masters level, but their approach was to create a supportive learning environment, largely through weekly meetings and seminars and a system of supervision backup, which I will discuss further below. This approach fits into what I call a *group* or *collective* model of research education and it is this model of research education in UCEWQ that I will focus on in this section.

In Chapter 4, I discussed the models of postgraduate research education in the natural sciences and the social sciences, which were linked to organisational and epistemological aspects of knowledge production in these different domains. I summarise the main elements of the natural science model below. Although the studies which these models were based on were on doctoral education, there are similarities with research education at a masters level as well. Becher *et al* (1994) and Delamont *et al* (2000) found that research education in the science departments that they investigated rested on a collective or group-based apprenticeship. Following Clark (1992), Becher *et al* found that doctoral students' experience in the natural science departments is framed by the discipline's requirements for knowledge production, rather than the student's educational needs. The research group is central in the socialisation process, and students' contribution to the work of the group may be substantial. Students' contribution to disciplinary knowledge is normally pre-defined by their supervisor, their research topics are allocated to them and expectations of originality are limited (Becher *et al*, 1994).

There are differences between the structure of UCEWQ, and a traditional natural science department. Clearly it is distinguished by the dominant application-oriented nature of the work. Also it is fairly new, and still relatively small and there are not, for instance, large numbers of postdoctoral students⁴⁵ who can take on much of the coaching of the postgraduate students. However, there are features of the ‘collective apprenticeship’ model attributed to the natural sciences model by Becher *et al* (1994). I will discuss some of these features below. I focus on how students’ research topics are based on areas that need to be investigated to contribute to knowledge production in the research centre, and how the topics are allocated to the students by the senior researchers in the centre. Laboratory and fieldwork practice is a central component in the organisation of knowledge production in the centre, and greatly influence the nature of postgraduate education and socialisation into the research community and disciplinary field. This type of approach to postgraduate education distinguishes the natural sciences from dominant practice in the social sciences and frames the model of research capacity development in the centre. However, I will argue that contrary to Becher *et al*’s argument, there is evidence that UCEWQ’s approach to RCD is not only determined by the discipline’s requirements for knowledge production, but that in the masters programme, the students’ *educational* needs are considered and prioritised. Furthermore, there are similarities in the group approach to research capacity development in UCEWQ and the SWOP internship programme.

Becher *et al* (1994) found in the natural science departments that they studied that “it is the research group which provides the key organizational frame for research and, in practice, the main source of identity and professional development” (68). In the case of UCEWQ, the centre forms an equivalent type of structure within the broader Institute to a research group in a traditional department, in that there is coherence in the source of funding and in the research and publishing that the centre does. In this way, the centre forms a community of practice (Lave and Wenger, 1991) and the staff and students are involved in a joint enterprise (Wenger, 1998). I apply these concepts in my analysis of the social aspects of the organisation of the postgraduate programme in the centre below in 9.4.1. Before addressing that, I will examine how the postgraduate students contribute to the knowledge production of the centre in an authentic way, and how the educational needs of the students are carefully considered and prioritised in the masters programme. I will explain how the

⁴⁵ There are generally relatively low numbers of postdoctoral students in South Africa (Cooper, 2004)

students' research is directly linked to the broader research programme of the centre before discussing how the educational needs of the students are addressed.

The research projects of the masters students in 2003 were linked to a large project, which was one of the contracts which the centre was conducting for the Water Research Commission (WRC). This project, described as the 'Salt project' was about the impact of high salinity on rivers, which is a problem in arid areas. Heather Davies-Coleman explained that there were a number of different components of this project that needed to be investigated. The staff in the centre formulated three masters thesis topics in the field of aquatic toxicology and one in the field of applied biomonitoring which were allocated to the students. A further aspect of the project was being investigated by a research officer in the centre. Davies-Coleman said:

... all of that will have to be written up as a project and then ... that will satisfy the Salt [project], which is one of the projects, and we'll get our funding. We'll get our funding for let's say three years on that, and at the end of three years we will come up with a big fat manual of results and it will include the summaries of all this work (HDC 2 par. 199).

Postgraduate students were linked to funding and matched to particular topics, through a consideration of the students' interests and the research needs of the centre. This is in accordance with Becher *et al*'s findings that postgraduate education in the natural sciences is framed by the needs for knowledge production in the discipline. In the case of the centre, they were framed directly by requirements for knowledge production with the potential to inform water management policy and implementation. Becher (1994) characterises thesis topics in the natural sciences as being designed by the supervisor, for example in Biochemistry "students might solve a small but fairly self-contained problem in their project designed in advance by the supervisor, who would nevertheless leave room for some shaping and decision-making by the student" (74). While research topics were allocated to students, they were expected to conceptualise the research design of the projects themselves, and were assisted with this.

Each of the masters students got financial support either from one of the centre's projects or through a bursary from a company. They each received R35 000,00 per year for two years for their own living and studying expenses, and their research running costs were

covered by the centre in addition to that. The three bodies that funded the students were Unilever, Eskom and the Water Research Commission. The students each had their own funder, to whom they were accountable.

The students had three obligations that they had to fulfil in exchange for the funding. They had to complete their thesis, meet reporting requirements to their funder, which differed from funder to funder, and they were required to publish their work as papers. Palmer stressed the importance for the centre of students publishing academic papers:

One of the shortcomings of ... the centre and the Institute has been - because ... we get money for applied work and all our time is taken up in producing products that each of us - all the money that comes in is tied to a particular product, and none of those products are academic papers, we fall behind in producing papers, and so our students are going to more and more be the vehicle for publication. So students that come in have an absolute obligation to write their papers ... and will be helped to do so (TP 2 par. 132).

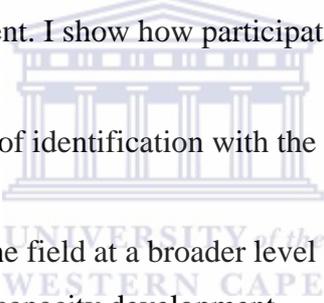
Thus students in UCEWQ played a role in production of knowledge in the applied field of Water Quality studies both through the contribution that they made to projects of the centre, and in their writing up of research for publication. Students' research and research reports contributed to the output of the centre for clients and funders, and as Palmer indicated above, they were expected to generate academic publications for the centre as well. In these ways they would contribute to the ongoing sustainability of the unit. At the same time assisting students in writing and publishing is seen as an integral part of the postgraduate programme.

I will explore the pursuit of application-oriented and basic research in the work of the centre and in the postgraduate programme further in section 9.5 on 'Epistemological aspects ...'. In the following section, I examine the organisational and social aspects of the way that the masters programme was structured which facilitated development of research capacity. I will highlight how the programme is not only centred on the students' contribution to the knowledge in the centre, but also how the educational needs of students were foregrounded.

9.4.1 Interaction within a community of practice and a community of peers

Underlying my analysis of the social context that UCEWQ provides for research capacity development is an understanding of the centre as a community of practice. I argue that UCEWQ takes the form of a community, which resembles a traditional research group in many respects, in that it is involved in a joint enterprise, with a coherent, collaborative research programme. As in the SWOP internship programme, the structured programme that was set up for the masters students facilitated the emergence of a community of peers, a sub-community within the broader community (Wenger, 1998, Brown and Duguid, 2001).

In this section I discuss ways in which the broader UCEWQ community of practice and the community of peers situated within this provides a structured and supportive context for research capacity development. I show how participation within these communities:

- 
- a) works to build a sense of identification with the practice of the field of environmental water quality studies,
 - b) provides exposure to the field at a broader level than students' own projects; and
 - c) mediates learning and capacity development.

In my analysis, I refer to Wenger's elements of coherence of practice (outlined in section 4.4.2 on 'Legitimate peripheral participation ...'). These elements are *mutual engagement* of participants in a *joint enterprise* and development of a *shared repertoire*, which over time constitutes resources for shared meaning.

I have mentioned that UCEWQ functioned in a similar way to a research group in a traditional natural science department. This was largely due to the sense of involvement in a *joint enterprise* (Wenger, 1998). Four out of five of the masters students were involved in researching different aspects of the 'Salt project', one of the central projects of UCEWQ mentioned above, which was on the effect of salination on rivers. Thus although they were doing separate research projects for their masters' theses, they were simultaneously

involved in a joint enterprise with the same goal⁴⁶ of contributing to the larger project. There was a necessary ethos of co-operation amongst the students, between staff and students, and with the technical staff. Davies-Coleman explained the need for co-operation, and the effect that it had on students.

... because we're scientific, of course, you always need technical back-up and we have lots of technical back-up. There's ... lots of people who are willing to help students and also Tally has introduced - and I think it's quite a good idea - in times of crisis, sometimes you just can't do things on your own. We go into the field and you do huge collections and analyses and ... bring all sorts of things back, and you need to work with animals quickly before they get under too much stress, and so often students are called to help other students (HDC 2 par. 129).

Through working together in the field and laboratory, the students (sometimes with staff members) are mutually engaged in the practice of doing research and negotiating the meanings of the practice. For example, they discuss the techniques of collection and handling of the animals and reasons for the ways that things are done. The laboratory-based nature of the type of knowledge production requires the co-operation and mutual engagement which form such an integral part of socialisation within the natural sciences (Collins, 1985, in Delamont *et al*, 2000:12). Similarly the way that fieldwork is structured contributes to the collective nature of the model of RCD being implemented. Another effect of students assisting each other is that "because they are doing slightly different research - they are learning about the bigger picture of water quality" (HDC 2 par. 129).

The centre structured a group process for the students through an introductory workshop and a weekly seminar programme. At the beginning of the year, a one-day workshop was run to communicate to students the requirements of a masters study. The structure of the thesis was discussed. The tasks and activities that they would need to do and the skills needed to do these tasks were outlined. Palmer said:

... we run through that for a day right at the very beginning, so that people have a really good idea of the nature of what they're taking on, and of the timing of it, because alongside of that, we put a time frame in terms of the time

⁴⁶ The fifth student was working on a topic on biomonitoring of two river systems in a different context to the 'Salt project', but there was much overlap, particularly with the student who was doing biomonitoring as part of the salination project.

they have to do their thesis and end products ... So that it forms a reasonably tight set of goals for the student to work within (TP 2 par. 110).

There is a similarity with the SWOP internship programme in that the students are given guidelines within a group process about what is expected of them. They are helped to structure their work programme and set deadlines. At UCEWQ, the weekly seminar is an important forum in the building up and sustaining of a community of practice amongst the masters students, as it involves mutual engagement of the students about the subject matter of Water Quality studies.

At the weekly seminar, each student has a turn to produce a seminar on her work and present it to the group. The supervisors of the student presenting are also invited to the seminar. The presentation part of the seminar is intended “as a time of criticism and it’s hard because every little thing is pulled to pieces by the whole group ...” (HDC 2 par. 116). This is consistent with one of the central principles of UCEWQ’s approach to the postgraduate programme which is to provide a balance between a supportive and critical environment. The student presenting her work also presents another relevant paper which she has read for her research. It is distributed beforehand and the student “walk[s] through that paper and discuss[es] it” with the group (HDC 2, par. 116).

Sekhonyana Lerotholi, one of the masters students, said of the weekly seminars:

... at the beginning I didn’t think they were such a good idea, but I can tell you now they are a very good idea, because we also discuss scientific papers - very recent papers, relevant to one’s project. So in a way we even get to more what other people are doing in different things. For example in toxicology for instance, ... you also ... get ideas from different people as to what you are doing ... and if its really worth - you just get an opportunity to double check your methods and your approach and you get into your presentation skills and communication skills (SL par. 100).

In the weekly seminar, there are a number of different processes taking place. Firstly, students are exposed to recent research papers from other scientists in the field of water research and related disciplines. They have the opportunity to discuss the research paper with their peers and the more senior academics present. The research paper is selected by the student presenting, and has particular relevance to her project. The students become familiar with the genre of the research paper. They engage with each other about the

theories, concepts and methods which are used to mediate the practice of research in the field (Engeström, 1987).

Secondly, students share their work through presenting a seminar on an aspect of their own research project. This gives them the opportunity to get responses from others about their work, and to check the appropriateness of the implementation of their research design and their use of methodology, by getting comments from their peers and from senior academics. The other students also have the opportunity to engage with the work of their colleagues. In this way the students are developing a shared *repertoire* which is used to negotiate further meaning in their discussions and leads to broader and more in-depth knowledge of the field for all the students.

Lerotholi comments that “in the Monday seminars we are not allowed to ... just sit back without commenting or asking questions (sounds amused), so she [Davies-Coleman] makes sure that at least all of us are participating in a way” (SL par. 144). In addition, the weekly seminars provide an opportunity for the students to develop their presentation and communication skills. Being able to present one’s work effectively is necessary in order to be able to interact with colleagues, both fellow students and in broader networks, to get the feedback that is needed. The weekly seminars play an important role in addressing students’ educational needs for interaction with peers and academics about their project work and relevant theory. They also provide exposure to the field of water studies more broadly than students’ individual projects.

Through a collective approach to orienting students towards their projects, and the weekly seminars, there was development of a community of peers, which was part of the broader community of practice of the centre. This community of peers, in interaction with the broader community of practice, the role of the research co-ordinator and the system of supervision, formed a supportive space for the students to pursue their individual projects. The interaction with each other and negotiation of the practice of research, facilitated their identity formation processes as scientists in the field of Water Quality studies, and the development of competencies needed to be a researcher in this field. Through exposure to national and international literature in the field, they were able to locate their research in relation to cutting edge research in the disciplinary field. Thus they were developing knowledge and competence in their emerging area of interest and expertise, while being

exposed to the broader field of Water Quality studies. They were able to inform their own research projects with this knowledge as well as develop a vision of how their research fitted into a bigger picture. They were able to grapple with concepts through their interaction with their peers and the more expert members of the local disciplinary community, as represented by their supervisors, the research co-ordinator and the academics attending the seminars.

I have used elements of theory of communities of practice to analyse how novice researchers or postgraduate students become socialised into local research communities through joint practice, and gradually move towards more central and more expert membership of communities. While community of practice theory is concerned with communities of practice which develop organically through involvement in shared practice, I have considered how development of a community of peers (a community within a community) has been facilitated through the establishment of the masters programme at UCEWQ. In order to understand research capacity development processes in a particular context, one also needs to analyse the role of the expert members of the community in creating the space for interaction, in consciously sharing their expertise and utilising knowledge of pedagogical processes to facilitate the learning of the students or young researchers, and I have taken this into account in my analysis and will continue to do so in the following two sections.

I observed in section 3.4.2 on ‘Legitimate peripheral participation ...’, that while communities of practice theory helps us to gain more insight into the social processes of research capacity development and identity formation, it does not provide analytical tools for understanding learning in relation to epistemological aspects of disciplines. In 9.5, I will focus on the epistemological dimensions of research capacity development of selected postgraduate students at UCEWQ. In the following three sections I will discuss further dimensions of UCEWQ’s approach to their masters programme. These are the centre’s approach to supervision and strategies for accommodating diversity of students on the programme.

9.4.2 Approach to supervision

In this section, I first discuss aspects of supervision raised by Palmer about her own

approach to supervision, and then the centre's approach to providing students with effective supervision and mentoring. Palmer characterised her supervision style as a combination of support and criticism. She also described a process of working with students in the field, engaging with the thought processes behind their actions, and exposing them to the "kind of mental dialogue" that she went through in her practice (TP 2 par. 114). Palmer's description of her communication with students in the field gives insight into the acquisition of tacit knowledge in an apprenticeship context. In the process that she describes, it not just through collaborative practice with an expert that tacit knowledge is acquired by the student. She shows how acquisition is facilitated by the expert making tacit knowledge explicit through externalisation and sharing of thought processes.

In UCEWQ there was discussion about supervision and sharing of individual approaches to supervision. An approach to supervision was being implemented which aimed at less reliance on a particular student-supervisor relationship. As I have mentioned, prior to 2003, the centre had only had individual postgraduate students. When it took on five masters students, there needed to be "an evolution of approach to graduate supervision" (TP 2 par. 106). As the research co-ordinator, an important part of Heather Davies-Coleman's role was to supplement the supervision of Palmer and Dr Nikite Muller. Both Palmer and Muller were very busy and often away from the centre. Davies-Coleman pointed out that Tally Palmer had six or seven students, was director of the centre, and had many other responsibilities. She said:

... my job is to relieve her particularly of those "I don't know how to do this, what should I do about this?" sort of problems. "Have you got any references for me?" or, "Who do I speak to about so and so?" or "What concentrations do I use?" Ja, so ...my job is to be the buffer between the supervisor - our supervisors, Nikite Muller and Tally in particular, and the day-to-day running of the research (HDC 2 par. 22).

Having a staff member in the research centre who is accessible to students to assist with day-to-day needs is an important aspect of providing a supportive environment. There is a parallel in SWOP with the executive director, Khayaat Fakier, who emphasises keeping an "open door" for students. Fakier presents this role both in terms of being accessible for students to come and talk about problems, and in terms of coaching them in the more practical aspects of their research projects. In order to be able assist the students, Davies-

Coleman attended the meetings between the students and the supervisors, and kept informed about the students' projects. The two masters students whom I interviewed, Sekhonyana Lerotholi and Nosiphiwo Ketse, both appreciated the availability of Davies-Coleman for assistance and advice.

9.4.3 Dealing with diversity

UCEWQ has had students from diverse backgrounds in terms of race, class, gender and national origin, including students from different countries in Southern Africa. Palmer said that UCEWQ had developed “an **implacable** commitment to diversity” (TP 2 par. 144). She said, “We **will** have a good mix of genders and races and backgrounds and capacities, and we will work as a team in that, so that people will learn how to do things and be helped to learn how to do things” (TP 2 par. 144). At the same time the thesis which students produced needed to be of a high standard. She said:

[The thesis] has to be sent to the top examiners. Its got to ... stand up as a piece of work that can be examined under the most rigorous criteria, but that whatever help is required ... is available and that requires quite a high level of personal commitment and, what I've seen emerging among the staff and leadership of the Centre is a real - without it even being articulated - a real solid commitment to providing skills training and with that comes confidence building. You know, people actually realising that they are able to achieve (TP 2 par. 144).

Heather Davies-Coleman said that the masters students were very different in terms of educational background and needs. She used the example of two students. Ketse had studied at a DET⁴⁷ school and then at Fort Hare, before coming to do her masters through UCEWQ, and William Barker was from a previously ‘model C’⁴⁸ school background and had done his undergraduate degree at Rhodes. She said that they each had different needs of the programme. Ketse needed a lot of input and Davies-Coleman would meet with her on a weekly basis, and also interact with her between meetings. She said that Barker, on the other extreme “needs to have the facilities available to him that allow him to go where he needs to go” (HDC 2 par. 112). She said that the centre in combination with the Institute had given him access to a big database, and resources such as a computer and access to the

⁴⁷ A DET school (Department of Education and Training) refers to a state government school, previously reserved for African students, located in an African township.

⁴⁸ During the transition from the apartheid education system, schools that were previously only for white students became open to students from all races, and were termed ‘model C’ schools.

internet. (As mentioned above, all the masters students had a computer and internet access.) Having access to these resources facilitated his ability to “just run with his research” (HDC 2 par. 112). The employment of a research co-ordinator with the role of supporting the students, enabled the centre to meet the differing needs of the students for support and interaction with an academic mentor.

Another aspect of addressing diversity is through communicating clear criteria of what is expected of the thesis. These criteria are given in the introductory workshop, and Tally Palmer makes a distinction between what she called the ‘bread and butter’ and the ‘jam’ of the thesis.

The bread and butter of their thesis must be enough to get their degree, and it must be done meticulously and excellently and it must be enough to get an MSc. The jam are the little questions that arise, in any piece of research that allow you to explore - very often they’re the difference between getting a degree or getting a distinction, or between adding real interest or being able to move into a PhD. And each of those must also be done well, but very often you can ask an interesting question and simply provide insight into it and discuss it, whereas your bread and butter section, you must tie down. You must actually have results. You must be able to discuss them in the context of the literature and the way you think about those two kinds of work is really different and I distinguish between that (TP 2 par. 108).

She said that she undertook to be very co-operative in the development of the bread and butter and encouraging in their exploration of the jam. There was a commitment from the centre to assist students as much as possible in the development of the ‘bread and butter’ whereas the exploration of the ‘jam’ was more of the students’ responsibility. There needed to be “a combination of direction and independence” in the process of doing the thesis because “you really want to provide the ability for the student you’ve accepted to get their degree, but for an excellent student to shine and to really adventure and grow as much as possible” (TP 2 par. 109). Making a distinction between what was essential to get a degree and the type of exploration that took the research further, was another way of accommodating diversity in a teaching programme.

I referred in section 4.3.2.1 on ‘The natural sciences’, to a distinction between students who are ‘operatively creative’ in that they can solve problems, and students who are ‘conceptually creative’, within the context of Clark’s ideal research training context (Cram,

1989, in Clark, 1993). Encouraging exploration of the 'jam' showed recognition that there was a need both for scientists who have mastered the concepts and methodology of the applied field, as well as for those who are more creative, with potential to work on the cutting edge of knowledge production, to formulate research objectives and to provide research leadership.

Palmer demonstrated an awareness within the developing pedagogical approach of the centre of the need to address diversity in the particular South African historical context, while striving for quality of postgraduate research, and encouraging further exploration by 'conceptually creative' students.

It is widely accepted that acquisition of tacit knowledge embedded in expert practice plays a crucial role in learning laboratory skills and other forms of scientific competence within the natural sciences. In the UCEWQ postgraduate programme there was much that was made *explicit* to students about research practice through discussion and conscious scaffolding processes in the laboratory and in the field. Staff and students described processes of mediation of acquisition of tacit knowledge through opportunities for engagement about research practice and through articulating and externalising thought processes. The process described by Palmer (discussed in section 6.3 on '...breaking through ...') of making tacit knowledge explicit through dialogue adds new insight to thinking about acquisition of tacit knowledge and needs to be further researched.

In my study of the centre, I found that in some ways the organisation of the centre fitted into the 'ideal type' of a natural science department as depicted by Becher *et al* (1994) and Delamont *et al* (2000), and in other ways it diverged from that 'ideal type'. There was a combination of positional and personal modes of socialisation. The position of the masters students in relation to levels of expertise in the discipline (legitimate peripheral participation) was clearly recognised. The learning experience was structured *for* the students in the carving up and allocating of projects by the expert members of the centre. Explicit guidelines were provided about the process of the programme, the skills needed, and what was expected of a thesis. These aspects of the programme were consistent with a positional mode of socialisation. However, there were a number of factors which were more consistent with a personal mode of socialisation. Within the structure of the allocated topics, students were required to conceptualise their own project. They were given leeway

to make mistakes and offered assistance with finding their own solutions to problems. There was flexibility for students to keep the project limited, or extend it further, depending on their individual abilities, needs and intentions, as well as on the nature of their topic. Substantial individual support was available, or the space to just ‘run with [the] research’, depending on students’ needs and backgrounds. Lastly, the teaching staff were concerned with the general “well-being of the person ...their financial situation and everything ...” (HDC 2 par. 137).

The centre also diverged from Clark’s and Becher *et al*’s characterisation of framing of postgraduate education in the natural sciences being determined by the discipline’s requirements for knowledge production, rather than the student’s educational needs (Clark, 1992, Becher *et al*, 1994). Although this was true to a certain extent, the centre’s purposeful structuring of opportunities for mediation of learning; provision of a supportive context for learning; the scaffolding provided to students about the requirements for success; and the accommodation of diversity were organised around meeting students’ educational needs.

9.5 Epistemological aspects of RCD in UCEWQ

In this section I review the research field of UCEWQ in terms of the multidisciplinary of the field, the disciplines it draws on and the modes of research conducted. I discuss the research projects of two of the masters students, considering the competencies required, the challenges faced, and how their development processes were supported by dimensions of the UCEWQ postgraduate programme. I consider the implications of the modes of research at UCEWQ for RCD and postgraduate education. Lastly I draw attention to possible tensions for students regarding their identity in a cross-disciplinary organisational context.

9.5.1 Disciplines and methodological approaches drawn on in water quality studies

I have described the field of environmental water quality studies as an application-oriented, multidisciplinary field in the natural sciences. Palmer pointed to the multidisciplinary nature of the field when she explained what disciplinary backgrounds students may come from.

You need a basic science degree and you could come from a range of

disciplines. I was trained first in biological sciences and then in zoology, so all my postgraduate training was strictly in zoology, but you could come into this field from zoology, botany, biological sciences, geography, hydrology, chemistry ... A wide range of scientific disciplines are brought together in the field of water and environmental water management (TP 2 par. 76).

Palmer emphasised that while the broader field of water research was multidisciplinary, including natural and social scientists, the field of Environmental Water Quality studies required researchers with a scientific training. However, in some projects water quality scientists collaborated with social scientists.

As mentioned above, the purpose of the Institute for Water Research (IWR), in which UCEWQ was located, was to contribute to “sustainable management of water resources in Southern Africa” (IWR, 2002/2003: Projects 23). Methodology for assessing and monitoring water quality formed an important aspect of water management. Much of the research of UCEWQ was aimed at developing methodology for this through an integration of three disciplinary areas or approaches. These were chemistry, biomonitoring, and ecotoxicology (IWR, 2002/2003: Projects 23).

Environmental Water Quality studies is conducted largely through studying organisms that live in the freshwater environment, through one or more of the above approaches. It is based on an understanding that organisms can only exist within their tolerance ranges. There is a range of levels of sensitivity or tolerance to particular toxicants amongst different species. Thus the existence of particular organisms in freshwater systems can give an indication of the health of a system. Research involves ongoing development of various research instruments to provide guidelines for acceptable levels of pollutants in water sources and to monitor water quality.

I will briefly outline the disciplinary areas and approaches drawn on in water quality studies in order to be able to discuss projects of particular students. Students need to apply knowledge from these disciplinary areas in their research and master particular methodological approaches. Firstly, students need to understand the environment being studied through the discipline of chemistry. *Chemistry* is used to build a picture of the abiotic or non-living environmental context in which an organism lives. Secondly, *biomonitoring* is a methodological approach used in ecology. It is used to assess the health of an ecosystem over a period of time. It involves consideration of a combination of biotic

factors, relating to *communities* of animals and plants in the environment. There is consideration of interactions between different species. Factors such as predation need to be taken into account, since they affect the existence and reproduction of organisms. The study of communities of organisms as an indicator of the health of an ecosystem is very complex because of the complex range of factors and interactions involved (Palmer *et al*, 2002, Palmer, 29/08/06).

I will discuss *aquatic toxicology* in more depth here, and discuss biomonitoring in relation to Sekhonyana Lerotholi's project in 9.5.2. Knowledge of principles of chemistry and ecology are needed for all research in water quality studies. Aquatic toxicology is an approach within water quality studies that involves experimentally exposing animals, mostly invertebrates, to pollutants, to determine what level of concentration they can tolerate. In the late 1990s, toxicology was being used internationally as a legislative tool in water management, but it was not well known in South Africa (TP 2 par. 44). Tally Palmer was one of the leading scientists in South Africa in the field of aquatic toxicology. She was the Biology representative in the process of redefining the National Water Act in 1998, along with various role players such as lawyers and water managers (HDC 1 par. 147, Palmer *et al*, 2002). Heather Davies-Coleman said:

... with that Water Act came a **whole** lot of consequent changes and regulations and requirements, all to do with water and water quality in this country and the field has opened quite broadly for Applied Toxicology in fresh water. There's a lot of work that needs to be done (HDC 1 par. 147).

Toxicology involves taking an organism, for example a limpet, and experimentally subjecting it to various levels or concentrations of a toxicant, and seeing what level it can tolerate. Toxicology can be applied in two ways.

The first approach is to do short (acute) tests and determine at what level one kills 50% of the limpets, then to do statistical analysis and apply the end results in the river ecosystem. This type of research could have the outcome of determining how much sulphate or another toxicant can be present in the effluent from an industry that gets pumped into a river.

The second approach is to look at long-term exposure to pollutants. This involves exposing the animals to different concentrations of the effluent and monitoring their growth and reproduction through one whole cycle of the animal's life and possibly second and third generation effects (HDC 1 par. 119, 149).

In order to do toxicological research, invertebrates have to be bred in a laboratory, because large numbers of organisms are used in experiments and many die as a result of the experiment. The breeding and supplying of the animals, as well as the more long-term type of toxicological research mentioned by Davies-Coleman requires extensive knowledge of the biology of the species. Thus there is a need for basic research to be done on the biology of particular species.

Davies-Coleman had been involved in doing basic research in the field of zoology on specific indigenous organisms to provide the knowledge needed for the conducting of applied water quality research for the purpose of informing policy development and the implementation of water management. She had worked on a project at the IWR, doing biological research on two indigenous species, in order to inform toxicological research on long-term exposure to toxicants. This research was later used as part of her doctoral study. The research was conducted:

... on the biology of a limpet, in particular a fresh water limpet, and also a mayfly - both of them found in this region in the rivers and we developed methods of collection from the river. We did a lot of research on how they grow, how fast do they grow, when do they reproduce, how often do they reproduce, what numbers do they get in summer and winter, and that was all in the field ... and then in the lab, we then had to try and grow them and what sort of densities, what temperatures, what did you feed them on, how best did they grow, do they need some artificial supplements if it didn't grow ... so there was a lot of biological investigation about our particular species we were working with (HDC 1 par. 119).

There were a number of studies researching the use of *indigenous* aquatic invertebrates in toxicological research, so as to develop water quality assessment instruments that were most appropriate for a South African context. Nosiphiwo Ketse's did her masters thesis on an indigenous freshwater shrimp, *Caridina Nilotica*, which was valuable for South African toxicology, both because it was indigenous, and because it was found in running water. The organism most commonly used in toxicological studies internationally, was the

Daphnia, the water flea, which was found mainly in standing water. Ketse's project will be discussed further in the following section. There were two other masters projects in 2003 which were part of the 'Salt project' and used toxicological research. Both of these projects aimed to use toxicological data to contribute to guidelines for protecting water quality of South African rivers.

9.5.2 Research projects of two masters students

In this section I discuss the research projects of the two masters students interviewed, in order to gain insight into the nature of their projects, the abilities needed to do the research, some of the challenges involved and how the students were dealing with these challenges.

Sekhonyana Lerotholi was doing his project on the ecological health of the Kat River, and Nosiphiwo Ketse was studying how embryonic development of the freshwater shrimp *Caridina Nilotica* is affected by particular toxicants. Both of these projects were part of the 'Salt project', mentioned above. I will introduce the discussion of each of the masters students projects with a brief outline of their educational (and work) background.

Lerotholi was from Lesotho, where he did a BSc in Physics and Physical Geography at the University of Lesotho. In his fourth year he had done a project which was a feasibility study of possible hydro-electric power stations in Lesotho. The project was narrowly framed and closely guided by his supervisor. The most important thing which he learnt from it was the ability to consider a number of factors which informed a decision. This ability to 'multi-task', as the masters students call it, is an important component of competence in doing environmental water quality research. He then did honours and worked in the field of Geohydrology. His job involved prospecting for boreholes, but he became frustrated and wanted to understand more about the water systems that he was working with. He realised that he needed to learn more about surface water. He decided to do his masters through UCEWQ at the Institute for Water Research (IWR). He was attracted to the IWR because he had read a number of its publications, and he acquired a scholarship from Unilever. Lerotholi was based at UCEWQ but was registered in the Geography department at Rhodes. Palmer was one of his supervisors.

Lerotholi's project was on the ecological integrity or health of the Kat River, in the Fort

Beaufort area of the Eastern Cape. The project was concerned mainly with the impact of salinization on the river catchment area, which was extensive because of the large scale irrigation of citrus farms along the banks. He intended the project to act as a baseline study for further assessment of the integrity of the river. The research design involved two stages, firstly, using biomonitoring, and secondly, a statistical application using toxicological data.

In the first stage, Lerotholi used a biomonitoring approach. He selected two sites to sample, one upstream and one downstream from the citrus farms. This enabled him to assess the impact of the citrus farming on the ecological health of the river. He described this stage below:

... I sample the invertebrates, instream invertebrates and I look at the fish and I also look at the riparian vegetation. That's the vegetation just on the banks of the river to see how much that has also been impacted because we're dealing with an ecosystem (SL par 80).

He said that in the second part of the study he was:

... going to use statistics to come up with relationships between the instream invertebrates and using toxicological data as to the different invertebrates' tolerances to salinity - data that we have in the centre. We're going to use statistics to try to come up with relationships as to where in the Kat there are impacts on [the river] (SL par. 80).

Thus the first part of the study involved doing fieldwork and using particular biomonitoring protocols in the sampling of animals and plants. The second part of the study involved using toxicological data about invertebrates from the river that was already available in the centre. The toxicological data had been collected at different sites in the river, thus they could be used to determine where there had been greater or lesser impact of salinization on the river.

At the time of the interview, Lerotholi described the experience of doing his masters project as "really tough" (SL par. 84). There had not been a research component in his honours course, and the approach of biomonitoring was new to him. Although he had taken a course on biomonitoring at the beginning of the year, it had taken time to understand the approach as a whole and to be able to master it in practice. It was fairly easy for him to

master the technical aspects of biomonitoring and to understand the protocols. However, it was hard to consistently maintain clarity about the link between the procedures, and how they were being used to address the research questions

The complexity of environmental systems was also daunting. One issue which Lerotholi raised was that natural processes of salinization took place, as well as those arising from irrigation. He was concerned that the accuracy of his data could be affected because he didn't know if he would be able to distinguish between these different processes.

Thus Lerotholi encountered difficulties learning a new approach, and applying it in an integrated way. It was difficult to connect the micro processes of the study consistently with the larger conceptual aspects. Lerotholi found the structure of regular meetings with his supervisor helpful. It gave him an opportunity to raise his questions and doubts. He said "sometimes the questions are addressed, and when you go back and you're thinking on your own, you get ... some new questions" (SL par. 140). He also found that the Monday meetings provided a valuable opportunity to discuss these questions with the other masters students and staff. Lerotholi described a process of 'learning by doing' – learning a methodological approach, applying it in the field and thereby generating recursive questioning that arose out of the interaction between theory and practice, and the research questions and data analysis. In the UCEWQ programme, the system of distributed mentoring, and the structured group seminars, helped him cope with this challenging process and manage the complexities of the research process and the complexity of the systems that he was researching.

Nosiphiwo Ketse did her undergraduate and honours degree at the University of Fort Hare, a historically black university in the Eastern Cape. While doing honours in Zoology, she did her research project on the sensitivity of freshwater shrimps to particular salt compounds. Initially she was planning to do her honours project on a topic in Marine Biology, but was unable to do this because of lack of appropriate equipment and funds to do the fieldwork. She was then allocated a topic on freshwater shrimps and did some of the laboratory work at UCEWQ at Rhodes because there were inadequacies in the laboratory infrastructure and equipment at Fort Hare. (This arrangement came about because Ketse's supervisor's wife worked as a senior laboratory technician at UCEWQ.) Thus Ketse came into contact with UCEWQ and later received a bursary from Eskom to do her masters in

Zoology through UCEWQ.

She described a substantial difference between studying at Fort Hare and at Rhodes and found the transition difficult to make. The main difference which she identified was that in her masters studies at UCEWQ there were expectations of independent thinking which she had not encountered at Fort Hare. She said:

When I was doing my honours [at Fort Hare], I was given this project and then they would just tell you that you're gonna do this and this and this, but here you're just given maybe your topic, then you have to think of ways of how you're going to do that experiment (NK par. 20).

In the UCEWQ masters programme, students were given research topics, but they had to work out the research design for their projects themselves, with assistance from their supervisors and Davies-Coleman. Ketse mentioned that at UCEWQ she had had to learn to 'multi-task'. This competency was also highlighted by Lerotholi and corresponds to the ability described by Palmer of managing complexity – looking at the object of study in relation to the different aspects of the broader ecological landscape, the chemical components, the ecology of plants and animals and interactions in the environmental context. It also included the ability to apply understanding of broader ecological contexts when doing laboratory research and statistical work.

Her experience of studying Zoology and Chemistry at Fort Hare was affected by lack of material resources. She said:

... even the laboratory is not that up to standard - maybe some equipment are not there ... even having things like field trips - we were just taught ... this is something you've never seen it before. You just don't have an idea how does it look like when you see it. There was not that much field trips so you can see what you are doing. We would always do it in class (inaudible) using a book (NK par. 32).

Ketse described how a lack of equipment for experiments, and a lack of funding for field trips meant that her education lacked much of the experiential component that needs to be integrated into science education. The lack of equipment also made it more difficult to develop essential laboratory skills. When she came to UCEWQ to use the laboratory, while she was doing honours at Fort Hare, she initially got some assistance in working with the

shrimps and doing the experiment, and after that was able to work more independently.

I will describe Ketse's masters research project, and then discuss one of the main challenges that she encountered during her project. I mentioned in 9.5 that one of the research objectives of the centre was to take methods of assessing water quality used in other countries and develop them for application in a South African context. Her thesis project contributed to research on the *Caridina Nilotica* shrimp, an indigenous freshwater invertebrate, found in flowing water, which could be used as one of the indicators of tolerance of the ecosystem to levels of toxicity. Her study was on the effect that exposure to toxicants had on the embryonic development of the *Caridina* shrimp's eggs. The particular toxicants that they were exposed to were sodium chloride and cadmium chloride.

There were two phases to the project. The first phase was to identify stages in the embryonic development of the shrimp, which took the form of biological investigation in the laboratory. The second phase was the exposure of the shrimp eggs to the toxicants and an investigation of how this affected embryonic development. Ketse's research involved chronic toxicity testing and contributed to knowledge about the effect of exposure to these toxicants on long term reproduction of the *Caridina* shrimp.

Ketse indicated that she experienced difficulty in conceptualising and designing the project, and needed assistance with decisions that she had to make during the course of the project. As well as meeting with her supervisors, she had weekly meetings and ongoing consultations with Davies-Coleman, to assist her with this.

Ketse encountered a challenge that she needed to solve in order to do her research project. She said:

I was supposed to come up with the design, where I can do my experiment because the problem with the eggs - they need constant aeration. They need to have air flowing through them when they are in their mother ... So when we're going to do the experiment, we needed to remove the eggs from the mother so that we can do our experiment. So we need to come up with ideas on how to keep them alive when they're outside their mother, so we had to come up with a model that will make them to survive. So I had a problem with that one - constructing the model ... so it was a very big difficulty, that one, but at the end I did come up with something. So at least now, they are surviving 'cause they need to survive for about seventeen days outside their mother, so now I

think I've achieved that (NK par. 109).

She had much assistance with solving the problem, particularly from a researcher who was dealing with a similar problem with fish eggs in the Ichthyology department. She described a collaborative process of problem-solving.

She said:

“a lot of people have been helpful. Then today they come up with another idea - then someone is coming with a better one so we just combine those ideas - then we came up with something” (NK par. 112).

In this case Ketse encountered a challenge to her research design, and had to consult other researchers, apart from her supervisors, to help her to resolve it. In this case there was a collaborative process of problem-solving and mediation of learning between researchers from different related disciplines, which Ketse accessed through the network of Life Sciences disciplines at the university.

In a much later discussion with Palmer (TP telephone conversation 29/08/06) (referred to in the following section), she mentioned that Nosiphiwo Ketse's project stood out amongst the masters students' in its very innovative approach. I was struck by this, since in previous interviews with Palmer and Davies-Coleman, they had emphasised the educational underpreparedness of Ketse, and her need for support and guidance. The innovativeness of the approach of her project was a new angle, which would have been interesting to explore further, if it had not come up so late in my research project.

9.5.3 Modes of research conducted at UCEWQ

I have discussed (in section 9.3.1) how relationships between UCEWQ, industrial groupings with interest in environmental impact of products and government bodies in the field of water management have been established in a way that conforms to what Rip (1997, 2004) refers to as a strategic science regime. Davies-Coleman described how Palmer's involvement in policy research and formulation in the field of water management enabled her to keep “her finger on the pulse” and analyse what research needed to be done to inform ongoing policy and practice in water management (HDC email 18/09/06). This

required what Rip describes as an “ability to carry out ... scanning of developments in scientific and societal environments, and ... skill in the identification and exploitation of ‘leads’” (*ibid*:157). It was accompanied by the setting up of strategic relationships in order to acquire funding and build an infrastructure to conduct relevant research.

Palmer characterised the research work of UCEWQ as having a localised application, as well as developing a way of thinking and approach that contributed to an international field of environmental water quality studies. Both of these aspects of research were valuable, and she saw UCEWQ as working at the cutting edge of their field both in terms of international research in the field and in application-oriented research. Since South Africa was a developing country, local outcomes of research were important (TP 29/08/06). UCEWQ’s approach to running a sustainable research programme fitted into the pattern of strategic research described by Rip (1997, 2004) and Henkel (2004). There was cross-subsidisation from the funding for projects commissioned by industry funders and government clients, which could be channelled into basic research. Research projects in the centre were aimed at providing immediately applicable solutions, as well as contributing to more long-term fundamental knowledge production. Some projects were geared towards the former, while others had implications for local implementation as well as more long-term knowledge production. Palmer mentioned that the research area of environmental flow methods, which her doctorate had been located in, was an example of an area that contributed to international cutting-edge research, and was significant for local policy and practice (TP 29/08/06).

The modes of research conducted in the centre had implications for the postgraduate programme as well as for the long-term environment provided for postgraduate study and research capacity development in the field. In a number of the masters students’ brief descriptions of their research projects, they included a statement about how their research would contribute to policy on water quality and water management in South Africa (IWR, 2002/2003). Palmer argued that in the case of the masters students’ projects, there were different levels of innovation. She contrasted Nosiphiwo Ketse’s project, in which “the whole approach was very innovative” with another masters student who had applied a known methodology (TP 29/08/06). She said that the latter student could have taken her research further, and, together with a third student working in an overlapping area, she could have made a more fundamental contribution to the research field. She emphasised

that decisions were made by students about what they wanted to achieve and how far they wanted to take their research. However, some students were more interested in pursuing fundamental questions than others.

While the aims of students' research projects varied along the continuum from application-oriented to basic research, the quality of their research needed to be excellent and publishable. This brings to mind Rip's categorisation of strategic research combining relevance (to specific contexts) and excellence (the advancement of science) (Rip, 2004). Articles which had a local, site-specific emphasis could be published in local journals, and research on more fundamental issues could be published in international journals. Both of these avenues of publishing were encouraged (TP 29/08/06).

In Chapter 4, I introduced Henkel's argument that the demand for strategic research from governments and the private sector and the response from academic research groupings, has led to the creation of a new, relatively stable epistemological and value framework for academic research. I argued that this is not necessarily the case in South Africa, and there is still ambiguity about the extent to which strategic science regimes are developing in South Africa (Mouton, 2001, Cooper, 2005). However, in the field of water quality research, there is evidence of the emergence of a strategic science regime, such as:

- formation of strategic partnerships;
- recognition from government and the private sector of their need for new knowledge at the leading edge of the scientific field;
- interest and support from government and industry in research capacity development and postgraduate education in the field. (See Chapter 4 section 4.7.)

UCEWQ was involved in pursuing a proactive research agenda, which linked to developments in the international field of environmental water quality studies. There were strong relationships with departments at Rhodes which had links to water research such as Zoology and Geography. These factors indicated that a potential existed for the development of conditions conducive to pedagogic continuity in the field of Environmental Water Quality studies, in which UCEWQ and the IWR could play an important role. In order to provide a stable research environment, and to build up and sustain the conditions for pedagogical continuity, the relationships with strategic partners would need to be nurtured and managed on an ongoing basis.

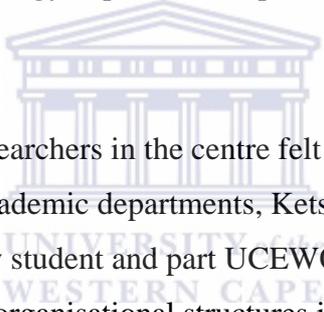
In order to facilitate long-term stability there was a need for flexibility to adapt to and manage changing societal and knowledge contexts. There would also be a need for more active support from the university to provide an anchor during times of uncertainty, which would be balanced by the benefits that were received from research centres such as UCEWQ.

9.5.4 Relationships with academic departments in the university

The issue of UCEWQ's relationships with academic departments has both organisational and epistemological dimensions. UCEWQ had strong links with related departments in the university, including Environmental science, Zoology and Entomology, and Geography. Research staff in the centre were involved in teaching in collaboration with these departments at third year and honours level and engaged in joint supervision of postgraduate students. Contributing to teaching in various related disciplines exposed undergraduate students to Water Quality studies, and attracted students to pursue studies through UCEWQ. It also contributed to strengthening relationships between departments.

There was a strong tradition of co-supervision both within the centre, and with staff members from other departments. Palmer said that the interaction in teaching and supervision “makes for very close academic linkages with those departments” (TP 2 par. 72). On the one hand the field of Water quality studies draws directly on knowledge, methods and techniques from other life science and earth science disciplines. On the other hand teaching and co-supervision across these disciplinary contexts had the effect of encouraging further exchange and multidisciplinary research agendas. The effect of teaching and supervision on interaction across disciplinary boundaries and on research agendas is an issue that comes up in all three of the research centres. For example, in PLAAS, Lahiff stressed that researchers tended to work within their own disciplinary boundaries. However, discussion on supervision of theses provided a stimulus for academics from different disciplinary backgrounds to engage with each others' disciplinary frameworks. It has been noted that exchange between different disciplinary frameworks is necessary for the conducting of application-oriented research. Moreover engagement in relation to postgraduate students' research may generate new developments within multidisciplinary research, which are not purely responsive to external needs.

In UCEWQ there were some problematic aspects to the cross-disciplinary organisational structure in which the students were located. Because UCEWQ and the Institute for Water Research were not departments in the university, students could not register with them. Postgraduate students needed to register with a department and do their thesis in one of the disciplines that were housed within a department such as Zoology or Environmental Science. Ketse felt uncomfortable with being located in UCEWQ while being registered in the Zoology department. She felt an outsider in the Zoology department, and added that some academics in the Zoology department expressed doubts as to whether her project was zoology (NK par. 192). (This could be a case of academics within a strongly bounded discipline, expressing resistance to accommodating knowledge production at the boundaries of their discipline.) Ketse's situation was aggravated because although one of her supervisors was a zoologist, he was based at the University of Fort Hare so could not be present in the Rhodes Zoology department to provide a strong link between her and the department.



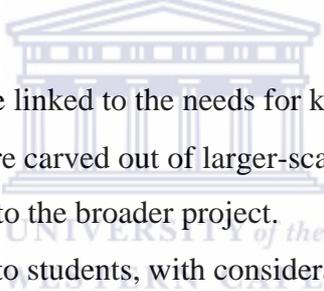
Thus although the senior researchers in the centre felt confident about its location and relationship with relevant academic departments, Ketse expressed her discomfort with her mixed status as part Zoology student and part UCEWQ student. One could argue that this type of location in different organisational structures is part of a larger mobility with which a student in an application-oriented, multidisciplinary research area potentially needs to deal, both in postgraduate education and certainly in her later career. However the power relations involved made it difficult for Ketse, a young black student from a disadvantaged education system, to negotiate the less familiar Zoology context in the historically white university context and also assert her own needs and identity. Postgraduate programmes in an application-oriented, multidisciplinary field need to take cognisance of how students negotiate identities between organisational structures such as the department and the research centre, and students should be provided with support in doing this.

9.6 Conclusion

The case of the Unilever Centre for Environmental Water Quality (UCEWQ) illustrates shifts which are widely depicted in international higher education literature. Both internationally and in South Africa, there has been increasing responsiveness of HE

institutions to societal needs, reliance on external sources of funding and development of organisational structures to accommodate these changes. As discussed above, the centre was closely linked both to government agencies which needed research for policy formation and implementation and to industries that wanted to be profiled to government in a positive way and get access to new research findings. While the bulk of the research conducted in the centre was application-oriented, the funding from industry and government contracts, consultancies and financial support allowed the centre to sustain and pursue its research agenda. Furthermore, funding from industry and government departments was channelled into RCD and student bursaries to educate a new generation of professionals with expertise in water quality research.

The organisation of postgraduate education, linked to epistemological aspects of knowledge production in the centre, showed strong similarities with Delamont's 'ideal model' of organisation and socialisation within natural science departments:

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- Students' projects were linked to the needs for knowledge production in the centre.
 - Individual projects were carved out of larger-scale funded projects to make an authentic contribution to the broader project.
 - Topics were allocated to students, with consideration of their interests, and with the requirement that they formulate the research design to address the research problem.
 - There was collaboration and teamwork amongst students and staff members in the laboratory, the field and through seminars.

While these processes were a central part of research capacity development in the centre, there was also an emphasis on developing a coherent *pedagogical* approach to educating postgraduate students. This was implemented through:

- Creating a group structure
- Building a community of peers to facilitate group interaction and engagement with theoretical knowledge and methodology;
- Providing a system of collective supervision and mentoring;
- Using opportunities to make tacit knowledge explicit, including knowledge about scientific practice and academic cultural norms and genres.

A significant factor in the staffing of UCEWQ was the employment of a research co-ordinator, who was responsible both for assisting with the research outputs of the centre and for supporting the postgraduate students and co-ordinating supervision and mentoring. This role can be compared to the role played by the executive administrator in the Sociology of Work Unit, although there was a different focus in their overall job descriptions. In a research centre where there is pressure for all research staff to produce outputs in order to acquire income, it is crucial that dedicated resources and time (as well as personal commitment) are channelled into facilitating research capacity development.

One of the areas of research competence which has been identified as necessary in an increasingly accountable international knowledge context is the ability to interact with societal and community needs and concerns (Nowotny *et al*, 2001, Rip, 2004). The objectives of the broader Institute for Water Research at Rhodes included the goal of making scientific knowledge about water management more accessible to government, industry and community stakeholders. This provides a step towards 'social robustness' (Nowotny *et al*, 2001). Developing awareness and competence in relation to the need for interaction with concerned social groupings was integrated into the pedagogical programme of the centre.

Lastly, UCEWQ was able to sustain and build a supportive and enabling organisational culture, which facilitated student interaction and learning. There appeared to be a gender dimension to the culture of mentoring created. The centre consisted mainly of women and there was an awareness amongst the staff interviewed both of the need for women to develop excellence in their own scientific practice as well as a conscious encouragement of the values, traditionally associated with women, of providing support and facilitating the development of others. The centre endeavoured to create an environment which encouraged growth and development of staff and postgraduate students.

CHAPTER TEN: CONCLUSION

10.1 Introduction

The central question guiding this study has been, “What can we learn about research capacity development from narratives of individual researchers and postgraduate students and from case studies of application-oriented research centres in South African universities?”.

I have explored this question through analysing narratives of RCD processes of individuals, in relation to the contexts provided by the research centres and their research fields, and as shaped by the transition period of South African society in the decade after the change in political dispensation.

In this concluding chapter I summarise the findings of the study, reviewing insights gained from the narratives and case studies about individual processes of development, and considering the implications of these for settings for RCD. I will then outline the main insights about research centres as settings for RCD, firstly, in relation to their organisational form and location in the university, and secondly, in relation to the modes of research conducted in the centres and epistemological dimensions of production of knowledge. I will consider the implications of this study for practice in RCD and postgraduate programmes and for related educational policy. Lastly, I will point out what I perceive to be the strengths and weaknesses of the study and identify areas for further research.

10.2 Summary of findings

In this section, I summarise the findings of the study in relation to the theoretical framework that has informed my analysis and conclusions.

10.2.1 Individual RCD processes and implications for RCD settings

The insights gained in this study have been acquired through reiterative processes of formulating and revising a theoretical framework for analysis, and analysing data. I have gained insights based on interpretations of the narratives and case studies in relation to

theory. These were strongly grounded in these narratives and case studies. In addition, insights have been gained from triangulation of narratives and case studies. Tentative claims about research capacity development were then investigated in relation to other case studies. The reader has been provided with much contextual information about the case studies and their programmes, as well as relevant extracts of narratives in order to be able to make her own judgement of analysis and interpretation of textual data. The claims made about RCD in these case studies may resonate with situations which readers encounter in their own professional contexts and may generate more informed understandings of research capacity development. The findings of this study can be drawn on to inform practice in research capacity building, as well as contributing to policy on RCD.

As this study developed, so did a central concept of research capacity development as a 'project of possibility'. Such a project involves forming a vision of "that which is not yet" (Simon, 1992:14) and working towards making that vision a reality. I see RCD as a 'project of possibility' in relation to three important themes in this study – learning and developing capacities; equity and transformation; and changing modes of knowledge production. Firstly, at the level of the individual developing knowledge and competence to do research, there is a need for bridging the gap between current knowledge and abilities and the realisation of potential to develop the capacities that are required to be a competent researcher.

Secondly, within the context of the national transformation process and project of building a more just and equitable society, there is a need to develop researchers who can function effectively in such a society and contribute to the process of transformation. However, one of the challenges is that the individuals themselves have been shaped by the social structures of the past. Furthermore, the organisations in which RCD processes are taking place are themselves sites of reproduction and of social change. They too have been influenced by social relations from the past, while they may be working towards a vision of the future.

Thirdly, in a world of rapidly changing systems and modes of knowledge production, research training needs to prepare individuals to operate in worlds of knowledge production that are still coming into being (Rip, 2004).

In the construction of a framework for analysing individuals' processes of research capacity development, I drew largely on theories of learning within socially situated contexts. I used Lave and Wenger's theory of legitimate peripheral participation into communities of practice for building a model of socialisation into nested social settings within research contexts (Lave and Wenger, 1991). This model was used to analyse learning as a process of identity formation in relation to communities of practice, disciplinary and research fields. Within this framework, the process of RCD was seen as one in which students and young researchers are located in a position of legitimate peripheral participation in communities of practice. Through participation in practice of the communities and exposure to a holistic vision of practice, they develop the knowledge and skills of expert members of the community. Theory of communities of practice has been helpful for researching the social contexts needed for learning and development, and the mediation of learning through group participation in practice. However, it does not provide analytical tools for understanding learning in relation to epistemological dimensions of disciplines and research fields. Furthermore it sees learning as taking place through implicit processes of socialisation, and disregards the role of pedagogic structuring, which I have found to be crucial for facilitating RCD.

I identified a theme in a number of the narratives, of RCD taking place through dual processes of identification and individuation. These processes took place with respect to mentoring relationships and communities of practice. Analysis of individuals' experiences of mentoring suggested that mentors and supervisors need to provide a combination of directive guidance and a developmental approach, which facilitates growth. The balance reached between a directive and facilitative approach would depend on the experience and needs of the student. I have argued that in most cases a mentoring relationship needs to provide scaffolding for the student's development, and facilitate and accommodate the student's growth from dependence to increased autonomy.

In the case of RCD in research settings, the findings of the study imply that young researchers need to be provided with structured opportunities to participate in research projects within a developmental frame. Involvement could begin in a limited way, on specific tasks, and through a process of scaffolding move towards increasing autonomy. However, it was necessary for researchers to develop a holistic vision of practice within the research field from an early stage in order to inform this developmental process.

The concept of mediation of learning is a central element in the conceptual framework of the study. Students and young researchers are faced with ongoing demands for cognitive growth in order to manage tasks which are beyond the grasp of their previously integrated knowledge and abilities. Mediation of these processes have been analysed mainly with reference to socially situated theories of learning. Development is seen as taking place through mediation in the zone of proximal development (Vygotsky, 1978). Through the practice of doing the activity with assistance, developmental processes are set in motion to enable the learner to manage such a task independently. Learning processes are supported through scaffolding (Bruner, 1986), where temporary supports are set in place and later withdrawn to facilitate development through “an ever-shifting ZPD” (Cazden, 1994:174). The concept of ‘cognitive apprenticeship’ has been used to analyse the mediation of learning of expert practice and sharing of tacit knowledge through processes of scaffolding, coaching and modelling (Collins *et al*, 1989). I have also used Engeström’s theory of ‘learning by expanding’ for conceptualising processes of transition made by individuals towards developing more cognitive control and flexibility (Engeström, 1987).

I have argued that settings for RCD need to provide mediation of learning through mentoring relationships, communities of practice, and structured and supportive programmes. Programmes of RCD and postgraduate education implicitly contain mediation processes embedded in mentoring, seminar programmes, laboratory practice or collaborative work in conducting fieldwork. However, the findings of this study suggest that practice of mediation and scaffolding in research capacity building needs to be more theoretically informed and well conceptualised, and the study provides insights which can be drawn on for this.

I have argued that research capacity development processes entail profound transitions in identity. Furthermore, there is evidence in many of the narratives of the intense emotional stress experienced by individuals when faced with demanding cognitive challenges that have to be overcome. This factor points to a need for there to be a ‘holding’ or ‘containing’ of the overall process of transition experienced by postgraduate students or researchers embedded in the RCD programme. Furthermore in a South African context, there needs to be recognition on the part of facilitators of postgraduate programmes of the particular difficulties of black, working-class or rural students arising out of socio-economic

conditions and disadvantaged educational backgrounds. Informants from SWOP highlighted the particular pressures of financial stress, and family and socio-cultural pressures and expectations. Furthermore, there are particular needs and constraints arising out of students' and researchers' gender roles in society. These factors require awareness and sensitivity and there are indications that there is a need for pastoral support to be integrated into postgraduate programmes in order to facilitate retention and success.

In two of the research centres, complex dynamics related to race, class and gender surfaced to different extents. These manifested themselves with regard to power, positioning and undermining voices, to which some of the individuals referred. Individuals need to grapple with these tensions within relationships with supervisors, mentors, colleagues and within institutions. At an organisational level, these tensions need to be addressed through processes of organisational reflection. Organisations involved in research capacity development need to do ongoing work at providing settings which encourage 'possibility', and generate organisational cultures which facilitate growth and transformation.

10.2.2 Research centres as contexts for research capacity building

In this study, processes of RCD of individuals have been studied as part of their life course, taking into account their backgrounds, past experiences, including anticipation of their trajectories into the future. Similarly, the research centres in the study are organisations in process. They are each relatively young organisations, originating in particular historical contexts, located within rapidly shifting terrain both in the fields in which they work nationally, and in the global knowledge economy. At the same time, they are located in universities, with their own complex and established organisational forms, which can be resistant to change. Thus when making claims about the contexts which research centres provide for RCD, one needs to consider the form in which they are at present (or more precisely at the time of the actual research) and consider the *potential* that they hold for facilitating RCD in future. In doing this, the opportunities that they offer and the challenges and constraints in their organisational structure and location need to be taken into account. The three research centres in the study each have their own unique set of circumstances, related to their field of research, the nature of their location at universities, relationships with departments and external networks.

10.2.2.1 The contexts provided by the centres at present

From this study of three application-oriented, multidisciplinary research centres, I have identified the opportunities that they provide as sites of research capacity development, as well as constraints and challenges. They are well placed as contexts for RCD in the following respects. Firstly, they provide students and young researchers with opportunities to develop capacities in various modes of research. Secondly, through their location at universities, they can draw on the wealth of resources for research education, including organisational structures, disciplinary knowledge and expertise for postgraduate education in traditional departments. Thirdly, they develop relationships with academic departments and institutes internationally, from which young researchers and students can benefit. Lastly, they are involved in collaborative research partnerships with a wide range of organisations such as government departments, industry, science councils, foreign donors and organisations representing civic society. Exposure to the complex relationships between ‘multiple worlds’ through which knowledge production takes place, can enable postgraduate students to begin to develop the repertoire of capacities that will be needed in the types of research environments where they may be employed in future.

The aim of the RCD programmes in each of the three research centres has been to equip students and young researchers with the abilities needed to conduct thorough and rigorous research in their fields. At the same time the centres have provided contexts where young researchers were exposed to the broader functioning of the centre, and to partnerships with different groupings with interests in the area. Involvement in application-oriented and use-oriented basic research contributed to the researchers’ overall repertoire of capacities.

There are a number of advantages of research centres as a context for postgraduate education. Students have opportunities to be involved in ‘real-world’ research; to gain access to the research projects in which the centre is involved and the organisations with which the centre works; and to be exposed to the different modes of research conducted in the centre. In all of the centres, students were involved in real-world projects to varying degrees. However, in the SWOP and UCEWQ masters programmes, the form of this involvement was contained and limited, and the priority was for students to conduct their masters thesis successfully.

At PLAAS the dominant approach to RCD of young researchers employed at the centre was what I have called a work-study model. In this model, a researcher was employed on a fulltime basis in the centre, working on centre projects while studying for a higher degree. In cases where researchers were sufficiently mature, experienced and able to manage complexity in their work and study practice, they benefited enormously from the experience that they gained. Involvement in the range of projects of the research centre gave them the opportunity to develop and fine-tune capacity in a range of types of research. However, many researchers being trained within this model floundered and failed to meet the demands of the research and study. This draws attention to the need for effective selection, recruitment, and matching of individuals to appropriate models of RCD.

A research centre can provide a community of practice with nested communities within it, which can be highly conducive to RCD. This happens when there is a shared vision of the objectives of the centre, even though young researchers or students may be participating in different group or individual projects. Through exposure to the overall practice of the community, young researchers develop identification with the work of the centre and the research fields engaged in. This shapes their identity formation process as researchers. This sense of a joint enterprise, and shared goals can result in an individual aligning their own goals with those of the centre, and through identification, reinforcing their motivation to do the practical and intellectual labour necessary to acquire the knowledge and develop the capacities needed.

Not all informants in the study, however, experienced supportive communities of practice in research centres. An organisational structure in which researchers are involved in different projects may work against a sense of overall coherence in the organisation, and may exacerbate isolation of individual postgraduate students. The research findings indicate that it requires a proactive strategy on the part of the research centre to build organisational structures which generate supportive communities of practice, to develop systems of distributed mentoring, and to develop an organisational culture which nurtures research capacity development. In addition, the success of an individual's process of RCD also depends on the agency of the individual to construct supportive networks for herself, and to build and make use of relationships which facilitate her learning.

Ideally RCD programmes should be located in the context of a *critical mass* of researchers at different levels of expertise, within particular research fields. Because of the relatively small-scale nature of the research centres in the study and associated localised research programmes, the quantitative aspects of critical mass were not present in the contexts of RCD. However, through the research centres, the students or researchers could link up to researchers in the field outside of the university. The SWOP programme intentionally tried to provide elements of the qualitative aspects of critical mass for their students.

The organisation of postgraduate programmes and models of RCD in the centres varied, with different levels of integration between the centre programmes and the traditional departments in the universities. A significant factor in the effectiveness of the SWOP internship programme was the close link between the programme and the teaching programme within the Sociology Department initially, and later the School of Social Science at Wits. The students in the programme had a grounding in sociology from their undergraduate studies, and were located in the structured honours and masters programmes offered by the Faculty, as well as in the SWOP programme. There were a number of benefits from this. The programme was strengthened by the synergy of the disciplinary programme embedded in the academic heartland of the university; the students' socialisation in the sub-discipline of Sociology of Work; and their exposure to and (limited) participation in SWOP's 'real world' research activities in the field of Sociology of Work.

In the case of UCEWQ, the masters programme was located firmly within the research centre, but there were strong linkages with other natural sciences departments and the Geography department at Rhodes. These linkages were established and reinforced through research collaboration with staff from these departments and co-supervision arrangements with members of departments. Although the programme was located in the multidisciplinary research field of UCEWQ, students' projects were located in one of the disciplines and registered in the corresponding department, so students needed to straddle the centre and an academic department.

One of the weaknesses of PLAAS' RCD programmes was a lack of integration with disciplinary departments at UWC. The combination of a multidisciplinary research field and the lack of strong relationships with local departments within the university, led to less

stability of the epistemological context provided for RCD. The strength of PLAAS' networks lay more in international institutional collaboration, which provided major funding and opportunities for RCD. However, some individuals needed more structured, local communities of practice to facilitate their process of development.

The ability of research centres to provide effective contexts for RCD is affected by a number of organisational factors, which arise out of the way that research centres are funded and how they are located in universities. The reliance of research centres on 'soft', external sources of funding means that there is a lack of permanence and security for employees. In many cases, the universities benefit from the productivity of the centres in terms of research contracts and publications, but are reluctant to commit central university funding to research centres. Researchers are generally employed on short-term contracts, which makes it difficult for them to plan long term career paths in research. In some cases, researchers work on short-term projects, which offer less opportunities to do in-depth research and to build a depth of knowledge and expertise in that area. However, there was evidence in this study that the majority of research conducted in these researchers tended towards relatively long-term projects of two to three years, which took the form of 'use-inspired basic research' (Cooper, 2006). I will discuss the implications of this mode of research for RCD below.

A further challenge to research centres' ability to facilitate RCD is linked to their capacity for mentoring and supervision. Because of research centres' reliance on donor and client-funding for projects, most researchers are employed on the basis of working on specific projects. Thus, their main priority is to deliver on their project commitments. Senior researchers have a number of pressures on their time – research outputs for donors and funders, academic publications for journals, and in some cases, they are involved in their own postgraduate study. This can manifest itself in a lack of capacity for mentoring of young researchers and students in the centre, where human resources, time and funding is not specifically allocated to this. Clearly mentoring of students and young researchers by mentors who are knowledgeable in their specific area of research is crucial. In addition to this, the employment of a staff member whose job description includes time dedicated to supporting the research capacity building of postgraduate students and young researchers was seen to be extremely valuable in SWOP and UCEWQ.

10.2.2.2 Organisational and epistemological dimensions and RCD

In this study, relationships began to emerge between the way in which knowledge production was organised and the epistemological dimensions of the modes of knowledge being produced. I became interested in investigating these relationships and their interaction with research capacity development. I drew on Becher *et al* 's (1994) and Delamont *et al* 's (2000) studies which investigate the relationships between the organisational forms and epistemological dimensions of research in particular disciplines and knowledge domains and research training in these disciplines (Becher *et al*, 1994, Delamont *et al*, 2000). Although these studies were conducted on research training in traditional academic departments, they contributed to a framework which I have used to analyse the relationship between organisational and epistemological of knowledge production and research capacity development in the centres in this study. I have examined these relationships as they apply to application-oriented, multidisciplinary research *generally*, as well as within the specific research fields of the centres.

I found that there were elements of similarity between the organisation of RCD programmes in the research centres in the social sciences and the centre in the natural sciences with Becher *et al*'s and Delamont *et al*'s findings about socialisation in these two knowledge domains, and there were interesting differences. I will highlight the main points of comparison. Models of postgraduate education in the social sciences are seen in the literature as being predominantly individualised, relying heavily on an individual apprenticeship model, with students formulating their own research topics and often working in an isolated way. In the natural sciences there was found to be a more collective approach to postgraduate education, based on collaborative laboratory research and students' projects contributing to central research projects of a research group. The models of formal postgraduate education being implemented at PLAAS conformed to the characteristics of socialisation in the social sciences in the literature. However, in the respective masters programmes of SWOP and UCEWQ there was more of a collective or group-based model being implemented, with a structured group programme, which created a community of peers for the students and facilitated learning and identity formation through interaction.

The masters programme at UCEWQ conformed in many ways to the 'ideal' model of postgraduate education in the natural sciences, in which students' thesis topics are allocated to them, and contribute to a central project of the research centre. Becher *et al* (1994) argue that postgraduate education in the natural sciences is organised primarily around the contribution that students make to knowledge in the field, and to a lesser extent are driven by students' educational needs. I have argued that at UCEWQ, while the students' research projects did make an authentic contribution to the research work of the centre, their educational needs were carefully considered in the implementation of the postgraduate programme. These findings imply that while organisation of RCD and postgraduate programmes is greatly influenced by the way knowledge is produced in disciplines and knowledge domains, this need not take a deterministic form. Insights gained from RCD practices in different knowledge domains can be channelled into development and implementation of a particular RCD programme in a way that is appropriate to organisational and disciplinary dimensions of that knowledge context, and which, at the same time, can address the learning needs of the students.

The concepts of *positional* and *personal* modes of socialisation (Bernstein, 1971, 1975, Delamont *et al*, 2000) contribute interesting insights to this study of RCD. Delamont *et al* argue that in the natural sciences, socialisation takes place through *positional* social relationships, where the authority of senior academics is more clearly hierarchical and overtly structured. They argue that in the social sciences, there are *personal* modes of socialisation, where boundaries between roles are more fluid and open to negotiation, and the system of control is more implicit. In this study positional and personal modes of social relations were identified in the research centres and models of RCD. While the social relations embedded in the models of RCD at PLAAS clearly fitted with *personal* modes of socialisation, at SWOP and UCEWQ, there were various combinations of positional and personal modes in models of RCD and mentoring relationships. I will return to this concept in section 10.3 on 'Implications for practice and policy'.

10.2.2.3 Modes of research and potential for the future

When I selected the research centres for this study, I envisaged them as *applied* research centres, with the expectation that the bulk of the research which they conducted was directed at supplying knowledge needs of research users in government, industry and in social groupings such as NGOs. During the course of the study, it became clear that while this research role was important in the work and the histories of each of the research centres, there was a significant emphasis in each case on conducting research that was aimed at unlocking fundamental knowledge, and at furthering research in the relevant research fields in national and international contexts. This finding supports Cooper's argument that much of the research conducted in applied research centres, linked to South African HE institutions, is in fact 'use-inspired basic research' (Cooper, 2006). It is for this reason that I have chosen to use the term 'application-oriented' to describe the research centres, and the general orientation of their research work, rather than 'applied'.

Understanding the research centres and the modes of knowledge production conducted in them in this way, has important implications for understanding RCD within these contexts. I will return to this below.

In the study I found that each of the research centres tried to reach a balance between conducting research which was responsive to the knowledge needs of local societal problems and developing a proactive research agenda which contributed to national and international research programmes. This took different forms in the different centres, which I have elaborated on in the case studies. I have argued that the mode of organisation of the research centres as well as the epistemological dimensions of knowledge production showed elements of similarity with an international trend identified as 'strategic science' (Rip, 1997). This is a trend of strategies on the part of scientists and research groupings which are aimed at generating income, as well as creating stability for their research fields through developing partnerships and producing directly useful research for industry or government.

The concept of strategic science has been developed largely in relation to knowledge production in science and technology. Thus it is not surprising that of the three centres, UCEWQ, located in the natural sciences, has developed funding and research linkages which most closely resemble the pattern of strategic science. I have described how the

centre developed an area of speciality in environmental water quality studies, at a time when research was needed to inform developments in water quality policy and practice. Furthermore certain companies have been eager to fund such research, in order to be profiled positively to government and to have early access to emerging research which would affect policy. Apart from funding for projects, one of the companies has provided 'unencumbered' funding through a renewable contract of three years, in order to support the ongoing work of the centre. This is an example of industry's recognition of the value of the capacity of this university grouping to produce relevant, cutting-edge research. Thus it was seen to be in industry's interests to support such a research environment which promised to continue providing relevant research *as well as* training researchers for the future. The research conducted in the centre was aimed at providing knowledge for the implementation of water quality policy and practice. In addition the centre conducted research which contributed to furthering the research field internationally, and there were projects that had both local, applicable outcomes as well as dimensions which leaned more towards basic research.

The basis for sustainability of the two research centres in the social sciences differed in that their main source of funding was not from industry, although SWOP did receive some project funding from the mining industry. The centres were involved in a network of partnerships, through which funding was acquired. Much of the project funding was acquired from international donors. SWOP had more of a secure funding base in the university and was more integrated into the university structures financially than either PLAAS or UCEWQ. It was clear that in both social science research centres, pure applied research, which has been defined as "developing the application of knowledge with a clear, actual project context in mind" (Cooper, 2003:12) formed a small part of the overall research work that was conducted. At PLAAS, the bulk of research was aimed at informing policy and implementation in the field of land and agrarian studies. Increasingly, their research involved critiquing policy and implementation. While the research problems arose from societal needs, the dominant mode of research conducted was relatively long-term, rigorous, scholarly research, combining relevance and excellence. At SWOP, Webster classified about eighty percent of the research conducted as basic research (EW email 31/08/06).

One of the key findings of this study is that the research centres' involvement in use-oriented basic research, combined with their location in universities, imply a strong potential for research capacity development. The necessary conditions for long-term facilitation of RCD are organisational and pedagogical stability, which lead to pedagogic continuity, combined with structured and supportive contexts. Each of the research organisations in this study are centred on a clear focus area, addressing long-term societal needs for research, and connected to national and international academic research fields. The challenge for sustainability of such centres is to create and maintain networks of interaction and funding, while remaining flexible and responsive to changing knowledge needs and sources of funding. Through my study of the research centres in their current forms, it appears that they are in a process of moving towards a version of what Rip (1997, 2004) terms a 'strategic science regime'. Because of their location at universities, there is at the same time a need to manage their articulation with university structures in order to achieve organisational and epistemological stability.

In the research centres, there were different degrees of epistemological stability, linked to the extent and form of multidisciplinary in the research fields of the centres. The level of epistemological stability in the centres was also affected by their organisational form, sustainability, and relationships with academic departments and institutes, both inside the university and in national and international academic networks. One can infer that effective academic mentoring and supervision relies on long-term security and that stability is necessary in order to provide for young researchers and students. Furthermore, epistemological stability is necessary for the conducting of 'use-oriented basic research' or 'strategic research' which draws strongly on disciplinary and sub-disciplinary conceptual and theoretical knowledge frameworks. The need to provide structured and supportive structures for RCD has been discussed extensively above.

I have examined how RCD processes are influenced by their location within a research field of a sub-discipline with permeable boundaries (Sociology of Work), and in different types of multidisciplinary research fields (in the cases of Land and Agrarian studies and Environmental Water Quality studies). Apart from the types of disciplinarity or multidisciplinary in the research fields of the centres, I have identified two different routes in identity formation processes of researchers, which I have categorised as a 'single stream' and as a 'meandering river'. In the field of Sociology of Work, most of the identity

formation processes of the researchers took the form of a 'single stream' in that through their undergraduate and postgraduate degrees they were being socialised into the broad discipline of sociology, and the sub-discipline of Sociology of Work. Whereas this is not necessarily the case for all academics or researchers in Development studies, a number of the researchers at PLAAS took a 'meandering' route in their disciplinary studies, through different disciplinary fields. In the field of water quality studies processes of socialisation and identity formation could be located somewhere between these two patterns, and varied with individuals. Policy on research capacity development needs to take into account the realities and the value of each of these routes of development, and multidisciplinary research training programmes need to find ways to accommodate and strengthen the development paths of researchers who have come to the research field along a meandering route.

10.3 Implications of the study for practice and policy

The summary of findings above has pointed to a number of implications for policy and practice. In this section I will highlight some of the main insights arising out of the study. Furthermore, I will emphasise some of the findings which I believe provide original insights into RCD in the context of application-oriented, multidisciplinary research settings in South Africa.

The findings of this study support arguments about the need for more pedagogically informed approaches to postgraduate study, for less reliance on the individual apprenticeship model and for systematically structured and supportive contexts for developing research capacity (Pearson and Brew, 2002, Henkel, 2004).

From a study of individual narratives and practices in RCD settings, this thesis provides insights into the educational needs of researchers and postgraduate students in their processes of research capacity development. The analysis of approaches to RCD and the implementation of programmes using the theoretical framework that has been constructed, can contribute to developing more pedagogically informed approaches to research capacity building. One of the central findings of the study in this respect has been the need for *mediation* of learning to be carefully conceptualised and systematically integrated into postgraduate and RCD programmes.

Increasingly, when applying for funding for research projects, an RCD component is integrated into the project proposal. This usually takes the form of funding to employ a research intern. However, there tends to be a lack of cognisance of the tremendous input required from senior researchers in order to mentor young researchers and students. Therefore, it is crucial that resources – human, financial and time – are provided for mentoring, and this needs to be incorporated into budgets and fundraising. For example, funding needs to be sought to ‘buy out’ the time of *mentors*. In the research centres in the study it was evident that the success of programmes did not rest only on material resources, but on the cultivation of a strong mentoring culture. Furthermore, creative means need to be developed to provide successful mediation for the learning processes of students and young researchers and this study highlights some creative mediation practices.

By arguing for less reliance on the individual apprenticeship model, my intention is not to undermine the value of one-on-one mentoring relationships. Such relationships continue to be of central importance. However, they need to be situated within structured and supportive programmes and contexts. There is also a need for more development and support of supervisors. On the one hand, supervisors could benefit from more dialogue and engagement about the process of supervision. On the other hand, more distributed forms of mentoring within an organisation can take some of the pressure off supervisors, if a student is being provided with guidance and support complementary to that of the supervisor.

A further insight of this study regards the combining of positional modes and personal modes of socialisation in postgraduate and RCD programmes. There was evidence that there is a place for hierarchical modes of social organisation, which are not applied in an authoritarian way. Rather, in such a model, the legitimate authority of senior researchers is asserted in the structuring of sequenced pedagogical opportunities for young researchers and students. In accordance with this, the role of young researchers and students is explicitly constructed in a directed and contained form. Their position of peripheral participation is recognised, while they are exposed to broader practice in the research field and participate in these practices in a limited way. The pedagogical process provides scaffolding for the young researchers to participate in and take responsibility for increasingly complex activities, and to gradually develop autonomy in research practice.

It has been noted that in a South African context, there tends to be resistance against imposing models which appear to be authoritarian. While it may seem paradoxical, a model which provides a structured programme for development is more likely to build capacity effectively and contribute to meaningful transformation in the long term, if this is conducted within a framework of a project of possibility.

In terms of *policy* in postgraduate studies, I will focus here on the structuring of postgraduate programmes. I noted in the models of RCD and the narratives of individuals how mediation can be provided for postgraduate study, through scaffolding and sequencing from an honours project to a masters thesis, or from a masters to a doctoral thesis. In cases where the respective projects were on similar subject matter, but entailed a broader scope, greater levels of complexity and/or more demanding methodological tools, the student could focus on managing the greater conceptual and cognitive demands of the more advanced thesis, without having to negotiate a whole new body of literature and new subject matter. I am suggesting that the link between the masters and doctoral degree could be investigated with the possibility of building more continuity between them.

I have also tentatively suggested the introduction of a second masters degree under certain circumstance. These include cases where students have done a coursework masters which has not prepared them sufficiently for conducting independent research, or in the case of researchers within a meandering disciplinary route, whose masters degree has not prepared them adequately for the theoretical and conceptual foundations needed for their chosen area of doctoral study. I have emphasised that such a strategy would need to be applied with great flexibility and careful assessment of individual students' needs.

Lastly, in terms of long-term research capacity development, policy planning needs to focus on creating and sustaining environments for pedagogic continuity. In this study I have argued that application-oriented research centres in universities have the potential to be productive and sustainable contexts for RCD in their respective research fields.

The realisation of this potential would depend on a number of factors, including:

- long-term strategic management of research centres;

- introduction of more secure and systematised relationships with universities, including an increase in permanent staff;
- a range of positions at different levels for students and young researchers, such as postgraduate programmes, internships, and postdoctoral opportunities;
- strong networks between research centres, academic departments and external knowledge producing organisations in particular fields.

I am aware that there needs to be flexibility in application-oriented research settings to accommodate the fast changing knowledge contexts and societal needs. Nevertheless this needs to be balanced with more stability and continuity within research environments in particular fields, in order to facilitate the development of future generations of capable and adaptable producers of knowledge.

10.4 Strengths and weaknesses of this study and directions for further research

This study opens up the area of research capacity development, which has not been widely studied in a South African context. Furthermore, it explores new territory through studying the settings which application-oriented, multidisciplinary research centres provide for RCD. The theoretical framework constructed for the study provides a resource which researchers and practitioners can draw on. Analysing RCD processes and contexts through social, organisational and epistemological lenses has made the study conceptually rich, and has generated useful insights about RCD embedded in particular contexts. The integration of learning theory into the conceptual framework and analysis of processes and settings can contribute to the goal of developing more pedagogically and socially informed approaches to postgraduate programmes, supervision and mentoring.

I have used biographical, narrative methodology in conjunction with other methods of data-gathering. Biographical, narrative interviews provide richly contextualised accounts of individuals' life experiences. In this case the narratives were centred on the individuals' processes of research capacity development. The individuals' narrated their experiences within the context of their overall identity formation processes. I selected individuals located in, or associated with the particular research centres in the centre. Thus I could triangulate between the interviews and sources of data on the research centres.

Furthermore, I could accumulate evidence from different sources about aspects of RCD,

such as research training models or capacity development within the application-oriented fields of the centres.

The use of biographical methodology, combined with the study of social and organisational settings, is innovative in the context of South African higher education studies. Researchers interested in using this approach could learn from the strengths and weaknesses of its application in this study.

It is both a strength and a weakness of this study that the phenomenon of research capacity development has been approached in an open-ended way. The project was approached in an exploratory way. I aimed to gain insight into research capacity development of the individuals within the complexity of psychological and social factors. Furthermore, RCD was studied within the contexts provided by the centres and broader societal factors. I used a modified version of a grounded theory approach where categories were developed *a priori* arising from literature, previous knowledge and experience but analysis was guided and categories were modified through interaction with the data (Freeman and Richards, 1996). In some ways the open approach of the research has been a strength of the study in that there was less of a tendency to impose theoretical frames onto the data, and I was open to insights arising out of the data. I believe that this study has gained insights into RCD in its complexity, rather than focusing on a narrow range of variables. However a weakness of the study is the breadth of the aspects of RCD which it covers. This breadth of focus, combined with depth of analysis of narratives and case studies has made the shaping of a final product difficult to manage.

This study was conducted on research centres and RCD programmes which were relatively fairly new. This could be seen as a limiting factor in the study. In spite of this, these research centres have provided rich and informative case studies. It would be valuable to study these research centres at a later stage, when RCD and postgraduate programmes had been developed further, or to study RCD programmes in other more established research centres.

In this study, I have begun to investigate epistemological dimensions of research capacity development within particular application-oriented, multidisciplinary knowledge fields.

There is a need for more detailed research of this nature to inform RCD programmes in particular knowledge fields.

Lastly, an area which I only grasped late in the study, is the range of types of research conducted at the centres, and the predominance of what has been referred to as strategic research or use-oriented basic research. I have started to explore how postgraduate education and RCD in the centres is affected by this range of research, particularly the impact of involvement in strategic or use-oriented basic research. Evidence from the study suggests that involvement in these forms of basic research are significant for the long-term building of conditions for pedagogic continuity in application-oriented research fields. However, this needs to be investigated more through further in-depth study of research capacity development in application-oriented research organisations.



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APPENDIX 1: List of interviews

I conducted 29 interviews in total. 18 of these were biographical narrative interviews with current or past postgraduate students, researchers in the centres, or closely associated with them. Of the 18 biographical interviews, I used 16 and put aside 2 because they did not contribute substantially to the study. I conducted 7 formal interviews with directors and other staff members with responsibility for research capacity development in the centres.

SWOP

Date	Informant	Position	Interview type
08/11/02	Sakhela Buhlungu	Deputy director	Biographical
13/11/02	Khayaat Fakier	Executive administrator	Semi-structured
13/11/02	Portia Lebala	Current intern	Biographical
01/03/03	Tshidi Letsepe	Researcher	Biographical
09/11/02	Ian Macun	Research associate	Biographical
06/09/02	Anthea Metcalfe	Past exec administrator	Exploratory
16/11/02	Sizwe Phakhathi	Researcher	Biographical
05/11/02	Thabo Sephiri	Past intern	Biographical
01/03/03	Malehoko Tshoedi	Past intern	Biographical
09/03/02	Eddie Webster 1	Director	Exploratory
05/11/02	Eddie Webster 2	Director	Semi-structured

PLAAS

Date	Informant	Position	Interview type
01/07/03	Andrew Ainslie	Associated researcher	Biographical
24/02/02	Ben Cousins 1	Director	Exploratory
05/09/02	Ben Cousins 2	Director	Semi-structured
16/03/04	Ben Cousins 3	Director	Follow-up
19/12/02	Moenieba Isaacs	Doctoral student	Biographical
16/03/04	Edward Lahiff	Researcher	Follow-up
28/07/02	Thembele Kepe	Researcher	Biographical
30/08/02	Buyiswa Maseko	Doctoral student	Biographical
29/08/02	Lungisile Ntsebeza	Researcher	Biographical

UCEWQ

Date	Informant	Position	Interview type
14/05/03	Heather Davies-Coleman	As past doctoral student	Biographical
04/06/03	Heather Davies-Coleman	As research co-ordinator	Semi-structured
07/11/02	Zola Kabane	Past masters student	Biographical
29/05/03	Nosiphiwo Ketse	Masters student	Biographical
04/06/03	Sekhonyana Lerotholi	Masters student	Biographical
01/08/02	Tally Palmer	Director	Exploratory
03/04/03	Tally Palmer	Director	Semi-structured



Appendix 2: Semi-structured interviews with directors

In the formal interview with directors of centres, I asked the following core questions supplemented by questions relating to the particular research centre.

1. Can you tell me about your career as an academic and a researcher and how you got into the field that you are working in?
2. How did [the research centre] get established and what path has it taken till the present?
3. How would you describe the approach that [the research centre] has to developing research capacity?
4. How effective do you think this approach has been?



Additional data about organisational and epistemological dimensions of the centres and the research conducted was extracted from various sources. These included interviews with other researchers and students, research centre documents, and follow-up interviews, emails or telephone conversations with the directors.