

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

**THE PhD DEGREE: AN INVESTIGATION INTO
DOCTORAL EDUCATION IN SOUTH AFRICA
AND INTERNATIONAL PhD REFORM INITIATIVES**

by

Tracy Bailey

Dissertation submitted in fulfilment of the academic requirements

for the degree of

MASTER OF SOCIAL SCIENCE

in the Department of Sociology,

University of Cape Town

2001

DECLARATION

This work has not been previously submitted in whole, or in part, for the award of any degree.
It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works, of other people has been attributed, and has been cited and referenced.

T. BAILEY

Signed by candidate

SUPERVISOR: Associate Professor David Cooper, University of Cape Town

ABSTRACT

Since its emergence in the 1800s in Germany, the 'modern' Doctor of Philosophy (PhD) degree has been one of the cornerstones of new knowledge production and research training. Over the past two decades, there has been a surge of debate and reform around doctoral education internationally as a result of significant changes in both the global and local contexts within which doctoral education takes place. At the macro level, globalisation and the global economy are redefining what constitutes knowledge, who produces it and for what purposes. At the same time, more than ever before, many governments are depending on doctoral graduates to contribute to achieving national goals. These developments have drawn into question the purpose and form of doctoral programmes and the knowledge products and training outcomes they produce.

In South Africa, despite the extensive policy development since 1994 which has focused on the ways in which higher education can better contribute to achieving national goals, there is a lack of critical assessment of PhD programmes in the national higher education policy. Neither is there any recognition of the debates and reforms in other countries. The central argument of this dissertation, therefore, is that there is a need for debate, research and policy development around doctoral provision in South Africa.

The dissertation begins with a discussion of some of the global and local factors which have stimulated and informed the debates around doctoral education internationally. This is followed by an analysis of recent national policy which impacts on doctoral education in South Africa, with specific reference to the absence of a critical assessment of PhD programmes. The focus then turns to defining the PhD in South Africa from both historical and contemporary perspectives. The brief historical sketch traces some of the major German, British and American developments in doctoral education, over a number of centuries, which have influenced the form of the PhD degree in South Africa today. The definition of the contemporary South African PhD is based on an analysis of the rules and regulations relating to doctoral degrees in South African universities. The profile of doctoral education in South Africa is extended through a detailed descriptive statistical analysis of the distribution of PhD degrees awarded at South African universities in 1996.

Two sets of case studies of reform are considered, both of which reflect innovative ideas about doctoral provision. The first cluster embodies initiatives in the United States which seek to improve problematic aspects of the American PhD (coursework and thesis) through add-ons and interventions. The second is the introduction of the professional doctorate in Australia which represents a fundamental reconceptualisation of the purpose and structure of the traditional European and Anglo-Saxon PhD (thesis only).

The concluding chapter reflects on the findings of the research in support of the argument that South Africa needs to engage in debate and policy development around doctoral provision. It highlights the possibilities that are offered by the American and Australian reforms, and considers these critically within the South African context.

University of Cape Town

ACKNOWLEDGEMENTS

I would like to extend my sincerest appreciation to Associate Professor David Cooper (University of Cape Town) who, as my supervisor throughout this process, has given me considerable support, encouragement and guidance.

I would like to thank my friend and colleague, Dr Sharman Wickham, for her steadfast support, her confidence in my ability, and for helping me to deal with some of the most emotionally and mentally challenging parts of this journey.

To all my friends and family, and especially to my partner Richard Mackintosh, thank you for your loving support, for being patient and for believing that I would actually finish! Thank you also to Michael Baker for always being ready to engage in critical dialogue, and for his careful reading of the final draft.

I am also grateful to the Education Policy Unit at the University of the Western Cape for providing access to the 1996 SAPSE data, and particularly to Mr Andre Burness whose efforts at re-organising the original dataset made it possible for me to work with it as I did.

Finally, I acknowledge the financial assistance given by the National Research Foundation in the form of a bursary.

Table of contents

	Page
LIST OF TABLES	iv
ACRONYMS	vi
CHAPTER ONE: INTRODUCTION TO THIS STUDY	1
1.1 Introduction	1
1.1.1 Background to and motivation for the study	1
1.1.2 Origins and evolution of the study	2
1.1.3 Research aims and questions: Delimiting the study	4
1.1.4 Structure of the dissertation	6
1.1.5 Methods of enquiry	7
1.2 Context to the international debates and reforms in doctoral education	8
1.2.1 Globalisation and the rise of the 'knowledge society'	9
1.2.2 Changes in the funding of higher education institutions	11
1.2.3 Changes in employment opportunities for PhD graduates	12
1.2.4 Changing profile of doctoral candidates	13
1.3 The South African policy context	14
1.3.1 The relationship between doctoral education and national policy	16
1.3.2 Doctoral education and national policy in South Africa	17
CHAPTER TWO: DEFINING THE PhD DEGREE	23
2.1 Introduction	23
2.2 Historical development of the PhD degree	24
2.2.1 The emergence of the doctoral degree in the medieval period	24
2.2.2 Germany and the 'Humboldtian Revolution' in the nineteenth century	26
2.2.3 The introduction of the PhD degree in America in the nineteenth century	30
2.2.4 The introduction of research doctorates in Britain in the late nineteenth century	31
2.2.5 The first research doctorates in South Africa in the beginning of the twentieth century	34
2.2.6 The impact of the growth of the American PhD on other countries	35
2.3 Defining the research doctorate in South Africa	37
2.3.1 Core features and processes of the PhD degree	38
2.3.2 The PhD versus the masters by research and dissertation	46
2.4 Summary	49

	Page
CHAPTER THREE: DOCTORAL DEGREES AWARDED IN SOUTH AFRICA IN 1996	53
3.1 Introduction	53
3.2 Degrees awarded at universities in 1996 by qualification sub-level	54
3.3 Degrees awarded in 1996 by university sub-types and individual universities	57
3.3.1 Doctoral and masters degrees awarded in 1996 by university sub-types	57
3.3.2 Doctoral and masters degrees awarded in 1996 by individual universities	59
3.4 Degrees awarded at universities in 1996 by race and gender	60
3.5 Degrees awarded at universities in 1996 by fields of study	64
3.5.1 Degrees awarded at universities in 1996 by macro groupings: 3 NRF clusters and 22 CESM categories	64
3.5.2 Doctorates awarded at universities in 1996 by sub-CESMs, race and gender	68
3.5.3 Comparative figures for masters degrees awarded at universities in 1996 by CESM categories and sub-CESMs	76
3.6 Degrees awarded in 1996 by university sub-types, individual universities, fields of study, and race and gender	78
3.6.1 Degrees awarded in 1996 by university sub-types, and race and gender	78
3.6.2 Degrees awarded in 1996 by university sub-types and CESM categories	80
3.6.3 Doctoral degrees awarded in 1996 by individual universities, CESM categories and sub-CESMs	82
3.7 Overview of degrees awarded at technikons in 1996	88
3.7.1 Degrees awarded in 1996 by technikon sub-types and individual technikons	88
3.7.2 Distribution of degrees awarded in 1996 at technikons by race and gender	90
3.7.3 Degrees awarded at technikons in 1996 by CESM categories	90
3.8 Key points and commentary	92
CHAPTER FOUR: INTERNATIONAL DEBATES AND REFORMS AROUND DOCTORAL EDUCATION	99
4.1 Introduction	99
4.2 Critiques and reforms around the PhD degree	101
4.2.1 The nature of PhD training in relation to employment requirements and opportunities	101
4.2.2 The process and experience of undertaking a PhD degree	107
4.2.3 Equity and diversity issues	110
4.3 Professional doctorates	113
4.3.1 Background to the development of the professional doctorate	113
4.3.2 Defining the professional doctorate and distinguishing it from the PhD	116
4.3.3 Descriptions of professional doctorate programmes	119
4.3.4 Case studies of professional doctorate programmes	123
4.4 Key points and commentary	129

	Page
CHAPTER FIVE: CONCLUDING COMMENTS	135
5.1 Introduction	135
5.2 The need for debate and policy development around doctoral education in South Africa	136
5.2.1 Changing local and global contexts	136
5.2.2 The skewed profile of South African doctoral candidates and awards	137
5.3 Reflections on the debates and reforms in the US and Australia in the South African context	140
5.3.1 Possibilities for South Africa in the international reforms	141
5.3.2 Negotiating the potential conflicts between academic, social and market interests	142
5.4 Areas for further research	145
5.4.1 Extending the profile of doctoral education in South Africa	145
5.4.2 Social needs and labour market review	146
5.4.3 The funding of doctoral education	146
5.4.4 The role of technikons in doctoral provision in South Africa	146
5.4.5 A national or international conference on doctoral education in South Africa	147
APPENDICES	149
1 Defining the senior doctorates offered in South African universities	151
2 About the data used in Chapter 3	153
2.1 Source of the degree awards and enrolments data	153
2.2 Missing data and rounding off	154
2.3 Accuracy of data	154
3 Categories used in Chapter 3	155
3.1 Institutional sub-types	155
3.2 Qualification sub-levels	157
3.3 Three NRF clusters, 22 CESM categories and 149 sub-CESMs	158
4 Additional statistics for universities in Chapter 3	163
5 Descriptions of research projects reviewed in Chapter 4	179
LIST OF SOURCES	181

List of tables

TABLES

	Page
3.1 University degrees awarded in 1996 by qualification sub-level	55
3.2 Technikon degrees awarded in 1996 by qualification sub-level	55
3.3 Degrees awarded in the United States in the 1996/97 academic year	56
3.4 Degrees awarded in the United Kingdom in the 1998/99 academic year	56
3.5 International comparison of doctorates awarded per million of the population	57
3.6 Degrees awarded in 1996 by university sub-types	58
3.7 Doctoral awards and enrolments, and masters degrees, awarded in 1996 by university sub-type	59
3.8 Doctorates and masters degrees awarded by individual universities in 1996	60
3.9 University degrees awarded in 1996 by race and gender	61
3.10 Doctoral degrees awarded at universities in 1996 by race and gender	62
3.11 Doctoral enrolments at universities in 1996 by race and gender	63
3.12 Doctoral and masters degrees awarded at universities in 1996 by race and gender	63
3.13 Doctorates and masters degrees awarded at universities in 1996 by the three NRF clusters	64
3.14 Doctoral degrees awarded at universities in 1996 by the three NRF clusters, race and gender	65
3.15 Doctoral awards and enrolments at universities in 1996 by the 22 CESM categories	66
3.16 Doctoral degrees awarded at universities in 1996 by CESM categories, and by race and gender	67
3.17 Top twenty-two sub-CESMs in which doctorates were awarded at universities in 1996, by race and gender	69
3.18 Doctorates awarded at universities in 1996 in the Life Sciences & Physical Sciences CESM category	70
3.19 Doctorates awarded at universities in 1996 in the Education CESM category	71
3.20 Doctorates awarded at universities in 1996 in the Philosophy, Religion & Theology CESM category	72
3.21 Doctorates awarded at universities in 1996 in the Health Care & Health Sciences CESM category	73
3.22 Doctorates awarded at universities in 1996 in the Engineering & Engineering Technology CESM category	74
3.23 Doctorates awarded at universities in 1996 in the Languages, Linguistics & Literature CESM category	75
3.24 Doctorates awarded at universities in 1996 in the Social Sciences & Social Studies CESM category	76
3.25 Doctorates awarded at universities in 1996 in the Psychology CESM category	76
3.26 Masters and doctoral degrees awarded at universities in 1996 by CESM categories	77
3.27 Doctoral degrees awarded to women in 1996 by university sub-type and by race	80
3.28 Doctoral degrees awarded to men in 1996 by university sub-type and by race	80
3.29 Doctoral degrees awarded at HAUs and Unisa in 1996 by CESM categories	81
3.30 Doctoral degrees awarded at HDUs in 1996 by CESM categories	82
3.31 Doctorates awarded at the University of Pretoria in 1996 by CESM categories	83
3.32 Doctorates awarded at the University of Stellenbosch in 1996 by CESM categories	84

	Page
3.33 Doctorates awarded at the Rand University in 1996 by CESM categories	84
3.34 Doctorates awarded at the University of Natal in 1996 by CESM categories	85
3.35 Doctorates awarded at the University of Cape Town in 1996 by CESM categories	86
3.36 Doctorates awarded at the University of the Witwatersrand in 1996 by CESM categories	87
3.37 Doctorates awarded at the University of South Africa in 1996 by CESM categories	87
3.38 Distribution of degrees awarded in 1996 by technikon sub-types	89
3.39 Doctorates and masters degrees awarded by individual technikons in 1996	89
3.40 Distribution of degrees awarded at technikons in 1996 by race and gender	90
3.41 Masters degrees awarded at technikons in 1996 by CESM categories	91

APPENDIX TABLES

3.1 Categorisation of universities	155
3.2 Categorisation of technikons	156
3.3 University qualification sub-levels	157
3.4 Technikon qualification sub-levels	157
3.5 Categorisation of the three NRF clusters into 22 CESM categories as used in SAPSE Table 2.13	158
3.6 Sub-CESM specialisms in SAPSE Table 2.13	159
4.1 Doctoral degrees awarded at universities in 1996 by sub-CESMs, and race and gender	163
4.2 Doctorates and masters degrees awarded at universities in 1996 by CESM categories and sub-CESMs	171
4.3 Top seven doctorate awarding universities by sub-CESMs	174

Acronyms

AIC	Advanced industrialised country
BA	Bachelor of Arts
CESM	Classification of Education Study Material
CHE	Council on Higher Education
DACST	Department of Arts, Culture, Science and Technology
DBA	Doctor of Business Administration
DLit/DLitt	Doctor of Literature
DoE	Department of Education
DPhil	Doctor of Philosophy
DRC	Dutch Reformed Church
DSc	Doctor of Science
DSP	Doctoral Study Programme
EdD	Doctor of Education
EPU	Education Policy Unit
FET	Further Education and Training
FRD	Foundation for Research Development
GEAR	Growth, Employment and Redistribution
HAT	Historically advantaged technikon
HAU	Historically advantaged university
HDT	Historically disadvantaged technikon
HDU	Historically disadvantaged university
ICT	Information and communication technology
MA	Master of Arts
MBA	Master of Business Administration
MLitt	Master of Literature
MSc	Master of Science
NASA	National Aeronautical and Space Administration
NGO	Non-governmental organisation
NQF	National Qualifications Framework
NRF	National Research Foundation
NSI	National System of Innovation
PhD	Doctor of Philosophy
PUCHE	Potchefstroom University for Christian Higher Education
RAD	Research and Academic Development
RDP	Reconstruction and Development Programme
RMIT	Royal Melbourne Institute of Technology

SAC	South African College
SADC	South African Development Community
SAPSE	South African Post-Secondary Education
SAQA	South African Qualifications Authority
S&T	Science and technology
TURP	Trade Union Research Project
UCGH	University of the Cape of Good Hope
UCT	University of Cape Town
Unisa	University of South Africa
Wits	University of the Witwatersrand

University of Cape Town

University of Cape Town

CHAPTER ONE: INTRODUCTION TO THIS STUDY

1.1 Introduction

1.1.1 Background to and motivation for the study

Since their emergence in the twelfth century in Europe, universities have served a number of different functions, the expression and importance of which have varied over the centuries and in different countries. Two of these, namely education for the professions and the production of new knowledge, are currently being given new meaning and emphasis. In the past couple of decades, there has been a surge of debate and reform in higher education internationally as institutions, professions and governments, amongst others, attempt to grapple with the rapid pace of social change and the challenges that this poses for the purpose and form of higher education. As one of the primary sites for the production of new knowledge, and the training of future researchers and professionals, doctoral education has also come under scrutiny.

The debates around doctoral education have centred on the changing macro contexts within which doctoral education is taking place (outlined in section 1.2), and the implications these have for achieving national goals, with particular reference to the purpose and form of doctoral programmes. In other words, as the demands on doctoral education have expanded and changed, the need has arisen for its fundamental premises to be reconsidered and examined. The debates and reforms around doctoral education in the United States and Australia will be explored in greater detail in Chapter 4. In short, they have focused on the purpose and form of doctoral education in relation to both the products and process of doctoral programmes. The debates about the 'products' of doctoral education concern issues such as what knowledge is produced, what kinds of skills are imparted, and who benefits from these. Questions about the process relate to how the doctoral programme is structured and carried out in order to achieve these objectives. Specifically, the debates have centred on the increasing presence of Mode 2 knowledge production (discussed below) and the implications this has in relation to the skills and knowledge needs of the global labour market, and thus the career preparation of doctoral graduates. They have also focused on the need for flexible provision in light of the changing profile and circumstances of doctoral candidates.

In the new South Africa, considerable attention has been given to the transformation of education since 1994 to achieve our national goals of equity and development. There is also evidence that the macro factors which are shaping developments in other countries are impacting on us too and this is reflected in policy. However, there is a worrying absence of

critical engagement in higher education policy-making circles around the relevance and appropriateness of our doctoral education system to our particular social, economic and political contexts. By way of example, there is not a single reference in the recently released National Plan for Higher Education (2001) to any concept of debate or reform around the PhD degree in South Africa. In addition, there appears to be little systematic research in this country into doctoral education provision.

The primary aim of my research, therefore, is to raise some of the important issues and questions around doctoral education, as they have emerged internationally, and to consider these within the context of a profile of doctoral education in contemporary South Africa. It is my hope that this research will stimulate debate and discussion around these issues, ultimately with a view to policy research and development.

The general structure of this dissertation is as follows. The second chapter seeks to define the contemporary PhD in South Africa from both historical and contemporary perspectives. This is followed in the third chapter by a detailed analysis of the doctoral degrees awarded in South African universities and technikons in 1996. The fourth chapter explores the debates and reforms around doctoral which have emerged in the United States and Australia over the past two decades. Finally, reflections on the findings of this research study for the South African context are discussed in the fifth and concluding chapter.

This first chapter is in three parts. The remainder of section 1.1 includes a more detailed discussion of this study, its aims and objectives, how these have been addressed, and the way in which the findings are reported in this dissertation. Section 1.2 outlines the various macro factors which have stimulated the debates and reforms in doctoral education internationally. The chapter concludes in section 1.3 with a brief review of the policy in South Africa which impacts on doctoral education and highlights the 'absences' with respect to the purpose and form of doctoral education.

1.1.2 Origins and evolution of the study

When I began the work for this degree in 1998, my research question was very broad. I wanted to investigate both the 'meaning' and 'value' of the Doctor of Philosophy or PhD degree in South Africa, particularly because of its importance in relation to knowledge production and research training. I have a keen interest in the relationship between knowledge and power, and the role of knowledge and research in the social, economic and political transformation of our country. In

addition, my work experience¹ has brought me into close contact with doctoral and masters students and their supervisors, and their concerns about postgraduate provision in South Africa.

I soon came to realise, however, that I needed a clearer understanding of what doctoral education *is*, before I could investigate its value or its relationship with power. I began to ask questions about where doctoral degrees come from historically and about the range of doctorates on offer. I therefore began reading about the history of doctoral degrees in the belief that a historical perspective would provide useful insights into why doctoral degrees look like they do today.

I then came across literature relating to the reforms in doctoral education in other countries such as the United States, the United Kingdom, Canada, Australia and New Zealand. I had not previously realised the extent to which doctoral education was being debated internationally and found evidence of major research projects around doctoral education provision, as well as new policies and doctoral degree programmes. And, in order to understand the debates better, I had to grapple with what was meant by 'globalisation', the 'global economy' and the 'knowledge society' and the implications these have for doctoral education.

I then turned to the national policy in South Africa which impacts upon doctoral education, namely the higher education, and science and technology, policies. I was astounded to discover that while token acknowledgement of the implications of globalisation for higher education was made, I could find no single article or policy document that provided critical comment on the meaning and value of doctoral education to our particular social, economic and political contexts. Furthermore, I could find little evidence of research undertaken in South Africa that related directly to doctoral education, and I began to wonder about the implications of the international debates and reforms for the South African context.

The final form in which this research is presented is thus the result of a long exploration into the many issues and concerns relating to doctoral education, as well as some of the factors which shape it. The main focus of the research, the particular research questions which are addressed in this study, the structure of the dissertation, and the methods of data collection and analysis employed, are discussed below.

¹ In the research facilitation unit of the Human Resources Research Council in Durban, and in my consultation and research training work as an associate of Research and Academic Development in Cape Town.

1.1.3 Research aims and questions: Delimiting the study

The primary aim of this research is to provide a basis, or point of departure, for discussion and debate around the form and purpose of doctoral education in South Africa. Clearly, an investigation of doctoral education is an enormous and complex task, considering the extent to which it impacts on and interacts with other sectors in society, both locally and internationally. Some of the questions which may be asked about doctoral education include: What is its purpose and form? Who are the stakeholders in doctoral education? In what ways does doctoral education interact with other sectors? How is doctoral education funded and how does this relate to its purpose and form? How does doctoral education manifest in different countries?

From within these multiple perspectives, I have chosen to focus on the following three questions:

1. What is the nature and extent of doctoral education in contemporary South Africa?
2. What are the debates and reforms in relation to PhD transformation which have been taking place in advanced industrialised countries (AICs) over the past two decades, and what are the macro factors which have stimulated these?
3. What are the implications of these macro influences, debates and reform initiatives in the South African context? In other words, what does South Africa need to think about, in relation to doctoral education, in the light of our particular social, economic and political needs?

The first two questions, as suggested by the title of this dissertation, form the two core components to my research. The third question is reflected upon in the concluding Chapter 5.

I have attempted to address these questions in the following way:

- I have focused primarily on research doctorates offered at universities – essentially what is termed here as the PhD degree – as these are by far the most common form of doctoral degree offered in this country, as well as in others. They are also, historically and currently, almost entirely offered through universities. Brief reference is made to the profile of degrees awarded in technikons in South Africa (Chapter 3) by way of comparison with universities.
- I have explored the historical emergence and development of the PhD degree in selected countries, with a view to understanding why the PhD degree in South Africa looks like it does today (first part to Chapter 2). The historical sketch thus focuses on a number of international developments around doctoral education which I believe form an historical thread between the first appearance of the PhD in the medieval period and the contemporary form of the South African PhD.
- I have developed a selective profile of current doctoral education in South Africa which is based on analyses of institutional definitions of doctoral degrees (second part to Chapter

2), and the distribution of doctoral degrees awarded in 1996 (Chapter 3). The profile is intended to provide insight into the nature of our doctoral education system, as well as a contextual framework within which the international debates and reforms discussed in Chapter 4 can be located.

- I have explored the debates and reforms around doctoral provision internationally (Chapter 4), and some of the macro factors which are influencing these (Chapter 1). Within this, I have focused mostly on case studies of the developments in doctoral education in the United States and Australia as these countries have played an important role in leading the international debates, and provide examples of innovative reforms in both policy and practice. Brief reference is made to developments in other countries such as the English-speaking countries of the United Kingdom, Canada and New Zealand, as well as Asia and South America. The discussion about international debates and reforms is not, therefore, a representative picture of all debates internationally. Rather, it focuses on case studies of reform in the United States and Australia, for which extensive literature was available.

The conceptual framework within which I have organised my research in response to these questions is based on three premises:

- That the processes associated with 'globalisation' and the 'new global economy' are impacting dramatically on doctoral education worldwide. The integral role of information and knowledge production for global economic competitiveness is changing the way we think about what constitutes knowledge, who produces it, where it is produced, and why it is produced. As one of the primary sites of knowledge production and the training of future researchers historically, universities and doctoral education systems internationally are being transformed, in part, by the global capitalist system.
- That the way in which these global processes impact on countries and their doctoral systems, and the way in which nations respond in terms of policy and practice, depends on the local context.
- That there is as yet no real debate in South Africa about these issues with respect to doctoral education. While the government's Growth and Development Strategy goes some way towards grappling with what globalisation means for us, there is no policy which considers what it means for doctoral education. In addition, our concerns are not only about how we can compete in the global economy. We are currently faced with having to address pressing local social, economic and political needs, and to bring about equity in our racially divided society. These issues also need to be drawn into the debate about doctoral education.

Both the global and South African contexts are discussed in greater detail below.

1.1.4 The structure of the dissertation

As the introductory chapter, Chapter 1 provides the broader context within which the pursuing chapters are located. As such, it includes a synthesis of selected literature on the developments which have stimulated the debates around doctoral education internationally. It also examines the national policy in South Africa which impacts on doctoral education.

Chapter 2 extends the contextual basis of this research with a brief overview of the historical emergence and development of doctoral education, and the PhD in particular, in order to understand some of the factors which have shaped it and its particular manifestation in South Africa. There follows a review of the rules and regulations relating to research doctorates in South African universities as a way of defining what doctoral education is in this country. This definition would also apply to other countries where the research doctorate is still mainly or entirely thesis-based.

Chapter 3 hones in more closely on doctoral education in South Africa with a descriptive statistical analysis of the doctoral degrees awarded at South African universities in 1996, and a few comparative figures for technikons. The awards are examined in terms of their distribution across different institutions and institutional sub-types, 'race'² and gender, and fields of study. An enormously skewed distribution is found with respect to the clustering of PhDs in certain institutions and fields of study.

In the absence of any published debates in South Africa, Chapter 4 shifts away from our local context and explores the criticisms and debates around the PhD degree internationally. This is mainly in the form of two sets of case studies of reform initiatives: those which seek to address problematic aspects of the traditional PhD degree in the United States through add-ons and improvements, and those which have focused on the development of the professional doctorate in Australia. The Australian reforms reflect quite a substantial transformation in the purpose and structure of the PhD degree.

To conclude, Chapter 5 highlights the key findings of this research in relation to my contention that there is a need for debate and policy development around doctoral education in South Africa. The chapter also considers the 'gaps' in this study which are reformulated as recommendations for further research. Finally, conclusions are drawn about the implications for

² In relation to our national goal of equity redress, I have given consideration in my research to the ways in which the racial discrimination of the apartheid era has impacted on our doctoral education system in South Africa. This has required that I make reference to the racial categories created during apartheid. These include the White population group which was privileged under the apartheid system, and the African, Coloured and Indian people who were significantly disadvantaged in comparison. The term 'black' is used to refer to the collective grouping of African, Coloured and Indian people.

doctoral education in South Africa of the global economy, our own particular social, economic and political context, as well as the debates and reforms which are taking place internationally.

1.1.5 Methods of enquiry

A combination of methods of enquiry have been used in this research, the range of which are summarised briefly below. A fuller discussion of the methods used will be covered in each chapter – and in some cases in the appendices – in relation to its particular 'methodology'. The methods of data collection and analysis include:

- The synthesis and evaluation of secondary material based on a review of the literature which covers:
 - The impact of globalisation and other factors on higher education and doctoral education internationally (Chapter 1).
 - The historical development of the PhD degree in Europe, the US, the United Kingdom and South Africa in the period between the Middle Ages and the twentieth century (Chapter 2).
 - The debates and reforms ... doctoral education in the US and Australia (Chapter 4).
- Thematic analysis based on information gleaned from internet searches, university prospecti and a review of the literature which includes:
 - The rules and regulations governing the process of doctoral education in South African universities in relation to admission requirements, the length of time to degree, supervision, examination of the degree, and conditions for its award (Chapter 2).
 - The descriptions of professional doctorate programmes in Australia (Chapter 4).
- Descriptive statistical analysis: Chapter 3 contains a detailed descriptive analysis of the doctoral degrees awarded in South African universities in 1996. The data used in this analysis is the most comprehensive and recent data available. It is based on the SAPSE (South African Post-Secondary Education) 1996 data obtained from the Education Policy Unit (EPU) at the University of the Western Cape. The analysis examines the distribution of doctoral degrees awarded across the various institutions and institutional types, race and gender, and fields of study.
- Policy analysis based on a review of the literature, and especially government policy documents: Chapter 1 contains a brief analysis of national policy in South Africa which impacts on doctoral education, namely the higher education, and science and technology, policies. In this section, the 'absences' in these two sets of policy with respect to debates on the PhD degree are highlighted.
- Exploration on some key issues via telephonic interviews with key informants: I contacted two key informants – namely, the Dean of Theology at the University of Stellenbosch,³ and

³ July 2001

the Dean of Science at the University of Cape Town⁴ – in order to gain insight into some of the more startling findings in Chapter 3. Their comments are included in the concluding discussion to Chapter 3.

- Self-reflection based on personal experience and anecdotal evidence: My reflections on the South African doctoral education system, in the light of the ideas presented in this dissertation, are informed by some of my own experiences and encounters through my work at the HSRC in Durban, and the RAD consultancy in Cape Town. Where relevant, these reflections are expressed as anecdotal evidence about the South African context.

I now turn to a discussion of the macro contexts within which the international debates and reforms are taking place, and then an overview of the South African policy context.

1.2 Context to the international debates and reforms in doctoral education

The processes of 'globalisation' and the growing importance of information and knowledge production in the global economy have become key factors shaping higher and doctoral education internationally. Based on the findings of an international workshop on doctoral education⁵ which drew input from countries in Asia, the Americas, and Europe, Johnson & Coward (2000:1) conclude that the current reforms in doctoral education in these regions are focused on similar objectives. These include:

- strengthening and expanding doctoral education;
- making doctoral training relevant to a wider range of occupations than just academic careers; and
- educating highly qualified professionals who can address problems in the context of broader social, economic, and environmental issues.

As will be shown in Chapter 4, these issues have also motivated reforms in countries such as Australia and New Zealand. However, although globalisation, the global economy, and the knowledge society are affecting everyone worldwide, the ways in which countries respond to these influences depend on their local context. Johnson & Coward (2000:6) argue that the "scale and maturity of graduate programs" and the particular "stages of economic development within different countries and regions" influence the type of reforms that will be implemented. Consequently, there is a discernable difference in the emphasis of the reforms between developing and industrially advanced countries. Specifically, Johnson & Coward (ibid) note that "Several Latin American and Asian developing countries are attempting to expand and strengthen their modest graduate programs" while North America and Europe "are mainly

⁴ August 2001

⁵ *Graduate education reform in Europe, Asia and the Americas*, hosted by the US National Science Foundation

focused on broadening the training of graduate students for careers outside academia." The Latin American and Asian scenarios ring true for South Africa where the national policy emphasis is on expanding doctoral education quantitatively (see section 1.3). By contrast, as the AICs have comparatively large and established doctoral education systems, they are well-placed to be looking at how they might strengthen the relationship between doctoral education and stakeholders in sectors other than the university. It is therefore not surprising that they are leading the debates in this regard.

Nevertheless, whatever the status of the doctoral education systems and economies of countries, more than ever before nations are dependent on the knowledge that is generated in higher education institutions through research for development, as well as the training and education of the highly skilled and specialised labour needed by the economy. In other words, increasingly governments are exploring the ways in which doctoral education can contribute to achieving national goals.

The following section explores the macro factors which are impacting on higher education systems internationally. It also highlights some of the micro factors which are relevant in AICs such as the United States including the increase in doctoral enrolments, the demands for more flexible provision, and the changing employment opportunities for doctoral graduates. The broader implications that these factors have for doctoral education, as they have emerged in the debates, are briefly highlighted.

1.2.1 Globalisation and the rise of the 'knowledge society'

Defining what is meant by 'globalisation' is a complex and problematic task and one that goes beyond the scope of this study.⁶ Suffice to say, a core feature of 'globalisation' is what Castells (2001a) refers to as the "new global economy" which emerged in the 1970s as a result of a crisis in the world economy.⁷ The capitalist system had reached the limits of expansion in its current form and was faced with finding new directions for production and profit (TURP 1997:17). The development of information and communication technologies (ICTs) effectively solved capitalism's 'problem': what has been termed the ICT or computer 'revolution' enabled businesses to transcend national borders without too much resistance, in order to find new markets and the cheapest methods of production (Castells 2001; Hall 2001:225; TURP 1997:18). Driven by neo-liberal ideological principles, the new global economy is characterised by, amongst others, a diminished role of the state in the economy, cutbacks in state funding for the public sector, deregulation, privatisation, competition and trade liberalisation (Orr 1997:43;

⁶ A detailed discussion of globalisation and its implications for South Africa can be found in Muller, J., Cloete, N. & Badat, S. (eds) (2001) *Challenges of globalisation: South African debates with Manuel Castells*.

⁷ See also Hall 2001:225; Orr 1997:43; TURP 1997:17

TURP 1997:19). Of particular significance to this study is the increasing emphasis on the role of knowledge production, research training and professional development for global economic competitiveness, all of which form the core components of contemporary doctoral degrees.

Concepts such as the 'knowledge society' and the 'informational economy' speak to the integral role that information and knowledge production play in innovation, productivity and competitiveness in the global markets. Research is no longer the preserve of universities and increasingly is taking place in other settings, such as business, industry and government. Within the context of business and industry, knowledge has effectively become a "commodity" which is privately owned through intellectual property rights (Orr 1997:42,46,56). With the rapid rate of technological advance, the workforce is required to possess "learning power" – that is, the ability to independently and continuously upgrade and expand on skills and competencies. This is what Castells (2001a:13) refers to as "self-programmable" labour, which is labour that

... has the built-in capacity to generate value through innovation and information, and that has the ability to reconstruct itself throughout the occupational career on the basis of this education and this information.

Some have argued therefore that education is less about acquiring a distinct body of knowledge and more about developing the skills required to "acquire new knowledge and the capacity to use knowledge as a resource in the context of the needs of society" (Ekong & Cloete 1997:5). The constant need for the production of new knowledge is all the more significant when one considers the rate at which knowledge becomes obsolete, and raises questions in relation to the lengthy time it takes to complete PhD degrees, or the narrow focus and overspecialisation in one subject area typical of traditional PhD programmes.

According to Gibbons (1994:9), "the parallel expansion in the numbers of potential knowledge producers on the supply side and the expansion of the requirement of specialist knowledge on the demand side are creating the conditions for the emergence of a new mode of knowledge production" – that is, Mode 2 knowledge production. Mode 2 is distinguished from Mode 1 which is linked to the rise of discipline-based research in the 1800s in Germany (see Chapter 2) and which has been the dominant approach to producing knowledge in universities for over 150 years. Mode 1 is concerned with extending the boundaries of disciplinary knowledge and is thus "governed by the, largely academic, interests of a specific community" (Gibbons 1994:2). In other words, Mode 1 is fairly limited in its social accountability as it is usually unconnected to any specific societal needs, and its quality and relevance is assessed by an academic peer group (Gibbons 1994:5; Martin & Etzkowitz 2000:4-5).

By contrast, Mode 2 is characterised by knowledge that is produced in the context of application. Mode 2 is thus not equated with applied research which is effectively theoretical knowledge developed in universities which is then applied to particular contexts. Instead, Mode

2 starts with a specific goal and is intended to benefit others beyond the university or academic context (Gibbons 1994:2). Consequently, there is a wider range of stakeholders who shape the research agenda and process in relation to defining the problems to be investigated, the methods to be used, the interpretation of the findings, and the dissemination of the results. In addition, the assessment of the quality of the knowledge produced goes beyond the intellectual and disciplinary criteria typical of the peer review system of Mode 1. Knowledge production is no longer purely about 'truth' or contributing to human progress as a whole and, therefore, the questions which might be asked differ from those in the traditional academic setting. For instance, "What use is it?", "Will it enhance the performance of people and organisations?" (Usher & Solomon 1998:2), or "Will the solution, if found, be competitive in the market? Will it be cost effective? Will it be socially acceptable?" (Gibbons 1994:5). It is in this sense that Gibbons (1994:4) argues that Mode 2 knowledge production is 'socially accountable'.

Mode 2 is transdisciplinary in that a range of specialists from across disciplines are used to investigate and solve complex problems. The research team frequently comprises a heterogeneous mix of people such as social and natural scientists, engineers, lawyers and representatives from business and industry. According to Gibbons (1994:3), this often results in solutions which are "beyond that of any single contributing discipline", as well as unique theoretical constructs and research techniques which straddle existing disciplinary boundaries. In addition, the diversity of research questions addressed in the range of potential sites of knowledge production requires new organisational forms. Therefore, the research teams tend to be transient and new networks form as the investigation of the problem progresses (Gibbons 1994:4). In other words, the researchers tend to be less institutionalised than in traditional university settings. These developments represent a significant challenge to the academic and discipline-based model of the Humboldtian reforms in the early 1800s in Germany (Mode 1).

1.2.2 Changes in the ²funding of higher education institutions

The changing definitions, sites and purposes of knowledge production, and the way in which they impact on universities, are being reinforced by changes in the funding of higher education institutions. Unlike the economic growth that took place between the 1950s and 1970s in AICs such as the United States, the last couple of decades have been characterised by economic recession and increasingly tight budgets for universities (Bartelse 1995:6; Kerlin 1995b:2). This has been equally true for South Africa in recent years. More than ever, universities are dependent on external funding and contracts for research. They are under pressure from governments to develop partnerships with, and be more responsive to the needs of, business and industry, which generally means a greater programme emphasis on science and technology (Orr 1997:47). This new university form has been termed the "market" or "entrepreneurial" university (Orr 1997:46; Subotzky 1998:2). Market universities are

characterised by competition and collaboration with other organisations as sites of knowledge production as “they become part of a wider and globalised knowledge market” (Usher & Solomon 1998:4; Moja & Cloete 2001:245).

These developments have a number of implications for doctoral education. For instance, according to Orr (1997:59), the emphasis on contract research is undermining long-term basic research, and the integration of teaching and learning, both of which form the basis of postgraduate training. In addition, while research is increasingly taking place in settings other than the university, this has not been coupled with an increase in the provision of research training in these new settings (*ibid*). This is clearly an opportunity for universities in terms of doctoral education.

1.2.3 ^③ Changes in employment opportunities for PhD graduates

In relation to the changing location of research and the increasing emphasis on highly specialised and skilled people for the labour market, there have been changes in the employment opportunities for doctoral graduates. Historically, doctoral degrees have been a license to teach in universities and, especially since the Humboldtian reforms, the PhD degree also became specialised training for research (see Chapter 2). Thus, for most PhD holders, a faculty position in a university was almost an inevitable career choice – with a position as a professor being the desired goal. In recent years, insufficient employment opportunities for the ever-growing number of doctoral graduates in the AICs has increasingly become a concern (Bartelse *et al* 2000a:148; Nyquist & Woodford 2000:5). This is particularly so in the United States where there are insufficient tenure-track faculty positions available to absorb the increasing supply of PhD graduates (Golde & Dore 2001:18; Kerlin 1995b:9). Golde & Dore (2001:17),⁸ for example, report that only about half the PhD graduates in any cohort “will be hired into full-time tenure-track faculty positions” and of those, only a small minority will find positions in research universities. The situation prevails in other countries as well. Only 10% of the PhD graduates in the Netherlands and only about one-third of the graduates in Australia are likely to find employment in academic institutions (Bartelse 1995:10). This shortage of faculty positions seems to be particularly acute for PhD graduates in the humanities (Nerad & Cerny 1999:1).⁹

While some reformers have urged universities to decrease graduation rates in light of the limited faculty positions available (Kerlin 1995b:6), others have argued that the numbers could increase or stay the same in view of the increasing employment opportunities outside of the university

⁸ 1999 survey of more than 4 000 doctoral students in the United States – see Appendix 5.

⁹ 1999 study of the career outcomes of individuals in the United States who undertook their PhD degrees in the discipline of English – see Appendix 5.

setting. Quoting Jody Nyquist, the director of the *Re-envisioning the PhD* project,¹⁰ Roseth (2000:47) comments that while there might be an oversupply of PhDs for academia, there is not an oversupply in terms of societal needs. This situation has contributed to debates around the PhD in terms of "eligibility, purpose, and training" (Nyquist & Woodford 2000:5), particularly with respect to career preparation. However, according to Bartelse (1995:10), the American private sector is far better equipped to absorb highly qualified researchers than European countries are where the labour market for PhDs outside of academia is under-developed. This is likely also the case in South Africa.

1.2.4 Changing profile of doctoral candidates

With the new emphasis on ongoing career development, as well as the cuts in funding for postgraduate study, there has also been a change in the number and profile of doctoral education candidates, particularly in the AICs. In recent years, there have been massive increases in higher and doctoral education enrolments in more advanced economies. Enrolment figures in doctoral education showed a dramatic increase in the 1990s in countries such as Australia, Germany, the Netherlands and the United Kingdom (Bartelse 1995:6-7). The most pronounced growth, however, has been in the United States to the extent that observers have referred to an 'oversupply of PhDs' in that country. The American National Research Council indicated that between 1963 and 1993, the annual number of PhDs awarded increased by 224%, from 12 278 to 39 754 (Kerlin 1995a:5). In the 1996/97 academic year, no less than 45 876 doctorates were awarded in the US (National Center for Education Statistics, United States Department of Education, 1999).

The profile of doctoral candidates has also changed. Where historically, doctoral students have been full-time, on campus, scholarship-holding individuals, increasingly they are mid-career professionals, engaged in full-time employment, with families and other responsibilities (Evans 1998:3). As a result, there has been a greater demand recently for flexible doctoral provision such as part-time or distance learning options.

In summary, these developments have posed a number of challenges to higher education systems with respect to the purpose and structure of their doctoral education programmes. The changing definitions, sites and purposes of research, and the new employment opportunities for doctoral graduates, associated with Mode 2 knowledge production, present a fundamental challenge to the academic and disciplinary orientation of Mode 1. In addition, the range of possible stakeholders can lead to a conflict of interest between the university, the market which requires knowledge production and training for profit, and the government whose primary focus

¹⁰ See Appendix 5 for a description of this project.

is achieving broad national development goals. Orr's (1997:64) distinction between academic, market and social knowledge is particularly useful here:

Academic knowledge is the traditional form of knowledge that has formed the core of the activity of traditional universities in the Humboldtian mould. It is largely characterised by elitism and has reproduced unequal social relations, while portraying itself as 'neutral' and 'value-free'. Market knowledge is knowledge in a commodified and commercialised form – it is proprietary and confidential and used for profit. Social knowledge refers to knowledge that is not commercialised or only available to academics, but is used for the social upliftment of disadvantaged communities.

More is said about this in Chapter 4 in relation to the reforms which are taking place in the US, and in Chapter 5 with particular reference to the South African context.

Finally, the cutbacks in public funding and the increase in enrolments internationally in the AICs have raised issues about accountability, quality and relevance in existing doctoral programmes, and have demanded that problems such as student attrition, high drop out rates, lengthy time to degree and the cost of doctoral education are given attention (Dinham & Scott 1999:2). The ways in which countries such as the United States and Australia have responded to these challenges are explored in greater detail in Chapter 4. With these macro developments in mind, I now turn to an examination of the national policy in South Africa which relates to doctoral education.

1.3 The South African policy context

South Africa has also been engaged in debates and transformation in higher education which have given consideration to the ways in which we can compete effectively in the global economy, while simultaneously addressing our urgent local reconstruction, development and equity goals. The 1990s in South Africa, beginning with the release of Nelson Mandela in 1990 and followed by the dawning of the post-apartheid political era in 1994, saw a flurry of new policies aimed at bringing about the fundamental transformation of the country. Faced with a fragmented and unequal education system (or more accurately, education systems) the new government has developed policies and plans that seek to create a unified, cohesive and co-ordinated education system for all South Africans. The establishment of the South Africa Qualifications Authority (SAQA), proposals for a National Qualifications Framework (NQF), and the various White Papers on education, have gone a long way towards providing the framework for transformation.

The *National Plan for Higher Education* (2001), at the time of writing, is the most recent in a long line of higher education related policy papers, which began with the National Education Policy Initiative in 1992. The latter was followed by the report by the National Commission on Higher Education, and the *Green Paper on Higher Education Transformation* in 1996, and the

Draft Education White Paper 3, the final *Education White Paper 3: A programme for the transformation of higher education*, and the Higher Education Act in 1997. In 2000, the Council on Higher Education released their report *Towards a New Higher Education Landscape* which was commissioned by the National Ministry of Education to inform the development of the National Plan.

However, while the new education policy in South Africa has given considerable attention to the general, and further education and training bands, and the undergraduate stratum of the higher education band, there has been no fundamental questioning or critique of the level 8 on the NQF which includes the masters and doctoral levels. For instance, the introduction of outcomes-based education at the primary and secondary school levels marks a radical shift away from traditional educational paradigms in this country. The Further Education and Training (FET) sector is also undergoing fundamental transformation in line with the new FET policy, under the auspices of the Colleges Collaboration Fund¹¹ project around technical colleges and schools. Similarly, the literacy and numeracy needs of the adult population have been tackled by government and non-governmental organisations (NGOs) alike, supported by the new Adult Basic Education and Training policy.

The structure, management, planning and funding of higher education institutions, as well as equity issues, are the primary focus of the Education White Paper 3 (Department of Education 1997) and most, if not all, higher education institutions have begun to embark on the planning and implementation of changes in line with policy. In addition, the structure and content of undergraduate degree programmes have received attention in a number of South African institutions in response to calls in the White Paper for change towards programme-based curricula. The current focus at the postgraduate level is on the establishment of graduate schools at some universities – notably the most privileged in South Africa – Witwatersrand, Natal and Cape Town. In comparison to the other educational levels, however, where calls for fundamental transformation have been heard, the upper postgraduate levels of masters and doctoral degrees have received relatively little attention. One wonders whether the traditional form of the PhD degree in South Africa is simply taken for granted. As William James (quoted in Kerlin 1995a:2) comments, “We have become so accustomed to [the PhD degree], it is so ingrained in our ways of thinking about higher education, that we consider it part of the natural order of the universe.”

The following two sections consider in greater detail the argument that there are significant silences in the national policy in relation to the purpose and form of the PhD degree.

¹¹ This is a joint project of the National Business Initiative and the Business Trust (see www.nbi.org.za).

1.3.1 The relationship between doctoral education and national policy

My interpretation of the policy in South Africa (or lack of it) which relates to doctoral education, rests on a number of my own assumptions. These include:

- That doctoral education is an important site of knowledge production, research training and professional development, and thus plays an integral role in terms of social, economic and political development
- That the processes of globalisation and the forces of the global economy discussed in the previous section, which are impacting on nations and their doctoral education systems, are impacting on South Africa too
- That, in addition to these macro factors, we have pressing local needs which must be addressed, to which doctoral education could contribute through knowledge production and research training
- That the relationship between doctoral education and national policy is a recent and somewhat unclear one.

In relation to this last point, Bartelse (1995:13) makes a number of interesting observations which I believe are pertinent to the South African context. Firstly, it is noteworthy that government regulation of doctoral education, and the incorporation of doctoral education into higher education policies in developed countries, only emerged after the Second World War. This is no doubt related to the fact that it was only after the war that governments and business realised the potential of universities as generators of new knowledge (Castells 2001c:208). These developments in the US are traced in Chapter 2.

Secondly, Bartelse argues that in many countries, particularly in Europe and Japan, although not in the United States, it is the first-level degree – the undergraduate degree – which has usually received the most attention:

...the first degree has historical primacy, predominates numerically, and possesses a deep hold on traditional thought and practice. It comes first in budgetary determination, public attention, and the concerns of government (Clark quoted in Bartelse 1995:13).

As was argued earlier, this has been the case in South Africa over the past few years of policy development.

Thirdly, speaking internationally, Bartelse (1995:13) notes that doctoral education is "situated on the borderline of higher education and sciences policies". This is fundamentally true of the current South African situation: both the Education White Paper 3 and the White Paper on Science and Technology (S&T) (Department of Arts, Culture, Science and Technology 1996) outline policy issues that in one way or another impact on doctoral education. The Education White Paper 3 (DoE 1997:2.89) acknowledges this cross over when it states: "The higher

education system is, in fact, an integral component of the National System of Innovation (NSI) described in the White Paper on Science and Technology". As Bartelse (1995:13) argues, this dual location of policy relating to doctoral degrees often leads to unco-ordinated changes in relation to doctoral education. This serves as a warning in our own context where, it appears, issues relating to doctoral education fall between the cracks of the two departments. It might also partly explain why the relevance of doctoral education is not being coherently debated at the policy level.

1.3.2 Doctoral education and national policy in South Africa

So, what does our national policy say about doctoral education? The answer is, relatively little. For instance, while the NQF debates focused on the integration of the various types and levels of education into one framework, they paid scant attention to the nature, purpose and value of existing higher degrees. The NQF discussion document (Government Gazette 2000:7.6) even concedes that the distinction between the qualification levels 8 and 8+ (that is, the masters and doctoral levels, respectively) is, in many ways, blurred. The NQF definitions of the level 8 qualifications are picked up again in Chapter 2.3.

The only direct reference to doctoral and masters degrees in the National Plan (2001:5.1) has to do with increasing the participation and graduation rates, particularly in regard to race and gender. It also acknowledges the uneven spread of research capacity and resources across our higher education institutions. Other areas of the policy talk indirectly to doctoral education, such as the importance of research for addressing local and global needs, building institutional research capacity, and the need for generic skills for the twenty-first century. *However, the link between these and the purpose and form of doctoral education is never made.* Both the direct and indirect references made to doctoral education are discussed in brief below.

Increasing participation and graduation rates at the masters and doctoral levels

Unlike the United States where there is an oversupply of PhD graduates, the current enrolment and graduation figures at the masters and doctoral levels in South Africa do not match the future labour market demands of the country. As stated in the Education White Paper 3 (DoE 1997:4.56):

The Government recognises the urgent need to increase the supply of postgraduates to the academic and general labour markets. The attrition and ageing of well-qualified academic staff and the emigration of graduate labour compels attention. Current low levels of enrolment in and graduation from doctoral programmes are insufficient to satisfy future requirements. Gross race and gender inequities are obvious at the postgraduate level.

According to the National Plan (2001:5.1), the proportion of doctoral and masters enrolments only increased from 5% to 5.7% between 1995 and 1999. In addition, South African higher

education institutions only produced around 4600 masters graduates and 750 doctoral graduates per year (National Plan 2001:5.3). The National Plan thus recommends that both the participation and graduation rates at the masters and doctoral levels are increased. While the Ministry establishes appropriate targets for enrolments, the emphasis in the short term is on increasing the graduation rates at these levels. The benchmarks for graduation rates in the next five years are 33% in contact institutions and 25% at distance education institutions at the masters level, and 20% at both types of institutions at the doctoral level (National Plan 2001:2.3.1). This translates into the following (National Plan 2001:5.3):

- At least 6% of the annual output of graduates, i.e. 6 000 of the minimum target of 100 000 graduates per annum ... must be masters graduates.
- At least 1% of the annual output of graduates, i.e. 1 000 of the minimum target of 100 000 graduates per annum, must be doctoral graduates.

The National Plan (2001:2.3.3) indicates that the quality of programmes must not be jeopardised by the focus on increasing graduation rates. One of the aims of the new Higher Education Quality Committee is to address these issues. Clearly, the assessment of quality is important in any educational setting, and we could do well to expand our doctoral education provision. However, the National Plan does not critically question the *appropriateness of our existing doctoral education system*. In other words, there is no critical examination of what we are expanding in terms of increased enrolments, or assessing in terms of quality.

Diversifying education in terms of race and gender

The issue of achieving race and gender equity in South Africa is a theme that runs through all the new policy written since 1994 and it receives attention in both the Education White Paper 3 of 1997 and the National Plan of 2001. While there has been success in increasing the number of black and women students enrolled in higher education institutions in the last decade (see Cooper & Subotzky 2001), there are still disparities which persist in terms of race and gender. This is particularly so at the doctoral level. As Chapter 3 will show, for example, the PhD enrolment and graduation figures awarded at universities in 1996 were heavily skewed in favour of White students (608 out of 699 or 87%), and particularly White males (383 out of 699 or 55%) (SAPSE 1996 Table 2.13). This skewed distribution is also evident across fields of study.

Furthermore, the improved representivity of students in the higher education system is not reflected in the race and gender profiles of the staff in these institutions (Cooper & Subotzky 2001; National Plan 2001:3.1.4). Between 1993 and 1998, the proportion of black staff increased from 13% to 20% in universities and from 12% to 29% in the technikons (National Plan 2001:3.1.4). However, the proportions of black academic and senior staff in these institutions remained significantly low. For example, between 1988 and 1998, the proportion of

African professional staff¹² grew from 5% to 13%, of Coloured staff from 2% to 3%, and Indian staff from 3% to 5% (Cooper & Subotzky 2001:210). The proportion of White staff dropped marginally from a high of 89% to 79% (ibid). The figures for women in these positions were somewhat better but still not representative of the broader population: the proportion of women in professional positions increased from 29% in 1988 to only 38% in 1998 (ibid).

Therefore, the need for equity redress remains high on the National Plan's agenda. In this regard, the National Plan (2001:Section 3) has set the following equity priorities for the higher education system:

- To increase the participation, success and graduation rates of black students in general and African and Coloured students in particular.
- To increase the representation of blacks and women in academic and administrative positions, especially at senior levels.

While the National Plan (2001:3.3) acknowledges that many institutions have begun to develop employment equity plans in relation to the Employment Equity Act, it also recommends "providing postgraduate scholarships targeted at black, women and disabled students" to address these staff equity concerns (National Plan 2001:3.4.2.1). Again, however, *the emphasis is on quantitative improvements without questioning whether the form of our doctoral programmes is appropriate.*

The importance of research and building research capacity

The Education White Paper 3 (1997), the National Plan (2001) and the White Paper on S&T (1996) all acknowledge the importance of research in addressing local reconstruction and development needs, as well as South Africa's position in the global economy. The National Plan (2001:5.1), for example, says the following:

The value and importance of research cannot be over-emphasised. Research, in all its forms and functions, 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 creates communities of scholars, who build collegiality and networks across geographic and disciplinary boundaries. 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.

Similarly, the role of research in the new National System of Innovation (NSI) is a major theme throughout the White Paper on S&T. Rather than focus on science and technology in themselves, the DACST has adopted the concept of 'innovation' as their guiding principle. One of the primary goals to achieve the vision of the Innovation Policy in South Africa is the

¹² Professional staff here includes members of the executive, administration or management, as well as instruction and research staff and specialist support.

"development of a culture within which the advancement of knowledge is valued as an important component of national development" (DACST 1996:Preamble). Within the framework of innovation and the NSI, the White Paper on S&T acknowledges the need for South Africa to engage in the process of globalisation, as well as to take care of its local social and economic development needs (DACST 1996:1.1):

The stimulation of a national system of innovation will be central to the empowerment of all South Africans as they seek to achieve social, political, economic and environmental goals. The development of innovative ideas, products, institutional arrangements and processes will enable the country to address more effectively the needs and aspirations of its citizens. This is particularly important within the context of the demands of global economic competitiveness, sustainable development and equity considerations related to the legacies of our past.

Both sets of policy thus highlight the importance of knowledge production, critical thinking, problem-solving and innovation for our general development. *But neither critically assess our current doctoral education system in relation to its role as a primary site for the development of many of these skills and activities.*

The National Plan articulates concerns relating to the uneven research capacity and the skewed utilisation of research resources across higher education institutions. In particular, the National Plan (2001:5.1) notes that "65% of the research outputs, which are recognised for subsidy purposes are produced by only six universities" and that the same six universities produce around 70% of all doctors and masters graduates (see also Chapter 3). The National Plan (2001:5.2) thus proposes that research funding allocations should be concentrated "in institutions where there is demonstrated capacity or potential based on approved mission and programme profiles". The emphasis on 'demonstrated potential' is aimed at ensuring that the historically black institutions also benefit – in other words, that the funding does not only go to the historically White institutions, who generally already have a substantially developed research capacity.

The Education White Paper 3 even spoke of a national research plan which has not, as yet, materialised. The national research plan would (DoE 1997:2.91):

... identify national priorities for research and postgraduate training, processes for the identification and establishment of centres of excellence and niche areas, targets and performance indicators to achieve redress by developing a more representative research community, and incentives for collaboration and partnerships, especially at the regional level, in research and postgraduate training.

But again, while *redress between institutions and niche development is stressed, there is no mention of the nature of PhD training itself.*

Skills development: Qualifications and programme review

In addition to research competencies, the National Plan (2001:Section 2) emphasises producing “graduates with the skills and competencies required to participate in the modern world in the 21st century”. The National Plan (2001:2.6) interprets this in terms of a shift in the balance of enrolments over the next five to ten years, in favour of science, engineering and technology, and business and commerce. The Ministry does, however, acknowledge the role of the humanities and social sciences in “the understanding of social and human development, including social transformation” as well as “career-oriented training in a range of fields such as education, law, private and public sector management, social development and the arts” (DoE 1997:2.25).

The National Plan also emphasises the need for generic skills such as “computer literacy, knowledge reconfiguration skills, information management, problem-solving in the context of application, team building, networking, negotiation/mediation competencies and social sensitivity” (National Plan 2001:2.7). These ideas are echoed in the White Paper on S&T (DACST 1996:2.4):

New approaches to education and training need to be developed that will equip researchers to work more effectively in an innovative society. This will require new curricula and training programmes that are comprehensive, holistic and flexible, rather than narrowly discipline-based. Education and training in an innovative society should not trap people within constraining specialities, but enable them to participate and adopt a problem-solving approach to social and economic issues within and across discipline boundaries.

The above quote reflects some of the core issues in the international debates, particularly the overspecialisation of the traditional PhD programme, and the need for graduates who can operate in transdisciplinary, problem-solving research contexts (Mode 2), both of which have major implications for our existing doctoral education provision. However, neither the DACST nor the National Plan specifically assess our current doctoral education system in terms of its contribution to producing these skills and competencies. In addition, the National Plan (2001:2.7) states that “there is a need to review the current academic policy and qualification structure to ensure that the qualifications framework is appropriate for our needs”. However, mention is only made here of restructuring the current three-year undergraduate degree into a four-year undergraduate degree, and nothing is said of reconsidering the masters- and doctoral-level degrees currently on offer.

In summary, in neither of these sets of policy is there any critical assessment of the purpose or relevance of our doctoral education system, nor how it might be restructured in order to meet our needs more appropriately. The emphasis is on increasing the numbers of masters and doctoral students and graduates, and on diversifying the profile of postgraduate students in terms of race and gender. The rationale behind these emphases is valid. I do not question the

need for equity redress, particularly as a short- to medium-term priority, or that we could do well to expand our doctoral education system quantitatively. As Chapter 3 will show, the proportion of doctorates awarded annually in South Africa per million of the population places us amongst the smallest producers of doctoral degrees – notably other developing countries. At the same time, South Africa is losing many educated and qualified people each year (the 'brain drain') who emigrate to other countries where their prospects for success and prosperity are greater. My concern is that the proposed changes do not take into account whether the particular form of doctoral education that we have in this country is the most appropriate or relevant to our needs. This argument is picked up again directly in the concluding chapter, after the evidence and issues have been assembled in Chapters 2 to 4.

Thus, with these macro and policy contexts in mind, I now turn to defining the PhD degree in South Africa in order to provide a definitive framework within which Chapters 3 and 4 may be interpreted. I begin with an historical sketch of the emergence and development of the PhD degree in selected countries. This is followed by an analysis of the rules and regulations relating to the PhD degree in South African universities.

CHAPTER TWO: DEFINING THE PhD DEGREE

2.1 Introduction

What exactly is a Doctor of Philosophy or PhD degree, and who or what is it for? How is a research doctorate different from other types of doctorates, or a masters degree by research? In order to provide a context to the chapters that follow, this chapter seeks to answer some of these questions about the PhD degree in South Africa from both historical and contemporary perspectives. The first part of this chapter (section 2.2) focuses on the historical emergence and development of the PhD degree internationally. This brief historical sociology begins with the emergence of the PhD in Europe in the medieval period. It then traces the development and refinement of the PhD as a research doctorate in nineteenth-century Germany, its diversification in America in the late nineteenth and twentieth centuries, and finally, its introduction in Britain and South Africa about a century ago.

The purpose of this historical sketch is twofold. Firstly, it seeks to shed some light on why the South African PhD looks like it does today. Secondly, it aims to provide a context within which the current factors shaping doctoral education (discussed in Chapter 1) and the debates and reforms which are taking place internationally (Chapter 4), may be interpreted. In so doing, it attempts to throw into relief those facets of our doctoral education system which are rooted in past traditions and circumstances, but which might no longer be appropriate and thus need revision. The discussion emphasises a selection of international developments in doctoral education which, I argue, form an historical thread that links particular discourses and practices in relation to knowledge production and doctoral education since the medieval period, with the form of the PhD degree in South Africa today. It also explores some of the economic and political factors which have shaped these reforms over this long historical period. This historical sketch does not, therefore, claim to be a comprehensive 'sociology of knowledge', or an historical account which resolves the many geographic variations and alternative practices over the past 800 years in doctoral education.

The second part to this chapter (section 2.3) includes a thematic analysis of the PhD programmes on offer in South African universities. Based on a review of the institutional guidelines and regulations relating to both doctoral and research masters degrees, the discussion describes the criteria for admission to doctoral programmes, as well as aspects of the process of undertaking and examining these degrees. Establishing the patterns and anomalies across institutions within these categories helps to identify the type of doctoral degree we have in South Africa, and distinguish it from PhDs in other countries (such as the

coursework PhD in America), masters by research, or the professional doctorates discussed in Chapter 4. In addition, this 'definition' of the South African PhD provides a framework for understanding the implications of the analysis of the sub-fields in which the doctorate was awarded in 1996 in South Africa (Chapter 3).

2.2 Historical development of the PhD degree

The historical emergence of the PhD degree has been traced back to the medieval era during which the first universities were established and the first doctoral and masters degrees were awarded in Europe. However, it was only in nineteenth-century Germany that the research orientation of the contemporary PhD degree came into being, based on the neo-humanist reforms led by Willem von Humboldt. The German form of the PhD quickly spread to America in the late nineteenth century, but with a coursework component added. In the twentieth century, the American PhD contributed greatly to the degree's diversification in many fields and to its immense popularity as a doctoral degree around the world. These historical processes will be traced below.

Although the first research doctorates were introduced in Britain in the 1880s, the German form of the PhD degree only arrived in 1917. As South African education at the turn of the twentieth century was to a large extent modelled on the British system, the development of postgraduate studies and research and the introduction of the PhD in Britain were important factors in the introduction of research doctorates in South Africa. The history of the PhD in Britain is therefore also discussed below. As there is currently no comprehensive account of how and when the PhD was introduced in South Africa, only brief mention is made of the first research doctorates that were awarded to students at the South African College, which was later to become the University of Cape Town.

2.2.1 The emergence of the doctoral degree in the medieval period

The history of masters and doctoral degrees is directly linked to the historical emergence of the first formally structured universities in Europe in the twelfth century. While many of the terms, concepts and structures of higher education around the world today were first used during the Middle Ages in Europe, in quite fundamental ways university education and the award of qualifications was very different in that time. In the early universities in Europe, there was essentially only one type of degree. Initially, both the terms 'doctor' and 'master' were used, often interchangeably, as titles for this qualification (Knowles 1978:1230). Later, the usage of these two titles varied geographically: 'master' is said to have been used in France and later in

Oxford, while 'doctor' was used in Italy and Germany (Noble 1994:8; Simpson 1983:5; Spurr 1970:9-10).

The reasons for the use of different terms appear to be related to the differing foci of the Italian and French universities. According to Spurr (1970:9), in "the thirteenth century, Bologna was a center for the study of civil and canon law and its teachers were called *doctors*; while Paris was pre-eminent in the study of arts and its faculty were termed *masters*." Thus, the Italian universities placed a greater emphasis on study in the professions – mainly law, theology and medicine – which were later known as the 'upper faculties'. On the other hand, the French institutions initially focused on the seven liberal arts in the 'lower faculty' which included the *trivium* of grammar, dialectic/logic and rhetoric, and the *quadrivium* of geometry, arithmetic, astronomy, and music (Ross 1976:7).

The emphases on different curricula was, in turn, related to the differing locus of control in the Italian and French universities (Noble 1994:9; Ross 1976:7). The former were primarily controlled by the students who made demands for study that was of interest and importance to them, whereas in the French universities, the teachers controlled the learning process and established courses of study they considered important. By the turn of the sixteenth century, the term 'doctorate' was applied to the degrees awarded in the higher faculties of law, medicine and theology while the term 'master' was applied to the lower faculties of arts and grammar (Bartelse 1995:3; Knowles 1978:1230-1231; Noble 1994:8).

While there is some uncertainty about the exact date, it appears that there is general agreement that the first degree was awarded in Paris, France *circa* 1150 (Noble 1994:7-8). Less than ten years later, the doctorate was awarded in Bologna, Italy after a charter granted to the University of Bologna by Frederick I which entitled graduates "to teach or practice their specialization without further examination" (Green in Noble 1994:8). The first doctorate in the faculty of philosophy, known as the Philosophiae Doctor (PhD), emerged approximately a century later in Paris and was gradually accepted by universities across Europe (Noble 1994:9). The doctorate, whether in the professions of law, medicine or theology, or later in the arts and philosophy, was a *licence to teach or practice* which was broadly recognised by other social institutions (Noble 1994:8; Spurr 1970:10).

Study at the early universities essentially took the form of an apprenticeship (Borbasi *et al* 1998:68) in which a student "attached himself to a particular teacher" (Ruëgg 1992:23). Although initially quite informal and unstructured, as time passed, "the process of acquiring a doctoral degree became structured and candidates were required to complete a clearly defined and demanding academic process" (Noble 1994:8) Durant (in Noble 1994:8) gives a detailed description of this academic process:

Toward the middle of the thirteenth century the custom arose of requiring the student, after five years of resident study, to pass a preliminary examination by a committee of his nation. This involved first a private test - a *responsio* to questions; second, a public disputation in which the candidate defended one or more theses against challengers, and concluded with a summation of the results - *determinatio*. Those who passed preliminary trials were called *baccalarii*, bachelors, and were allowed to serve a master as assistant teacher or 'cursory' lecturer. The bachelor might continue his resident studies for three years more; then if his master thought him fit for the ordeal, he was presented to examiners appointed by the chancellor ... if the student passed this public and final examination he became a master or doctor, and automatically received an ecclesiastically sanctioned license, to teach anywhere in Christendom. As a bachelor he had taught with an uncovered head; now he was crowned with a biretta, received a kiss and a blessing from his master, and, seated in the magisterial chair, gave an inaugural lecture or held an inaugural disputation; this was his *inceptio* ... by these and other ceremonies he was received into the magisterial guild.

Initially, the title of 'bachelor' (meaning novice) was granted to the student who had completed three to four years of study of the *trivium* and thus marked the first stage in the attainment of the masters or doctoral degree (Knowles 1978:1231; Simpson 1983:5). It also entitled the bachelor to work in a master's school as a teaching assistant (Spurr 1970:10). The status of bachelor was soon converted into a first degree, although its status differed between countries (Spurr 1970:11).

According to Noble (1994:10), the medieval PhD degree was essentially the study of the *quadrivium* and the *trivium* and the only award for the completion of a course of study in the faculty of arts or philosophy. It signified the holder's competence in the field of philosophy and was only awarded to those "considered to be at their intellectual peak" (ibid). The award of the PhD was based on a verbal public defence of a thesis. Thus, the early PhD degree in no way resembled the contemporary version which is based on original research embodied in a written thesis, and which may be undertaken in almost any faculty or discipline. Instead, it was based on a broad knowledge of a wide range of subjects within the arts and philosophy. And unlike the contemporary PhD which is often undertaken by relatively young academics at the start of their careers, the medieval PhD was awarded to more mature scholars.

2.2.2 Germany and the 'Humboldtian Revolution' in the nineteenth century

Lead up to the German reforms

Despite the fact that the doctorate or masters degree was a license to teach, university education up until the end of the eighteenth century in Europe could not be considered practical or vocational in the sense we understand it today. Rather than providing specialised, vocational training, the general classical education of the universities was about transmitting the existing "intellectual heritage" (Ben-David 1977:10-11) which was considered to provide sufficient personal development and training of the mind for any kind of occupation. Perhaps this was most pronounced in England where the bachelors degree at Oxford and Cambridge stressed the development of 'culture' or 'character' rather than practical training for a profession. In

addition, as Ben-David (1977:10) argues, during this time, "higher education was overwhelmingly education in the classical languages and in the reading and interpretation of classical texts." Knowledge was thus about interpretation and reinterpretation, rather than the investigation of the 'new'.

In this sense, the form and nature of university education and the degrees that universities awarded, remained virtually unchanged for the remainder of the medieval period and up until about the eighteenth century. The eighteenth and nineteenth centuries in Europe were characterised by major reform and revolutions (for example, the French Revolution), as well as significant scientific advances associated with the 'rise of science'. European and North American history resonated with great developments in many intellectual fields such as philosophy, mathematics, law, metaphysics and literature, as well as a range of significant inventions such as the microscope, thermometer and the printing press (Ross 1976:15). This era saw the peak of the Renaissance and the start of the Reformation and the French Enlightenment, the effect of which "was to loosen the authority of religious thought, to encourage new fields of investigation, and to nourish fresh scientific speculation" (Ross 1976:14).

A belief in the applicability of science to existing professions such as medicine and engineering gave rise in the eighteenth century to the introduction of specialised professional schools beyond the borders of the universities which were far more practical and utilitarian in nature than the classical education universities could offer. Thus, as a number of theorists have argued, few of these pioneering scholarly activities were taking place within the universities. Ross (1976:14) maintains that rather than providing the basis for vibrant intellectual and creative activities and developments, as it did during the Middle Ages, the university in Europe developed into a place of rigid and unshifting ideas whose primary value was to maintain the status quo. In England, for example, the curricula of Oxford and Cambridge were criticised for being extremely narrow as they only focused on Greek and Latin, while the "large evolving fields of natural philosophy, science, social science, medicine, and law were almost completely neglected" (Ross 1976:17). And in spite of the pioneering vision of the early founders of the United States in the seventeenth century, American institutions in the eighteenth century followed in the footsteps of Oxford and Cambridge. Offering only bachelors degrees, their curricula were reported to rely heavily on the Oxbridge classical tradition of Greek and Latin readings (Ross 1976:23).

In the wave of reform and revolution that was sweeping across Europe, universities also came under attack. According to Ben-David (1977:12), the university reformers of the eighteenth and early nineteenth centuries "were dissatisfied with the increasing gap between the classical education given at the universities and the new scientific research and the modern literary-

philosophic culture that grew up outside the universities." One of the significant developments in the latter part of the eighteenth century was the reorganisation of the traditional faculties to accommodate the emerging separate disciplines, such as history, mathematics, physics, modern languages, and the natural sciences, many of which were readily absorbed into the philosophical faculties (McClelland 1980:106-108). According to Turner (1975:510), the "rise of the disciplinary communities in the later 18th century can be traced in the emergence of self-conscious schools, the propagation of specific research techniques, and the proliferation of specialized journals". However, it was only in the following century that these disciplinary communities became widespread practice (Turner 1975:511).

The Humboldtian reforms and their impact on the purpose and form of doctoral education

The nature of the reforms and the resultant systems of higher education in France, England and Germany were very different. Of particular interest to this study was the shift in emphasis to the triad of teaching-study-research, in the Humboldtian tradition in German universities at the beginning of the nineteenth century. Willem von Humboldt, one of the prime neo-humanists of the time, formulated what was essentially a relatively coherent ideology of higher education which had two basic interrelated elements: the first stressed that pedagogically, a university education should combine the learning of what was already known with a constant search for new knowledge ("discovery"); the second was an emphasis on the rounded, life-long learning of the individual – as opposed to learning or education for a career.

By the turn of the nineteenth century, the former aspect to the Humboldtian reforms (i.e. the stress on the link between teaching and research) was reflected in changes in the dominant discourses around teaching and learning (McClelland 1980:122). Amongst others, these emphasised that research – which had been taking place mainly outside of university walls – should be as integral a part of the scholar's activity as teaching (Bartelse 1995:4; Ben-David 1977:27; Clark 1995:19; McClelland 1980:123; Noble 1994:6). There was also a move away from the 'synthesis' form of scholarship towards the conception of the 'new'. Thus, in line with the ever-increasing speed of development and change in the western world, especially technologically, there was a move away from the notion of a static body of knowledge towards an emphasis on ongoing curiosity and passion for discovery (McClelland 1980:124). This in turn was linked to the neo-humanist notion of the ongoing development of the individual.

Humboldt established the University of Berlin between 1810 and 1812 which had, as its primary objective, the *creation of new knowledge* (Noble 1994:6; my emphasis). Thus, for the first time, research activities were effectively merged into the advanced study at doctoral-level in the new form of the PhD degree, and the research undertaken was located within the emerging specialised disciplinary areas. It is important to note, however, that the emphasis was on the

pursuit of science for science's sake, as opposed to a more utilitarian view of the outcomes of science. As McClelland (1980:125) argues:

... there were some forms of knowledge the new type of teacher-scholar was supposed not to care about: The merely practical, applied, or useful branches of knowledge ... were despised. ... One result of such thinking was the sundering of "technical" and "theoretical" education in the nineteenth century.

There were number of other interrelated consequences of the Humboldtian reforms which gave new form and prominence to the PhD degree. The first was the rise in importance of the philosophical faculty in German universities: what had previously been considered the lower or inferior faculty of arts or philosophy came to be seen as equivalent to the historically superior faculties of law, medicine and theology (Ben-David 1977:20; McClelland 1980:110; Simpson 1983:15). According to McClelland (1980:133), the "philosophical faculty, which had sunk to its nadir by the early eighteenth century, had recovered enough by 1800 that many regarded it as the core of the university curriculum." In addition, Simpson (1983:15) argues that the growth of the philosophical faculties in the nineteenth century – with the concomitant increase in students enrolling in the new fields of science – was the driving force behind Germany's dramatic surge ahead scientifically and technologically.

This, together with the new dedication to and enthusiasm for inquiry and discovery, gave rise to an image of the university in Germany, at the turn of the nineteenth century, as a place of vibrant intellectual and exploratory activities. There was a comparatively greater sense of autonomy and freedom of expression than was being experienced in France and England at the time. Therefore, a second consequence, related to the first, was the increased flow of foreign students – particularly from the United States and Europe – to German universities, and the subsequent influence the so-called 'German model' had on developments around the world (Bartelse 1995:4; Ross 1976:27-28). For example, the British universities in the 1800s still did not offer a PhD degree and thus:

As might be expected, among the growing number of students from all over the world attending various German universities, the British also took their place. Whilst his own university did not provide higher courses, the keen graduate who wished to continue in more specialized studies had to seek them abroad (Simpson 1983:16).

At the same time, American students were travelling to Germany to continue their education, as the American university system of the eighteenth century and first half of the nineteenth century resembled the English college system and did not offer anything further than the Bachelor of Arts (BA) degree (Simpson 1983:17).

A third and final consequence, related to the flow of American and English students, amongst others, to German universities, was pressure to introduce the PhD in these countries. Yale was the first American university to offer the PhD degree in 1861. This encouraged the ancient

universities in England to upgrade their own system – although only about 50 years later (Simpson 1983:18) (see section 2.2.4 below).

2.2.3 The introduction of the PhD degree in America in the nineteenth century

As noted above, until the middle of the nineteenth century, the American universities and colleges were based on the English college system and offered bachelors degrees which encompassed a broad classical education with no specialisation. The bachelors degree could be converted to a masters degree three years after graduation and on payment of a fee (Simpson 1983:17). The returning American academics from Germany in the early 1800s were thus filled with ideas about and enthusiasm for the scientific enquiry and research specialisation they had encountered abroad, and were unimpressed with the existing college system in their own country (Clark 1995:119; Ross 1976:45). The concept of the PhD degree was discussed in American institutions early in the nineteenth century – both as a way of diverting the flow of American students from German universities to American institutions instead, and of improving the quality and increasing the spread of American education to equal that which was taking place in Europe.

Although the first PhD degree was awarded at Yale in 1861, there was still no postgraduate education as such in America. In the period following the Civil War (1861 – 1865), the United States embarked on a long and rigorous effort to rebuild the new nation and, according to Ross (1976:43), the growth in the number of universities and their enrolment figures reflected this. Furthermore, this was also a time during which the role and purpose of the religiously-based colleges were rigorously debated and it was strongly argued that they would not keep up with the increasing demands of the rapidly urbanising country. The philosophical debates about the most desirable ideology of education were superseded, however, by practical and technological demands, and increasingly, calls for a system of higher education which would contribute to the developing country were heard (Ross 1976:44-45). In addition, various possibilities of how to incorporate the advanced degree into the existing college system were debated and tested over more than 50 years after the Civil War (Clark 1995:119-120).

Consequently, the manifestation of graduate education and the PhD degree in the United States was vastly different to that of the German model. The first American innovation, in the 1870s, was the creation of 'graduate' and 'graduate professional' schools. In what came to be known as the "vertical university" (Clark 1995:120), the higher tier of advanced degrees was placed on top of the college (undergraduate) system into a unique hierarchical model. This was, according to Bartelse (1995:4), essentially the German concept "superimposed on the English college system". This development was greatly stimulated by the introduction of the first doctoral programme at Johns Hopkins University in 1876 which gave particular impetus to the

development of graduate education and the PhD in America (Bartelse 1995:5; Noble 1994:13; Spurr 1977:117, 118). The second innovation in the American system was the inclusion of coursework into the PhD degree (Bartelse 1995:5) which was essentially a response to the practical and technological needs of the nation at the time.

Thus, while the graduate schools and the American PhD of the last quarter of the nineteenth century were premised on the German philosophy of the integration of teaching and research, they were organisationally different from the German model (Ben-David 1977:108). Rather than a single, centrally planned system, doctoral education emerged in America in a variety of settings, with numerous specialisations and either vocationally oriented in professional schools, or academically in the graduate schools (Bartelse 1995:4-5).

2.2.4 The introduction of research doctorates in Britain in the late nineteenth century

Up until the late nineteenth century, there were no postgraduate degrees in Britain. Oxford and Cambridge universities were based on the medieval Paris system and thus only had a masters degree which was essentially a confirmation of the period of the bachelorship (Simpson 1983:6). In contrast to the apparent eagerness and ease with which the Americans had introduced the PhD degree and developed their system of graduate education in the last quarter of the nineteenth century, the introduction of advanced research degrees and scientific investigation in British universities was drawn out over more than fifty years. Recommendations for reform emerged as early as 1850. However, the centuries-old tradition of liberal, undergraduate education at Oxford and Cambridge universities gave rise to conservative resistance towards these ideas. The introduction of postgraduate education was also delayed because historically the British higher education system did not have government support in terms of state aid, and the distinct and individual institutions had no single body to unify any reform efforts (Simpson 1983:85-90). The many institutional variations in the titles, status and curricula attached to the new degrees which emerged between 1850 and 1917 (when the first PhD degree was introduced at Oxford), are not comprehensively described here. Rather, this section outlines a selection of political and academic/institutional developments in this period which stimulated the introduction of doctoral-level research degrees and scientific investigation in British universities.

The primary motivation for reform in Britain was to divert the flow of American students, as well as English and colonial students, from the German to British universities. However, as the forces of industrialisation and capitalism gave rise to major scientific and technological advances in other parts of Europe, the British were increasingly under pressure to reconsider their liberal, classical education and to introduce a system of education which would more effectively meet these needs. The onset of the First World War further emphasised the extent to

which Britain was lagging behind her European counterparts scientifically and technologically and, more importantly, how much she depended on other countries for manufactured goods.

The first research doctorates in the United Kingdom were introduced in the 1880s at both London and Cambridge universities, but these were in the form of doctorates in science and literature, and not the PhD degree as it had developed in Germany. As early as 1860, London University had been the first British institution to take the bold step of establishing a science faculty and introducing the Doctor of Science (DSc) degree as the award for "proficiency in physics and chemistry" (Simpson 1983:34-36). Eight years later, London introduced the Doctor of Literature (DLitt) degree. Both the DSc and the DLitt were syllabus- and examination-based degrees, but in 1885, this was replaced with the requirement that the degrees be awarded *solely on the basis of a thesis embodying original research* (Simpson 1983:46-48).

Just prior to these developments, in 1882, Cambridge University had introduced the research-based doctorates in science and literature (Simpson 1983:62-63) upon the recommendations of the 1870 Royal Commission on Scientific Instruction and the Advancement of Science (Simpson 1983:31). As Simpson (1983:42-43) argues, this was a momentous step for this institution as it was the first time that a degree would be based on original research and not on examination, and where the idea of research training in the form of postgraduate studies was first considered. Initially, Oxford University took a different approach and in 1894 introduced research-based bachelors degrees in literature and science but, by 1900, had also introduced doctorates in science and literature (Simpson 1983:56,59-60).

Despite these developments, however, at the turn of the twentieth century, very little research training was taking place at Oxford and Cambridge and "nothing that could as yet be even remotely described as *systematic instruction* for graduate students" (Simpson 1983:66-67, author's emphasis). The ancient traditions of these two universities were still stifling "the development of specialization and scientific pursuits" (Simpson 1983:130). In addition, the introduction of research degrees had not served the purpose of attracting American students to British institutions (Simpson 1983:76).

After continuing pressure for Britain to provide specialised, advanced training in science and technology, the Imperial College of Science and Technology was established in London in 1907 out of the existing Royal College of Science and the Royal School of Mines (Simpson 1983:93-94). At the same time, the development of postgraduate studies was surging forward at other universities such as Manchester, Liverpool, Leeds and Birmingham, aided by fellowships and postgraduate scholarships which encouraged the research activities of staff and students (Simpson 1983:94). Increasingly, and as had happened in the US, extending the boundaries of

knowledge through research was seen as one of the main objectives and assets of a university (Simpson 1983:96-97).

Britain's concern about her lack of postgraduate studies for advanced training in research and scientific investigation, and the degree to which she was lagging behind her European counterparts, was greatly accentuated with the onset of the First World War. Britain had for some time relied upon other countries (and ironically Germany) for many of her manufactured goods which, owing to the war, she no longer had access to (Simpson 1983:112). And thus, as Simpson (1983:114) argues,

... the urgent needs of the war led to an intensification of the struggle for the recognition of science which in turn resulted in a greater appreciation of the need for properly organized postgraduate research schemes leading to suitable qualifications.

Consequently, in 1915, the British government issued a White Paper on the development of scientific and industrial research which was essentially its first real commitment to funding research and research training. The government provided postgraduate scholarships and fellowships and established the Advisory Council for Scientific Research (Simpson 1983:112).

Thus, in the second decade of the twentieth century, the foundations for the introduction of the 'modern' PhD degree had been laid and two meetings in 1917 put the finishing touches to these developments. The first of these was a meeting of the five northern universities (Manchester, Leeds, Liverpool, Sheffield and Birmingham) to discuss the introduction of a new research degree (Simpson 1983:130). The meeting agreed on the need for a lower doctorate and debated at length what its status and title should be. There was resistance to removing the existing Master of Arts (MA) degree, although it appeared that the lower doctorate would be equivalent to it. However, as the idea of introducing a doctorate was because the title of 'doctor' was what attracted foreign students, the meeting eventually agreed to the title of 'Doctor of Philosophy' (Simpson 1983:132).

A week later, the United Kingdom Universities Conference was held which was greatly influenced by the discussions at the previous week's meeting. The Conference made a number of resolutions, among which was the need to institute a new doctorate based on no less than two years' original research or advanced study, while maintaining the form and nature of the existing doctorates. In addition, it was decided that the title of the new doctorate would be the same across all faculties and the title of 'Doctor of Philosophy' or PhD was recommended (Simpson 1983:133-135).

Oxford was the first university to introduce the Doctor of Philosophy in 1917 but "in its traditionally individualistic fashion" called it the 'DPhil' instead of PhD¹ (Simpson 1983:135). There was much deliberation at Oxford as to what to do about the DLitt and DSc degrees and it was eventually decided to keep these two degrees "as recognition of the independent and mature work of older men but also to honour great scholars of other universities" (Simpson 1983:138-139). By contrast, the new doctorate "would be to reward the earliest advanced work of young graduates" (ibid). Cambridge and the provincial universities soon followed in introducing the PhD (Simpson 1983:147,154-156), while London University was the last to do so in 1919 (Simpson 1983:158-159).

In summary, the PhD degree which finally emerged in Britain was based on the German thesis-based model and not the coursework and thesis PhD which had developed in America. In addition, because of the way in which the reforms unfolded, the 'senior doctorates' such as the DSc and DLitt which were awarded to mature scholars, were evident in the British doctoral education landscape. As will be shown below, given the British colonial influence on South Africa's higher education system, which emerged in the second half of the nineteenth century, South Africa followed the British route in relation to doctoral education.

2.2.5 The first research doctorates in South Africa in the beginning of the twentieth century

There is no comprehensive account of how or when the PhD arrived in South Africa and such an investigation would constitute a separate research study in itself. However, what is certain is that at the turn of the twentieth century, higher education in South Africa was closely modelled on the British system and was, in many ways, affected by the developments in that country. At the time when Britain first began to consider introducing postgraduate study into her universities, South Africa had a number of colleges but no university. In 1858, the Cape Colony appointed a Board of Public Examiners which was responsible for providing examinations in law and surveying, as well as in literature and science, which corresponded to the examinations for the BA and MA at London University (Ritchie 1918:172). The Board was empowered to award first, second and third class certificates which were equivalent to the MA, BA and matriculation certificates, respectively.

In 1873, an Act of Parliament replaced the Board of Examiners with the University of the Cape of Good Hope (UCGH) as an examining university (much like that of London University) which was now able to confer academic degrees (Ritchie 1918:216). The first degree ceremony of the UCGH was held on 12 December 1874 and six BA graduates and one MA graduate were awarded their degrees (Boucher 1973:68-69). Four years later the UCGH became a member of

¹ Evidence of this nomenclature in South Africa is found at the Stellenbosch and Rand universities (see section 2.3).

the British and imperial universities and her degrees were granted full recognition in the British world, that is, they were granted equivalency to those in British universities (Boucher 1973:36).

The first honorary doctorates were awarded in 1899 after the UCGH Amendment Act of 1896. However, it was only in the first decade of the twentieth century that research doctorates were awarded by the UCGH. The Council of the UCGH had replaced the existing research fellowships for science and engineering (of which the first had been awarded to Charles Juritz) with the DSc degree in pure science, preceded by a Master of Science (MSc) degree (Boucher 1973:95). Five DSc degrees were awarded to students at the South African College (SAC) between 1907 and 1915, all of which were research degrees by thesis. The first of these was awarded to Juritz in 1907 and the thesis title was: "A study of the agricultural soils of the Cape Colony" (Ritchie 1918:810). Thus, South Africa had essentially followed the developments in British doctoral education, and particularly those in London University and later in Oxbridge, with the emphasis on thesis-based research rather than coursework.

2.2.6 The impact of the growth of the American PhD on other countries

Clark (1995:116) argues that in the twentieth century the American higher education system, embodied in the graduate school with its coursework and thesis PhD, became a "tower of strength" to which students from around the world were attracted for "high-quality training". But how did the American PhD take root so strongly, and in turn become such a beacon for higher education systems around the world? An understanding of how graduate education in the United States – and particularly the PhD degree – advanced as it did, both qualitatively and quantitatively, is linked to the substantial development of research in these universities in the first half of the twentieth century.

The first massive boost to university-based research in the United States occurred in the period between the two world wars. A number of wealthy private foundations (notably Rockefeller and Carnegie) elected to support "the long-term development of the research capability of the universities" (Clark 1995:127), and particularly research in the sciences. This began in the 1920s with a few of the private universities and extended in the 1930s to public institutions. Significantly, this injection of major funding resulted in universities becoming the home of American science and provided a very strong basis for the growth and development of graduate education in the country, with the number of institutions offering the doctorate and the number of doctoral degrees awarded increasing exponentially (Clark 1995:127, 128). Thus, by the Second World War, there was a huge research university sector in the United States, even by international standards.

A second major boost to university-based research and thus graduate education came during and after the Second World War when the federal government of the United States began to invest largely in research – and the universities benefited again, with the result that their departments increased in size and became very research oriented (Clark 1995:118). For example, during the Second World War, “the immense research capacity of the graduate schools was harnessed to several research and development projects”, including the development of the atomic bomb (Ben-David 1977:114). Clearly, the American federal government was interested in national defence issues (Clark 1995:129) but soon extended this interest to their place in the ‘space race’ in response to the launch of the Russian *Sputnik* in 1958. This gave the universities ample rationale to make demands for greater funding: they argued that the appearance of *Sputnik* highlighted that the superiority of American science was under threat by the Soviet Union (Ben-David 1977:117). This, together with the climate of the Cold War which was then at its peak, provided a good argument for increased research funding for America to maintain its scientific, and thus economic, advantage. The newly established National Aeronautical and Space Administration (NASA) became a major research university funder and the 1958 National Defense Education Act provided federal monies for graduate students (Clark 1995:130).

In this way, research was spread across a greater number of universities in the country, the number of institutions offering PhD programmes increased, and the university-based research system and its associated PhD teaching and learning structure grew even larger and became more complex. It is also interesting to note that this was the period during which research that was not necessarily related to teaching began to emerge as a real function of the universities (Ben-David 1977:114).

The “successes of American research” in the twentieth century (Ben-David 1977:120) have impacted greatly on the reform measures in the systems of higher education in other countries (Bartelse 1995:5). For example, the governments of other nations committed greater funding to research in universities based on the American example. It also gave rise to the notion that university reform was fundamental to the social and economic development of a country (Ben-David 1977:121-122). This point of view has also been adopted in South Africa (see Chapter 1.3).

A distinguishing element of the manifestation of the research-teaching nexus in the United States was that, unlike in Germany, England and France, research “was conceived of here as regular professional work for which one was trained, and not as an elite activity for which one was somehow ‘chosen’ through individual charisma” (Ben-David 1977:108). In other words, one could undertake research training for a career as a researcher, and not only as part of the

training for another profession. This is what authors such as Noble (1994:15) and Ben-David (1977) have referred to as the "professionalization" of the PhD degree.

Finally, where the original medieval doctorates in law, theology, medicine and arts/philosophy were considered to be advanced training to become teachers in these fields, they were limited in their vocational aspects. However, the practically minded Americans made demands for advanced education in a wide array of professions (Noble 1994:15). As a result, the PhD is now offered in a number of different occupational or professional contexts, even those for which the disciplines are new and do not have a solid theoretical basis or tradition (Ben-David 1977:109). These include disciplines such as "accounting, animal science, home economics, education, German, nursing, nuclear engineering, physical education, veterinary pathology and zoology" (Walters in Noble 1994:15). This has also filtered through to South Africa where PhDs are offered in a range of fields.

With these historical developments in mind, I now turn to defining the contemporary research doctorates offered in South African universities which, more often than not, are given the title of 'Doctor of Philosophy'. The impact of the British system in South Africa is clearly evident, particularly with regard to different naming conventions for research doctorates, as well as the existence of so-called 'senior doctorates' reminiscent of the DSc and DLitt degrees in the United Kingdom in the late nineteenth century.

2.3 Defining the research doctorate in South Africa

Since the award of the first doctorates in the early 1900s, doctoral education in South Africa has expanded and diversified. Virtually all of the doctorates awarded today are research degrees which culminate in a thesis, many of which go under the title of PhD, as well as other titles which will be explored in this section. In addition to these research doctorates, South African universities also award the so-called 'senior doctorates'² and 'honorary doctorates', while technikons have recently introduced doctoral-level degrees,³ although far fewer are awarded than at universities, as the statistical overview in Chapter 3 will indicate.

The focus of this section, however, is on defining the research doctorates or PhDs offered in South African universities. The definition of the research doctorate is based on a review of the institutional rules and regulations relating to the admission to the PhD degree, aspects of the PhD process, and the rules associated with the examination of the thesis. Rules and regulations in relation to the PhD degree are often provided at institutional, faculty and even departmental

² See Appendix 1 for a more detailed description of this form of 'advanced' doctorate.

³ Technikon doctorates were initially called "Laureatus" but increasingly are being referred to as "Doctor of Technology" degrees.

levels. Each level down the institutional hierarchy provides more detailed information about undertaking the degree.

As not all university websites carry information regarding the rules and regulations for degrees, this review of institutional and faculty guidelines is not exhaustive. However, the relevant documentation of the majority of South African universities, during the period October 2000 to April 2001, has been consulted and used in this discussion. These include the universities of Cape Town, the Free State, Fort Hare, Natal, the North, the North West, Port Elizabeth, Potchefstroom, Pretoria, Rand, Rhodes, South Africa, Stellenbosch, the Western Cape, Witwatersrand, and Medunsa. Of course, the ways in which these rules and regulations are applied on a daily basis would provide additional insights into how the PhD is defined and experienced, but this is beyond the scope of this study.

The following section begins with a detailed discussion of the PhD degree in South Africa and concludes with a brief overview of the similarities and differences between the PhD degree and the masters by research.

2.3.1 Core features and processes of the PhD degree

As already mentioned, certain universities in South Africa, such as Stellenbosch, Port Elizabeth, Fort Hare, Rand, Pretoria and South Africa, offer research doctorates that are identical to PhD degrees but which are given other titles. Stellenbosch and Rand Universities use the term "DPhil" to refer to Doctor of Philosophy degrees which can be obtained in any number of disciplines. This nomenclature follows that used in Oxford and Cambridge universities in England, as indicated earlier in this chapter. The naming of other research doctorates, such as the Doctor of Education (DEd), Doctor of Administration (DAdmin) or Doctor of Commerce (DCom) degrees might also be a British influence where traditionally "the doctorates of British universities have been named for the particular faculty; for example: DD (Divinity), MD (Medicine), LLD (Law), DMus (Music)" (Phillips & Pugh 1994:18).

Despite their different nomenclature, these research doctorates are the same as PhD degrees in that they culminate in a thesis⁴ – the research for which is expected to be original, to contribute significantly to the existing knowledge in the field, and to demonstrate the candidate's ability to work independently. However, as the PhD is the name most commonly used for the research doctorate in South Africa, for ease of reference this term will be used throughout this section to refer to research doctorates in general.

⁴ The terms "dissertation" and "thesis" are used in different ways by different institutions. The same applies to the terms "promoter", "advisor" and "supervisor". For the purposes of this study, the term "thesis" is used throughout to refer to the final written product of a doctoral degree and the term dissertation is used to refer to the research report of a masters degree. The term "supervisor" is used to refer to the individual(s) who supervise both the masters or doctoral process.

As the following discussion illustrates, while there are variations between institutions, faculties and disciplines in the requirements and processes surrounding the PhD degree, there are a number of core features of what may be identified as the 'South African PhD'. Generally speaking, the PhD degree is the most advanced degree available at universities in South Africa, except for the senior doctorate which is awarded very rarely. Following the influence of the Humboldtian Revolution in Germany, the contemporary PhD in South Africa and other countries is essentially:

- A *post-masters research degree*
- With a *specialisation* in a specific field or discipline
- Culminating in a *thesis*⁵
- Which shows signs of *original and independent work* which makes a *significant contribution to existing knowledge* based on the *production of new knowledge*.

The award of the degree may thus be viewed as the "institution's 'stamp of approval' of the student's ability to conduct original research in at least one academic discipline" (Kerlin 1995a:2). Where the primary emphasis lies in a PhD degree, however, is not commonly agreed upon. For some, the emphasis is on the final product – namely the thesis – and its content, 'originality' and contribution to the existing 'body of knowledge'. For others, the PhD degree process is essentially about research training which is an approach that is more concerned about future career prospects and the skills and competencies required in the job market (Bartelse 1995:8; Golde & Dore 2001:5). These debates are examined more closely in Chapter 4.

The following discussion describes the core features of the South African PhD degree process in greater detail and points out some unique features.

Eligibility: How does one become a PhD candidate?

The requirements for admission to a PhD programme vary from institution to institution, and department to department, and can be considerably complex. It is commonly required that the prospective PhD student possesses a masters degree – either in the specific field in which they intend to pursue the PhD or in another field deemed relevant or appropriate. Provision is made for those individuals who do not possess the requisite masters degree through the assessment of other formal qualifications and previous work experience which might be considered 'equivalent' to a masters degree. This is expressed in one set of institutional documentation as:

⁵ While elements of coursework have very recently appeared in a few PhD programmes, it is my understanding that nowhere in South Africa does the coursework comprise more than 50% of the overall programme structure (personal communication, David Cooper July 2001).

"A student will be admitted to the degree only if he/she has obtained a master's degree in Engineering or has been allowed to the status thereof" (Faculty of Engineering website, PUCHE, December 2000). Exactly how this equivalency is assessed varies considerably and might include the need for the candidate to possess an honours or bachelors degree coupled with registration for a masters or relevant work experience. The *General Regulations Handbook for PhD Degrees 2000* at Rhodes University, for example, states that:

... a candidate shall not be admitted to the degree of Doctor of Philosophy until at least three years after admission to the degree or status of Bachelor with Honours (in any Faculty), or of Bachelor of Laws, or of Bachelor of Education, or of Bachelor of Divinity, or of Bachelor of Music, or until at least two years after admission to the degree of Master.

More recently, other admission requirements in addition to the masters degree have been introduced, such as relevant work experience. In the Department of Education at the University of the Free State, for instance, a prospective PhD candidate is expected to "provide proof that he/she is in the service of the Higher/Further Education sector for two years" (Faculty of Education website, University of the Free State, December 2000). PhD candidates in Public & Development Management at the University of the Witwatersrand are required to have several years' management experience in order to be admitted (*Information sheet regarding the PhD in Public and Development Management*, University of the Witwatersrand website, October 2000). Another example is the PhD in Media and Development and Public Health Communication at the University of Natal whose guidelines state that: "Selection of candidates will be based on relevant project experience, ability to work in teams, and commitment to full-time studies in the field" (Cultural and Media Studies website, December 2000). The inclusion of previous work experience and other capabilities such as the capacity to work in teams are recently new requirements for the PhD degree in South Africa. These are indications of 'professional' elements emerging in some South African PhDs, the concept of which is discussed in greater detail in Chapter 4.

If the institution feels that the prospective student is inadequately prepared in some way or another to pursue the PhD degree, it may require that s/he undertake one or more courses or qualifying examinations before proceeding. Such courses might involve upgrading research skills or filling in the theoretical or content gaps in the field in which the student intends to do the PhD. Examples of these kinds of regulations are provided below.

It should be clearly understood, however, that possession of the prescribed qualifications does not automatically qualify a student to register for a higher degree. A student may be required to comply with additional requirements, e.g. in the form of additional studies, an assignment or an oral or written examination, before being allowed to register.

(General information: *Master's and Doctor's degrees*, UNISA website, October 2000)

Students transferring from one discipline to another frequently do not possess the research skills necessary for coping with an advanced degree. It is recommended that:

- an attempt be made to measure the research skills possessed by the student, either by asking students to submit a research paper, or by asking them to complete a project calling for advanced research skills, or by requiring a student to write a departmental admissions test;

- if research skills are found to be insufficient, clear directions should be given by the department as to how the individual may improve these skills and thus qualify for entry.
(*Application procedures*, University of the Western Cape website, October 2000)

A student who obtained the degree of Master of Science or who has been admitted to the status thereof, may be admitted to the PhD degree in Engineering by Senate after completing any courses required by the director or after successfully completing a preliminary examination on a certain field, as determined by the director.

(*Faculty of Engineering Regulations for PhD in Engineering*, PUCHE website, December 2000)

In circumstances where the candidate does not hold the MSc(Eng) degree, he/she will be expected to register for the MSc(Eng) through the research only option. His/her registration could be converted to PhD status when demonstrable evidence of substantial progress and research ability in the chosen research topic has been made.

(Faculty of Engineering website, University of the Witwatersrand, April 2001)

Having submitted a written application to pursue a PhD degree, prospective students are usually registered provisionally after which they must submit a research proposal to the appropriate board or committee. If the proposal is accepted, the candidate is recommended for registration to the university Senate. In some cases, such as in the Faculty of Education at the University of the Free State, candidates are required to defend their research proposal before a panel before it will be accepted.

PhD students are encouraged to identify their own research topics, although usually in consultation with faculty or departmental staff. It is also often required that the research topic falls within the area of expertise of one of the supervisors available in the department. In some cases, however, students are required to choose topics that either fall within a set curriculum of subjects, or within the broader research programme of the department.

In summary, the process of registering for a PhD degree can be a lengthy and complex one. The quote below, taken from the University of the Witwatersrand's website, provides an overview of the process at that institution. It also highlights the distinction in status between the individual who is in the process of registering for their PhD degree – here called the "registrant" – and the individual who has been accepted into the PhD programme and who is henceforth referred to as a "candidate":

- The enquiry stage. The School establishes whether the enquirer has the relevant qualifications and experience, and if supervision would be available.
- The applicant stage. In this stage applicants are selected who will be permitted to register, on the basis of a 5000-word 'short proposal' and other documents.
- The registrant stage. This covers the first year of registered study, during which the student is called a 'registrant'. The student attends a Methodology course, completes such core courses and/or options as may be specified from the Masters of Management degree as being relevant to his/her proposed research, attends research seminars, and formulates a 15 000-word 'long proposal' for admission to candidature.
- The candidate state. During the subsequent years of study the student is called a 'candidate'. In this time the student prosecutes the research and writes the thesis.

(*Information sheet regarding the PhD in Public & Development Management*, Wits website, October 2000)

Time to degree

The prescribed period of study for the PhD degree varies between and within institutions. In general, it appears that the PhD is expected to be completed in a minimum of 2 years (for example, at the Universities of the Free State, Cape Town, Potchefstroom, Pretoria and Witwatersrand) although the Faculty of Education at the University of the Witwatersrand indicated that a minimum of 1 year would be acceptable. The maximum number of years allowed for registration as a PhD candidate varies – particularly with regard to full-time or part-time status where the latter would be given a year longer to complete. Taking this into account, the maximum number of years permitted to complete a PhD degree ranges between 4 and 10 years.

Supervision

An aspect of the research training inherent in the PhD process is the notion of “apprenticeship” insofar as the “students work under the tutelage of their advisors, learning the intricacies of research, and becoming increasingly independent scholars” (Golde & Dore 2001:5). In South Africa, it is usually the case that the PhD candidate works under the supervision of at least one individual in the university who is a specialist in the field in which the PhD is being undertaken. The supervisor(s) may also be appointed from an institution other than the university at which the student is registered, where appropriate, as is the case at Medunsa and the University of the Witwatersrand. The supervisor(s) are usually appointed at the departmental or faculty level and the appointment is ratified by the Senate or equivalent body of the university.

Examination of the degree

① The examination process of the PhD degree can take on a variety of forms. The primary method of examining the PhD degree is on the basis of the submission of a thesis. An exception to this is the PhD in Medical Sciences at the University of the North where a number of scientific papers published in an accredited journal can take the place of the thesis (Faculty of Health website, University of the North, December 2000). This does not, however, represent a significant shift as the papers together might resemble the chapters of a thesis.

② Each institution has numerous rules and guidelines for the style, format and submission of the thesis. These include the language in which the thesis should be written, the number of bound and unbound copies of the thesis which must be submitted to various parties, the inclusion of an abstract and information on covering pages, and the maximum length of the thesis. The maximum length of the thesis varies between institutions and faculties. The University of Cape Town, for example, stipulates a maximum length of 80 000 words while a PhD thesis in Public &

Development Management at the University of the Witwatersrand should fall within the 70 000 to 100 000 word range. Thesis length was also prescribed in terms of numbers of pages. For example, the DPhil dissertation in Value and Policy Studies at Stellenbosch University should be between 250 and 300 pages while the PhD in (Pure) Mathematics at the University of the Witwatersrand should be between 100 to 400 pages in length.

The examination of the thesis may be accompanied by a written and/or oral examination which focuses on the thesis itself and/or the broad field in which the thesis is located. The University of the North West regulations also indicated that practical examinations might be required (*Examination rules for the degree of doctor*, University of the North West website, December 2000). The following is an example of this aspect to the examination process:

A candidate may be required by the Senate to submit to examination, written, oral or both, on the subject of the thesis and on the whole field in which it falls.

At the request of the candidate or for any other sufficient reason Senate may afford the candidate the opportunity to defend the thesis.

(*Common rules for the degree of Doctor of Philosophy in all faculties*, University of Natal website, December 2000)

When submitting his/her thesis for examination, it is customary for the student's supervisor to submit a signed and written statement that s/he approves the submission of the thesis. An example of this regulation from UNISA is as follows:

Except with the special permission of Senate, no thesis may be handed in unless it is accompanied by a written declaration from the promoter in which permission is granted for the examination of the thesis. Such a declaration does not imply that the promoter considers the thesis acceptable.

(*General information: Master's and Doctor's degrees*, UNISA website, October 2000)

Since the early universities, doctoral degrees have always been examined by a group of people rather than by one individual; that is, the award of the degree has always been a collective responsibility (Ruëgg 1992:23). In South Africa today, the same procedure is followed although the number of examiners appointed to examine the thesis, and where they are drawn from, varies. At the University of Natal, three examiners are appointed, at least two of whom are external to the university. At Rhodes University, the norm is for three external examiners to be appointed and, only in "exceptional circumstances" would one of the examiners be internal to the university. The PhD in Public and Development Management at the University of the Witwatersrand is "examined by the candidate's supervisor, and two examiners external to the University, at least one of whom is from abroad" (*Information sheet regarding the PhD in Public & Development Management*, University of the Witwatersrand website, October 2000).

Conditions for the award of the degree: Originality, significance and independence

In describing the nature of the work undertaken for the thesis, there are three key concepts which appear to be applied consistently across institutions in South Africa. These concepts relate to the originality of the work, the significance of the work as a contribution to the field or

discipline in which the research is conducted, and the ^③*independent* nature of the research undertaken. Examples of such statements taken from the institutional or faculty rules and regulations relating to the PhD degree are provided below.

The thesis must constitute a substantial contribution to knowledge in the chosen subject and may embody only the original work of the candidate with such acknowledged extracts from the work of others as may be pertinent. It must on presentation be accompanied by a declaration on the part of the candidate regarding the extent to which it represents his/her own work, both in concept and execution.

(*General Rules and Policies 2000*, University of Cape Town)

DPhil (Biokenetics) - Through the doctoral thesis, in which the qualification finally culminates, a qualifying learner would show evidence of independent and original scientific work. The thesis would constitute a decided contribution to knowledge of and insight into the subject discipline as well as the field of research. Qualifying learners would display applied competence in research methodology, and the proper written and/or oral communication in the research process and findings. The learner should be able to reflect on his/her research decisions and applications to assess the effect thereof in the holistic context of research in the sport industry.

(*Faculty of Commerce Handbook 2000*, Rand University)

At the close of the period of research every candidate for the degree shall ... present for the approval of the Senate a thesis which must constitute a substantial contribution to the advancement of knowledge in the subject chosen, and must be satisfactory as regards literary presentation and in a form suitable for publication.

(Faculty of Science website, Medunsa, October 2000)

No thesis will be accepted which does not make a distinct contribution to the knowledge or understanding of the subject and afford evidence of originality shown either by the discovery of new facts or by the exercise of independent critical power.

(*Faculty Handbooks*, University of Natal website, December 2000)

The thesis shall show proof of originality and shall be a decided contribution to the knowledge of and insight into the subject.

(*Examination Rules for the Degree of Doctor*, University of the North West website, December 2000)

DCom (Accounting) - The learner should develop applied specialised competencies in the mastering, interpretation, understanding, analysis and application of accounting principles in the financial accounting field. A qualifying learner should show evidence of original and independent scientific work.

(*Faculty of Commerce Handbook 2000*, Rand University)

What is most striking about these concepts and the way they appear in the institutional documentation is that they are extremely vague and, in all the cases I have examined, remain unclarified and unexplained. This is echoed by Noble (1994:100) when he reports on Berelson's findings in the 1960s that precisely what 'original', 'significant' and 'independent' mean is left entirely to faculty and departments to define. In other words, the assessment of these criteria is based on examiners' knowledge of the field as 'experts'.

Interestingly, the notion of originality in doctoral degrees is an old one. Throughout the centuries, university teachers (i.e. those with doctorates) were expected to make "original contributions to learning, to discover contradictions in existing traditions, and to solve them" (Ben-David 1977:11). Noble (1994:100-101) offers some suggestions as to what originality implies in the contemporary context:

In its most general sense, 'original' describes research that has not been done previously or a project that creates new knowledge; it implies that there is some novel twist, fresh perspective, new hypothesis, or innovative method that makes the dissertation project a distinctive contribution. An original project, although built on existing research, should not duplicate someone else's work.

Phillips and Pugh (1994:61-62) offer another description of what it means to be original in the PhD context, based on research conducted with students, supervisors and examiners in the United Kingdom in 1992:

1. Carrying out empirical work that hasn't been done before.
2. Making a synthesis that hasn't been made before.
3. Using already known material but with a new interpretation.
4. Trying out something in this country that has previously only been done in other countries.
5. Taking a particular technique and applying it in a new area.
6. Bringing new evidence to bear on an old issue.
7. Being cross-disciplinary and using different methodologies.
8. Looking at areas that people in the discipline haven't looked at before.
9. Adding to knowledge in a way that hasn't previously been done before.

Significance is also a problematic term when applied to a thesis. Noble (1994:101) defines the term as follows: "A significant piece of work provides information that is useful to other scholars in the field, and, ideally, is of such importance that it alters the thinking of scholars in the students' field of study". However, with the huge amount of research, knowledge production and information generation that takes place daily around the world, to what extent can a PhD thesis truly be considered significant? It is more likely to be quite a small slice of the bigger knowledge pie.

The concept of independence (or autonomy) is closely related to that of originality and is itself problematic and in need of clarification. According to the study conducted by Noble (1994:101), the degree of independence exercised or experienced by the candidate depends on a number of factors, including the discipline in which the degree is undertaken, the research resources needed (finances, equipment, access to sites, etc), and the supervisory style and relationship, amongst others. Noble argues that candidates can experience high, medium or low autonomy. Students in the social sciences or humanities are, according to Noble, the most autonomous in that while they receive guidance and advice from their supervisors, the choices made about the research (topic, approach etc) and the actual undertaking of the research, are largely in the hands of the candidate. Those students who experience a medium degree of autonomy are usually those who share the responsibilities and decisions with their supervisor, and where the supervisor retains a fair amount of control over the research process. Students in the sciences, argues Noble, are those who generally experience the lowest degree of independence. This is largely because most PhD degrees in the sciences take place within the context of a larger research project managed by the supervisor. Thus, the funding for the project and often also the topic originate with the supervisor. In these cases, Noble (1994:101-102) argues that the issue of the student's independence should be seriously questioned.

2.3.2 The PhD versus the masters by research and dissertation

Senate may, on the recommendation of the Board of the Faculty concerned, convert the registration of a candidate for the Master's degree by thesis to registration for the PhD degree if they consider that the work is of a *standard normally expected of a doctoral student*.
(*General Regulations 2000*, Rhodes University; my emphasis)

Senate may permit a candidate registered for a master's degree, *by virtue of the quality and development of his/her work*, to change his/her candidature to that for a PhD degree but retrospective registration for the PhD degree will not be allowed, except by special permission of Senate.
(*General Rules and Policies 2000*, University of Cape Town; my emphasis)

On the face of it, the two quotations above make it clear that there is a difference between the masters degree and the PhD degree – the basis of which would be the deciding factor in which degree to award. However, the phrases “standard normally expected of a doctoral student” and “by virtue of the quality and development of his/her work” are extremely vague and it is precisely this kind of normative evaluation that forms part of the mystery of advanced postgraduate degrees (see Chapter 4). For what exactly constitutes the “standards” of doctoral education, as opposed to those at a masters level – especially considering that both degrees involve research, supervision and a thesis of some kind? This section seeks to unpack the differences between these degrees in a further attempt to define the PhD degree.

Admission requirements

As the masters degree is below the doctorate on the NQF, prospective students are usually required to have an honours degree or equivalent prior to admission. However, beyond this, there are very few differences between the masters and PhD degrees in terms of admission requirements. As with the PhD, special circumstances may also apply and additional courses aimed at bringing the student wishing to register for the masters degree up to speed may be prescribed. The following quotations indicate institutional rules in this regard:

Normally only students holding an honours degree will be accepted as candidates for the degrees of MA, MSc, MCom, or MSocSc. Students holding an ordinary degree will be accepted only in exceptional cases.
(*General Regulations 2000*, Rhodes University)

A person shall not be admitted as a candidate for the degree [of Master of Science] unless he or she ... has shown by examination or publication or a record of appropriate training, that he or she has reached a level in the subject or cognate subject equivalent to an honours degree.
(*Faculty of Science Handbook 2000*, University of Cape Town)

[Master of Commerce in Business Management] If it is deemed necessary, the Head of the Department may prescribe a reading programme which the student must complete to the satisfaction of the supervisor before the student may commence with the writing of the dissertation.
(*Faculty of Economic & Management Sciences Handbook 2001*, University of South Africa)

Prior learning and relevant work experience may also qualify a student for enrolment in some of the Masters degrees offered.
(*Requirements for admission: Postgraduate studies*, University of the Western Cape website, October 2000)

As with the PhD, the student is only accepted for candidacy once the project proposal has been approved by the appropriate board or committee. However, while admission to a PhD programme is based on the final approval of the university Senate, a lower ranking body or individual, such as the Dean of the faculty, is charged with accepting admissions to masters programmes.

Aspects of the degree process

One of the differences between the PhD and masters by research degree is that the PhD is expected to take longer than the masters to complete. Whereas the PhD degree can take up to 10 years according to official institutional regulations, the masters degree is usually expected to be completed in a minimum of one year to anywhere between 2 to 4 years – again depending on whether the student is registered full-time or part-time. In a similar vein, the masters by research dissertation is expected to be shorter than the PhD thesis: the former is usually limited to about 50 000 words (as at UCT).

The role of the supervisor can also differ. In some cases, the influence of the supervisor is far more evident in the masters degree than in the PhD and the supervisor of a doctoral candidate is often expected to be more of a critic than a mentor. As with the PhD degree, the examination of the masters dissertation may be accompanied by an oral, written and/or practical examination. There is also not much difference in the number and choice of examiners for the masters or PhD degrees. In both cases, there is usually more than one examiner at least one of whom is external to the degree-granting institution.

A further point of comparison is the expectations of the masters dissertation. A common thread in most institutional guidelines reviewed is that the masters dissertation should meet satisfactory or acceptable literary standards and be presented in a form suitable for publication. This suggests that part of the research training provided encompasses the ability to write and present research findings in an acceptable academic format. But, to what extent is the student's work expected to be original, independent and make a significant contribution to the field, as is the case with the PhD degree? One would anticipate that this would be a major area of difference between the two degrees. However, a review of the institutional guidelines indicates that in some cases, the distinction between the PhD and masters degrees, in this regard, is clearly drawn while in others there appears to be very little difference between the two.

In one camp are those faculties or institutions which emphasise the research training and advanced study associated with the masters by research and dissertation, but which do not demand that the dissertation show proof of originality and a significant contribution to existing knowledge, as with the PhD. For example, the masters dissertation in Industrial Psychology at

the University of Free State is meant to furnish "proof that the candidate is capable of producing scientific research" (Faculty of Economics and Management Sciences website, December 2000). Similarly, for the MCom degree in the Faculty of Commerce at the University of the Witwatersrand:

A candidate is required to undertake supervised advanced study and research on an approved topic, on completion of which a dissertation is to be submitted. The dissertation should show that the candidate is acquainted with and can apply the methods of research.
(*Information for Applicants for Admission to Research Degrees 2001*, Faculty of Commerce, University of the Witwatersrand)

A third example indicates quite clearly how the Science Faculty of UCT distinguishes between the MSc and the PhD degree:

The [MSc] dissertation shall demonstrate the successful completion of a programme of training in research methods, a thorough understanding of the scientific principles underlying the research project and an appropriate acquaintance with the relevant literature. It shall be clearly presented and conform to the standards laid down from time to time by the department and the Faculty.

... The dissertation will usually consist of a detailed report on the conduct of, and analysis of the results of, a research project performed under the close guidance of a suitably qualified supervisor or supervisors. It is *not essential for the degree of MSc that the dissertation constitute a distinct contribution to knowledge in the subject, nor that the research project(s) undertaken necessarily be original*. The degree is usually regarded as a training course to equip the candidate with the skills necessary either for employment in a given field, or for further, independent research for the degree of PhD in the same or related subject area. The course of training provided, and the research project(s) undertaken, *will usually be less rigorous, and require less independent thought, than would study for a PhD*.

(*Faculty of Science Handbook 2000*, University of Cape Town; my emphasis)

In another camp are those institutions and faculties in which the distinction between the requirements for a masters by research and a PhD is blurred or even nonexistent. For example, in the Faculty of Science at Medunsa, there is no obvious difference between the requirements of the MSc and PhD degrees as both are required to make "a substantial contribution to the advancement of knowledge in the subject chosen" (Faculty of Science website, Medunsa, October 2000). Additional examples of the need for the masters by research to show one or all of originality, significant contribution and independence are provided below.

The dissertation must show an acquaintance with methods of research and afford evidence of independent critical power in the handling and interpretation of material already known or newly discovered. The *dissertation may embody the original work of the candidate*, with such acknowledged extracts from the work of others as may be pertinent.

(*Faculty of Commerce Handbook 2000*, University of Cape Town; my emphasis)

To obtain a master's degree in Business Management the following condition must be met: A dissertation *based on original research* in a study field of Business Management.
(Faculty of Economic & Management Sciences website, University of the Free State, December 2000; my emphasis)

The MSc course comprises a dissertation in which the results of an *original research project* are presented in a form suitable for publication.

(Faculty of Mathematics & Natural Sciences website, University of the North, December 2000; my emphasis)

The level descriptors for the NQF are designed to distinguish between the different levels in the framework. However, even the authors of the NQF discussion document (Government Gazette

2000:7.6) concede that at the more advanced levels (that is, 7 to 8+) "there may be no significant differences in knowledge attributes, operational contexts or learner autonomy" which are the criteria by which the other levels are distinguished. In other words, the differences between masters and doctoral degrees on the NQF are nuanced. For instance, while at level 8 (masters) "knowledge boundaries are *merely explored*, at level 8+ [doctorates] learners make an *original and significant contribution*, suggesting that there is a subtle difference in the sub-levels and this *difference lies in the nature of the contribution*" (Government Gazette 2000:7.6; my emphasis).

In summary, in those cases where the masters by research is clearly distinguished from the PhD degree, it may be seen to be distinguished on the following bases:

- It is a degree in which the student is expected to undertake advanced study in order to master a particular content area and is thus less advanced than the PhD.
- It is also essentially a research training ground in which the student must demonstrate the ability to conduct research, but which does not have to meet the requirements of originality, significance and independence. As such, the research for a masters degree can involve the replication of research already conducted and can rely on secondary sources to a large extent. In other words, a masters dissertation can be limited to a synthesis of existing knowledge which shows that one 'knows the field as it is'.
- The masters dissertation is considerably shorter than the PhD thesis, can be completed in a shorter time and is much more limited in scope. In addition, while it must contain a comprehensive summary of the literature in the field, it does not have to be as critical, evaluative or reflexive as a PhD.
- The masters dissertation must show the candidate's ability to write and present research findings academically and in a form suitable for publication.

2.4 Summary

Despite the 800 year history of doctoral education, the PhD degree as we know it today as specialised research and research training in a specific disciplinary field only took shape in nineteenth-century Germany as a result of the Humboldtian reforms. Its spread to America served to diversify and popularise it, and stimulated the unique model of graduate education, involving a significant coursework component, typical of that country. The development of postgraduate education and the introduction of the PhD degree in Britain took considerably longer. One of the primary motivations for introducing the PhD degree in Britain just after the First World War was to draw the American students who were flocking to German universities to British institutions instead. Industrialisation and the rise of capitalism in Europe in the second half of the nineteenth century also put pressure on Britain to improve her research and

postgraduate training, a situation which was greatly accentuated during the First World War. The introduction of the research doctorate in South Africa in the beginning of the twentieth century was influenced by the developments in the British system, upon which our higher education system was modelled, and thus took the form of the thesis-based research doctorate.

Today in South Africa, the vast majority of doctoral degrees awarded at universities are research doctorates, which may have a range of different titles but which most often are given the name PhD. While there is some variation between institutions, departments and disciplines in certain aspects of the PhD degree, there are a number of core features which one might refer to as comprising a 'South African PhD'. These include that it is a post-masters research degree with a specialisation in a specific field or discipline. It culminates in a thesis which must show evidence of independent and original work which makes a significant contribution to existing knowledge based on the production of new knowledge.

In general, the admission requirements for a PhD degree include a masters degree or equivalent and, in some cases, previous work or research experience. Where prospective candidates do not meet these formal requirements, additional courses or background work are provided to bridge theoretical or methodological gaps.

The completion of the PhD degree is a lengthy process and anywhere up to 10 years is provided for in the institutional guidelines. However, as Chapter 4 indicates, in reality the degree can take even longer to complete. PhD candidates are generally supervised by at least one academic who is internal to the degree-granting institution although, in special circumstances, an additional supervisor might be appointed from outside the university context. The examination of the PhD degree is on the basis of a thesis which must show proof of original and independently undertaken research that makes a significant contribution to the field of study. This particular aspect of the PhD process was problematised on the basis that the concepts of originality, independence and significance are normatively defined, and vary according to the sub-field in which it is placed.

The preceding discussion has also indicated that the extent to which the PhD degree is distinguished from the masters by research degree varies from institution to institution. In some cases, in South African institutions there was virtually no distinction between the masters by research and PhD degrees, particularly in terms of the demands of originality, independent work, and making a significant contribution to knowledge in the field. In others (such as the MSc in the Faculty of Science at UCT), the line was more clearly drawn. Here, the masters by research was conceived of specifically in relation to training in research and mastery of the field. I argued, however, that in both cases, the factors which distinguish these two advanced research degrees are fundamentally normative and, even in the detailed rules and regulations,

2000:7.6) concede that at the more advanced levels (that is, 7 to 8+) "there may be no significant differences in knowledge attributes, operational contexts or learner autonomy" which are the criteria by which the other levels are distinguished. In other words, the differences between masters and doctoral degrees on the NQF are nuanced. For instance, while at level 8 (masters) "knowledge boundaries are *merely explored*, at level 8+ [doctorates] learners make an *original and significant contribution*, suggesting that there is a subtle difference in the sub-levels and this *difference lies in the nature of the contribution*" (Government Gazette 2000:7.6; my emphasis).

In summary, in those cases where the masters by research is clearly distinguished from the PhD degree, it may be seen to be distinguished on the following bases:

- It is a degree in which the student is expected to undertake advanced study in order to master a particular content area and is thus less advanced than the PhD.
- It is also essentially a research training ground in which the student must demonstrate the ability to conduct research, but which does not have to meet the requirements of originality, significance and independence. As such, the research for a masters degree can involve the replication of research already conducted and can rely on secondary sources to a large extent. In other words, a masters dissertation can be limited to a synthesis of existing knowledge which shows that one 'knows the field as it is'.
- The masters dissertation is considerably shorter than the PhD thesis, can be completed in a shorter time and is much more limited in scope. In addition, while it must contain a comprehensive summary of the literature in the field, it does not have to be as critical, evaluative or reflexive as a PhD.
- The masters dissertation must show the candidate's ability to write and present research findings academically and in a form suitable for publication.

2.4 Summary

Despite the 800 year history of doctoral education, the PhD degree as we know it today as specialised research and research training in a specific disciplinary field only took shape in nineteenth century Germany as a result of the Humboldtian reforms. Its spread to America served to diversify and popularise it, and stimulated the unique model of graduate education, involving a significant coursework component, typical of that country. The development of postgraduate education and the introduction of the PhD degree in Britain took considerably longer. One of the primary motivations for introducing the PhD degree in Britain just after the First World War was to draw the American students who were flocking to German universities to British institutions instead. Industrialisation and the rise of capitalism in Europe in the second half of the nineteenth century also put pressure on Britain to improve her research and

postgraduate training, a situation which was greatly accentuated during the First World War. The introduction of the research doctorate in South Africa in the beginning of the twentieth century was influenced by the developments in the British system, upon which our higher education system was modelled, and thus took the form of the thesis-based research doctorate.

Today in South Africa, the vast majority of doctoral degrees awarded at universities are research doctorates, which may have a range of different titles but which most often are given the name PhD. While there is some variation between institutions, departments and disciplines in certain aspects of the PhD degree, there are a number of core features which one might refer to as comprising a 'South African PhD'. These include that it is a post-masters research degree with a specialisation in a specific field or discipline. It culminates in a thesis which must show evidence of independent and original work which makes a significant contribution to existing knowledge based on the production of new knowledge.

In general, the admission requirements for a PhD degree include a masters degree or equivalent and, in some cases, previous work or research experience. Where prospective candidates do not meet these formal requirements, additional courses or background work are provided to bridge theoretical or methodological gaps.

The completion of the PhD degree is a lengthy process and anywhere up to 10 years is provided for in the institutional guidelines. However, as Chapter 4 indicates, in reality the degree can take even longer to complete. PhD candidates are generally supervised by at least one academic who is internal to the degree-granting institution although, in special circumstances, an additional supervisor might be appointed from outside the university context. The examination of the PhD degree is on the basis of a thesis which must show proof of original and independently undertaken research that makes a significant contribution to the field of study. This particular aspect of the PhD process was problematised on the basis that the concepts of originality, independence and significance are normatively defined, and vary according to the sub-field in which it is placed.

The preceding discussion has also indicated that the extent to which the PhD degree is distinguished from the masters by research degree varies from institution to institution. In some cases, in South African institutions there was virtually no distinction between the masters by research and PhD degrees, particularly in terms of the demands of originality, independent work, and making a significant contribution to knowledge in the field. In others (such as the MSc in the Faculty of Science at UCT), the line was more clearly drawn. Here, the masters by research was conceived of specifically in relation to training in research and mastery of the field. I argued, however, that in both cases, the factors which distinguish these two advanced research degrees are fundamentally normative and, even in the detailed rules and regulations,

often do not provide objective clarity. It is generally dependent on the faculty members involved in postgraduate education to apply their experience, and the concepts they hold linked to their specific field, in making these kinds of distinctions.

The following chapter extends the profile of the PhD degree in South Africa through a detailed analysis of the doctoral degrees awarded in 1996 which, as the preceding discussion has established, are PhD degrees or equivalent research doctorates by different names. The intention of Chapter 3 is to gain an understanding of what doctoral education in South Africa looked like near the end of the twentieth century in terms of the profile of doctoral awards by institutional types, race, gender and fields of study.

University of Cape Town

University of Cape Town

CHAPTER THREE: DOCTORAL DEGREES AWARDED IN SOUTH AFRICA IN 1996

3.1 Introduction

In order to gain insight into the state of doctoral education in South Africa at the end of the twentieth century, this chapter provides a detailed descriptive analysis and discussion of the doctoral degrees awarded at South African universities in 1996. The analysis is based on the SAPSE (South African Post-Secondary Education) 1996 dataset obtained from the Education Policy Unit (EPU) at the University of the Western Cape. This particular dataset was used in this study because it is the latest and most comprehensive dataset available on doctoral degrees awarded in South Africa and because it contains data that is disaggregated to the sub-CESM (Classification of Education Study Material) level.¹

The chapter begins with an analysis of the data at an aggregated level to provide the reader with a general overview of doctoral degrees awarded in 1996. Section 3.2 examines the award of doctoral degrees as a proportion of postgraduate degrees, as well as in relation to all the degrees awarded at universities and technikons in that year. Comparative figures for the United States and the United Kingdom are also provided. Section 3.3 explores the distribution of doctoral degrees awarded across individual universities and university sub-types and section 3.4 analyses doctoral awards through the lenses of 'race'² and gender.

While sections 3.2 to 3.4 provide a useful overview, the aggregated data conceals a number of patterns which emerge through a micro-analysis of the lowest possible level in the SAPSE data, that is, the sub-CESM level (provided by SAPSE Table 2.13, see Appendix 2 for details). In sections 3.5 and 3.6, the data is analysed at this disaggregated level which reveals a very skewed picture of doctoral degree awards in terms of race and gender, and the fields of study in which they were awarded. Section 3.5 explores the breakdown of doctoral degrees awarded across the three National Research Foundation (NRF) clusters (broad fields of study), the 22 CESM categories and their sub-CESM specialisms³, and highlights the differences in distribution among the various race and gender categories. Section 3.6 takes a detailed look at the seven universities that awarded the vast majority of doctoral degrees in 1996 according to the CESM categories and sub-CESMs in which they were awarded. There follows a brief overview of the doctoral and

¹ More detailed information relating to the data used in this chapter is provided in Appendix 2.

² In relation to our national goal of equity redress, I have given consideration in this analysis to the ways in which the racial discrimination of apartheid has impacted on doctoral education in South Africa. The data in this chapter is therefore analysed according to the racial categories created during apartheid which include the advantaged White population group, and the comparatively disadvantaged 'black' population groups of African, Coloured and Indian students.

³ See Appendix 3.3 for a detailed breakdown of these groupings.

masters degrees awarded at technikons in 1996. The chapter concludes with a discussion of the most significant findings of the analysis in the chapter.

As was highlighted in Chapter 2, the dominant form of the doctorate in South Africa is the thesis- and discipline-based research doctorate – most commonly referred to as the Doctor of Philosophy (PhD) degree. In addition, Professor Ian Bunting (personal communication via my supervisor, June 2001) confirmed that at most one senior doctorate⁴ is awarded in South Africa annually. It is thus assumed that the data relating to doctoral degrees awarded used in this chapter refers almost entirely to research doctorates or PhD degrees.

3.2 Degrees awarded at universities in 1996 by qualification sub-level

Doctoral and masters degrees comprised a very small proportion of all degrees awarded at both universities and technikons in 1996. While universities have a long history of postgraduate education, up until the 1990s, technikons were non-research, teaching institutions. It is thus not unexpected that the number of doctoral and masters degrees at the universities is significantly higher than that at technikons. As indicated in Table 3.1 below, of the 66 426 degrees awarded at universities in 1996, 699 or 1% were doctoral degrees and 3 980 or 6% were masters degrees. By contrast, only 2 or 0.01% of the 20 854 degrees awarded at technikons in 1996 were doctoral degrees, and 105 or 0.5% were masters degrees (Table 3.2). Doctoral degrees awarded at universities in 1996 comprised 15% of upper postgraduate degrees and 3% of all postgraduate degrees.

⁴ See Appendix 1 for a definition of the 'senior doctorate' in South Africa.

Table 3.1 : University degrees awarded in 1996 by qualification sub-level⁵

		No	%
Undergraduate qualifications	Undergraduate Diploma/Certificate	9 523	14%
	General Academic First Bachelor Degree	24 565	37%
	Professional First Bachelor Degree	10 917	16%
	Total Undergraduate	45 005	68%
Lower postgraduate qualifications	Postgraduate Diploma/Certificate	4 954	8%
	Postgraduate Bachelor Degree	4 064	6%
	Honours Degree	7 724	12%
	Total Lower postgraduate	16 742	25%
Upper postgraduate qualifications	Masters Degree	3 980	6%
	Doctoral Degree	699	1%
	Total Upper postgraduate	4 679	7%
Total		66 426	100%

Source: SAPSE 1996 Table 2.13 for universities.

Note: Data for the University of the North West is not included in this table as it was unavailable in the SAPSE 1996 dataset. According to the University's Graduate Ceremony Programme for 1996, only one PhD degree was awarded that year.

Table 3.2 : Technikon degrees awarded in 1996 by qualification sub-level

		No	%
Lower undergraduate degrees	National Certificate	267	1%
	National Higher Certificate	62	0%
	National Diploma	16 435	79%
	Total Lower undergraduate	16 764	80%
Upper undergraduate degrees	Post Diploma Diploma	129	1%
	National Higher Diploma	2 171	10%
	Baccalaureus Technologiae Degree	1 683	8%
	Total Upper undergraduate	3 983	19%
Postgraduate degrees	Masters Diploma in Technology	52	0%
	Magister Technologiae Degree	53	0%
	Laureatus in Technology	1	0%
	Doctor Technologiae Degree	1	0%
	Total Postgraduate	107	1%
Total		20 854	100%

Source: SAPSE 1996 Table 2.13 for technikons and the Natal Technikon Graduation Programme for 1996.

Note: Although the Natal Technikon data was unavailable in the SAPSE 1996 dataset, figures for this institution are included in this table based on the Natal Technikon Graduation Programme for 1996.

By way of comparison, the figures for the United States and the United Kingdom are provided in Table 3.3 and Table 3.4 below. The degrees awarded in the US, UK and South Africa follow a similar pattern where the vast majority of degrees awarded were at the undergraduate level with a sharp decrease in numbers at the masters and doctoral levels. However, while the proportion of doctoral degrees in South Africa (1%) was similar to both the US (2%) and the UK (3%), the proportion of masters degrees (6%) is much lower than in the US (18%) and the UK (27%).

⁵ Appendix 3.2 details which qualifications are included in the qualification sub-levels referred to in Tables 3.1 and 3.2.

Table 3.3 : Degrees awarded in the United States in the 1996/97 academic year

Qualification level	No	%
Undergraduate	1 822 835	80%
Masters	419 401	18%
Doctorate ⁶	45 876	2%
Totals	2 288 112	100%

Source: National Center for Education Statistics, US Department of Education (1999)

Table 3.4 : Degrees awarded in the United Kingdom in the 1998/99 academic year

Qualification level	No	%
1 st degrees	263 700	70%
Masters/other postgraduate	104 300	27%
PhD or equivalent	11 300	3%
Totals	379 300	100%

Source: Education and Training Statistics for the United Kingdom (2000)

A more revealing picture, however, is highlighted in Table 3.5 below which indicates the proportion of doctoral degree recipients per million of the population in selected countries. As can be seen, there is a notable gap between AICs such as Germany, the US, the UK and Japan, on the one hand, and less developed countries such as Brazil or Chile, on the other. Of particular significance is the vastly differing position of South Africa, depending on whether the calculation is done for the population as a whole, or for the White population only. In other words, the proportion of White doctoral degree recipients in South Africa per million of the population (135 per million) is only slightly less than the US (158 per million) and the UK (190 per million), and higher than Japan (111 per million). By contrast, if the whole South African population is taken into account, the proportion drops to 16 per million of the population, which is far closer to that of other developing countries such as Brazil (18 per million) or Argentina (11 per million). In a sense, this speaks to the dual nature of South African society as both a developed and developing country, largely as a result of the racial divisions imposed by the apartheid system. The link between the particular stage of economic, political and cultural development, and the relative size of doctoral education in a country, is explored in more detail in Chapter 4.

⁶ These figures include research doctorates and exclude professional doctorates.

Table 3.5 : International comparison of doctorates awarded per million of the population

Country	Doctorates awarded in 1997 or most recent year	Population 1998	Doctorates awarded per million of the population
Germany	24 174	82.1m	294 / million
United Kingdom	10 993	57.7m	190 / million
United States	42 705	270.3m	158 / million
South Africa (White population)	608 ⁷	4.5m ⁸	135 / million
Japan	13 921	125.9m	111 / million
Brazil	2 972	169.8m	18 / million
South Africa (total population)	699 ⁹	42.8m	16 / million
Argentina	408	36.3m	11 / million
China	6 042	1 265.5m	5 / million
Chile	57	14.7m	4 / million

Source of figures for doctorates awarded in 1997: Johnson & Coward (2001:17)

Source of population figures for 1998: McDevitt (1999:A6-A10)

3.3 Degrees awarded in 1996 by university sub-types and individual universities

In recent years in South Africa it has become common practice to analyse educational institutions in terms of their status during apartheid. This is in recognition of the vastly different circumstances under which these institutions originated and evolved, as well as the different social, economic and political advantages or disadvantages associated with them. It is also in recognition of the fact that the so-called legacy of apartheid continues to impact on the present in this country. For the purpose of the analysis of the degrees awarded in 1996, the institutional types of Historically Advantaged Universities (HAUs) and Historically Disadvantaged Universities (HDUs) in relation to the universities are used throughout. Similarly, the categories of Historically Advantaged Technikons (HATs) and Historically Disadvantaged Technikons (HDTs) are employed.¹⁰

3.3.1 Doctoral and masters degrees awarded in 1996 by university sub-types

A review of the degrees awarded by university sub-types across all qualification sub-levels in Table 3.6 below reveals that the ten HAUs, followed by the University of South Africa (Unisa), invariably granted the highest number of degrees in each qualification sub-level compared to the nine HDUs.¹¹ Both the four English and the six Afrikaans HAUs awarded 12% of all degrees at the upper postgraduate (masters and doctorates) level. By contrast, over 70% of the degrees

⁷ SAPSE 1996

⁸ South African Census (1996)

⁹ SAPSE 1996

¹⁰ The institutional categories are based on those used by Cooper & Subotzky 2001. Appendix 3.1 details which institutions fall into these categories and their sub-categories.

¹¹ Data for the University of the North West was not available in the SAPSE 1996 dataset and is thus not included in any of the tables in this section. Reference in the following analysis is therefore made to *nine* instead of ten HDUs and *five* instead of six African HDUs. However, as noted earlier, the University of the North West only awarded one PhD in 1996 and which does not significantly distort the figures presented here.

awarded at the nine HDUs were at the undergraduate level, with only 3% or less at the upper postgraduate level.

Table 3.6 : Degrees awarded in 1996 by university sub-types

	Undergraduate		Lower postgraduate		Upper postgraduate		Totals	
	No	%row	No	%row	No	%row	No	%row
6 Afrikaans HAUs	12 514	62%	5 320	26%	2 378	12%	20 212	100%
4 English HAUs	7 530	58%	3 861	30%	1 509	12%	12 900	100%
Unisa	7 998	67%	3 426	29%	526	4%	11 950	100%
5 African HDUs	6 484	74%	2 255	26%	47	1%	8 786	100%
2 Non-African HDUs	3 550	70%	1 377	27%	144	3%	5 071	100%
2 Special Purpose HDUs	6 929	92%	503	7%	75	1%	7 507	100%
Totals	45 005	68%	16 742	25%	4 679	7%	66 426	100%

Source: SAPSE 1996 Table 2.13 for universities.

Note: The University of the North West is not included in this table.

The doctoral and masters¹² degrees awarded in 1996 exhibit the same pattern of ranking in terms of university sub-types (Table 3.7). Around half of all doctoral and masters degrees were awarded at the six Afrikaans HAUs - 340 out of 699 doctoral degrees (or 49%) and 2 038 out of 3 980 masters degrees (or 51%). The second highest number of doctoral and masters degrees were awarded at the four English HAUs – 244 or 35% of all doctoral degrees and 1 265 or 32% of all masters degrees. If the average number of doctorates per institution within each of the HAU sub-types is calculated, the figure is roughly the same for both (57 doctorates per Afrikaans HAU and 61 per English HAU). This suggests a fairly even distribution across the two categories.

At both the doctoral and masters levels, the three HDU sub-types ranked last. As a whole, the nine HDUs awarded only 4% of doctorates and 6% of masters degrees. The six African HDUs awarded only 2 of the 699 doctoral degrees (or 0.3%) and only 45 of the 3 980 masters degrees (or 1%). The enrolment figures¹³ for 1996 (Table 3.7) were very similar to the degrees awarded, with only a slight increase in enrolments at the two non-African HDUs.

¹² Comparative figures for masters degrees are included at various points in this chapter in order to highlight the similarities and differences between masters and doctoral degrees in terms of fields of study, and race and gender.

¹³ Enrolment figures for doctoral degrees for the same year are included to provide a tentative profile of a slightly later cohort of doctoral candidates than those who graduated in 1996.

Table 3.7 : Doctoral awards and enrolments, and masters degrees, awarded in 1996 by university sub-type

	Doctorates awarded		Doctoral enrolments		Masters awarded	
	No	%	No	%	No	%
6 Afrikaans HAUs	340	49%	2 515	50%	2 038	51%
HAUs 4 English HAUs	244	35%	1 676	33%	1 265	32%
Total HAUs	584	84%	4 191	82%	3 303	83%
Unisa Total Unisa	89	13%	583	12%	437	11%
2 Non-African HDUs	13	2%	228	5%	131	3%
2 Special Purpose HDUs	11	2%	44	1%	64	2%
5 African HDUs	2	0%	38	1%	45	1%
Total HDUs	26	4%	310	6%	240	6%
Totals	690		5 084		3 980	

Source: SAPSE 1996 Tables 2.12 and 2.13 for universities.

3.3.2 Doctoral and masters degrees awarded in 1996 by individual universities

The clustering of institutions into HAUs and HDUs conceals the concentration of degrees awarded in a few institutions. If the universities are ranked according to the number of doctoral degrees awarded in 1996, as depicted in Table 3.8, it is apparent that the top seven universities together awarded over three-quarters (78%) of all the doctoral degrees. Six of these are HAUs and the seventh is Unisa.¹⁴ As the vast majority of doctorates awarded at Unisa were awarded to White recipients (82% - see 3.6), in this case, Unisa might also be considered an HAU. Table 3.8 below indicates that it is the same seven universities that have the highest doctoral enrolments in 1996, although the order in which they appear differs, with Natal dropping in enrolments slightly. Within the HDU category, the doctoral degree awards were clustered in Vista, Durban-Westville and the Western Cape, at 1% each. Three universities did not award any doctoral degrees in 1996, namely the Universities of Fort Hare, Transkei and Venda. Notably, all three are HDUs.

The picture for masters degrees awarded in 1996 is similar (Table 3.8). The same seven universities, although in a different order, together awarded four-fifths or 81% of the total. The percentage of masters degrees awarded by the HDUs was only 4% of the total with the majority (83 or 2%) awarded at Durban-Westville, followed by the Western Cape (48 or 1%) and Medunsa (52 or 1%).

¹⁴ The top seven universities awarding doctoral degrees will be analysed later in this chapter according to the fields of study in which the degrees were awarded.

Table 3.8 : Doctorates and masters degrees awarded by individual universities in 1996

	University	Doctorates awarded		Masters awarded		Total awarded	Doctoral enrolments	
		No	%	No	%	No	No	%
HAUs and Unisa	Pretoria	105	15%	618	16%	723	845	17%
	Unisa	89	13%	437	11%	526	583	11%
	Natal	77	11%	304	8%	381	403	8%
	Cape Town	73	10%	431	11%	504	570	11%
	Stellenbosch	68	10%	480	12%	548	528	10%
	Witwatersrand	67	10%	460	12%	527	573	11%
	Rand	63	9%	418	11%	481	427	8%
	Free State	45	6%	250	6%	295	338	7%
	Potchefstroom	41	6%	219	6%	260	245	5%
	Rhodes	27	4%	70	2%	97	130	3%
	Port Elizabeth	18	3%	53	1%	71	132	3%
HDUs	Vista	8	1%	12	0%	20	19	0%
	Durban-Westville	7	1%	83	2%	90	97	2%
	Western Cape	6	1%	48	1%	54	131	3%
	Medunsa	3	0%	52	1%	55	25	1%
	Zululand	1	0%	15	0%	16	22	0%
	North	1	0%	6	0%	7	11	0%
	Transkei	0	0%	10	0%	10	1	0%
	Venda	0	0%	10	0%	10	3	0%
	Fort Hare	0	0%	4	0%	4	1	0%
Totals		699	100%	3 980	100%	4 679	5 084	100%

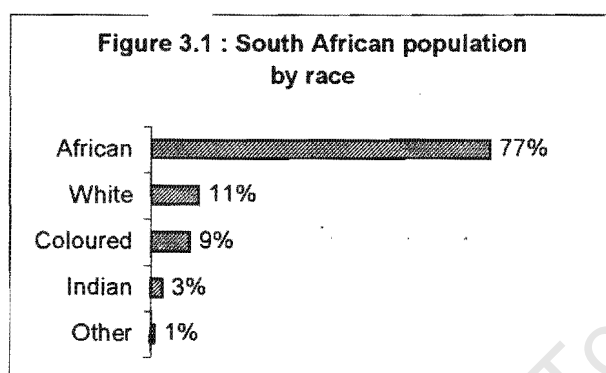
Source: SAPSE 1996 Tables 2.12 and 2.13 for universities.

3.4 Degrees awarded at universities in 1996 by race and gender

The apartheid era was characterised by severe forms of discrimination and exclusion – particularly in terms of race where legislation barred members of the black¹⁵ population groups in South Africa from participating in many aspects of social, economic and political life. This is most noticeable in the education system which was divided in terms of access and quality along racial lines. Secondary forms of discrimination around gender and disability also characterised this period and continue today. As the following analysis indicates, at the upper levels of higher education, the exclusion of blacks and women is very marked. In addition, the data indicates that there are substantial differences by race within the gender categories of male and female. It is thus suggested that the experiences of White females are markedly different from those of African or other black females, as well as from White males. Therefore, throughout this chapter, race and gender categories are analysed simultaneously.

¹⁵ For the purposes of this study, the term "black" is used to refer to the collective grouping of African, Coloured and Indian people. The analysis of the distribution of degrees awarded across the racial categories highlights the vast inequalities as a result of the apartheid era.

According to the 1996 Census, the South African population comprised 52% females and 48% males. As Figure 3.1 indicates, Africans constituted over three-quarters (77%) of the population and White people comprised the second largest population grouping, at 11% of the total. Coloured and Indian people constituted 9% and 3% of the population, respectively. These proportions can be borne in mind with respect to the analysis which follows.



Source: South African Census 1996

Table 3.9 below indicates the distribution of all degrees awarded at universities in 1996 by race and gender.¹⁶ What is of significance here is the different patterns of distribution for White and African students across both gender categories. In other words, while for White males and White females the proportion of degrees awarded increased from the undergraduate level through to the postgraduate level, the opposite occurred for African males and females. The number of degrees awarded to Coloured males and females, and Indian females, increased slightly at the lower postgraduate level and then dropped off again at the upper postgraduate level. Overall, the majority of upper postgraduate degrees were awarded to males while females were awarded the majority of degrees at the undergraduate and lower postgraduate levels.

Table 3.9 : University degrees awarded in 1996 by race and gender

	Undergraduate		Lower postgraduate		Upper postgraduate	
	No	%	No	%	No	%
African females	14 372	32%	3 681	22%	232	5%
African males	8 716	19%	3 030	18%	431	9%
White females	9 032	20%	4 095	24%	1 424	30%
White males	8 282	18%	3 906	23%	2 233	48%
Coloured females	1 034	2%	486	3%	47	1%
Coloured males	1 016	2%	474	3%	97	2%
Indian females	1 506	3%	682	4%	73	2%
Indian males	1 047	2%	389	2%	144	3%
Totals	45 005	100%	16 742	100%	4 681	100%

Source: SAPSE 1996 Table 2.13 for universities.

¹⁶ Data for the University of the North West was not available in the SAPSE 1996 dataset and is thus not included in any of the tables in this section.

The most noticeable aspect of Table 3.10 below is that the number of White students awarded doctoral degrees in 1996 is far higher than the figures for the other race categories: White females received 92% of doctoral degrees awarded to women and White males 84% of those awarded to men. In absolute numbers, however, there were consistently more male than female degree recipients in all the racial categories. For example, in the African grouping, 85% of the doctorates were awarded to males and only 15% to females. However, there was a considerably smaller gap between White males and females, and Indian males and females. The staggeringly high proportion of White females to females in other racial categories speaks to the double case of disadvantage that black women experienced under apartheid in terms of both race and gender discrimination.

The percentage of doctoral degrees awarded to Indian females and males (3% each) is equivalent to the percentage of Indians in the South African population (see Figure 3.1). This suggests that, unlike African and Coloured students, Indian students were fully represented in a race equity sense at the doctoral level. This probably relates to the stress on higher education amongst the Indian population which has often resulted in Indian individuals obtaining relatively higher levels of education than other black population groups.

Table 3.10 : Doctoral degrees awarded at universities in 1996 by race and gender

	Female			Male			Totals		
	%col	No	%row	%col	No	%row	%col	No	%row
African	3%	8	15%	10%	47	85%	8%	55	100%
Coloured	2%	4	27%	2%	11	73%	2%	15	100%
Indian	3%	7	33%	3%	14	67%	3%	21	100%
White	92%	225	37%	84%	383	63%	87%	608	100%
Totals	100%	244	35%	100%	455	65%	100%	699	100%

Source: SAPSE 1996 Table 2.13 for universities.

The enrolment figures for the same year in Table 3.11 below, which indicate the pattern for a slightly later cohort, show marginal changes in the distribution across race and gender. There were more African females and African males enrolled in 1996 (10% and 14% respectively) than graduated, and a total increase from 8% to 13% for Africans. At the same time, there were fewer White females and White males enrolled (83% and 77% respectively) than graduated in 1996 and the overall total for White students enrolled for doctoral degrees was 79%.

Table 3.11 : Doctoral enrolments at universities in 1996 by race and gender

	Female			Male			Totals		
	%col	No	%row	%col	No	%row	%col	No	%row
African	10%	174	27%	14%	476	73%	13%	650	100%
Coloured	3%	51	27%	4%	138	73%	4%	189	100%
Indian	0%	71	30%	5%	169	70%	5%	240	100%
White	83%	1 440	36%	77%	2 565	64%	79%	4 005	100%
Totals	100%	1 736	34%	100%	3 348	66%	100%	5 084	100%

Source: SAPSE 1996 Table 2.12 for universities.

The pattern for masters degrees follows that of the doctoral degree distribution with White students and males comprising the largest proportion of all degree recipients (Table 3.12). However, at the masters level, the percentage for White students was slightly lower than at the doctoral level while the proportion of African degree recipients was slightly higher. Of particular interest is that African females were better represented at the masters level (6%) than at the doctoral level (1%), in comparison to females in the other black population groups. This suggests that the barriers to doctoral education are greater for African women than for other race categories which again speaks to the double disadvantage of being African and female under the apartheid system. At both the doctoral and masters levels, the percentage of Coloured recipients (3%) is much lower than the proportion (9%) of the South African population of which they form part. Overall, within the black population groups, across both gender categories, the percentage of masters degrees awarded was higher than the percentage of doctoral degrees awarded.

Table 3.12 : Doctoral and masters degrees awarded at universities in 1996 by race and gender

	Doctorates awarded		Masters awarded	
	No	%	No	%
African females	8	1%	224	6%
African males	47	7%	384	10%
White females	225	32%	1 199	30%
White males	383	55%	1 850	46%
Coloured females	4	1%	43	1%
Coloured males	11	2%	86	2%
Indian females	7	1%	66	2%
Indian males	14	2%	130	3%
Totals	699	100%	3 982	100%

Source: SAPSE 1996 Table 2.13 for universities.

3.5 Degrees awarded at universities in 1996 by fields of study

This section analyses the doctoral degrees awarded in 1996 in terms of macro and micro fields of study. The macro groupings include the three NRF clusters (broad fields of study), and the 22 CESM categories. The micro grouping includes the 149 sub-CESM specialisms within the 22 CESM categories.¹⁷

3.5.1. Degrees awarded at universities in 1996 by macro groupings: 3 NRF clusters and 22 CESM categories

At the most macro level of analysis – the three NRF clusters – the award of both doctoral and masters degrees follows the same pattern: both are very skewed towards the Social Sciences & Humanities, followed by the Natural Sciences & Engineering, and the Health Sciences (Table 3.13).¹⁸ Interestingly, a higher proportion of doctorates (34%) than masters degrees (23%) were awarded in the Natural Sciences & Engineering. Only around 10% of both degrees were awarded in the Health Sciences. Doctoral enrolment figures for the same year show that the distribution across the three NRF clusters for a slightly later cohort of candidates is very similar to the cohort awarded doctorates in 1996.

Table 3.13 : Doctorates and masters degrees awarded at universities in 1996 by the three NRF clusters

Three NRF clusters (broad fields of study)	Doctorates awarded		Doctoral enrolments		Masters awarded	
	No	%	No	%	No	%
Social sciences & humanities	393	56%	2 810	55%	2 632	66%
Natural sciences & engineering	240	34%	1 774	35%	915	23%
Health sciences	66	9%	500	10%	433	11%
Totals	699	100%	5 083	100%	3 980	100%

Source: SAPSE 1996 Table 2.13 for universities.

Table 3.14 below shows that for all the race and gender categories, the majority of doctoral degrees awarded were in the Social Sciences & Humanities. The smallest proportion was awarded to White males (54%) and the highest to Coloured males (100%). All the Coloured females (4) were awarded their doctorates in this cluster. Significantly, White females were awarded far more doctoral degrees (67) in the Natural Sciences & Engineering than females in the other racial categories (1 each for African and Indian females). While the figure for White females as a proportion of all doctoral degrees obtained in this category (67 or 28%) is still much lower than for White males (149 or 62%), it does suggest that White women have had greater success than females in the other racial categories in obtaining doctoral degrees in the Natural

¹⁷ See Appendix 3.3 for a detailed breakdown of these groupings.

¹⁸ Data for the University of the North West was not available in the SAPSE 1996 dataset and is thus not included in any of the tables in this section.

Sciences & Engineering - a field which is traditionally a male preserve. There were no African or Indian male doctoral degree recipients in the Health Sciences.

In terms of the distribution between gender categories within each racial grouping, there appeared to be divisions along quite conventional lines. For example, there were more White females (50%) than White males (42%) in the Health Sciences, but less White females (32%) than White males (53%) in the Social Sciences & Humanities. The most skewed ratio of White females to White males, however, was in the Natural Sciences with 28% and 62% respectively. The pattern of distribution between African females and African males was similar. For example, more African males (14) than African females (1) received their doctorates in the Natural Sciences & Engineering. This gap was even more pronounced in the Social Sciences & Humanities with 33 and 5 doctorates awarded to African males and African females respectively.

Table 3.14 : Doctoral degrees awarded at universities in 1996 by the three NRF clusters, and race and gender

	Health sciences			Natural sciences & engineering			Social sciences & humanities			Totals		
	%col	No	%row	%col	No	%row	%col	No	%row	%col	No	%row
African females	3%	2	25%	0%	1	13%	1%	5	63%	1%	8	100%
African males	0%	0	0%	6%	14	30%	8%	33	70%	7%	47	100%
White females	50%	33	15%	28%	67	30%	32%	125	56%	32%	225	100%
White males	42%	28	7%	62%	149	39%	53%	207	54%	55%	383	100%
Coloured females	0%	0	0%	0%	0	0%	1%	4	100%	1%	4	100%
Coloured males	2%	1	9%	2%	4	36%	2%	6	55%	2%	11	100%
Indian females	3%	2	29%	0%	1	14%	1%	4	57%	1%	7	100%
Indian males	0%	0	0%	2%	5	36%	2%	9	64%	2%	14	100%
Totals	100%	66	9%	100%	241	35%	100%	393	56%	100%	699	100%

Source: SAPSE 1996 Table 2.13 for universities.

If one uses the 22 CESM categories from SAPSE, it is apparent that the highest number of doctoral degrees awarded were in the Life Sciences & Physical Sciences (20%) (Table 3.15). This was followed by Education (14%), Philosophy, Religion & Theology (11%), Health Care & Health Sciences (10%), Engineering & Engineering Technology (8%), Languages, Linguistics & Literature (7%), Social Sciences & Social Studies (7%) and Psychology (6%). Of significance is that these eight CESM categories together claimed over four fifths (83%) of the total awards.

Relatively few doctorates were awarded in the remaining CESM categories. Four of these are of particular concern as they represent fields in which this country urgently requires expertise for our socio-economic development and political transformation. These CESM categories include Public Administration & Social Services (20 or 3%), Agriculture & Renewable Natural Resources (17 or 2%), Computer Science & Data Processing (8 or 1%) and Mathematical Sciences (15 or 2%).

The doctoral enrolment figures for the same year in Table 3.15 indicate very little difference in the distribution across the 22 CESM categories between the 1996 cohorts of graduates and enrolled

students. The only notable exception was Education where the proportion of enrolments was lower (10%) than the degrees awarded (14%).

Table 3.15 : Doctoral awards and enrolments at universities in 1996 by the 22 CESM categories

CESM categories		Doctorates awarded		Doctoral enrolments	
		No	%	No	%
15	Life sciences & physical sciences	138	20%	959	19%
7	Education	99	14%	558	11%
18	Philosophy, religion and theology	74	11%	522	10%
9	Health care & health sciences	70	10%	523	10%
8	Engineering & engineering technology	56	8%	381	8%
12	Language, linguistics & literature	49	7%	357	7%
22	Social sciences & social studies	46	7%	418	8%
20	Psychology	44	6%	306	6%
4	Business, commerce & management sciences	23	3%	158	3%
21	Public administration & social services	20	3%	123	2%
13	Law	19	3%	198	4%
1	Agriculture and renewable natural resources	17	2%	158	3%
16	Mathematical sciences	15	2%	143	3%
3	Arts, visual and performing	9	1%	71	1%
6	Computer science & data processing	8	1%	70	1%
2	Architecture & environmental design	3	0%	39	1%
14	Libraries & museums	3	0%	37	1%
5	Communication	2	0%	20	0%
10	Home economics	2	0%	13	0%
19	Physical education, health education & leisure	2	0%	28	1%
11	Industrial arts, trades & technology	1	0%	1	0%
17	Military science	0	0%	1	0%
Totals		699	100%	5 084	100%

Source: SAPSE 1996 Tables 2.12 and 2.13 for universities.

Table 3.16 below highlights that the distribution of doctoral awards in 1996 by race and gender was very skewed across the 22 CESM categories with considerably higher numbers of doctorates awarded to White males and White females. Generally, the majority of doctorates awarded across all the racial categories were clustered in the top eight CESM categories discussed in this section. African females received most of their doctorates in the CESM categories of Education, Health Care & Health Sciences and Language, Linguistics & Literature (2 in each). Education (16 or 34%) also ranked high for African males followed by Life Sciences (10 or 21%) and Language, Linguistics & Literature (9 or 18%). The profile of doctorates awarded to White males and White females differed in some significant ways. For instance, while the highest number of doctorates awarded to both these race/gender categories was in the Life Sciences, White males were awarded a high proportion of doctorates in Philosophy, Religion & Theology (61 or 15%), and Engineering & Engineering Technology (45 or 13%). In contrast, White females received a higher proportion of doctorates in Education (37 or 16%) and Health Care & Health Sciences (34 or 15%). Both of these fields are 'softer' options usually associated with women.

Table 3.16 : Doctoral degrees awarded at universities in 1996 by CESM categories, and by race and gender

CESM categories		African females		African males		Coloured females		Coloured males		Indian females		Indian males		White females		White males		Totals	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
15	Life sciences & physical sciences	0	0%	10	21%	0	0%	3	25%	1	14%	3	21%	47	19%	74	19%	138	20%
7	Education	2	26%	16	34%	1	25%	1	9%	2	29%	6	42%	37	16%	34	9%	99	14%
18	Philosophy, religion & theology	1	13%	2	4%	0	0%	3	27%	0	0%	2	14%	4	2%	61	15%	73	10%
9	Health care & health sciences	2	25%	1	2%	0	0%	1	9%	2	29%	0	0%	34	15%	30	8%	70	10%
8	Engineering & engineering technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	11	4%	45	13%	56	8%
12	Language, linguistics & literature	2	26%	9	18%	1	25%	0	0%	0	0%	0	0%	22	7%	15	4%	49	7%
22	Social sciences & social studies	0	0%	2	4%	1	25%	0	0%	0	0%	0	0%	11	3%	32	9%	46	7%
20	Psychology	0	0%	0	0%	1	25%	0	0%	1	14%	0	0%	24	10%	18	5%	44	6%
4	Business, commerce & management sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	21	6%	23	3%
21	Public administration & social services	0	0%	1	2%	0	0%	2	18%	0	0%	0	0%	12	4%	5	2%	20	3%
13	Law	0	0%	2	4%	0	0%	0	0%	1	14%	0	0%	4	1%	12	3%	19	3%
1	Agriculture & renewable resources	1	13%	1	2%	0	0%	0	0%	0	0%	0	0%	1	0%	14	5%	17	2%
16	Mathematical sciences	0	0%	1	1%	0	0%	1	11%	0	0%	1	7%	4	1%	8	2%	15	2%
3	Arts, visual & performing	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	4	2%	4	1%	9	1%
6	Computer science & data processing	0	0%	0	0%	0	0%	0	0%	0	0%	1	7%	2	1%	4	1%	8	1%
2	Architecture & environmental design	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	3	0%
14	Libraries & museums	0	0%	0	0%	0	0%	0	0%	0	0%	1	7%	2	1%	0	0%	3	0%
5	Communication	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%	2	0%
10	Home economics	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%	2	0%
19	Physical education, health education & leisure	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	2	0%
11	Industrial arts, trades & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%
17	Military science	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Totals		8	100%	47	100%	4	100%	11	100%	7	100%	14	100%	225	100%	383	100%	699	100%

Source: SAPSE 1996 Table 2.13 for universities.

3.5.2 Doctorates awarded at universities in 1996 by sub-CESMs, race and gender

While the analysis of the macro categories provides some insights into the profile of doctoral graduates in 1996, the aggregated data conceals some important differences. This section therefore takes the preceding analysis a step further with an analysis by the 149 sub-CESM specialisms. The discussion begins with an examination of the top 22 sub-CESMs in which doctorates were awarded (i.e. different from the CESM categories) by race and gender as indicated in Table 3.17.¹⁹ This follows with an analysis of the top eight CESM categories identified in Table 3.15 above in terms of the distribution across sub-CESMs, and race and gender. The 22 CESM categories by race and gender are indicated in Table 3.16 above as well. Individual tables are provided alongside the discussion of each of the eight CESM categories for ease of reference, and the complete breakdown of doctoral degrees awarded by sub-CESM specialisms and by race and gender is in Appendix Table 4.1.

Table 3.17 indicates that, generally speaking, the distribution of doctoral awards was concentrated around a small selection of sub-CESMs. The highest number of doctorates awarded was in All Other Education (52 or 7%) followed by Christianity (44 or 6%). The total of the three education categories which appear in the top 22 sub-CESMs is 96 or 14% of all doctorates awarded. All Other Psychology ranked third with 37 or 5% of all doctorates awarded and Chemistry (30) and Zoology (26) followed closely at 4% each. Both Electrical and Chemical Engineering & Technology appear in the top 22 sub-CESMs and together constitute 29 or 4% of the total.

Of the doctorates awarded to White females, 31 (or 14%) were in the sub-CESMs of All Other Education and Secondary Education and a further one tenth (22 or 10%) in All Other Psychology. This was followed by 12 (or 5%) in Botany, 11 (or 5%) in Chemistry and 10 (or 4%) in Social Work. By far the majority of White males (39 or 10%) were awarded doctorates in Christianity. This was followed by 30 (or 8%) in the sub-CESMs of All Other Education and Secondary Education, and Zoology at 19 or 5% of the total. Electrical and Chemical Engineering accounted for 22 or 6% of the doctorates awarded to White males. Seven (or 15%) of the 47 doctorates awarded to African males were awarded in the top ranking sub-CESM of All Other Education followed by Secondary Education at 6 or 13% of the total.

¹⁹ Data for the University of the North West was not available in the SAPSE 1996 dataset and is thus not included in any of the tables in this section.

Table 3.17 : Top twenty-two sub-CESMs in which doctorates were awarded at universities in 1996, by race and gender

Sub-CESMs	African females (n=8)		African males (n=47)		Coloured females (n=4)		Coloured males (n=11)		Indian females (n=7)		Indian males (n=14)		White females (n=225)		White males (n=383)		Totals (n=699)	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
706 All other education	1	13%	7	15%	0	0%	1	9%	2	29%	3	21%	22	10%	16	4%	52	7%
1804 Christianity	1	13%	2	4%	0	0%	1	9%	0	0%	1	7%	0	0%	39	10%	44	6%
2003 All other psychology	0	0%	0	0%	0	0%	0	0%	1	14%	0	0%	22	10%	14	4%	37	5%
703 Secondary education	0	0%	6	13%	1	25%	0	0%	0	0%	1	7%	9	4%	14	4%	31	4%
1510 Chemistry	0	0%	4	9%	0	0%	0	0%	0	0%	2	14%	11	5%	13	3%	30	4%
1509 Zoology	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	6	3%	19	5%	26	4%
806 Electrical engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	16	4%	18	3%
1504 Botany	0	0%	2	4%	0	0%	0	0%	1	14%	0	0%	12	5%	3	1%	18	3%
1302 All other law	0	0%	2	4%	0	0%	0	0%	0	0%	0	0%	3	1%	12	3%	17	2%
404 Business economics etc	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	15	4%	16	2%
1514 Physics	0	0%	0	0%	0	0%	2	18%	0	0%	0	0%	1	0%	11	3%	14	2%
902 All other basic health care sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	4	2%	10	2%	14	2%
704 Tertiary education	1	13%	3	6%	0	0%	0	0%	0	0%	1	7%	5	2%	3	1%	13	2%
1511 Biochemistry	0	0%	1	2%	0	0%	1	7%	0	0%	0	0%	4	2%	7	2%	13	2%
1507 Microbiology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	5	2%	8	2%	13	2%
2104 Social work	0	0%	0	0%	0	0%	1	9%	0	0%	0	0%	10	4%	2	1%	13	2%
2206 History	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	4	2%	7	2%	12	2%
1809 All other philosophy, religion & theology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	12	3%	12	2%
903 Medicine/surgery	0	0%	0	0%	0	0%	0	0%	2	29%	0	0%	7	3%	3	1%	12	2%
803 Chemical engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	5	2%	6	2%	11	2%
1204 English	0	0%	2	4%	0	0%	0	0%	0	0%	0	0%	5	2%	4	1%	11	2%
2203 Economics	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	10	3%	11	2%
Totals	3		31		1		6		6		8		139		244		438	

Source: SAPSE 1996 Table 2.13 for universities.

The top eight CESM categories in which doctorates were awarded are analysed below according to the distribution across sub-CESMs, race and gender.

Life Sciences & Physical Sciences (CESM category 15)

As Table 3.16 indicates, one-fifth (20% or 138) of all doctorates awarded in 1996 were in the Life Sciences & Physical Sciences. This reflects the strong tradition of doctoral education in the natural sciences in South African universities. The distribution across the race and gender categories was very skewed with the majority awarded to White males (74) and White females (47). On the other hand, only 10 awards in this category were made to African males (10) and none to African or Coloured females.

Within the Life Sciences (Table 3.18), 104 or 83% of the doctorates were concentrated in six sub-CESMs, namely Chemistry (30), Zoology (26), Botany (18), Physics (14), Microbiology (13) and Biochemistry (13). The top three – Chemistry, Zoology and Botany – together accounted for just over half (74 or 54%) of all the Life Sciences doctorates. More than half (58%) of the doctorates awarded to White males in the Life Sciences were in Zoology (19), Chemistry (13) and Physics (11), and almost half (49%) those awarded to White females were concentrated in Botany (12) and Chemistry (11). Chemistry was also the sub-CESM in which African and Indian males received the highest number of doctorates in this CESM category (4 and 2 respectively).

Table 3.18 : Doctorates awarded at universities in 1996 in the Life Sciences & Physical Sciences CESM category

Sub-CESMS	African males		Coloured males		Indian females		Indian males		White females		White males		Totals	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1510 Chemistry	4	40%	0	0%	0	0%	2	66%	11	23%	13	18%	30	22%
1509 Zoology	1	10%	0	0%	0	0%	0	0%	6	13%	19	26%	26	19%
1504 Botany	2	20%	0	0%	1	100%	0	0%	12	26%	3	4%	18	13%
1514 Physics	0	0%	2	67%	0	0%	0	0%	1	2%	11	25%	14	10%
1507 Microbiology	0	0%	0	0%	0	0%	0	0%	5	11%	8	11%	13	9%
1511 Biochemistry	1	10%	1	33%	0	0%	0	0%	4	9%	7	9%	13	9%
1505 Entomology	0	0%	0	0%	0	0%	1	33%	1	2%	3	4%	5	4%
1506 Genetics	0	0%	0	0%	0	0%	0	0%	1	2%	4	5%	5	4%
1512 Geology	0	0%	0	0%	0	0%	0	0%	2	4%	4	5%	6	4%
1503 Biology	1	10%	0	0%	0	0%	0	0%	2	4%	0	0%	3	2%
1508 Physiology	0	0%	0	0%	0	0%	0	0%	1	2%	0	0%	1	1%
1513 Oceanology	0	0%	0	0%	0	0%	0	0%	1	2%	1	1%	2	1%
1516 All other life sciences & physical sciences	1	10%	0	0%	0	0%	0	0%	0	0%	1	1%	2	1%
Totals	10	100%	3	100%	1	100%	3	100%	47	100%	74	100%	138	100%

Source: SAPSE 1996 Table 2.13 for universities.

Education (CESM category 7)

The second highest number of doctorates awarded (99 or 14%) were in the CESM category of Education, as shown in Table 3.16. Again, the majority of doctorates in this category were awarded to White females (37) and White males (34) and it is interesting to note that in this case, the females outnumbered the males. It is also significant that of all the CESM categories, Education is the only one in which doctoral degrees were awarded across all the race and gender categories, and is thus the most inclusive in this regard.

The doctorates awarded in Education were clustered around particular sub-CESMs with All Other Education (52) and Secondary Education (31) comprising 83% of the total (Table 3.19). Notably, the sub-CESM of All Other Education was the highest ranking for doctorates across all sub-CESMs comprising 52 or 7% of the total (Table 3.17). A third (34% or 16) of the African males who obtained their doctorates in 1996 did so in the Education CESM category. Within this, as shown in Table 3.19, 44% or 7 were in All Other Education and 38% or 6 in Secondary Education. Just under half (42% or 6) of the Indian males obtained doctorates in Education, 3 of which were in the category All Other Education.

Table 3.19 : Doctorates awarded at universities in 1996 in the Education CESM category

Sub-CESMs	African females		African males		Coloured females		Coloured males		Indian females		Indian males		White females		White males		Totals	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
706 All other education	1	50%	7	44%	0	0%	1	100%	2	100%	3	50%	22	42%	16	47%	52	53%
703 Secondary	0	0%	6	38%	1	100%	0	0%	0	0%	1	17%	9	17%	14	41%	31	31%
704 Tertiary	1	50%	3	19%	0	0%	0	0%	0	0%	1	17%	5	9%	3	9%	13	13%
702 Primary	0	0%	0	0%	0	0%	0	0%	0	0%	1	17%	1	2%	1	3%	3	3%
Totals	2	100%	16	100%	1	100%	1	100%	2	100%	6	100%	37	100%	34	100%	99	100%

Source: SAPSE 1996 Table 2.13 for universities.

Philosophy, Religion & Theology (CESM category 18)

The third highest number of doctorates (73 or 10%) were awarded in the CESM category of Philosophy, Religion & Theology (Table 3.16). Of these, 61 or 83% were awarded to White males compared to only 4 (or 5%) awarded to White females. In addition, about one-quarter (3 out of 11) of the doctorates awarded to Coloured males were also in this CESM category. Of these, two were in philosophy and one was in Christianity. Interestingly, more than half (60% or 44) of the doctorates awarded in the Philosophy, Religion & Theology CESM category were in the sub-CESM of Christianity (Table 3.20).²⁰ Significantly, Christianity was also the highest ranking category for White males constituting 39 or 10% of all doctoral degrees awarded to this

²⁰ See section 3.8 of this chapter for a tentative explanation for the high proportion of doctorates in the sub-CESM of Christianity.

grouping (Appendix Table 4.1), and also the second highest ranking sub-CESM overall in which 44 or 6% of all doctorates were awarded (Table 3.17).

Table 3.20 : Doctorates awarded at universities in 1996 in the Philosophy, Religion & Theology CESM category

Sub-CESMs	African females		African males		Coloured males		Indian males		White females		White males		Totals	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1804 Christianity	1	100%	2	100%	1	33%	1	50%	0	0%	39	64%	44	60%
1809 All other philosophy, religion & theology	0	0%	0	0%	0	0%	0	0%	0	0%	12	20%	12	16%
1801 Philosophy	0	0%	0	0%	2	67%	0	0%	1	25%	5	8%	8	11%
1802 Science of religion	0	0%	0	0%	0	0%	1	50%	2	50%	4	7%	7	10%
1807 Judaism	0	0%	0	0%	0	0%	0	0%	1	25%	1	2%	2	3%
Totals	1	100%	2	100%	3	100%	2	100%	4	100%	61	100%	73	100%

Source: SAPSE 1996 Table 2.13 for universities.

Health Care & Health Sciences (CESM category 9)

Table 3.16 indicates that one tenth (10% or 70) of all doctorates were awarded in Health Care & Health Sciences. The majority of these were awarded to White females (34) and White males (30). Significantly, one-quarter (2 out of 8) of the doctorates awarded to African females and almost one third (2 out of 7) awarded to Indian females were in this CESM category. No doctorates were awarded to Coloured females and Indian males in this category.

Exactly half (35 or 50%) of the doctorates awarded in this CESM, as indicated in Table 3.21, were clustered around three sub-CESMs, namely All Other Basic Health Care Sciences (14 or 20%), Medicine/Surgery (12 or 17%), and All Other Health Care & Health Sciences (9 or 13%). Of the doctorates awarded to White females, the highest proportion (7 or 21%) was in Medicine/Surgery, followed by 6 (or 18%) in Nursing. The only doctorates awarded to African and Indian females in this CESM category were in Nursing (2) and Medicine/Surgery (2) respectively. Doctorates in Nursing were only awarded to females.

Table 3.21 : Doctorates awarded at universities in 1996 in the Health Care & Health Sciences CESM category

Sub-CESMs	African females		African males		Coloured males		Indian females		White females		White males		Totals	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
902 All other basic health care sciences	0	0%	0	0%	0	0%	0	0%	4	12%	10	33%	14	20%
903 Medicine/surgery	0	0%	0	0%	0	0%	2	100%	7	21%	3	10%	12	17%
916 All other health care & health sciences	0	0%	0	0%	0	0%	0	0%	5	15%	4	13%	9	13%
905 Nursing	2	100%	0	0%	0	0%	0	0%	6	18%	0	0%	8	11%
907 All other clinical health sciences	0	0%	0	0%	1	100%	0	0%	2	6%	4	13%	7	10%
913 Pharmaceutical sciences	0	0%	0	0%	0	0%	0	0%	4	12%	3	10%	7	10%
901 Anatomy	0	0%	0	0%	0	0%	0	0%	4	12%	1	3%	5	7%
904 Dentistry	0	0%	0	0%	0	0%	0	0%	1	3%	3	10%	4	6%
915 Veterinary medical sciences	0	0%	1	100%	0	0%	0	0%	1	3%	2	7%	4	6%
Totals	2	100%	1	100%	1	100%	2	100%	34	100%	30	100%	70	100%

Source: SAPSE 1996 Table 2.13 for universities.

Engineering & Engineering Technology (CESM category 8)

Just less than one tenth (56 or 8%) of the doctorates awarded were in the Engineering CESM category (Table 3.16). Despite the fact that there have been some changes in the racial profile in Engineering at the undergraduate level, the race and gender imbalances at the upper postgraduate level are still severe as only White males (45) and White females (11) received doctorates in this category. Historically, and as with the Life Sciences, Engineering has been a field dominated by the White population and given considerable attention at the HAUs (see section 3.6.3).

As Table 3.22 indicates, two-thirds (38 or 68%) of the doctorates awarded in Engineering were in Electrical Engineering (18 or 32%), Chemical Engineering (11 or 20%) and Civil Engineering (9 or 16%). These were followed by All Other Engineering (6 or 11%) and Mechanical Engineering (5 or 9%). Two-thirds (30 or 67%) of the doctorates awarded to White males in this category were in Electrical, Chemical and Civil Engineering and Technology. By contrast, almost half (5 or 46%) of the White female doctorate recipients were in Chemical Engineering and Technology. It is notable that the doctorates awarded in Engineering in absolute numbers (56) were only just over half those awarded in Education (99) (Table 3.16).

Table 3.22 : Doctorates awarded at universities in 1996 in the Engineering & Engineering Technology CESM category

Sub-CESMs	White females		White males		Totals	
	No	%	No	%	No	%
806 Electrical engineering & technology	2	18%	16	36%	18	32%
803 Chemical engineering & technology	5	46%	6	13%	11	20%
804 Civil engineering & technology	1	9%	8	18%	9	16%
815 All other engineering & engineering technology	2	18%	4	9%	6	11%
811 Mechanical engineering & technology	1	9%	4	9%	5	9%
813 Mining engineering & technology	0	0%	3	7%	3	5%
808 Industrial engineering & technology	0	0%	2	4%	2	4%
812 Metallurgical engineering & technology	0	0%	2	4%	2	4%
Totals	11	100%	45	100%	56	100%

Source: SAPSE 1996 Table 2.13 for universities.

Languages, Linguistics & Literature (CESM category 12)

Seven percent (or 49) of all doctorates were awarded in Languages, Linguistics & Literature (Table 3.17). Of these, 22 were awarded to White females, 15 to White males, and 9 to African males. In addition, one-quarter of all the doctorates awarded to African females (2) and Coloured females (1) were in this CESM category.

The top two ranking sub-CESMs, as shown in Table 3.23, were English and Afrikaans at 42% of the total, or 21 out of 49. Fifteen of these 21 (or 71%) were awarded to White females. Doctorates in South Asian languages and Hebrew together accounted for one-fifth (20% or 10) of the total which reflects the specific interests at our universities of the Indian and Jewish populations in South Africa. African languages (including isiXhosa, isiZulu, isiNdebele, Sesotho sa Leboa, and Sesotho) constituted 8 or 16% of the total. Interestingly, 4 of the 8 doctorates awarded in African languages were awarded to White students – 2 White males in isiZulu and 2 White females in isiNdebele.

Table 3.23 : Doctorates awarded at universities in 1996 in the Languages, Linguistics & Literature CESM category

Sub-CESMs	African females		African males		Coloured females		White females		White males		Totals	
	No	%	No	%	No	%	No	%	No	%	No	%
1204 English	0	0%	2	22%	0	0%	5	23%	4	27%	11	22%
1203 Afrikaans - Nederlands	0	0%	0	0%	0	0%	10	45%	0	0%	10	20%
1220 South Asian languages	0	0%	2	22%	1	100%	1	5%	2	13%	6	12%
1208 Hebrew	0	0%	1	11%	0	0%	0	0%	3	20%	4	8%
1201 Linguistics	1	50%	0	0%	0	0%	1	5%	0	0%	2	4%
1202 Literary studies	0	0%	1	11%	0	0%	0	0%	1	7%	2	4%
1205 French	0	0%	0	0%	0	0%	1	5%	1	7%	2	4%
1209 Latin	0	0%	0	0%	0	0%	1	5%	1	7%	2	4%
1216 isiXhosa	0	0%	2	22%	0	0%	0	0%	0	0%	2	4%
1217 isiZulu	0	0%	0	0%	0	0%	0	0%	2	13%	2	4%
1218 isiNdebele	0	0%	0	0%	0	0%	2	9%	0	0%	2	4%
1206 German	0	0%	0	0%	0	0%	1	5%	0	0%	1	2%
1207 Greek	0	0%	0	0%	0	0%	0	0%	1	7%	1	2%
1210 Sesotho sa Leboa	0	0%	1	11%	0	0%	0	0%	0	0%	1	2%
1211 Sesotho	1	50%	0	0%	0	0%	0	0%	0	0%	1	2%
Totals	2	100%	9	100%	1	100%	22	100%	15	100%	49	100%

Source: SAPSE 1996 Table 2.13 for universities.

Social Sciences & Social Studies (CESM category 22)

Doctorates in the Social Sciences & Social Studies constituted 7% of the total, or 46 out of 699 (Table 3.16) which is relatively low considering that this CESM category ranked seventh overall. Again, the vast majority of these were awarded to White males (32) and White females (11) which together constituted 94% of the total. One out of the four doctorates awarded to Coloured females was also in this CESM category.

As Table 3.24 indicates, the two top ranking sub-CESMs in this category were History (12 out of 46, or 26%) and Economics (11 out of 46, or 24%). Together, these two sub-CESMs comprised half of all the doctorates in the Social Sciences. In addition, almost three-quarters of the History doctorates (17 out of 23, or 74%) and 10 out of the 11 doctorates in Economics (91%) were awarded to White males. The high proportion of doctorates in History might be linked to the preoccupation with our recent political past. Of particular note is that there were only 3 doctorates in the sub-CESM of Political Science and Government – accounting for less than 1% of the doctorate total (Table 3.24). This is somewhat of a concern in a country that is currently grappling with a new political dispensation and the fundamental transformation of its society.

Table 3.24 : Doctorates awarded at universities in 1996 in the Social Sciences & Social Studies CESM category

Sub-CESMs	African males		Coloured females		White females		White males		Totals	
	No	%	No	%	No	%	No	%	No	%
2206 History	1	50%	0	0%	4	36%	7	22%	12	26%
2203 Economics	0	0%	0	0%	1	9%	10	31%	11	24%
2204 Geography	1	50%	0	0%	1	9%	4	8%	6	13%
2201 Archaeology	0	0%	1	100%	2	18%	2	6%	5	11%
2210 Sociology	0	0%	0	0%	1	9%	4	8%	5	11%
2202 Anthropology	0	0%	0	0%	1	9%	3	9%	4	9%
2208 Political science & government	0	0%	0	0%	1	9%	2	6%	3	7%
Totals	2	100%	1	100%	11	100%	32	100%	46	100%

Source: SAPSE 1996 Table 2.13 for universities.

Psychology (CESM category 20)

Table 3.16 indicates that 6% (or 44) of the doctorates awarded were in the field of Psychology. More than half of these (24 or 55%) were awarded to White females and 18 (or 41%) were awarded to White males. One of the four doctorates awarded to Coloured females was in Psychology, and in the sub-CESM of Industrial Psychology. The All Other Psychology sub-CESM was also the third highest ranking overall in which 37 or 5% of doctorates were awarded (Table 3.17).

Table 3.25 : Doctorates awarded at universities in 1996 in the Psychology CESM category

Sub-CESMs	Coloured females		Indian females		White females		White males		Totals	
	No	%	No	%	No	%	No	%	No	%
2003 All other psychology	0	0%	1	100%	22	92%	14	78%	37	84%
2002 Industrial psychology	1	100%	0	0%	1	4%	3	17%	5	11%
2001 Clinical psychology	0	0%	0	0%	1	4%	1	6%	2	5%
Totals	1	100%	1	100%	24	100%	18	100%	44	100%

Source: SAPSE 1996 Table 2.13 for universities.

3.5.3 Comparative figures for masters degrees awarded at universities in 1996 by CESM categories and sub-CESMs

The distribution of masters degrees awarded across the 22 CESM categories reveals a slightly different picture from that of the doctorates, as indicated in Appendix Table 4.2.²¹ The most significant difference was that the highest percentage (21%) of masters degrees was awarded in the field of Business, Commerce & Management Sciences which is almost double the next ranking category, namely Health Care & Health Sciences at 11%. These were followed by Education (10%), Life Sciences & Physical Sciences (10%), Psychology (7%) and Engineering

& Engineering Technology (7%). Together, these six areas of specialisation constituted two-thirds (66%) of all masters degrees awarded, as depicted in Table 3.26. Notably, the CESM category of Philosophy, Religion & Theology which ranked third in the doctoral awards appeared much further down the list of masters degrees.

Table 3.26 : Masters and doctoral degrees awarded at universities in 1996 by CESM categories

CESM categories	Masters		Doctorates	
	No	%	No	%
Business, commerce & management sciences	835	21%	23	3%
Health care & health sciences	448	11%	70	10%
Education	405	10%	99	14%
Life sciences & physical sciences	402	10%	138	20%
Psychology	282	7%	44	6%
Engineering & engineering technology	277	7%	56	8%
Social sciences & social studies	244	6%	46	6%
Law	218	5%	19	3%
Languages, linguistics & literature	210	5%	49	7%
Philosophy, religion & theology	193	5%	74	11%
Public administration & social services	130	3%	20	3%
Architecture & environmental design	70	2%	3	0%
Agriculture & renewable natural resources	64	2%	17	2%
Arts, visual & performing	58	1%	9	1%
Computer science & data processing	49	1%	8	1%
Mathematical sciences	39	1%	14	2%
Libraries & museums	27	1%	3	0%
Physical education, health education & leisure	15	0%	2	0%
Communication	11	0%	2	0%
Home economics	6	0%	2	0%
Industrial arts, trades & technology	0	0%	1	0%
Military science	0	0%	0	0%
Totals	3 983	100%	699	100%

Source: SAPSE 1996 Table 2.13 for universities.

These six CESM categories are analysed below according to the distribution across the sub-CESMs within each category, based on Appendix Table 4.2. Within the CESM category of Business, Commerce & Management Sciences, 92% of the masters degrees awarded were in All Other Business, Commerce & Management sciences (404 out of 835) and Business Economics (362 out of 835). These are more than likely Master of Business Administration (MBA) degrees. The masters degrees awarded within the Health Care & Health Sciences CESM category were spread across a much wider range of sub-CESMs, although more than a quarter (27%, or 121 out of 448) were awarded in the Medicine/Surgery sub-CESM. This is expected as it is within this category that medical specialists are qualified. This was followed by All Other Clinical Health Sciences at 18% (79) and All Other Basic Health Care Sciences at 17%

²¹ Data for the University of the North West was not available in the SAPSE 1996 dataset and is thus not included in any of the tables in this section.

(74). The distribution in the Health Sciences is thus similar to that of the doctoral degrees awarded.

Of the 405 masters degrees awarded in the Education CESM category, 91% were clustered in the Secondary Education (221) and All Other Education (147) sub-CESMs, which follows the same pattern of distribution as the doctorates. In the Life Sciences & Physical Sciences CESM category, the picture for the masters degrees awarded was similar to that of the doctorates, except for the inclusion of Geology instead of Physics in the top six sub-CESMs. Together, these six sub-CESMs (Zoology, Chemistry, Geology, Biochemistry, Botany, and Microbiology) comprised over two-thirds (70%) of all masters degrees. As with the doctorates, the masters degrees awarded in the Mathematical Sciences CESM category were very low at 39 or 1% of the total. Similarly, within the Psychology CESM category, the majority of masters degrees awarded (151 out of 282, or 54%) were in the sub-CESM of All Other Psychology. However, at the masters level, Clinical Psychology claimed the second highest number of degrees – 97 or 34% of the total. Within the Engineering & Engineering Technology CESM category, just under a quarter (65 or 23%) of the masters degrees were awarded in Electrical Engineering which was also the top ranking sub-CESM for doctorates awarded in this CESM category. At the masters level, however, this was followed by Mechanical Engineering – 44 out of 277 or 16% – which, for doctorates awarded, ranked fifth.

In summary, there are similarities and differences in the patterns of distribution across fields of study between masters and doctoral awards. The most obvious difference is the proliferation of masters degrees in Business which was a marginal CESM category in the doctoral awards. Also at the masters level, traditional academic fields such as Philosophy, the Social Sciences, and Linguistics, Languages & Literature, claimed a smaller proportion of awards. It appears that doctoral education has developed a particular profile which reflects a small selection of interests.

3.6 Degrees awarded in 1996 by university sub-types, individual universities, fields of study, and race and gender

3.6.1. Degrees awarded in 1996 by university sub-types, and race and gender

The apartheid system of education imposed strict racial divisions on its institutions insofar as universities and technikons were created for the different race groups in South Africa. A review of the distribution of doctoral degrees awarded across the institutional sub-types, however, reveals that rather than each race group fitting neatly into its predetermined institutional

category (that is, Africans attending African HDUs, etc), there tended to be a clustering in both the English and Afrikaans HAUs, followed by Unisa. Tables 3.27 and 3.28 respectively indicate that 235 or 96% of all doctorates awarded to females and 438 or 96% of all doctorates awarded to males were at the two HAU sub-types and Unisa.²² This might be because these institutions are historically better funded and more established than the HDUs, and are more likely to offer a range of doctoral degrees not available at the other institutions. In addition, Cooper & Subotzky (2001:216) indicate that the HAUs (including Unisa) were the largest employers of staff in 1998 and that the ratio of professional to non-professional staff in these institutions were higher than at the HDUs. Thus, it is likely that the HAUs have more staff with doctoral-level qualifications available to supervise doctoral candidates.

Therefore, for all race and gender categories, except for Indian females, the greatest proportion of doctoral degrees awarded were at one or both of the HAU sub-types, and at Unisa (Tables 3.27 and 3.28). This was particularly so for White males and females, and for African males. As Table 3.28 indicates, 53% (or 201) of the White males, and 43% (or 20) of the African males were awarded their doctorates at the six Afrikaans HAUs. This is approximately 34 White males and 3 African males per Afrikaans HAU. In addition, 135 or 35% of White males and 13 or 28% of African males received their doctorates from the four English HAUs. This amounts to about 34 White males and 3 African males per English HAU which is the same ratio as for the Afrikaans HAUs. Similarly, half (110 or 49%) the White females obtained their doctoral degrees at the six Afrikaans HAUs and a further third (78 or 35%) at the four English HAUs (Table 3.27) which is approximately 28 White females per Afrikaans HAU and 20 per English HAU.

It was interesting to note that half (7 out of 14) of the Indian males obtained their doctoral degrees at English HAUs (Table 3.28). In fact, 6 out of the 7 doctoral degrees obtained at English HAUs were at the University of Natal, and the seventh at Rhodes. The high proportion of doctorates awarded at the University of Natal is no doubt related to the concentration of the Indian population in KwaZulu-Natal. On the other hand, 43% (or 3) of the Indian females obtained their doctoral degrees at the two non-African HDUs (2 at UDW and 1 at UWC), as shown in Table 3.27.

Only 27% (or 3) of the Coloured males were awarded their doctorates at an HDU. In addition, it is interesting to note that 4 doctoral degrees were awarded to White males at a Non-African HDU. It is unusual for White candidates to attend HDUs and it might be that these doctorates were awarded to staff members at this institution who undertook a doctoral degree as part of their staff development.

²² Data for the University of the North West was not available in the SAPSE 1996 dataset and is thus not included in any of the tables in this section.

Table 3.27 : Doctoral degrees awarded to women in 1996 by university sub-type and by race

University sub-type	African		Coloured		Indian		White		Female total	
	No	%	No	%	No	%	No	%	No	%
Afrikaans HAU	1	13%	0	0%	1	14%	110	49%	112	46%
English HAU	3	38%	2	50%	2	29%	78	35%	85	35%
Unisa	2	25%	1	25%	1	14%	34	15%	38	16%
Non-African HDU	0	0%	1	25%	3	43%	0	0%	4	2%
- Durban-Westville	0	0%	1	25%	2	29%	0	0%	3	1%
- Western Cape	0	0%	0	0%	1	14%	0	0%	1	0%
Special Purpose HDU	2	25%	0	0%	0	0%	2	1%	4	2%
African HDU	0	0%	0	0%	0	0%	1	0%	1	0%
Totals	8	100%	4	100%	7	100%	225	100%	244	100%

Source: SAPSE 1996 Table 2.13 for universities.

Note: The Non-African HDU category has been broken down to show the distribution between the two institutions.

Table 3.28 : Doctoral degrees awarded to men in 1996 by university sub-type and by race

University sub-type	African		Coloured		Indian		White		Male totals	
	No	%	No	%	No	%	No	%	No	%
6 Afrikaans HAUs	20	43%	3	27%	4	29%	201	53%	228	50%
4 English HAUs	13	28%	4	36%	7	50%	135	35%	159	35%
Unisa	9	19%	1	9%	2	14%	39	10%	51	11%
2 Non-African HDUs	1	2%	3	27%	1	7%	4	1%	9	2%
- Durban-Westville	1	2%	0	0%	1	7%	2	1%	4	1%
- Western Cape	0	0%	3	27%	0	0%	2	1%	5	1%
2 Special Purpose HDUs	3	6%	0	0%	0	0%	4	1%	7	2%
9 African HDUs	1	2%	0	0%	0	0%	0	0%	1	0%
Totals	47	100%	11	100%	14	100%	383	100%	455	100%

Source: SAPSE 1996 Table 2.13 for universities.

Note: The Non-African HDU category has been broken down to show the distribution between the two institutions.

3.6.2. Degrees awarded in 1996 by university sub-types and CESM categories

As shown in Table 3.29, the award of doctoral degrees across CESM categories was generally evenly spread between the six Afrikaans HAUs and the four English HAUs. There were, however, some differences between the two. While the majority of doctorates awarded at both HAU sub-types were in the Life Sciences & Physical Sciences, the proportion was considerably higher at the four English HAUs (81 or 33%) than at the six Afrikaans HAUs (54 or 16%). The English HAUs also awarded a higher proportion of doctorates in Health Care & Health Sciences (15% vs 9%) and Engineering & Engineering Technology (14% vs 6%). By contrast, the Afrikaans HAUs awarded a somewhat higher proportion of doctoral degrees in Education (15% vs 4%), Philosophy, Religion & Theology (11% vs 4%), Psychology (8% vs 3%), Public Administration & Social Services (8% vs 3%), and Business, Commerce & Management Sciences (4% vs 1%). The doctoral degrees awarded at Unisa in 1996, as indicated in Table

3.29, were clustered around a handful of CESM categories including Education (33%), Philosophy, Religion & Theology (25%) followed by Psychology, and Law, at 8% each.

Table 3.29 : Doctoral degrees awarded at HAUs and Unisa in 1996 by CESM categories

CESM categories	6 Afrikaans HAUs		4 English HAUs		Unisa	
	No	%	No	%	No	%
Agriculture & renewable natural resources	11	3%	6	2%	0	0%
Architecture & environmental design	1	0%	2	1%	0	0%
Arts, visual & performing	4	1%	3	1%	2	2%
Business, commerce & management sciences	14	4%	2	1%	5	6%
Communication	0	0%	0	0%	2	2%
Computer science & data processing	3	1%	5	2%	0	0%
Education	51	15%	11	4%	29	33%
Engineering & engineering technology	21	6%	35	14%	0	0%
Health care & health sciences	32	9%	34	14%	3	3%
Home economics	2	1%	0	0%	0	0%
Industrial arts, trades & technology	1	0%	0	0%	0	0%
Languages, linguistics & literature	28	8%	14	6%	5	6%
Law	8	2%	3	1%	7	8%
Libraries & museums	1	0%	2	1%	0	0%
Life sciences & physical sciences	54	16%	81	33%	0	0%
Mathematical sciences	6	2%	9	4%	0	0%
Philosophy, religion & theology	36	11%	10	4%	22	25%
Physical education, health education & leisure	2	1%	0	0%	0	0%
Psychology	28	8%	7	3%	7	8%
Public administration & social services	17	5%	0	0%	3	3%
Social sciences & social studies	20	6%	21	9%	4	4%
Totals	340	100%	245	100%	89	100%

Source: SAPSE 1996 Table 2.13 for universities.

Considerably fewer doctoral degrees were awarded at the HDUs (Table 3.30). The two doctorates awarded at African HDUs were in Education and Psychology. Almost half (46%) of the doctorates awarded at Non-African HDUs were in Philosophy, Religion & Theology - two at the University of Durban-Westville and four at the University of the Western Cape. Five out of the 8 doctorates at Vista University were awarded in Education. It is possible that these latter doctorates were undertaken by staff at these institutions.

Table 3.30 : Doctoral degrees awarded at HDUs in 1996 by CESM categories

CESM categories	9 African HDUs		2 Non-African HDUs				2 Special Purpose HDUs			
			UDW		UWC		Vista		Medunsa	
	No	%	No	%	No	%	No	%	No	%
Business, commerce & management sciences	0	0%	1	14%	0	0%	1	12%	0	0%
Education	1	50%	1	14%	1	17%	5	63%	0	0%
Health care & health sciences	0	0%	0	0%	0	0%	0	0%	1	33%
Languages, linguistics & literature	0	0%	1	14%	0	0%	1	12%	0	0%
Law	0	0%	0	0%	1	17%	0	0%	0	0%
Life sciences & physical sciences	0	0%	1	14%	0	0%	0	0%	2	67%
Philosophy, religion & theology	0	0%	2	29%	4	67%	0	0%	0	0%
Psychology	1	50%	1	14%	0	0%	0	0%	0	0%
Social sciences & social studies	0	0%	0	0%	0	0%	1	12%	0	0%
Totals	2	100%	7	100%	6	100%	8	100%	3	100%

Source: SAPSE 1996 Table 2.13 for universities.

3.6.3 Doctoral degrees awarded in 1996 by individual universities, CESM categories and sub-CESMs

Earlier in this chapter, the 7 universities that together awarded just over three-quarters (78%) of the doctorates in 1996 were listed as Pretoria (15%), Unisa (13%), Natal (11%), Cape Town (10%), Stellenbosch (10%), Witwatersrand (10%) and Rand (9%). In this section, the doctoral degrees awarded in 1996 at these universities are analysed according to the CESM categories and sub-CESMs in which they were awarded. In some cases, the award of doctorates was spread relatively evenly across the CESM categories, while in others, they were clustered around only a few. Tables for each of the universities are provided below. The complete dataset for the seven universities and all the sub-CESMs is in Appendix Table 4.3.

University of Pretoria (n=105)

As Table 3.31 below and Appendix Table 4.3 indicate, the doctorates awarded at the University of Pretoria were quite evenly spread, with the greatest number in the following CESM categories and sub-CESMs. Sixteen out of 105 doctorates (15%) were awarded in Life Sciences & Physical Sciences. Of these, 5 were in Zoology and 5 were in Botany. Fifteen doctorates (14%) were awarded in Philosophy, Religion & Theology, 12 of which were in Christianity. A further 13 doctorates (12%) were awarded in Health Care & Health Sciences, of which 4 were in All Other Clinical Health Sciences and 4 were in Veterinary Medical Sciences.

Table 3.31 : Doctorates awarded at the University of Pretoria in 1996 by CESM categories

CESM categories	No	%
Life Sciences & Physical Sciences	16	15%
Philosophy, Religion & Theology	15	14%
Health Care & Health Sciences	13	12%
Education	11	11%
Engineering & Engineering Technology	12	11%
Psychology	7	7%
Public Administration & Social Services	7	7%
Business, Commerce & Management Sciences	5	5%
Social Sciences & Social Studies	4	4%
Agriculture & Renewable Natural Resources	3	3%
Arts, Visual & Performing	3	3%
Languages, Linguistics & Literature	3	3%
Law	2	2%
Mathematical Sciences	2	2%
Architecture & Environmental Design	1	1%
Physical Education, Health Education & Leisure	1	1%
Totals	105	100%

Source: SAPSE 1996 Table 2.13 for universities.

University of Stellenbosch (n=68)

The doctorates awarded at this university were also fairly evenly spread across the CESM categories (Table 3.32) and, like Pretoria, the top two CESM categories were Philosophy, Religion & Theology, and Life Sciences & Physical Sciences. Ten of the 68 doctorates (or 15%) were awarded in Philosophy, Religion & Theology, 9 of which were in Christianity (Appendix Table 4.3). Nine (or 13%) of the doctorates were awarded in Life Sciences & Physical Sciences, with 2 each in Botany, Microbiology and Chemistry. A further 8 (or 12%) doctorates were awarded in Languages, Linguistics & Literature, with 2 each in Hebrew and isiXhosa. Despite the fact that the second highest number of doctorates awarded at this university was in the Life Sciences category, the profile is very different from the other universities owing to the inclusion of Languages, Linguistics & Literature, and Public Administration & Social Services in the top four CESM categories.

Table 3.32 : Doctorates awarded at the University of Stellenbosch in 1996 by CESM categories

CESM categories	No	%
Philosophy, Religion & Theology	10	15%
Life Sciences & Physical Sciences	9	13%
Languages, Linguistics & Literature	8	12%
Public Administration & Social Services	7	10%
Education	6	9%
Engineering & Engineering Technology	6	9%
Health Care & Health Sciences	6	9%
Social Sciences & Social Studies	4	6%
Agriculture & Renewable Natural Resources	3	4%
Business, Commerce & Management Sciences	3	4%
Law	2	3%
Computer Science & Data Processing	1	2%
Industrial Arts, Trades & Technology	1	2%
Mathematical Sciences	1	2%
Psychology	1	2%
Totals	68	100%

Source: SAPSE 1996 Table 2.13 for universities.

Rand University (n=63)

Unlike the previous two Afrikaans HAU's (Pretoria and Stellenbosch) the doctorates awarded at Rand University were clustered around two CESM categories namely Education and Psychology, as shown in Table 3.33 below. A third (21 out of 63, or 33%) were awarded in Education, which was also the top-ranking CESM category at Unisa. Of these, 11 were in Secondary Education and 7 were in Tertiary Education (Appendix Table 4.3). Just under one-fifth (11 or 18%) of the doctorates awarded were in Psychology, 10 of which were in the category All Other Psychology. Finally, 8 out of 63 (or 13%) were awarded in the Life Sciences & Physical Sciences, 3 of which were in Zoology and 3 in Chemistry.

Table 3.33 : Doctorates awarded at the Rand University in 1996 by CESM categories

CESM categories	No	%
Education	21	33%
Psychology	11	18%
Life Sciences & Physical Sciences	8	13%
Business, Commerce & Management Sciences	5	8%
Languages, Linguistics & Literature	5	8%
Social Sciences & Social Studies	4	6%
Health Care & Health Sciences	2	3%
Mathematical Sciences	2	3%
Computer Science & Data Processing	1	2%
Engineering & Engineering Technology	1	2%
Law	1	2%
Philosophy, Religion & Theology	1	2%
Public Administration & Social Services	1	2%
Totals	63	100%

Source: SAPSE 1996 Table 2.13 for universities.

University of Natal (n=77)

As Table 3.34 shows, the doctorates awarded at Natal were very skewed in favour of the Life Sciences & Physical Sciences at 36% or 28 of the total. Within these, 6 were in Chemistry, 6 in Physics, and 5 in Botany (Appendix Table 4.3). Eight doctorates (10%) were awarded in Engineering & Engineering Technology, 5 of which were in Electrical Engineering. Finally, 7 out of 77 (9%) doctorates were awarded in the Social Sciences & Social Studies, within which 3 were in History and 3 in Geography. Apart from the predominance of doctorates in the Life Sciences CESM category, the profile of doctoral awards at Natal is very different from that at Pretoria or Stellenbosch.

Table 3.34 : Doctorates awarded at the University of Natal in 1996 by CESM categories

CESM categories	No	%
Life Sciences & Physical Sciences	28	36%
Engineering & Engineering Technology	8	10%
Social Sciences & Social Studies	7	9%
Agriculture & Renewable Natural Resources	6	8%
Health Care & Health Sciences	6	8%
Languages, Linguistics & Literature	5	7%
Education	4	5%
Philosophy, Religion & Theology	4	5%
Libraries & Museums	2	3%
Mathematical Sciences	2	3%
Psychology	2	3%
Business, Commerce & Management Sciences	1	1%
Computer Science & Data Processing	1	1%
Law	1	1%
Totals	77	100%

Source: SAPSE 1996 Table 2.13 for universities.

University of Cape Town (n=73)

As with Natal, almost a third (30%) of all the doctorates awarded at Cape Town were in the Life Sciences & Physical Sciences (Table 3.35). Six of these were in Chemistry and 4 were in Microbiology (Appendix Table 4.3). A further 14 (19%) of the doctorates were awarded in Engineering, 4 of which were in Chemical Engineering. Thirteen out of the 73 (or 18%) doctorates awarded were in Health Care & Health Sciences, of which 4 were in the sub-CESM Medicine/Surgery.

Table 3.35 : Doctorates awarded at the University of Cape Town in 1996 by CESM categories

CESM categories	No	%
Life Sciences & Physical Sciences	22	30%
Engineering & Engineering Technology	14	19%
Health Care & Health Sciences	13	18%
Social Sciences & Social Studies	8	11%
Philosophy, Religion & Theology	4	6%
Languages, Linguistics & Literature	3	4%
Psychology	3	4%
Mathematical Sciences	2	3%
Architecture & Environmental Design	1	1%
Arts, Visual & Performing	1	1%
Computer Science & Data Processing	1	1%
Education	1	1%
Totals	73	100%

Source: SAPSE 1996 Table 2.13 for universities.

University of the Witwatersrand (n=66)

As Table 3.36 indicates, the vast majority of the doctoral degrees awarded at Wits were clustered around 3 CESM categories. One-quarter (17 out of 66, or 26%) were awarded in the Life Sciences & Physical Sciences. Of these, 5 were in Biochemistry and 3 each were in Genetics and Chemistry (Appendix Table 4.3). A further 14 doctorates (or 21%) were awarded in Health Care & Health Sciences, of which 5 were awarded in All Other Health Care and Health Sciences, 4 in Anatomy and 3 in All Other Basic Health Care Sciences. Finally, a fifth of all doctorates (13 out of 66 or 20%) were awarded in Engineering & Engineering Technology. Four of these were in Chemical Engineering, and 3 each in Electrical Engineering and Mining Engineering.

Witwatersrand has a very similar profile to Cape Town insofar as the CESM categories of Life Sciences, Engineering, and Health Sciences all feature in the top three categories in which doctorates were awarded, although in a different order. A further similarity is the high number of doctorates awarded in the Chemistry and Chemical Engineering sub-CESMs.

Table 3.36 : Doctorates awarded at the University of the Witwatersrand in 1996 by CESM categories

CESM categories	No	%
Life Sciences & Physical Sciences	17	26%
Health Care & Health Sciences	14	21%
Engineering & Engineering Technology	13	20%
Languages, Linguistics & Literature	5	8%
Mathematical Sciences	4	6%
Social Sciences & Social Studies	3	5%
Arts, Visual & Performing	2	3%
Education	2	3%
Law	2	3%
Architecture & Environmental Design	1	2%
Business, Commerce & Management Sciences	1	2%
Computer Science & Data Processing	1	2%
Philosophy, Religion & Theology	1	2%
Totals	66	100%

Source: SAPSE 1996 Table 2.13 for universities.

University of South Africa (n=89)

The doctorates awarded at Unisa in 1996 were tightly clustered. A third (33%, or 29 out of 89) of the doctorates were awarded in Education (Table 3.37), 26 of which were in the category All Other Education (Appendix Table 4.3). A quarter (25% or 22) were awarded in Philosophy, Religion & Theology, 17 of which were in Christianity. Significantly, unlike the other universities, there were no doctorates awarded in the Life Sciences & Physical Sciences, or Engineering & Engineering Technology.

Table 3.37 : Doctorates awarded at the University of South Africa in 1996 by CESM categories

CESM categories	No	%
Education	29	33%
Philosophy, Religion & Theology	22	25%
Law	7	8%
Psychology	7	8%
Business, Commerce & Management Sciences	5	6%
Languages, Linguistics & Literature	5	6%
Social Sciences & Social Studies	4	5%
Health Care & Health Sciences	3	3%
Public Administration & Social Services	3	3%
Arts, Visual & Performing	2	2%
Communication	2	2%
Totals	89	100%

Source: SAPSE 1996 Table 2.13 for universities.

In summary, while each of these seven universities exhibited a unique profile of doctoral awards across the CESM categories, indicating 'niche' areas, there were some similarities between them. For instance, the Life Sciences & Physical Sciences CESM category was the highest ranking in five of the seven universities including Pretoria, Stellenbosch, Natal, Cape Town and Witwatersrand. By contrast, Rand University and Unisa both awarded the majority of their doctorates in the Education CESM category. Both Cape Town and Wits awarded the majority of their doctorates in the Life Sciences & Physical Sciences, Health Care & Health Sciences, and

Engineering & Engineering Technology. The majority of doctorates awarded at Pretoria and Stellenbosch were in the Life Sciences & Physical Sciences, and Philosophy, Religion & Theology. Rand University, although an Afrikaans HAU like Pretoria and Stellenbosch, exhibited a very different profile of doctoral awards with the top two CESM categories of Education and Psychology. Unisa had a fairly unique profile of doctoral awards, particularly as no doctorates were awarded in the Life Sciences & Physical Sciences, or in Engineering & Engineering Technology. Instead, Education, Philosophy and Law were the top three CESM categories in which doctorates were awarded at this institution.

3.7 Overview of degrees awarded at technikons in 1996

This section seeks to provide a brief overview of the degrees awarded at technikons in 1996 as a point of comparison with those awarded at universities for the same year. What is of interest in this analysis is the extent to which the profile of doctoral and masters graduates at the two types of institutions differ, particularly with regard to the different programme emphasis in the technikons which is generally more science, technology and profession-related. As only two doctorates were awarded at technikons in 1996, it is not possible to analyse and make detailed comparisons with those awarded at universities. Instead the higher number of masters degrees awarded (88) is used to make some comparison on the assumption that the findings for the masters degrees awarded might provide some insight into the future picture of doctoral awards at technikons. The following analysis examines the degrees awarded according to technikon sub-types²³ and individual technikons, race and gender, and the 22 CESM categories.

3.7.1 Degrees awarded in 1996 by technikon sub-types and individual technikons

As indicated in Table 3.38 below, by far the highest number of degrees awarded in each qualification sub-level²⁴ were at the 6 HATs.²⁵ The two doctoral degrees²⁶ awarded at technikons in 1996 were at HATs, as well as 81 (or 92%) of the masters degrees. Six masters degrees were obtained at a Non-African HDT and one at an African HDT. The Technikon SA did not award any doctorates or masters degrees in 1996 at all. Table 3.38 also highlights that technikons in South Africa are still largely undergraduate institutions with almost all (99%) of the degrees awarded at the undergraduate levels.

²³ See Appendix Table 3.2 for a breakdown of which institutions fit into which technikon sub-type.

²⁴ See Appendix Table 3.4 for a breakdown of the qualification sub-levels referred to here.

²⁵ As the Natal Technikon data is missing from most of the tables presented here, reference is made to six instead of seven HATs.

²⁶ The doctoral (Doctor Laureatus and Doctor of Technology) and masters (Master of Technology and Masters Diploma in Technology) degrees of technikons have been collapsed in each case to show only doctorates and masters.

Table 3.38 : Distribution of degrees awarded in 1996 by technikon sub-types

Technikon sub-types	Lower undergraduate			Upper undergraduate			Masters			Doctorates			Totals		
	%col	No	%row	%col	No	%row	%col	No	%row	%col	No	%row	%col	No	%row
6 HATs	51%	8 084	78%	63%	2 209	21%	92%	81	1%	100%	2	0%	54%	10 376	100%
South African	24%	3 795	88%	15%	513	12%	0%	0	0%	0%	0	0%	22%	4 308	100%
2 Non-African HDTs	13%	1 983	80%	14%	481	20%	7%	6	0%	0%	0	0%	13%	2 470	100%
5 African HDTs	12%	1 916	86%	9%	317	14%	1%	1	0%	0%	0	0%	12%	2 234	100%
Totals	100%	15 778	81%	100%	3 520	18%	100%	88	1%	100%	2	0%	100%	19 388	100%

Source: SAPSE 1996 Table 2.13 for technikons.

Note: Natal Technikon data is not included in this table and thus the total for masters degrees is 88 and not 105 as in Table 3.39.

The two technikons that awarded doctoral degrees in 1996 were the Cape and Pretoria Technikons, as shown in Table 3.39 below. Four-fifths or 83% of all masters degrees were awarded at five technikons (Pretoria, Port Elizabeth, Cape, Natal and Witwatersrand Technikons). Five technikons did not award any masters degrees in 1996, 4 of which were HDTs (Border, Eastern Cape, Mangosuthu and North West) and the fifth, Technikon SA.

Table 3.39 : Doctorates and masters degrees awarded by individual technikons in 1996

	Doctorates awarded		Masters awarded		Total postgraduate	
	No	%	No	%	No	%
Pretoria	1	50%	20	19%	21	20%
Port Elizabeth	0	0%	20	19%	20	19%
Cape	1	50%	18	17%	19	18%
Natal	0	0%	17	16%	17	16%
Witwatersrand	0	0%	13	12%	13	12%
Vaal Triangle	0	0%	7	7%	7	7%
Peninsula	0	0%	4	4%	4	4%
Free State	0	0%	3	3%	3	3%
ML Sultan	0	0%	2	2%	2	2%
North Transvaal	0	0%	1	1%	1	1%
Border	0	0%	0	0%	0	0%
Eastern Cape	0	0%	0	0%	0	0%
Mangosuthu	0	0%	0	0%	0	0%
North West	0	0%	0	0%	0	0%
South African	0	0%	0	0%	0	0%
Totals	2	100%	105	100%	107	100%

Sources: SAPSE 1996 Table 2.13 for technikons, and the Natal Technikon Graduate Ceremony Programme 1996.

Note: Data for Natal Technikon is included in this table and thus the total for masters degrees awarded is 105 and not 88 as in Table 3.38.

3.7.2 Distribution of degrees awarded in 1996 at technikons by race and gender

The two doctorates awarded at technikons in 1996 were obtained by a White male and a White female. As Table 3.40 indicates, of the females, only White females were awarded masters degrees (15) and the vast majority (64 out of 73, or 88%) of masters degrees awarded to males went to White males.

Table 3.40 : Distribution of degrees awarded at technikons in 1996 by race and gender

	Masters		Doctorates		Totals	
	No	%	No	%	No	%
African females	0	0%	0	0%	0	0%
African males	5	6%	0	0%	5	6%
White females	15	17%	1	50%	16	18%
White males	64	73%	1	50%	65	72%
Coloured females	0	0%	0	0%	0	0%
Coloured males	1	1%	0	0%	1	1%
Indian females	0	0%	0	0%	0	0%
Indian males	3	3%	0	0%	3	3%
Totals	88	100%	2	100%	90	100%

Source: SAPSE 1996 Table 2.13 for technikons.

Note: Natal Technikon data is not included in this table and thus the total for masters degrees awarded is 88 and not 105 as in Table 3.39.

3.7.3 Degrees awarded at technikons in 1996 by CESM categories

As might be expected, an analysis of the CESM categories in which the masters degrees were awarded at technikons in 1996 reveals a vastly different focus in comparison to the universities, one which reflects the historical emphasis of the former institutions on the more practical and professionally-oriented specialisations. Of particular note in Table 3.41 below is that just less than half (46 or 44%) of all masters degrees awarded were in the CESM category of Engineering & Engineering Technology. The second ranking specialisation for masters degrees was Health Care & Health Services but this was exactly half of the Engineering figure at only 23 or 22%. However, together, Engineering and the Health Sciences constituted two-thirds (66%) of all technikon masters degrees in that year. The next three highest CESM categories in which masters degrees were awarded were Business, Commerce & Management Sciences (13 or 12%), Life Sciences & Physical Sciences (6 or 6%), and Arts, Visual & Performing (5 or 5%). Together, 93 or 89% of all masters degrees were awarded in these five CESM categories.

Many of the CESM categories in which no masters degrees were awarded are what might be considered traditional university or academic fields, including Language, Linguistics & Literature; Law; Philosophy, Religion & Theology; and Psychology.

Table 3.41 : Masters degrees awarded at technikons in 1996 by CESM categories

CESM categories	Masters degrees awarded	
	No	%
Engineering & engineering technology	46	44%
Health care & health sciences	23	22%
Business, commerce & management sciences	13	12%
Life sciences & physical sciences	6	6%
Arts, visual and performing	5	5%
Computer science & data processing	3	3%
Education	3	3%
Agriculture & renewable natural resources	2	2%
Architecture & environmental design	1	1%
Home economics	1	1%
Social sciences & social studies	1	1%
Industrial arts, trades & technology	1	1%
Language, linguistics & literature	0	0%
Law	0	0%
Libraries & museums	0	0%
Mathematical sciences	0	0%
Military science	0	0%
Philosophy, religion & theology	0	0%
Psychology	0	0%
Public administration & social services	0	0%
Communication	0	0%
Totals	105	100%

Source: SAPSE 1996 Table 2.13 for technikons, and the Natal Technikon Graduate Ceremony Programme 1996

Note: Natal Technikon data is not included in this table and thus the total for masters degrees awarded is 105 and not 88.

In summary, there were some significant differences between universities and technikons in terms of the degrees awarded in 1996. Firstly, universities awarded considerably more doctoral degrees than technikons (699 versus 2) although figures for the technikons are likely to increase in the future. Secondly, while the Life Sciences, Engineering & Health Sciences CESM categories featured high on the lists of both university doctoral awards and technikon masters awards, technikons awarded a much greater proportion of degrees in Business, Commerce & Management Sciences, and the Visual & Performing Arts than did universities. There were, however, similarities between the two types of institutions insofar as the majority of masters and doctoral degrees were awarded to White males, and within historically advantaged institutions.

3.8 Key points and commentary

The distribution of doctoral degrees awarded in South African universities in 1996 was very skewed. This was true for the distribution across individual institutions and institutional sub-types, and in terms of who doctoral degrees were awarded to in relation to race and gender categories. The concentration of doctoral degrees around a selection of fields of study is also evident – in general showing little relation to the most pressing social, economic and political development needs of the country. In addition, the enrolment figures for the 5 084 doctoral candidates in 1996 show that little change can be expected in the near future. The following discussion highlights some of the most pertinent results of the analysis and discussion in this chapter.

In absolute numbers, South Africa produces relatively few doctoral graduates in comparison to advanced industrial countries (AICs) such as the United States and the United Kingdom. Clearly, as a developing country, South Africa does not have the long history of doctoral education nor the kind of funding for advanced postgraduate higher education that AICs do. South Africa also has a lower base of science and technology and less of an emphasis on high-level training. However, the small number of doctorates awarded in 1996 is probably also attributable to the fact that the apartheid system allocated most of the financial and other resources to the small White minority to pursue doctoral education. This is particularly pronounced when one considers that in the UK in 1997, 190 doctorates were awarded per million of the population and in the US around 158 per million. If the same analysis is applied to the White population in South Africa, it is apparent that they are not far behind these AICs with 135 per million of the population. By contrast, if the same calculation is done for all population groups in South Africa, the average per million of the population drops to 16. From this point of view, South Africa falls within the developing country band along with countries such as Brazil and Argentina which awarded 18 and 11 doctorates per million, respectively. As indicated in Chapter 1, the low participation and graduation rates at the doctoral and masters levels are recognised in the White Paper 3, and the National Plan for Higher Education (2001) calls for substantial increases in these areas.

At an institutional level, the distribution of both masters and doctoral degrees awarded in South Africa in 1996 was very skewed in favour of the HAUs and HATs. In broad terms, no less than 84% of all the university doctorates awarded that year were awarded at the six Afrikaans and the four English HAUs, with an additional 13% awarded at Unisa. Similarly, in 1996, the two doctorates awarded at the technikons, and 92% of all the masters degrees, were awarded at HATs. It is also interesting to note that except for Indian females, the majority of doctorates awarded at universities across all the race and gender categories were either at Afrikaans or English HAUs. The doctoral awards at universities were even further concentrated around a few

institutions, with over three-quarters (78%) awarded at only seven universities (Pretoria, Unisa, Natal, Cape Town, Stellenbosch, Witwatersrand and Rand). Similarly, four-fifths (83%) of the masters degrees awarded at technikons were concentrated around five institutions, namely Pretoria, Port Elizabeth, Cape, Natal and Witwatersrand Technikons.

The reasons for this concentration are historical and, amongst others, are related to the structure of the higher education system and the unequal allocation of resources associated with the apartheid era. On the one hand, the HAUs were invariably better resourced with regard to research funds and facilities (such as laboratories), as well as the qualified staff required to supervise postgraduate students. At the same time, because the HDUs were established mainly as undergraduate teaching institutions for the African, Coloured and Indian population groups, their research capacity went undeveloped. The HAUs were thus well-placed in comparison to their black counterparts to provide doctoral training. This is no doubt still the case as relatively limited change has taken place in terms of equalising the resources of historically advantaged and disadvantaged institutions. As indicated in Chapter 1, both the National Plan for Higher Education (2001) and the White Paper on Science & Technology (DACST 1996) acknowledge this and indicate the government's intention to build the research capacity of the latter institutions, particularly where potential is demonstrated. This has already been taken up by the National Research Foundation (NRF) in the form of their University and Technikon Research Support Programmes.²⁷ Whether these programmes will result in an increase in doctoral graduate outputs is still uncertain.

The effects of the racial discrimination of apartheid, as well as gender discrimination, on the participation in doctoral education of African, Coloured and Indian people, as well as women, are highly apparent in the data. Overall, the vast majority of doctoral degrees (608 or 87%) awarded at universities in 1996 were awarded to White candidates and almost two-thirds of these (383 or 63%) were awarded to White males. This profile was also evident in the distribution of masters degrees at universities and technikons where 1 850 or 46% masters degrees at universities and 6 198 or 32% at technikons were awarded to White males. In many other respects, the dominance of Whites, and particularly White males, is evident.

The analysis of the data relating to the distribution of doctoral degrees across the three NRF clusters (broad fields of study), CESM categories and sub-CESM specialisms produced some interesting and sometimes startling results, both in terms of the concentration of doctoral graduates in a small selection of specialisations, as well as the skewed distribution with regard to the race/gender categories. In the universities, the distribution of doctoral and masters degrees awarded across the three NRF clusters was very skewed in favour of the Social Sciences & Humanities (56% and 66%, respectively). Significantly, this applied across both

gender categories. Within the Natural Sciences & Engineering, there were more than double the number of male than female graduates, which is to be expected as this field of study has traditionally been a male preserve. It is also notable in this regard that White women were awarded a much higher number of doctorates in the Natural Sciences than women in the other racial categories (67 versus 1 each for African and Indian females) which suggests that White women have had far greater success in breaking into this traditionally male field.

The doctorates awarded were also clustered around a selection of the 22 CESM categories: over four-fifths (83%) were awarded in the eight CESM categories of Life Sciences & Physical Sciences (20%); Education (14%); Philosophy, Religion & Theology (10%); Health Care & Health Sciences (10%); Engineering & Engineering Technology (8%); Languages, Linguistics & Literature (7%); Social Sciences & Social Studies (7%); and, Psychology (6%). The gender imbalances within the Life Sciences & Physical Sciences category, as well as the large gap between White and other racial categories, were clearly evident as the majority of doctoral degrees were awarded to White males (74 out of 138, or 54%) and White females (47 or 34%). The doctorates in the Life Sciences were also concentrated around a few sub-CESMs and together, Chemistry, Zoology and Botany accounted for just over half (74 or 54%) of all the doctorates awarded in this category.

The Education CESM category accounted for the second highest number of doctoral graduates overall (99 or 14%). While the majority of these degrees were awarded to White males and females, this CESM category stood out as being unique in that it was the only category in which all the race/gender categories were awarded doctoral degrees. Significantly, one-third (16 or 35%) of the African males and two-fifths (6 or 42%) of the Indian males obtained their doctorates in Education. Over four-fifths (84 or 83%) of the doctorates awarded in Education were in the sub-CESMs of All Other Education, and Secondary Education.

The third highest number of doctorates awarded by CESM category were in Philosophy, Religion & Theology (74 or 11%). Again, the majority were awarded to White males (61 or 83%) although this was also a significant category for Coloured males who received just over one-quarter (3 or 27%) of their doctorates in this category. Almost two-thirds (44 or 60%) of all the doctorates awarded in Philosophy, Religion & Theology were in the sub-CESM of Christianity. Of these, 39 (or 89%) were awarded to White males.

Relatively few doctorates were awarded in the remaining CESM categories. Some of these represent fields in which this country urgently requires expertise in terms of pressing social, economic and political needs, for example, Public Administration & Social Services, Agriculture & Renewable Resources, Mathematical Sciences (important for, amongst others, renewable

²⁷ www.nrf.ac.za/

resource management), and Computer Science & Data Processing. It will be interesting to see how institutions respond to what the government regards as the most urgent areas of expertise needed in South Africa, as outlined in the Education White Paper 3 (DoE 1997), the White Paper on S&T (DACST 1996) and the new NRF research priorities.²⁸ The implications of the skewed distribution across fields of study are considered in greater detail in Chapter 5.

The analysis of the distribution of doctoral degrees awarded at the micro level of sub-CESMs revealed some of the most important and novel findings of this research. The highest number of doctorates awarded at the sub-CESM level were in All Other Education (52 or 7%) followed by Christianity (44 or 6%) and All Other Psychology (37 or 5%). The doctoral degrees awarded to White males, White females and to African males were also slightly clustered. For instance, the highest proportion of doctorates awarded to White males was in Christianity (39 or 10%) and the second highest in Zoology (19 or 5%). Of those doctorates awarded to White females, All Other Education and All Other Psychology were the highest proportion at 10% (22) each. These were followed by Botany at 5% (12). The vast majority of doctorates awarded to African males were in one of two fields of education, including All Other Education (7 or 15%) or Secondary Education (6 or 13%). The doctoral degrees awarded to the other race/gender categories were too few in number to discern any clustering around specific sub-CESMs.

The analysis of the distribution of masters degrees awarded across the various fields of study reveals a very different picture from that of the doctorates. Of significance was that one-fifth (21%) of all masters degrees were awarded in the Business, Commerce & Management Sciences CESM category, followed by Health Care & Health Sciences at 11%. This suggests that there is a greater emphasis at the masters level on professionally-oriented fields of study, in comparison to the more traditional, academic focus of the doctoral degrees awarded.

The clustering of doctoral awards in such a small number of fields could be interpreted in a number of ways. For instance, the fields of study in which the majority of degrees were awarded are quite traditional and basic disciplines in universities (for example, Life Sciences, and Philosophy, Religion & Theology). These fields have a longer tradition in doctoral education in comparison to many of the "newly emerging and applied sciences" (Guo 2000:33) and thus it is more likely that they are associated with advanced levels of study. As a result, many universities do not offer doctoral degrees in the newer fields. Guo also argues that the particular distribution across fields of study might be linked to the influence of academic supervisors' own "specialities and expertise" (ibid).

²⁸ The focus areas for NRF research support activities were listed in July 2001 as Unlocking the Future; Distinct SA Research Opportunities; Ecosystems and Biodiversity; Sustainable Livelihoods; Growth and Competitiveness; ICT and Information Society; The Globalisation Challenge; Indigenous Knowledge Systems; Education and the Challenge for Change (www.nrf.ac.za/).

Johnson & Coward (2000:9) argue that demands for doctoral graduates and university research from business and industry also tend to be clustered in certain sectors which leads to clustering in the distribution of awards across fields:

... for certain disciplines there is a strong tradition of producing trained people for the private sector – e.g., the biological sciences in Argentina; the information technology (IT) industry in India; and engineering in Japan.

According to Professor Reddy (Dean of Science at the University of Cape Town),²⁹ this might well explain why many more doctorates were awarded in Chemistry as opposed to Physics. He argued that the chemical industry in South Africa (including companies such as Sasol and AECI, as well as pharmaceutical companies which are developing drugs for the treatment of tuberculosis and HIV/AIDS) is well-established, and that there are many employment opportunities for chemistry graduates. By contrast, the physics-related industries in South Africa are underdeveloped, job opportunities for Physics graduates are very limited, and thus it is difficult for physics departments to attract students.

The skewed distribution of doctoral awards across fields of study might also be related to specific interest groups in this country. For example, the concentration of doctorates awarded to White females in Botany and to White males in Zoology might well reflect the emphasis on environmental conservation in this country. Professor Reddy commented that in the Western Cape, where there is considerable interest in and concern about the marine ecology and the 'floral kingdom', that it is easy for faculty "to sell ideas for research in these areas". This is no doubt the case in other regions of the country in relation to our conservation ethics about our environment. Professor Reddy also commented that there are plenty of employment opportunities for graduates, particularly in Zoology, such as in environmental management and consultation.

Professor Louw (Dean of Theology at the University of Stellenbosch)³⁰ provided some useful insights into the high proportion of White males awarded doctoral degrees in Christianity (39 or 10%). He informed me that over the past 300 to 400 years within the Dutch Reformed Church (DRC) there has been an "unspoken law and tradition" amongst the church elders that ministers should be educated to the highest level possible. In this context, a doctoral degree is not a prerequisite for a position in the ministry, but rather a preferred level of intellectual development. The types of research that one might undertake in a PhD degree in Christianity range from hermeneutical investigations of ancient scriptures, to the modern milieu within which the church operates. This might include investigations into medical ethics, or issues around abortion. Thus, there is a strong 'internal' pressure within the DRC for their ministers to advance their scholarship via PhD degrees which is reflected in the data in this chapter.

²⁹ Personal telephonic communication, August 2001

³⁰ Personal telephonic communication, July 2001

The analysis of the distribution of doctoral degrees awarded at the seven universities which awarded the highest number of doctorates also revealed some interesting points. Firstly, the highest number of doctorates awarded at Pretoria, Stellenbosch, Natal, Cape Town and Witwatersrand universities was in the CESM category of Life Sciences & Physical Sciences. While the spread across the sub-CESMs within this CESM category varied, Chemistry appeared among the top-ranking sub-CESMs at each of the universities. Rand University and Unisa stood out as unusual in that the majority of the doctorates awarded were in the Education CESM category. And, interestingly, Unisa was the only one out of the seven universities which did not award any doctorates in the Life Sciences & Physical Sciences CESM category.

What was clear was that while each of these seven universities exhibited a unique profile of doctorates awarded across the CESM categories, indicating 'niche' areas, there were some similarities between them. For example, both Pretoria and Stellenbosch awarded the majority of their doctorates in the Life Sciences & Physical Sciences, followed by Philosophy, Religion & Theology. Cape Town and Wits, on the other hand, awarded the majority of their doctorates in the Life Sciences, followed by Health Care & Health Sciences, and Engineering & Engineering Technology. Despite these patterns, however, policy relating to doctoral education in South Africa could consider the ways in which these 'niche' areas could be strengthened at these institutions in the future, and thereby avoid duplication and overlap.

The analysis of the degrees awarded at technikons in 1996 was restricted largely to the analysis of masters degrees, as only two doctoral degrees were awarded that year. Both the doctorates were awarded at HATs (Pretoria and Cape Technikons) and one each was awarded to a White male and a White female. This extremely small number of doctorates awarded at technikons was one of the differences observed between the universities and technikons, which is not unexpected considering that technikons have only recently begun offering doctoral-level degrees. This raises policy questions in relation to whether doctoral degrees should be encouraged and developed at technikons, particularly as doctoral-level study helps to develop undergraduate teaching and strengthens the overall culture of scholarship in departments.

The other difference between the two institutional types was the greater proportion of masters degrees offered in the Natural Sciences & Engineering, and the Health Sciences at technikons as opposed to universities. Again, this might be expected in light of the emphasis on science and technology in technikons. There was very little difference between the universities and technikons in relation to the large proportion of degrees awarded to White males, and within the historically advantaged institutions.

With this selective profile of doctoral education in South Africa in mind, I now turn to an examination of some of the critiques of the traditional PhD programme in universities in the United States, and the responses in the form of add-ons and improvements that have been the focus of policy development and change. I then discuss the development of the professional doctorate, particularly in Australia, as an example of innovative reform in doctoral education.

University of Cape Town

CHAPTER FOUR: INTERNATIONAL DEBATES AND REFORMS AROUND DOCTORAL EDUCATION

4.1 Introduction

In Chapter 1, some of the major developments internationally which have sparked debate around the purpose and form of higher and doctoral education,¹ were highlighted. Briefly, these included:

- The impact of globalisation and the rise of the 'knowledge society' on higher education. This is associated with an emphasis on information and knowledge production for global economic competitiveness; the increase in sites of knowledge production outside of the university; partnerships between universities, business, industry and governments; and changes in the definition of research encapsulated in the shift towards Mode 2 knowledge production.
- Changes in the funding of higher education institutions, as well as the enrolment trends and profile of candidates within doctoral education.
- Changes in employment opportunities for doctoral graduates.

The debates include a range of concerns relating to doctoral education and specifically research doctorates or the PhD. There have also been a number of responses to these critiques. There are those who fiercely defend the traditional PhD degree² and argue for its retention in its current form. People who support this argument usually make reference to the long "history of successful training of humanists, social scientists, and scientists" (Nyquist & Woodford 2000:8). Others, however, have taken to reform in both policy and practice in relation to the changing demands on doctoral education.

For the purposes of this study, two sets of case studies of reform are brought into view. The first cluster embodies initiatives mainly in the United States which seek to improve problematic aspects of the traditional PhD programme (coursework and thesis) without fundamentally restructuring the degree. Typical of this camp of reformers are the individuals and institutions involved in the *Re-envisioning the PhD* project³ in the US which, as the project title suggests,

¹ The terms 'doctoral education', 'PhD education' and 'PhD training' are used throughout this chapter in reference to research doctorate programmes, for which there are a range of degree titles as outlined in Chapter 2.

² The term 'traditional PhD' is used here to refer to the research and thesis form of the degree which is typical of the PhD programmes in most Anglo-Saxon countries, including South Africa, as well as many other countries in Europe, Asia and Latin America. In reference to the United States, however, this definition is widened to include coursework which forms a significant portion of American PhD programmes.

³ See Appendix 5 for a description of this project.

recognises the need for rethinking and reform – although in ways that do not alter the core features of the degree.

The second set of reforms represent a shift away from the traditional European and Anglo-Saxon PhD degree with its sole emphasis on academic research, a thesis and new knowledge production within a traditional discipline. In countries such as Australia, New Zealand, Canada and the United Kingdom, the development of *professional* doctorates – based to some extent on the American model⁴ – has been an attempt to address the 'globalisation' developments outlined in Chapter 1.2, and particularly the shift towards Mode 2 knowledge production. While research is also an important component of many professional doctorates, the fundamental emphasis is on *improving professional practice*, often in more transdisciplinary ways.

This chapter is thus structured in the following way. It begins with a discussion of the critiques of the PhD degree in the general literature around doctoral education, as well as those which have been the focus of a number of research projects conducted mainly in the United States. One should thus bear in mind that the debates discussed here are mostly relevant to AICs, including European countries such as France and Germany (Johnson & Coward 2000:7), and that the American PhD includes coursework as well as research. This discussion is combined with examples of the first type of reform mentioned above – namely improvements to the current form and structure of PhD programmes without any fundamental change to the degree itself. Not all of these issues are immediately relevant to the South African context; I think here specifically of the 'oversupply of PhDs' in the United States and the lack of faculty positions available to absorb them. However, as was highlighted in Chapter 1, the National Plan for Higher Education (2001) calls for an increase in our doctoral participation and graduation rates. The American case provides some insight into the kind of issues which might arise if and when our enrolments increase.

The second part of the chapter focuses on a case study of the development of the professional doctorate in Australia, with brief reference to other countries. The professional doctorates in Australia represent a fundamental reconceptualisation of PhD education and are included here as they reflect some very innovative ideas which would make for interesting debate in South Africa. A more detailed investigation of the Australian case was made possible by easy access to recent literature. Essentially, the professional doctorate embraces both a concept and a practice which are largely missing from the doctoral education landscape in this country.⁵ Section 4.3 outlines the conceptual framework for these doctoral programmes, and attempts to identify, in terms of structure, how they differ (or not) from the traditional PhD degree. The

⁴ See section 4.3.1 below.

⁵ Elements of the professional orientation to doctoral education have begun to emerge in some South African PhD programmes such as the PhD in Public and Development Management at the University of the Witwatersrand, or the PhD in Education at the University of the Free State (see Chapter 2.3).

discussion concludes with a selection of case studies of professional doctorate programmes which includes examples from countries other than Australia. Each of these has been selected as an example of a type of, or aspect of, a professional doctorate programme.

4.2 Critiques and reforms around the PhD degree

The macro developments outlined in Chapter 1 have been major factors leading to the closer examination of the traditional PhD degree in many countries. While the specific contexts of doctoral education in these countries differ, there are a number of issues which appear to be of common concern to all. The following discussion draws on a selection of five research projects, conducted over the period of 1994 to 1999, and other literature. All but one of the studies were conducted in the United States and therefore this review is largely a case study of American concerns and reforms. However, as suggested earlier, these are also applicable to AICs such as Germany or France. In addition, the Dinham & Scott study (1999) which included respondents from Canada, the United Kingdom, Australia and New Zealand, showed no major 'country' differences. This signals that generally speaking the critiques in the American context are applicable elsewhere.

Descriptions of each of the five projects reviewed here are provided in Appendix 5. These studies detail the experiences and problems of individuals both during and after their doctoral candidacy, as well as the view from business and industry on doctoral education. The range of concerns and recommendations relating to PhD programmes which emerged from these studies is discussed below according to three broad themes. These include the skills and competencies which PhD graduates acquire; the experience of undergoing doctoral education from the viewpoint of doctoral candidates – both past and present; and finally, race and gender equity in doctoral education. Mini case studies of reforms or improvements to PhD programmes are included in the discussion.

4.2.1 The nature of PhD training in relation to employment requirements and opportunities

Inadequate preparation for faculty positions

A number of authors have documented findings which indicate that PhD graduates are ill-prepared to undertake the range of responsibilities, other than research, associated with a faculty position. Nyquist & Woodford (2000:5) mention such responsibilities as including "teaching, collegial evaluation, collective and individual curricular planning, and service to the college, university, and community". Doctoral candidates in the same study echoed these

concerns and commented that their teaching and research assistant experiences did not equip them for the range of other faculty involvements including "committee work, service, teaching across disciplinary lines, faculty governance and institutional politics" (Nyquist & Woodford 2000:13).

It was argued by respondents from universities and colleges in the Nyquist and Woodford study (2000:10) that doctoral candidates are socialised into a particular set of values that prioritise their own research over all else. These respondents associated this with the emphasis on specialisation and individualism inherent in the traditional PhD programme. One of the respondents from a university commented that: "Even though we attempt to be perfectly clear during the interview process about our priorities, new faculty try to change us because of the value system they have acquired during graduate study that puts research before anything else" (ibid).

The lack of preparation for faculty teaching appeared to be the greatest concern (Golde & Dore 2001:21; Murray 2000). It was reported that, in most cases, the only exposure PhD students have to teaching at the undergraduate level is the teaching assistantships offered by departments. As Golde & Dore (2001:22) observe, the emphasis is usually on financial aid and creating "a labor pool of junior instructors" rather than a serious teaching apprenticeship. This is apparently more pronounced in the sciences than in the humanities and social sciences. As a result, PhD graduates lack "training in designing courses, developing curricula, and the more active learning pedagogies" (Nyquist & Woodford 2000:10).

Recommendations which emerged from the research suggested that faculty and university administration needed to critically review their PhD programmes in light of these problems and that resources and support need to be provided for programmes that will better equip future members of faculty (Golde & Dore 2001:46, 47). Specifically, Golde & Dore (2001:45) recommend that faculty actively encourage their doctoral students to learn about "academic citizenship" by involving them in governance and decision-making, curriculum planning, and in interactions and projects with the broader community. With regard to teaching responsibilities, these authors suggest that future faculty are trained in how "to motivate learners, assess learning, and use technology for instructional purposes" (ibid). And, to avoid the assumption that PhD graduates learn how to teach through observing their own lecturers at work, teaching skills should be demonstrated and assessed (Nyquist & Woodford 2001). The following case study is an example of a national initiative to address these particular concerns around PhD training.

The "Preparing Future Faculty" programme

<http://www.preparing-faculty.org/PFFWeb.Contents.htm>

The Preparing Future Faculty (PFF) programme is a national initiative in the United States that is sponsored mainly by the Council of Graduate Schools and the Association of American Colleges and Universities. Established in 1993, the programme includes 43 doctoral degree-granting institutions and over 295 partner institutions. The aim of the PFF programme is to fundamentally transform the way in which future faculty (doctoral students) are prepared for the variety of faculty responsibilities which are broadly grouped into research, teaching and service.

By participating in a PFF programme, doctoral students are given the opportunity to observe and experience faculty responsibilities at a variety of academic institutions with varying missions, diverse student bodies, and different expectations of faculty. This is achieved through the cluster approach. The cluster comprises a doctoral degree-granting institution as the anchor institution, in partnership with a range of other types of academic institutions such as a liberal arts college, a community college and a masters university. Working in these different settings, the doctoral students participate in various learning activities which range from getting teaching experience, to working with a teaching mentor, observing faculty committees, and learning about faculty governance, amongst others. As part of the PFF programme, each participating student is provided with a number of mentors who provide support and feedback relating to the student's research and teaching activities.

The national PFF programme has been taken up by academic institutions in different ways ranging from campus-wide initiatives to departmentally-based PFF programmes to institutions that have implemented only some of the PFF elements.



Inadequate preparation for employment outside of academia

Chapter 1 highlighted that increasingly research is taking place in business and industry and that this has resulted in a greater number and diversity of employment opportunities for doctoral graduates. And as enrolments in doctoral education increase, particularly in the AICs, universities are unable to absorb all the graduates into employment. It is fortuitous that there is supply and demand from both sides. Not surprisingly though, this closer interaction between doctoral education located within universities, and business and industry, has brought into question whether PhD programmes are adequately preparing graduates for employment outside of the university setting.

While responses from many stakeholders indicate that doctoral education provides high quality research training, there is wide disagreement about whether research should be the *only* kind of training that PhD candidates receive (Golde & Dore 2001:12; Nyquist & Woodford 2000:5). The Nyquist & Woodford study (2000:6) indicated a divide amongst respondents between those who considered the PhD degree to be a *research qualification* which would prepare students for academic life, and those who viewed the PhD as involving a much *broader professional preparation* which would open up a range of career opportunities for graduates.

Much of the feedback from business, industry and the public sector reflects this latter view and has highlighted some of the deficiencies in PhD training for employment in these sectors. Firstly, private sector employers have taken issue with what they regard as the narrow disciplinary research focus and overspecialisation inherent in the PhD experience. Some have argued that PhD graduates tend to lack contextual knowledge and understanding about the world beyond the university and their thesis topic (Nyquist & Woodford 2000:5). This inhibits the graduate's ability to apply the skills they acquire during the doctoral process to contexts outside of the university setting (Murray 2000).

A related concern centres on the need for generic skills necessary in the business world, including planning and time management, communication skills, occupational health and safety, and management principles (Borbasi, Pearson & Gott 1998:69). Perhaps this perceived deficiency is more pronounced in the natural sciences and engineering, for in social research, interpersonal and communication skills, time management, and updated information relating to the wider social, political and economic contexts within which one lives, are integral to the research process.

Finally, business and industry leaders have argued that PhD graduates lack the capacity for interdisciplinary or transdisciplinary, and collaborative or team-based work (Murray 2000; Nyquist & Woodford 2000:5; Roseth 2000:47). A doctoral graduate in Kerlin's study (1995b:24) commented that as junior faculty, one is usually penalised for collaboration, and aptly summarised this traditional university view as: "How can we count that article towards tenure if we can't be sure how much of it you wrote and how much your co-author wrote?" The same candidate juxtaposed this view point with his experience in a non-academic setting where the prevailing attitude towards collaboration was: "Of course we work on our projects in teams – the results are much better that way".

Respondents suggested that in terms of improving PhD training for both faculty and other types of positions, doctoral students need opportunities to understand and interact with disciplines other than their own, and to work in interdisciplinary teams (Nyquist & Woodford 2000:8-9). Both doctoral students and faculty members should be given opportunities to spend time in industry settings, as well as in government or non-governmental contexts (Nyquist & Woodford 2000:17, 20). Perhaps in the form of an internship, students could explore the professional options available and learn more about the different "culture" of a private sector environment. Faculty members could keep abreast of changes in their field in practice, which would better equip them to help their students. As one representative from industry commented, "Nearly two thirds of PhDs in chemistry go into industry, and yet academicians, by and large, have very little idea of what it takes to succeed in industry and exactly what goes on" (Nyquist & Woodford 2000:18). Other suggestions were to invite alumni who work in non-academic careers to speak to

prospective and existing PhD candidates, and to incorporate professional development seminars into the PhD programme (Golde & Dore 2001:46, 47).

However, only some disciplines have, over time, developed good connections with industry and government (Golde & Dore 2001:17) and thus have any real sense of the skills and competencies needed by these sectors. And, as Golde & Dore discovered in their survey, faculty were far more inclined and better equipped to assist graduates in finding academic positions, than to encourage or identify employment opportunities outside of academia (Golde & Dore 2001:19). Perhaps the most insidious issue is that in faculty and PhD circles there was frequently a stigma attached to the idea of PhD graduates seeking employment outside of academia (Roseth 2000:47):

Students still acquire from their mentors the belief that, if they want to be regarded as at the top of their fields, their career choice should be academia; those who choose to work in the private sector are made to feel like second-class citizens.

Nerad & Cerny (1999:2) confirm this idea with their finding that faculty considered it a failure on the part of doctoral graduates if they did not find a faculty position. More is said about the link between the form of doctoral education and the demands of business and industry in the conclusion to this chapter.

The following two case studies represent initiatives that seek to address the reported inadequacies in PhD training with regard to preparing students for careers outside of academia. The second case is notable insofar as it provides an example of developments in Belgium.

The Preparing Future Professionals Programme at the Arizona State University

From the *Promising Practices in Doctoral Education* web site
<http://depts.washington.edu/envision/p406.htm>

The Graduate School of the Arizona State University has implemented a comprehensive professional development programme that is designed to assist in the training of doctoral students who wish to establish non-academic careers. The programme is a collaborative effort between the Graduate School and various departments and graduate programmes, university student support and administrative agencies, business and industry, and scholars and experts in the area of professional development for graduate students.

The programme comprises two broad components. The first provides doctoral students with the opportunity to interact with doctoral alumni who have successfully entered non-academic careers in the form of a Career Panel Series. The panels include either discipline specific or cross-disciplinary discussions to provide students with insights and information from both perspectives.

The second component of the programme is the series of Career Training/Development Workshops and Education Forums which seek to equip doctoral students with a range of career-related skills. The workshops include:

- Career exploration and goal setting: (i) assisting students to identify their career aspirations and potential career paths, and match these with their academic qualifications; (ii) providing information about career resources available on campus, career planning, the career

placement realities of doctoral graduates, and the pros and cons associated with pursuing academic and non-academic careers.

- Resume development, and skills around preparing for and coping with interviews.
- Business skills including writing or conducting presentations in non-academic business settings.
- Entrepreneurial skills workshops provide students with methods, tips and strategies for starting their own businesses.

The Doctoral Study Programme in the Sciences and Pharmaceutical Sciences at the University of Antwerp, Belgium

<http://pavo-www.uia.ac.be/pavo/docop/engdoc/infowetfarme.html>

"In Belgium and in some other European countries, obtaining a PhD degree used to be based mainly on the philosophy of 'learning-by-doing' under the exclusive guidance of a supervisor. In many cases, a PhD guaranteed a secure academic career.

This career pattern is no longer evident. Today many, if not most, doctors have to prove themselves outside the university and higher education. After a period of specialisation, the PhD student ends up in a labour market which is often looking for people who are scientifically highly qualified, but which also formulates extra demands, including flexibility, communicative skills and knowledge of languages. The belief that the necessary skills will be acquired during the professional activity is outdated in the context of today's competitive labour market." (Regulations and administrative procedures for the Doctoral Study Programme Science-Pharmaceutical Science at the University of Antwerp, 2000)

This was the rationale for the establishment of the Doctoral Study Programme (DSP) at the University of Antwerp in the early 1990s. According to Baumgart & Linfoot (1998:115), this new form of doctoral programme is one of a number of such initiatives in Western Europe "in which scientists not only acquire specialised knowledge through their research but apply that knowledge in political, economic, social and cultural contexts". The DSP is compulsory for PhD students in Science or Pharmaceutical Science within the European Community although foreign students are also invited to participate on a voluntary basis. It is completed over a four year period.

The basic premise of Antwerp's DSP is to extend the PhD graduate's knowledge both within and beyond his/her discipline and the university. In the discipline-related activities, the aim is to broaden the student's knowledge in terms of the discipline, as well as in his/her particular area of specialisation. The non-discipline related activities might include multidisciplinary activities, the development of communication and language skills, or courses in stress management, computer literacy or local economics. There is no prescriptive format for the programme of activities which is developed between the individual student and his/her supervisor. The following options might be included in a student's programme of activities:

- Attendance at summer schools, congresses, workshops or symposia as either a passive or active participant (poster presentations, guest speaker or giving a lecture)
- Taking additional courses within other postgraduate programmes, language courses, in-service training sessions – either with or without examinations
- Teaching a class, giving lectures, leading practical training or tutoring, or supervising the development of a thesis
- Making presentations at, for example, professional meetings
- Writing – reports, scientific publications, articles for popular publications; or refereeing academic articles
- Representation on university committees.

Progress of the students' work is documented in files – one each dedicated to the discipline- and non-discipline related aspects of the programme. The files are essentially detailed records of all the activities that the student has participated in and are evaluated annually by the student's supervisor, as well as the DDC and the Faculty PhD Committee. The evaluation

culminates in the award of the earned credits for the past academic year, the majority of which are for the discipline-related activities. Recognition of the completion of the DSP is made through the award of a certificate which is granted at the same time as the candidate receives his/her PhD award.

The focus in these initiatives is on the professional development of doctoral students through career information and generic skills development. They reflect the impact of the global economy, and some elements of Mode 2 knowledge production. For example, these initiatives depend on partnerships between the university, business and industry. They also require a degree of institutional change through which the activities of departments are extended beyond their disciplinary interests – that is, they are tending towards the transdisciplinarity characteristic of Mode 2 knowledge production.

4.2.2 The process and experience of undertaking a PhD degree

② The lack of clarity surrounding the process of acquiring a PhD degree

It holds true for many students at both the masters and doctoral levels that the process of acquiring the degree is in many ways a mystery. While the majority of the students in Golde & Dore's study reported being clear about the formal requirements of their doctoral programmes, they were uncertain about what the doctoral process itself entailed and what would be expected of them (Golde & Dore 2001:30, 31, 34). Golde & Dore (2001:29) commented that the "key features that are critical to their success remain murky to them throughout their time in graduate school" (Golde & Dore 2001:29). A doctoral candidate in Kerlin's study put it slightly differently: "The doctorate pursuit is frighteningly vague and arbitrary in its goals, and outcomes sometimes" (Kerlin 1995b:27).

A prime example of this is understanding exactly what the purpose of the PhD thesis is, what skills and competencies it is meant to demonstrate, and what sort of tone and content is deemed appropriate (Kerlin 1995b:4). The following quote provides a humorous slant on this particular concern:

Not only is the PhD dissertation constrained by the requirement that it be original (in the sense of dealing with material never dealt with before) and dull; it must also conform to the prejudices of the examiners. In other words, it must not be too original. Especially on the theoretical side, it must be compatible with the current 'thinking' in the field. It must not be too advanced, and it must have no truck with notions now considered obsolete (although in fact these obsolete notions often return in time as the latest findings). It thus manages the not inconsiderable feat of being both stultifying and capricious. (Smith in Kerlin 1995b:4-5)

The responsibility for this problem lies in the hands of both students and faculty. Golde & Dore (2001:29) suggest that students ask appropriate questions that will provide the necessary information along the way. At the same time, faculty should attempt to communicate the norms

and requirements of the doctoral programmes more clearly to students, and to change these when "it would be educationally beneficial to do so" (ibid).

Supervision

There is no doubt that the supervisory relationship plays a critical role in the success of the degree process and can make or break the doctoral experience for the student concerned. The issues and concerns relating to the supervisory relationship are numerous. They include, for example:

- A lack of understanding on the student's part of what s/he may expect from his/her supervisor (Golde & Dore 2001:37)
- Inadequate support, guidance and direction from supervisors (Dinham & Scott 1999:46)
- Insufficient time made available by supervisors – often because of other faculty commitments or an overload of graduate students to supervise (Dinham & Scott 1999:46)
- Inadequate knowledge of the field of research and/or methodology on the part of the supervisor (Dinham & Scott 1999:49; Kerlin 1995b:18)
- Discriminatory practices on the part of the supervisor, for example, racism, sexism or homophobia (Dinham & Scott 1999:49; Kerlin 1995a:10; Kerlin 1995b:19, 25)
- Conflicting ideas about the topic, approach etc of the research (Dinham & Scott 1999:50)
- Personality clashes between student and supervisor (Dinham & Scott 1999:50).

The literature around research supervision provides numerous suggestions and guidelines on improving the process. PhD students in the Nyquist & Woodford study (2000:13) recommended that "mentoring needs to begin earlier, to be more systematic, to be based on a multiple-mentor model and to informally include teaching and curriculum concerns and career planning". Others felt that their supervisors could provide more explicit and concrete direction, give regular and constructive feedback, and provide emotional support (Nyquist & Woodford 2000:14).

Time to degree and dropout rates

There appears to be general consensus that the average time taken to complete a PhD degree is too long and that measures must be taken to remedy what is essentially one of the most difficult aspects of the PhD process for most candidates. According to the American National Research Council, for all disciplines in 1993, the average time to degree was 10.5 years⁶ (Kerlin 1995a:8). The figure relating to the PhD component for the same year in all disciplines in Germany was 4.6 years (Bartelse 1995:9). It also appears that the time to degree is increasing

⁶ Note that in the United States, time to degree is measured from the first year of the bachelors degree.

across all disciplines although the problem is more acute in the European universities, than in the United States or Australia.

Average time to degree differs from discipline to discipline. In general, it seems that it takes longer to complete a PhD degree in the social sciences and humanities than in the sciences. Nerad & Cerny (1999:3), for example, found that the time to degree for PhDs in English was longer than any other discipline, with over half of their sample taking more than 9 years to complete their degrees. In Germany, the average time to degree for the sciences was 4.2 years and the social sciences 5.6 years. The time to degree for the social sciences in England was apparently so lengthy in the 1980s that a special policy was formulated to deal with the issue (Bartelse 1995:9).

Lessening time to degree is a common feature in the reforms in Europe, the United States and elsewhere. Johnson & Coward (2000:7) comment that in Europe, the motivation is primarily related to relieving the financial strain on public funding, which is exacerbated by the relatively high unemployment rate amongst graduates. In the US, the emphasis is on "institutional accountability: students should not be kept for years within an overspecialized doctoral program because of their value as a research assistant to their major professor" (ibid).

Some of the suggestions in this regard involved formally limiting the PhD degree to a specific number of years (around 3 to 4 years) (Nyquist & Woodford 2000:8) which amounts to imposing stricter constraints on candidates. It also relates to defining the "essence" of the PhD (ibid). The debate about whether the PhD degree should be a research qualification, or whether it should also prepare graduates with other skills and expertise, emphasises the difficulties associated with defining this "essence". Others have suggested that supervisors should be penalised financially for lengthy completion times (Nyquist & Woodford 2000:19). In Switzerland, shorter completion times are encouraged through financial award to supervisors whose students complete their PhD degrees in less than four years (personal communication, David Cooper 2001).

Overly long time to degree often results in high drop out rates, usually because of lack of adequate finances to support the candidate over such a long period of time, or "fear of falling behind in the job market" (Murray 2000). Other reasons for student dropout include poor student/supervisor relationships, and general dissatisfaction with the doctoral degree process and/or programme (Kerlin 1995a:8). In the mid-1990s in the United States and Canada, the dropout rate of doctoral candidates was as high as 50% (Kerlin 1995a:3). Nearing syndrome proportions, this phenomenon has come to be called the "ABD phenomenon" – all but dissertation – where students manage to pass their qualifying examinations, even complete coursework components, but never get to the stage of starting and/or finishing the PhD thesis

(Kerlin 1995a:7). This comes at a serious financial cost to the institutions, the individual candidates and society. It also impacts on the job prospects of doctoral candidates (Bartelse 1995:9).

Financial concerns

A common concern for postgraduate students is finances. Nearly a quarter of the respondents who experienced difficulties with the doctoral process in Dinham & Scott's study (1999:21,40) reported financial pressures as being their primary concern. The majority of students undertaking postgraduate degrees depended on financial support in some form or another, such as bursaries or scholarships, bank or other personal loans, tutoring or teaching and research assistantships (Golde & Dore 2001:38). Additional forms of financial support came from the candidate's spouse or parents, full-time or part-time income-generating work outside of the faculty, or company sponsorship. In some cases, more extreme measures were taken such as a doctoral student in art who relied on the sale of his possessions! (Dinham & Scott 1999:39). All in all, enormous student debt is a common scenario for doctoral candidates and, for many, it can take years to pay back the debts incurred. And this is not taking into account the loss of real income for many students throughout the doctoral process (Kerlin 1995b:21).

Strain on personal and family life

PhD candidates have frequently reported the ups and downs they experience during the doctoral process. These include bouts of no self confidence, anxiety relating to the uncertainty of the doctoral process, times of boredom and lagging interest in what they are doing, and fears and uncertainty about future job prospects (Kerlin 1995b:24-25). In addition, undertaking a PhD degree can have detrimental effects on a doctoral student's personal and family life. Dinham & Scott (1999:21-23, 40, 54-55) report a range of these kinds of issues, including:

- Little time for spouse, family and friends (i.e. no personal or social life) which causes conflicts. There were even reports of marriages ending in divorce, primarily because of the pressure caused by the degree process.
- Disruptive for those who have to relocate to a new city or country in order to do a PhD.
- The pressures of living under severe financial constraints.
- Major impacts on personal health, generally owing to stress.

4.2.3 Equity and diversity issues

Issues relating to equity have been a central concern in the new South Africa and various policies have sought to address the inequalities inherited from the apartheid system. The statistics on doctoral degrees awarded in 1996 (Chapter 3) testify to the chronic imbalances in

terms of race and gender in South Africa at the doctoral level. Equity issues in higher education are also of concern in other countries such as the United States. The American Council on Education reported that "the number of minority doctorates granted by US universities grew by 27 percent between 1982 and 1992" and that by 1992, there was much greater diversity in terms of the fields or disciplines in which individuals from minority groups had received their PhDs (Kerlin 1995a:11). However, a recent report of the American National Research Council argued that, particularly in the sciences, "African-Americans, Hispanics and Native Americans continue to be underrepresented among doctoral-level researchers" (Carpenter 2000). The report recommended that at both policy and programme levels, efforts be made to diversify the research workforce.

In terms of gender, the proportion of women receiving doctoral degrees in the United States has increased steadily over the past few decades: in 1963, only 11% of all doctorate recipients were women but by 1993 this had increased to 45% (Kerlin 1995a:9). In Canadian universities, the number of women enrolled in doctoral programmes almost tripled between 1973 and 1993, from about 22% to almost 38% of all enrolments (Kerlin 1995a:19). It is quite likely that, as with the black minorities, the distribution of women across fields of study is skewed.

Both black and women doctoral students are "under-represented and underemployed relative to their male peers" (Murray 2000). This is particularly so in terms of faculty rank where the majority of women are employed in the lower echelons. This was also shown to be the case in South African higher education institutions (Chapter 1.3). Research in the US has shown that the high attrition rate among female PhD students is linked to a number of factors, many of which are probably applicable in the South African context. For example, women PhDs have reported a lack of female role models in faculty or supervisory positions in what is essentially a male-dominated departmental environment (Kerlin 1995b:6-7). Incidences of sexism and discrimination have also been cited where, for example, male faculty are reported to have given almost exclusive preference to male doctoral candidates for research assistanceships or fellowship awards. Discrimination also impacts on women doctoral students in that it may exclude them from the types of informal networks that support doctoral candidates within and outside of the faculty; or deny them "acceptance as 'professional colleagues' by faculty in the same manner as male students" (Kerlin 1995a:10).

Issues relating to psychology, as well as socio-cultural norms have been shown to play a role in whether or not women pursue doctoral studies. For example, a study conducted in the United States in the 1980s indicated that "females in graduate school tend to be more timid, set lower goals for themselves, and are likely to be given less encouragement than males" (Kerlin 1995a:10). This rings true for South Africa where male children are frequently still given

preference over female children in terms of resources allocated and encouragement given by families for furthering their education.

The following case studies are examples of initiatives to address the problems confronting minority groups – on both ethnic and gender grounds – in the United States. The first programme focuses on women in the traditionally male fields of science and engineering. The second concerns ethnic minorities in the field of computational sciences.

The “Model Recruitment and Retention Program for Women Graduate Students in Science and Engineering” at the University of Michigan

From the *Promising Practices in Doctoral Education* web site at <http://depts.washington.edu/envision/p161.htm> and the University of Michigan's *Featured Practice* web site at http://www.wcer.wisc.edu/gradedforum/FP_descr/PID_48.htm

The University of Michigan, in conjunction with the Sloan Foundation, has implemented a model recruitment and retention programme for women graduate students in engineering and the physical sciences. Established in 1995, the programme has four core components. These include:

- Research to investigate the range of issues that confront female doctoral students in science and engineering
- Systemic institutional change in order to provide a more positive and conducive environment for women in these fields
- Evaluation and dissemination of the results of the implementation of this model
- Programmatic efforts to attract and retain women students in these graduate programmes.

One of the programmatic initiatives is the Peer Advising Program in which senior women doctoral students serve as peer advisors and role models for new female graduates. The peer advisors are carefully selected and given training in a range of skills including how to listen and be understanding and supportive, provide decision-making and problem-solving assistance, tutor and provide academic assistance, and the ability to refer other students to relevant campus professionals. Essentially, the role of the peer advisors is to assist new women graduates to make the transition into the department and to develop their own supportive networks.

The “Graduate Education Enhancement Program for Underrepresented Minority Students in the Computational Sciences” at Rice University

From the University of Michigan's *Featured Practice* web site at http://www.wcer.wisc.edu/gradedforum/FP_descr/PID_43.htm

In 1995, Rice University established a graduate enhancement programme, funded by the Sloan Foundation, which focuses on improving the retention rates of minority students in the computational sciences (including Computational & Applied Mathematics, Computer Science, Electrical & Computer Engineering, and Mechanical Engineering & Materials Science). The programme operates on the basis of six core interventions. These include:

- Community building. This component forms the backbone of the programme upon which all the other initiatives rest. The aim is to try to bridge ethnic divisions which might exist within the minority group, and to build and nurture a cohesive social and professional body of

graduate students. Part of this process involves training senior graduate students who then mentor junior members.

- **Counselling.** This aspect to the programme focuses on providing students with "survival skills" which might include learning to ask for assistance or developing support groups. Again, the assistance of senior graduate students is enlisted who provide input into the process by sharing their own survival and coping strategies.
- **Mentoring.** The program director mentors students on developing as scientists as well as on the scientific aspects of their work.
- **Intervention.** The assistance of senior graduate students is enlisted to keep a close eye on junior students, and to alert the programme director when they suspect that someone is experiencing either academic or personal problems that might cause them to drop out of the course. The programme director deals with the student directly to help him/her take the necessary steps to solve the problem.
- **Professional development.** Students attend compulsory professional development seminars hosted by the university. The Sloan Foundation provides funding for students to attend national conferences, and for visiting scholars to make guest presentations on discipline-specific topics and on general issues relating to diversity. The benefits of the professional development programme are that it creates confidence in students, develops professional behaviours, and assists students to develop networks with others across the country.
- **Student fellowships.** The Sloan Foundation provides fellowships for excellent students including those who would not ordinarily be funded by traditional programmes because of existing evaluation criteria.

The recommendations and reforms which relate to opportunities for interdisciplinary experience and the development of a wider range of skills and competencies, go some way towards addressing the needs of graduates who, increasingly, seek careers outside of the university setting. However, as the above discussion has highlighted, within academic circles, there is often resistance to fundamentally changing doctoral education, as well as a number of obstacles to implementing reforms. The development of professional doctorates provides an example of a more radical approach to addressing the needs of graduates, as well as of business, industry, government and others. A discussion of these doctorates follows in the next section.

4.3 Professional doctorates

4.3.1 Background to the development of the professional doctorate

The professional doctorate in the United States

The concept and practice of the professional doctorate is not new. Indeed, the first degrees which emerged in the Middle Ages were doctorates in the learned professions of medicine, law and theology. The award of doctoral degrees in other professions was introduced in the United States at the beginning of the twentieth century. Providing education for the professions was one of the most innovative developments in American higher education (Ben-David 1977:60-61)

as it moved far beyond the classical education typical of British higher education, and the integration of teaching and research embodied in the Humboldtian movement. As shown in Chapter 2, the development of graduate studies in America was greatly stimulated by the establishment of the first doctoral programme at the Johns Hopkins University in the last quarter of the nineteenth century. This quickly became the means through which researchers, and college and university teachers, received their professional training (Ben-David 1977:61-62). The original graduate schools which were based in the arts and sciences soon gave rise to the graduate professional schools which provided graduate education in other professions. One of the earliest professional doctorates awarded was the Doctor of Education at Harvard University in 1920 which was administered from within the School of Education (Spurr 1970:140). Today, professional doctorates are offered in a wide range of fields and schools. The professional doctorate – particularly as it has developed in Australia – will be defined in more detail in section 4.3.2.

The professional doctorate in Australia, New Zealand, the United Kingdom and Canada

Professional doctorates were introduced in Australia in the 1980s, and in the 1990s in New Zealand, the United Kingdom and Canada. There is also evidence of the introduction of the professional doctorate in Hong Kong (Hong Kong Polytechnic University web site, May 2001). The development of the professional doctorate in these countries is in response to the changing socio-economic contexts within which doctoral education is taking place outlined in Chapter 1, as well as the range of criticisms of the traditional PhD, many of which were discussed in section 4.2. Two issues in particular prompted developments in these directions. The first of these is the often cited criticism that the PhD degree is too narrowly specialised and does not provide graduates with the range of knowledge, skills and expertise required of modern economies and societies. The second relates to the changing profile of doctoral candidates. Whereas traditionally, doctoral candidates were engaged in full-time study on campus, increasingly they are in full-time employment with family and other responsibilities. As Evans (1998:3) puts it, the emergence of the professional doctorate was in response to "the demand for part-time – especially off-campus – doctoral study, and the pressures to harness higher education to the professions, industry and to the economy more generally".

The discussion of the professional doctorate which follows centres on a case study of developments in Australia, although brief reference is made to other countries. Most of the data used in the discussion are from two international conferences held on the professional doctorate in 1998 and 2000:⁷

⁷ The 1st Biennial International Conference on Professional Doctorates was held in 1997. As this conference took the form of a series of discussion groups, rather than formal conference presentations, there are no proceedings available.

- The 2nd Biennial International Conference on Professional Doctorates entitled: "Professional Doctorates: Innovations in Teaching & Research", Coffs Harbour, Australia, 8-10 July 1998. The conference proceedings were published in book format.
- The 3rd Biennial International Conference on Professional Doctorates entitled: "Doctoral education and professional practice: The next generation?", Armidale, Australia, 10-12 September 2000. At the time of writing, the conference proceedings had not yet been published and I thus contacted as many of the participants for whom I could find email addresses to request copies of their papers.

National policy initiatives in Australia

According to Maxwell & Shanahan (2000:1), Australia is leading the development of the professional doctorate by way of efforts within institutions, but also as a result of initiatives at the national government level. The impetus for debate and change in doctoral education at national level in Australia came first in the form of the Dawkins White Paper (1989) which called for "greater responsiveness by the tertiary sector to industry" (Maxwell & Shanahan 2000:2). This was followed in 1990 by a report of the Australian Higher Education Council and National Board of Employment, Education and Training which called for "the introduction of professionally related doctorates" (Evans 1998:5). More specifically, the Council suggested that such degrees provide

... extended and advanced training in certain professional fields where projects and investigations are applied in nature, oriented to practice in the professions and where, in some cases, the setting might be industry-based rather than campus-based. ("Higher Education Courses and Graduate Studies" report of the HEC, quoted in Spear 1997:1)

The debate about doctoral education in Australia has been supported by two research projects conducted by the Department of Employment, Education, Training and Youth Affairs which investigated and evaluated doctoral education in Australia (Evans 1998:5). In addition, in 1998 the Australian Research Council employed the services of a research consultant to investigate the career paths of PhD graduates.

The emergence and spread of the professional doctorate in Australia and New Zealand

Following the calls for a more professionally-oriented doctorate, many Australian doctoral programmes have undergone a number of modifications, notably with regard to the inclusion of coursework components, "changes to entry requirements, different examination 'products' and examination procedures", as well as the provision of more flexible doctoral study in the form of part-time, off-campus and distance education options (Evans 1998:5). This has resulted in considerable diversity in provision.

Interestingly, the first professional doctorate in Australia – the Doctor of Creative Arts – was established in 1984 at the University of Wollongong (Bell 1998:109) which was five years earlier than the Dawkins White Paper. However, in the wake of the policy initiatives mentioned above, during the 1990s there was a steady increase in the number and spread of professional doctorates across fields. In 2000, Maxwell & Shanahan (2000:5) identified no less than 105 different professional doctorate programmes in Australia. New Zealand, by contrast, had only four at the time, the first of which was established in 1995. The overall enrolment figures in 2000 were 1 659 in 72 different programmes and, by the same year, over 200 candidates had graduated with professional doctorates (Maxwell & Shanahan 2000:7).

Currently, professional doctorates in Australia and New Zealand are offered in the following fields of study (Baumgart & Linfoot 1998:115; Maxwell & Shanahan 2000:6; Spear 1997:2-3):

- Architecture
- Business (including Business Administration, Organisation Dynamics, and Public Administration)
- Design
- Education (including Teaching, and Science Education)
- Engineering
- Environmental studies
- Health (including Health Services Management, Nursing, Medicine, Population Health, Clinical Pharmacy, Public Health, and Health Science)
- Law
- Psychology (including Clinical, Sport, Health, Forensic, and Educational)
- Technology
- Visual and performing arts.

The field of Education has led the way in terms of the development of the professional doctorate and currently comprises the greatest proportion (30%) of all professional doctorates in Australia and New Zealand (Maxwell & Shanahan 2000:6).

4.3.2 Defining the professional doctorate and distinguishing it from the PhD

According to Maxwell & Shanahan (2000:1), the professional doctorates in Australia and New Zealand are currently in their second generation. The first generation of professional doctorates saw the development of a doctorate that was *structurally* different from the PhD degree. This involved the incorporation of professional development coursework components into the traditionally thesis-based programme. The second generation of the professional doctorate involved a more substantial *reconceptualisation* of doctoral education, particularly with regard to the “narrow disciplinary focus” usually associated with the PhD (ibid). Emphasising the

partnerships between universities, professions and workplaces in shaping the doctoral process, the second generation professional doctorate is regarded as fundamentally different from the traditional PhD (Maxwell & Shanahan 2000:2). In a sense, as Seddon (2000:11) argues, the development of professional doctorates was inevitable "because their development is tied to contemporary globalisation and the rise of the knowledge society".

The conceptual framework of the second generation professional doctorate programmes includes the following interrelated elements (Maxwell & Shanahan 2000:2):

- Doctoral-level work which incorporates advanced study and research that is in every way closely related to and informed by the specific *professional context* within which the candidate is working.
- This is closely related to an emphasis on *improving professional practice* and is thus associated with continuous professional development and problem-based learning. According to Seddon (2000:11), this implies a "strong learning orientation".
- An essential component of the conceptual framework for the professional doctorate is *Mode 2 knowledge production*. Mode 2 was defined in Chapter 1 as involving knowledge production in the context of application, transdisciplinarity, heterogeneity and transience, social accountability and reflexivity.
- Mode 2 implies *linkages with and relevance to sectors outside of the university setting* such as business, industry, government and non-governmental organisations. Thus, work for the professional doctorate draws together, is located in and impacts on three different sites or interests: the university or academic; the profession within which the doctoral work is conducted; and the candidate's specific place of work which could be in any of the abovementioned sectors.
- Added to this three-way model are the importance of the socio-economic and political *macro contexts* within which the doctoral study is undertaken (Morley & Priest 1998:24).
- Finally, there are efforts to *disseminate the results of the research to a wider audience* than the academic community.

Essentially, these new emphases in doctoral education imply a much wider definition of research, away from the narrow specialisation in a specific discipline with only academic interests at heart. These elements are reflected in the rationale for the establishment of professional doctorate programmes, three examples of which are provided below.

Retallick & Barnsley (1998:37) describe the rationale for the establishment of the EdD at the Charles Sturt University in Australia for educational professionals and practitioners as follows: "The Faculty of Education at CSU ... recognised that a single extended independent and large-scale research project [the PhD] does not meet the needs of a considerable number of educational professionals. They desire a professionally-oriented program that consolidates, refines and extends their theoretical bases, has direct practical application to their professional situation, and results in benefits to them as educational practitioners."

The Doctor of Health Services Management at the University of New England has the following two aims (Parton *et al* 1998:49): "The first is to prepare health service professionals, senior managers, researchers and policy analysts for advanced leadership in their professional practice. This is achieved through a program of external study consisting of coursework and thesis. The second aim is to extend students rapidly (i.e. in 4 years) through a doctoral degree with a research thesis equivalent to the PhD."

The DBA at the Southern Cross University has the following objectives, amongst others (Meredith 1998:57):

- "present an academic program of excellence linked to management development;
- develop in candidates, superior levels of competence in management skills;
- foster abilities and competence in the processes of researching key areas of management and communicating the results of the research to peer groups and society;
- provide extended and advanced training in management linked to workplace projects and investigations; and
- further relationships between Southern Cross University and management in the public and private sectors in Australia and overseas."

However, in practice the conceptual ideal outlined above has not always been achieved, and the academic focus still receives the greatest emphasis. Maxwell & Shanahan, for example, found that the distinctiveness of the professional doctorate programmes in their study were primarily related to university, rather than to professional or workplace interests and of these, the majority were in relation to the introduction of a coursework component (Maxwell & Shanahan 2000:9). As a result, it is often difficult to distinguish the professional doctorate from the traditional PhD degree, as the following example highlights.

Concerns about the lack of distinctiveness between professional doctorates and PhDs were expressed in the Maxwell & Vine (1998) study. The external examiners of three EdD theses at the University of New England commented that they could find little to distinguish what they were reading in the professional doctorate theses from those they had examined in traditional PhD programmes. This prompted Maxwell & Vine to undertake a research project that explored the attitudes and opinions of both supervisors and examiners of the two types of doctorates. Their conclusion was that while in some cases there would inevitably be some overlap between a professional doctorate and a PhD thesis, the following criteria could loosely be applied to distinguishing between the two (Maxwell & Vine 1998:81-83):

- While theory might play a more significant role in a PhD thesis, critical reflection should be a core characteristic of the EdD degree, particularly with regard to the candidate's personal professional experience which could be brought to bear on the interpretation of the findings, and complemented by other perspectives.
- The candidate's professional experience should be evident in the research topic for an EdD.
- The research for the EdD should be located within the context of the candidate's workplace and should thus have an applied, problem-solving focus (i.e. problem-based learning). Therefore, action research would more likely be associated with a professional doctorate.

- A tightly connected group of papers (such as a research portfolio) would be an acceptable format for the write up of the professional doctorate.
- The use of the first person would be acceptable in an EdD thesis insofar as it related to the candidate's personal professional experience.

In summary, there are various factors which might distinguish the professional doctorate from the PhD:

- The inclusion of coursework in addition to the thesis (in countries other than America).
- The research for a professional doctorate is generally multidisciplinary and applied in nature and is closely related to the profession within which it is conducted.
- One of the intended outcomes of the research is to improve practice in the profession, as opposed to developing purely theoretical knowledge. Action or problem-based learning forms a significant part of the degree process.
- Those undertaking a professional doctorate are accountable to a much wider audience than the PhD which is traditionally only accountable to the discipline within which it is conducted, typical of Mode 1 knowledge production.
- Furthermore, the research for a professional doctorate tends to draw on a range of methods and approaches in the investigation of complex problems in professional settings. This is as opposed to the narrow specialisation within a single discipline typical of a PhD programme.

Finally, the stress on the 'professional' in the professional doctorate has a number of implications for the institution, faculty and department within which the doctorate is offered, as well as those involved in delivering and supervising the degree. Maxwell & Vine (1998:75) describe these implications as follows:

... the research question is more likely to be found in the professional's context by the professional rather than at the university by an academic. The research is likely to be concerned with improvement so methodologies will be required that can accommodate such an interest. Also, the coursework will likely as not need to be mediated by the proposition that the 'students' know more about their contexts than the academic.

In addition, as Seddon (2000:6) points out, the 'empirical facts' or the grounded reality of how professional doctoral programmes actually function, do not always match up with the coherent conceptual framework.

4.3.3 Descriptions of professional doctorate programmes

The following is a thematic analysis of professional doctorate programmes in Australia and New Zealand. The discussion is structured around a number of aspects of the doctoral programmes including the target audience, admission requirements, methods of delivery, programme structure, examination products and supervision. While this is a general overview of

professional doctorate programmes, it is useful to bear in mind the typology developed by Seddon (2000:1) which corresponds, to some extent, to the first and second generation professional doctorates mentioned earlier. These three types of professional doctorate include:

- A. The coursework plus research thesis model
- B. The research portfolio model
- C. The elaborate professional networking model.

While elements of the three types of professional doctorates are discernable in these descriptions, section 4.3.4 provides more explicit examples of each in a selection of case studies.

Target audience

Generally speaking, the professional doctorate is geared towards mid-career professionals who occupy some form of management or leadership position. Thus, it is usually the case that professional doctorate candidates are in full-time employment. This is in contrast to many young PhD candidates who have had relatively little work experience and who are using the PhD degree as a springboard into a new career – usually as a member of faculty or as a researcher. Evans (1998:3) defines the professions that are targeted by professional doctorate programmes quite broadly as those occupations which “require a degree for entry”, whether or not they are regulated by government policy or a professional association. This includes those traditionally regarded as professionals such as teachers, lawyers or architects, as well as others including artists, business people or public sector employees.

By way of example, the majority of the students enrolled for the EdD at both the University of West Sydney and Flinders University were university lecturers. Other large groupings in these programmes included school principals and teachers. The remainder of the groups included training executives, counsellors, non-school educators, tertiary institution administrative officers and a full-time student (Baumgart & Linfoot 1998:119; Reynolds 1998:4). Two-thirds of the candidates enrolled for the DBA at Southern Cross University were “partners in professional practice or senior managers” from a wide range of industry sectors. Just less than a third of the candidates were from the public sector representing “all three tiers of government”. The remainder of the candidates were academics from universities in Australia and Asia (Meredith 1998:58).

Admission requirements

In terms of admission requirements, Maxwell & Shanahan (2000:8) argue for “previous research experience/expertise combined with workplace experience of at least four years in the

profession". The findings of their research, however, indicated that a small minority of the professional doctorate programmes included either one or both of these in their admission requirements. The following are examples of professional doctorates which require both specific educational qualifications as well as professional work experience.

The DBA at the Royal Melbourne Institute of Technology (RMIT) requires that prospective candidates are in possession of a professional qualification – preferably an MBA – and have "extensive professional experience" (Morley & Priest 1998:23). Essentially, the programme is aimed at professional executives and thus, unlike the PhD degree, "is not designed for the needs of academics and researchers" (Morley & Priest 1998:25).

Prospective candidates for the EdD at Charles Sturt University are required "to possess appropriate tertiary qualifications, have proven writing and research skills, and have at least five years professional experience in educational settings" (Retallick & Barnsley 1998:37).

Admission to the Doctor of Health Services Management at the University of New England requires that candidates possess the "equivalent of a masters degree in health services management, [have] at least seven years professional experience in health services management and [can demonstrate] the ability to conduct independent research" (Parton *et al* 1998:49).

The admission requirements for the EdD at Flinders University include a IIA honours degree or a masters degree plus "at least five years relevant work experience and employment in a leadership or senior position". In addition to this, prospective candidates are required to demonstrate "their commitment to innovation and the capacity to contribute to it in professional practice" (Reynolds 1998:2).

Methods of delivery

Following the need for more flexible doctoral study, many professional doctorate programmes offer a range of delivery options, including full-time or part-time study, evening classes and/or distance education. In some cases, the dominant mode of delivery was supported by web-based delivery via the internet, such as the DBA at the Southern Cross University.

Structure of the professional doctorate

A common feature of the professional doctorate is the inclusion of both coursework and research into the degree structure. According to Maxwell & Shanahan's study (2000:7), all of the professional doctorate programmes surveyed contained a research component. Within two-thirds of these programmes, the research component was greater than 66% while the remainder varied between 20% and 60%. The coursework components more often than not included an advanced research methods course, as well as a range of compulsory and optional doctoral-level subjects. Doctoral and professional seminars are used to support students through their coursework and research. In many cases, the coursework component acts as an extensive preparation for the research component (Baumgart & Linfoot 1998:116).

However, there were inconsistencies between programmes on the importance of research within the overall structure, and thus the ratio of research to coursework. As a result, debates

continue with regard to the role of research and whether the decreased research component has created an inferior version of the PhD degree.

Examination products

While the research thesis was the primary examination product in a number of the professional doctorate programmes, there were also examples of innovative approaches to documenting and examining doctoral work. These included creative works or compositions in the Arts or Music, and the research portfolio concept incorporated in, for example, the Doctor of Nursing degree at the University of Adelaide. A more detailed discussion of this latter approach is provided in the case study section below. Briefly, however, the rationale for the portfolio is that the "single subject, single method thesis" typical of the traditional PhD is not necessarily appropriate for professional practitioners (Borbasi, Pearson & Gott 1998:68). Borbasi, Pearson & Gott (1998:67) argue that "in a professional award there is a need to adopt a broader view and to develop experience and ability in the use of more than one research approach". An example of this is the DBA at the Southern Cross University which requires candidates to produce 18 papers in the form of articles or research reports, as well as a thesis of up to 50 000 words (Meredith 1998:59). This multiple methods approach is indicative of the transdisciplinarity inherent in Mode 2 knowledge production. Sometimes a combination of formats for reporting the research undertaken are involved.

Two-thirds of the programmes in Maxwell & Shanahan's (2000:7-8) study used the research thesis as the major research output, while the remaining one-third offered alternatives such as creative works or research portfolios. Maxwell & Shanahan argue that these results indicate that despite developments in the professional doctorate, there is still relatively little programmatic diversity, particularly within the fields of Education, Psychology, Administration, and Law.

In terms of the intended outcome of the degree process, the Australian Council of Deans and Directors of Graduates Studies guidelines (1998) state that: "The successful professional doctorate candidate should be judged, through examination, to have made a significant contribution to knowledge *and/or* practice in their profession" (Maxwell & Shanahan 2000:8; my emphasis). This echoes the type of guidelines given for the research programme of a traditional PhD degree and clearly implies a research component within the professional doctorate. However, the requirement that the knowledge generated through research should *contribute to the profession* within which the candidate is based is not mentioned in any of the rules and regulations for South African doctorates which were described in Chapter 2. Of particular interest is the "and/or" in the quote above which implies that the professional doctorate need not focus on new knowledge production within the boundaries of a discipline; rather, it could focus

on improving professional practice via knowledge development. I would argue that this marks a radical departure from the traditional PhD.

Supervision

The position of the professional doctorate somewhere between the university, profession and work place has raised some interesting issues around and approaches to supervision. While some programmes still utilise the traditional academic supervisor, others have drawn in additional supervisors from outside the university who are usually practitioners from the professional context within which the doctorate is undertaken. An example of this is the RMIT DBA where candidates have two supervisors for the research and thesis component of the programme: one drawn from the academic environment and the other from the external business environment (Morley & Priest 1998:25). The DBA at the Southern Cross University, on the other hand, only appoints one supervisor from within the academic sector (Meredith 1998:59).

4.3.4 Case studies of professional doctorate programmes

The following case studies provide a more detailed picture of the overall objectives and structure of a selection of professional doctorate programmes. At least one of each of the three models mentioned in section 4.3.3 is included. The first case is an example of the type A professional doctorate as it is based on a research and coursework structure with the final output in the form of a thesis. The second case study is an example of type B which uses the research portfolio as the examination product. The third case outlines the structure of Seddon's third model (type C) of elaborate professional networking. The fourth case study differs from the professional doctorates discussed thus far in that it is located in chemistry – a field which is traditionally regarded as academic rather than professional. The final case study represents an interesting cross-over between the traditional PhD and the professional doctorate in that while it retains the title and research orientation of the former, it is clearly geared towards the professional development and improvements to professional practice commonly associated with the latter.

Case study 1: The Doctor of Business Administration (DBA) at the Royal Melbourne Institute of Technology (RMIT) in Australia

This professional doctorate programme is an example of the research and coursework model which culminates in a thesis and the discussion is based on Morley & Priest (1998:23-36).

The DBA at the RMIT was established in 1996 with an initial cohort of 13 students. This has been the average intake number at the start of each year since. The DBA is targeted primarily

at managers and senior managers in full-time employment who are expected to have an MBA or similar masters degree, as well as extensive professional experience.

This professional doctorate comprises three main components, namely coursework, the development of a thesis under supervision, and "reflection on professional practice and the linkages between knowledge, research and practice". The latter component – reflection – is viewed as the integrating factor between the coursework and research. The thesis development and coursework run concurrently over the three years, and the proportion of research versus coursework is 45% and 55% respectively.

The coursework comprises the following:

- Four doctoral subjects which focus on research methods; organisational theory and experience; advanced business strategy; and techniques of strategic analysis.
- Professional development seminars which are group discussion opportunities for candidates to "gain greater understanding of their personal dynamics in interacting with other managers and organisations, to further enhance their personal effectiveness in the work environment".
- Doctoral seminars which focus on issues of theory and practice related to strategic management. Participants include other leading professionals in the field as well as academics from the institution.

The doctoral candidates are required to draw on their own experiences and expertise as a major contribution to the programme. Furthermore, the curriculum of the DBA, involving all the aspects mentioned above, is described as a "spiral curriculum model" which is based on the educational theory of Bruner. The spiral curriculum enables "planned revisiting of key concepts throughout the duration of the course ... [through which] conceptual development is expanded and deepened".

In terms of supervision, each candidate has two mentors – one an academic and the other drawn from the business sector. Candidates are provided with additional support in the form of Supervised Professional Practice Review Sessions. The primary output of the doctoral programme is in the form of a thesis of at least 30 000 words which is expected "to make an original and significant contribution to the advancement of professional practice in strategic management, as well as demonstrating a level of competence appropriate for a doctoral award".

Case study 2: The Research Portfolio of the Doctor of Nursing at the University of Adelaide

The Doctor of Nursing offered at the University of Adelaide utilises the research portfolio instead of a thesis as the examination product of the degree. The overview below is based on the discussion by Borbasi, Pearson & Gott (1998:67-74).

This Doctor of Nursing degree comprises a 50:50 distribution of research and coursework. What makes this doctoral programme innovative is its use of a research portfolio in place of the traditional research thesis. The rationale behind the introduction of this format of research output is the idea that the ever-changing and complex world of professional practice requires practitioners to be able to draw on a number of different theories, approaches and methods in their investigation, interpretation and analysis of issues. The single topic, single method approach of the PhD degree, it is argued, does not meet the needs of many nursing practitioners.

The research portfolio is essentially a collection of written or other texts which are produced throughout the course of the degree programme. Borbasi, Pearson & Gott describe its fundamental aims as follows: "The portfolio is a unique personal file containing evidence of learning, reflection and advanced practice. In addition to traditional academic work (journal papers, essays) it can contain items collected from current work activities, evidence from

workplace and academic sources that testify to sustained progress and development, reflections of actions taken and choices made and plans for future development. ... The goal is to capture a reflective, critical and analytical account that describes the journey the learner is embarked upon".

As already suggested, the portfolio need not only contain written text but may also include other aural or visual components as evidence or examples of plans. Thus, for example, video cassettes showing relevant events (such as a meeting or teaching session), or musical compositions designed to assist patients to work through grief or other conditions, or even plans for new buildings or designs for new equipment could be included. The emphasis on reflection, "describing the journey" and the variety of materials which can be included in the portfolio, are important additions to the traditional requirements for a doctoral degree.

The research portfolio is assessed at the same level as the PhD degree by external international or national scholars. It is required to make an original contribution to knowledge in the field and to exhibit rigorous scholarship. Additional requirements of the work include a good grasp of possible research approaches, evidence of collaborative working, a plan of action to improve nursing practice, and ideas about how the research findings could be disseminated. In terms of supervision, the co-ordinators of this programme encourage candidates to seek out as many different mentors as they feel necessary, particularly as different approaches and methodologies are likely to be employed. These are all elements of Mode 2 knowledge production, that is, they reflect transdisciplinary, goal-oriented and socially accountable research which go beyond the normal requirements of the traditional PhD as outlined in Chapter 2.

Case study 3: The EdD at the University of West Sydney, Australia

The third case study focuses on what is considered to be a new model of the EdD and of professional doctorates in general. This case is based on the discussion provided by Baumgart & Linfoot (1998:115-122).

The new EdD introduced at the University of West Sydney in 1995 is considered to be different from most professional doctorates in that the usual mix of coursework and thesis has been replaced by a structured educational environment which aims to "encourage research and its dissemination through publication and other forms of presentation of research findings". In addition, the EdD programme "is based on a partnership between the University and educational employers to provide candidates with an integrated set of experiences enabling them to demonstrate, through research and scholarship, a set of outcomes reflecting the qualities prized in modern professional educators". This is one example of how a doctoral programme can be reconceptualised in order to address the issues described earlier in this chapter relating to the inadequate preparation of doctoral students for employment outside of academia.

According to Baumgart & Linfoot, the following six features of the EdD programme distinguish it from others on offer:

Entry to candidature: The admission requirements reflect those of the traditional PhD programme insofar as candidates are required to have undertaken substantial coursework at the masters level and to have had previous research experience. However, where necessary, bridging courses around specific areas of knowledge or skills will be provided and recognition of prior learning is granted in terms of the candidate's previous research experience or publications. The programme is targeted at individuals who are potentially future leaders in any of the education sectors.

Work program: Instead of a set of structured coursework subjects followed by a period of research, candidates are encouraged to develop their ideas, to gather information and to discuss their progress in a number of different group contexts and with a broad range of other people. Such group contexts include informal meetings, seminars and conferences in which candidates can discuss their progress with their supervisors and other students. At least one residential conference is scheduled each year during which students are given the opportunity to present their work. They are also encouraged to present their work at other conferences or forums. In addition, approximately six dinner meetings are held throughout the year during which students as well as guest speakers⁸ discuss issues around theory, methodologies and educational issues.

Candidates are encouraged to draw on their immediate work environments for their research topics and the University "willingly negotiates with employers to facilitate research by candidates in their workplace contexts".

The portfolio: Instead of a research thesis, students are required to develop a portfolio of at least six pieces of written work, at least four of which must be published. As with the research portfolio at the University of Adelaide, the structure of the EdD portfolio is not prescribed and can include any combination of texts such as reviews or critiques of previous research, policy analysis, or an evaluation project that is commissioned by an employer. While applied and strategic research is encouraged, there is still a need for the application of new knowledge to be grounded in sound conceptual and theoretical bases.

Each portfolio is required to include an over-arching statement or commentary which describes how the portfolio was developed (including where collaboration occurred) and which draws all the elements of the portfolio together into a coherent whole.

External advisers: Another distinguishing feature of this doctoral programme is that instead of employing the services of one or two supervisors, "a cadre of external advisers who are scholars and researchers with international reputations in various educational fields and drawn from several different countries" are appointed. The external advisers assist in a variety of ways such as in providing feedback to students at the conferences and participating in the EdD seminars. In addition, they are usually invited to make keynote addresses at the conferences in order to provide examples of other research in the field and are also asked to provide feedback to the University on the programme itself. They might also act as external examiners. Of significance to the candidates, however, is that these external advisers "provide a network of contacts for students in their continuing professional growth".

Learning by teaching: In the absence of having to attend structured courses, the EdD candidates, based on the expertise they have developed in the workplace and within the programme, are invited to teach others – including fellow candidates, other postgraduate students, staff of the masters programme and even teachers. The assumption here is that one gains a much greater understanding through teaching than being a student.

Assessment: Three external examiners are appointed to assess the portfolio. However, as the majority of the work included in the portfolio would already have been refereed and published, the primary focus of the examiners is on the scope and quality of the work presented, and whether, in their judgement, it warrants a doctoral award. In this regard, the extent to which the work presented is of a doctoral standard, the criteria usually applied to professional doctorates are employed, that is, the portfolio "needs to represent a substantial contribution to knowledge in the subject area and to provide evidence of originality through the discovery of new facts or the exercising of independent critical ability or the application of knowledge in new contexts".

⁸ See below with regard to the external advisors cohort.

Case study 4: The Doctor of Chemistry at the University of Texas, Dallas

This fourth case study represents a departure from what is conventionally considered to be a professional doctorate in that it is based in the traditionally research-based discipline of chemistry. Information about this doctorate has been gleaned from the Department of Chemistry web site at <http://www.utdallas.edu/dept/chemistry/>.

Dubbed a programme for the "preparation of problem-solvers", the Doctor of Chemistry degree was established in 1983 after extensive consultation with representatives from the chemical industry around their most urgent needs in terms of doctoral training, as well as their ideas about how to better prepare students for future careers in industry. These included three major points:

- That as problem-solvers, doctoral graduates must be able to respond to a variety of situations, and thus must have a broad, fundamental background in chemistry
- That problem-solvers must be able to respond to short and medium term problems
- That doctoral students benefit enormously from industrial experience before graduating.

In response to these directions, the DChem degree which spans five years of intense study and research is structured around three core components. These include:

- A broad, fundamental curriculum that comprises nine compulsory courses including organic chemistry, inorganic chemistry, analytical chemistry, thermodynamic materials, and industrial chemistry. This is typical of the coursework PhD in the United States.
- Three research projects which aim to refine and extend the student's research and problem-solving skills. The first is the apprenticeship practicum during which the student learns to carry out research on a directed project. This is followed by the industrial practicum (see below) after which the student is required to prepare a final report in the format that the company normally uses. The final practicum is the fundamental practicum in which the student works more independently under the supervision of a faculty member, the research for which must culminate in a manuscript ready for submission to a peer-reviewed scientific journal. This third aspect to the programme reflects the more traditional PhD with the development of a mini-thesis.
- A mandatory 9-12 month industrial practicum in an industrial or government research and development position. During this time, the student works on a proprietary problem which will ultimately benefit the company, but will also develop the student's skills as an industrial "problem-solver", and is thus more akin to the professional doctorate. The student's technical manager is a voting member of the student's Supervisory Committee for the Industrial Practicum defence. The industrial practicum usually takes place after the first two years of the programme.

The success of the programme is measured, in part, by the apparent ease with which all the DChem graduates were able to find positions in the chemical industry. This is in contrast to the report of an American Chemical Society survey, published in 1998, which indicated that 51% of chemistry PhD graduates were compelled to take postdoctoral positions and that only 35% managed to find career positions immediately after graduating.

Case study 5: PhD in Educational Research at Lancaster University in the United Kingdom

This case is unique as while it is actually a PhD degree, it reflects many of the elements of a professional doctorate. This is an interesting cross-over between the two types of degrees and indicates one of the possible directions for the PhD degree in the future. It is also an example of developments in the UK. The discussion below has been compiled from the course web site at: <http://www.lancs.ac.uk/depts/edres>.

This is a part-time doctoral programme which is targeted primarily at experienced professionals in the higher and further education sectors. The course is carried out over four years and includes directed study through coursework and the development of a research thesis.

The aim of the programme is "to provide an opportunity for experienced professionals to become autonomous researchers and to gain deeper and more critical insight into their own professional practices and concerns". This highlights the cross-over between the traditional PhD and the elements of the professional doctorate which are concerned with professional development and improving aspects of professional practice.

While admission to the programme does not require that students have prior research experience, it does require an honours, or preferably a taught masters degree, or comparable qualifications, as well as "at least three years experience of teaching, research or administration in a university, further education college, or comparable institution".

The coursework component of the programme includes the following five modules:

- **Module A: Research methods and philosophy of science.** This module focuses on developing research skills in relation to critically evaluating the research of others, different types of research designs, methods for collecting both qualitative and quantitative data, and the philosophical/epistemological underpinnings of these techniques, ways of analysing, interpreting and presenting data in a variety of forms and "to a range of audiences".
- **Module B: In-practice learning and development.** The aim of this module is "to enhance students' ability to articulate and analyse professional practices, including their own, in particular relation to the process and substance of current educational change". The approach in this model is a combination of theoretical exploration followed by action research within the student's professional context in relation to professional practice, professional development and the management of change.
- **Core module: Education, training and work.** This module aims "to enable students to assess critically theory of, and practice at, the training/education and work interface". As such, it encourages students to locate their own professional practice within the theoretical debates around education/training and work.
- **Core module: Policy, change and organisational development.** The fourth module aims "to provide students with a theorised understanding of the nature, conditions and constraints of post-compulsory education and of its organisational forms in contemporary societies". This includes policy formation and implementation, the nature of the academic/teaching professions in post-compulsory education, and institutional management and organisational change.
- **Core module: Learning, teaching and assessment.** The aim of this module is "to introduce students to recent research and theorising about the nature of student learning, and to provide a number of theoretical frameworks within which new developments in the organisation of learning, teaching and assessment can be understood". This is intended to enable students to understand the debates and to develop the skills necessary to act as change agents with respect to teaching, learning and assessment.

The examination products of this programme include a number of short assignments attached to each of the modules, a research portfolio and a thesis of about 45 000 words.

4.4 Key points and commentary

I argued in Chapter 1 that globalisation, the new global economy and the rise of the knowledge society are impacting on nations and their doctoral education systems worldwide. However, the ways in which countries are responding to these challenges differ according to their particular socio-economic and educational contexts. On the one hand, developing countries which have comparatively small doctoral education systems, have mainly focused their reforms on expanding their doctoral education provision. This is also the case in South Africa where our national policy has called for improvements in participation and graduation rates at the doctoral level.

On the other hand, AICs such as the United States, Germany and France, which already have large and sophisticated doctoral education systems, have focused their reforms on making their doctoral education provision relevant to business and industry. As was shown, this has also been a central concern in the Australian reforms. In this context, the traditional PhD degree has come under fire from various quarters, particularly with regard to its relevance and benefits to the individuals who undertake them, and to the sectors who are likely to employ PhD graduates. However, developing countries are also beginning to consider these issues as, increasingly, they are realising the potential for doctoral education to contribute to economic and social development. It is in this sense that these debates are of significance in the South African context.

This chapter has focused on some of the major concerns about the traditional PhD degree internationally and has considered two responses to these issues in the debates around doctoral education. The first are those initiatives which aim to improve the problematic aspects of the PhD through add-on programmes or interventions which are taking place in the United States and other AICs. The second response is the development of the professional doctorate in Australia and elsewhere which is geared specifically towards the career needs of doctoral candidates, as well as the skills and knowledge requirements of business, industry and the professions. As universities in the US have offered professional doctorates since the early twentieth century, it is understandable that the main thrust of their reforms around PhD education is on improving the PhD itself.

As was shown in section 4.2, the criticisms of traditional PhD programmes are wide-ranging. They focus on the skills and competencies acquired in the PhD programme, the problems experienced by candidates during the PhD process, and equity and diversity issues. While the specifics and relative importance of these issues varies between countries, they are all significant considerations in the South African context. Stakeholders in universities, business, industry and government have expressed concern in the international debates about the

overemphasis on the development of research skills in PhD programmes at the expense of other important skills and competencies. Historically within the university, a PhD degree has been a license to teach and thus most graduates have pursued careers as faculty members. However, stakeholders in universities have argued recently that the traditional PhD programme fails to prepare graduates for the range of faculty responsibilities other than research. Ironically, the greatest concern was about teaching skills. The Preparing Future Faculty Programme in the United States was provided as an example of a national initiative to address these issues. The programme offers doctoral students the opportunity to observe and experience faculty responsibilities at a range of different educational institutions across the country.

Increasingly though, doctoral graduates are pursuing careers outside of the university context. Feedback from employers in business, industry and government, however, has highlighted that the narrow disciplinary focus and research specialisation typical of the traditional PhD programme does not equip graduates with the broad range of skills required in these settings. For example, stakeholders have argued that PhD graduates often lack the ability to work in teams and across disciplines, as well as generic skills such as time management and planning. Two case studies of initiatives which aim to equip PhD graduates with a wider range of relevant skills were discussed. The Preparing Future Professionals Programme at the Arizona State University focuses on providing doctoral students with career-related training and information. The Doctoral Study Programme at the University of Antwerp in Belgium seeks to broaden the knowledge and skills base of doctoral students in the Sciences and Pharmaceutical Sciences to better equip them for employment outside of the university.

However, while some stakeholders actively encourage this re-orientation of the traditional PhD degree towards providing the skills needed by business and industry, there are others who are resistant to this type of reform as it implies a move away from the academic focus of doctoral education, and a threat to academic freedom. In other words, the reforms which call for a closer interaction between doctoral education and business and industry have resulted in a conflict of interest between academia and the market. This has raised questions in relation to both the *product* of doctoral education (that is, the knowledge produced and the training provided) and the *process* (that is, the problems associated with undertaking the doctorate, such as lengthy time to degree).

With regard to the knowledge produced in the context of doctoral education, those who are not in favour of re-orienting the PhD to incorporate the needs of business and industry are concerned about academic freedom: if the needs and interests of those external to the university or discipline are taken into account, then there is a potential threat to the free spirit of inquiry associated with academic research. As highlighted in Chapter 1.2, the influence of

economic interests on university-based research leads to intellectual property issues and impacts on the types of research questions that are asked and how the findings are interpreted.

In relation to the nature of the training provided in the PhD process, the question is whether doctoral education should focus on research training and certification, or whether it should respond more directly to the wider professional development needs of business, industry and government as employers of PhD graduates? It seems feasible to suggest that PhD training should encompass a wider range of skills that are applicable in other employment contexts, considering that there are insufficient faculty positions available to absorb the increasing number of PhD graduates. From this point of view, and in light of the demands for career preparation for employment beyond the university context, is the PhD the most appropriate site for training university teachers and faculty members in these other functions? And should there be such an emphasis on disciplinary-based research? In effect, these kinds of questions reflect the increasing emphasis on Mode 2 knowledge production which draws the research agenda and process out of its traditionally academic location, into a variety of other settings.

Again, however, those opposed to the business and industry orientation to doctoral education argue that the skills needs of these sectors should not be the central concern of the degree-granting institutions. For instance, one of the respondents in the Nyquist & Woodford study (2000:8) argued that: "It is impossible to prepare students for the broad array of positions as is being advocated. There are too many, and we are not familiar with the possibilities. That is the hiring institution's responsibility". I agree that doctoral education and university-based research should not be subservient to economic imperatives and, indeed, companies must take care of their staff development needs. In addition, the culture of academic scholarship which is nurtured in the context of doctoral education is an important foundation for knowledge production and postgraduate training. However, this type of response is overly resistant to engaging with other stakeholders around the purpose and form of doctoral education, and seems to encourage the retention of the academic 'ivory tower'. In this regard, in Chapter 5 I argue that the boundaries of doctoral education in South Africa need to be widened in order to incorporate the needs and priorities of other stakeholders, including business and industry, but particularly those who are excluded from the dominant economic and knowledge production spheres such as the poor and marginalised.

Problematic areas of the PhD process were also considered in this chapter, many of which appear to be common concerns internationally. They certainly ring true of the anecdotal evidence⁹ I have encountered in the South African context. For instance, many students in the American studies expressed a lack of clarity about what the doctoral process entailed and

⁹ Through my work at the Human Sciences Research Council in Durban, and Research and Academic Development in Cape Town (see Chapter 1.1).

exactly what was expected of them. Other issues revolved around supervision, lengthy time to degree, high dropout rates, and financial pressures. All of these can impact considerably on the personal lives of students as well as their progress in the degree and, in many cases, make for an inefficient doctoral education system. The reforms in this regard therefore tend to focus on tightening up the process and making it more efficient. The discussion on the critiques of the PhD concluded with a consideration of equity and diversity issues which are of significant concern in South Africa and in other countries. Here, the relatively low participation and graduation rates of both black and women doctoral students were highlighted and two case studies of interventions aimed at addressing the problems of ethnic and women doctoral candidates in the United States were included.

The discussion of the professional doctorate focused on developments in Australia in the 1980s and 1990s. The stimulus for the introduction of these new degrees came in part from the national policy level and was supported by various research projects undertaken by the Australian government into doctoral education provision. Criticisms of the narrow disciplinary focus of traditional PhD programmes as well as the need for more flexible doctoral provision were the primary concerns which gave rise to the introduction of these professionally-oriented doctorates.

Broadly speaking, professional doctorates were defined as including the following:

- Doctoral-level study and, in most cases, research related to professional development and improving professional practice. The coursework usually includes research methods and professional development courses.
- An orientation to research which embraces the shift to Mode 2 knowledge production and which impacts on the university, profession and workplace. This implies a greater dependency on partnerships and interaction between universities, business and industry.
- A target audience of mid-career professionals who, in order to be admitted to the programme, should usually have extensive professional experience.
- Supervisors drawn from both university and professional contexts.
- Flexible methods of delivery such as part-time or distance education options to meet the needs of the professionals.

What were termed 'first generation' professional doctorate programmes resembled traditional PhD programmes. Although they included coursework (which PhD programmes in most English-speaking countries other than the United States do not) they still incorporated a substantial research component and more often than not culminated on a thesis as the examination product. The 'second generation' professional doctorates reflected a greater reconceptualisation of doctoral education and were distinguished from the traditional PhD programme in the following ways:

- The theoretical emphasis in the traditional PhD is replaced in the professional doctorate by critical reflection that is informed by the candidate's professional experience and context.
- The professional doctorate is usually problem-based and often involves a type of action research that is aimed at improving professional practice.
- It is often based on an extended network of academics and professionals who inform the doctoral work.
- In addition, the examination product of the professional doctorate might include options such as the research portfolio, instead of the traditional thesis.

The professional doctorates in Australia were grouped according to Seddon's (2000:1) typology. These included the coursework plus research thesis model; the research portfolio model; and the elaborate professional networking model. The research portfolio model represents a shift from both the traditional PhD and the first generation professional doctorates in relation to the examination product. Here, the single topic, single method approach embodied in a thesis is considered inappropriate for most professional practitioners. Thus, rather than a single monograph, the research portfolio may comprise a range of separate but linked texts or other media which could be developed using a variety of methods. These multiple products of the doctoral process are usually brought together in a coherent whole in an additional document which provides an overarching commentary on the study, and how all the pieces fit together.

The elaborate networking model also represents quite a radical departure from the traditional PhD programme and the first generation professional doctorates. The example of the EdD at the University of West Sydney was provided. Here, instead of a structured coursework programme, candidates are encouraged to develop their thinking and to gather information in group contexts. The groups comprise other students and supervisors, as well as other scholars or professionals in the field with whom candidates are expected to interact and engage in the process of developing their work. In place of the one or two traditional academic supervisors, a cadre of external advisors, who are internationally renowned scholars and researchers from different countries, are drawn into the doctoral process. This cadre of supervisors as well as the participants in the group discussions and conferences form a wider network within which candidates undertake their work. This network is also meant to play a part in the continuing professional development of the candidate in his/her future career.

In conclusion, the reform initiatives in both the US and Australia emphasise the need for responsivity to doctoral candidates, and business and industry, in terms of their career preparation and specialised skills development needs, respectively. Despite the fact that many of these reforms reflect a strong economic orientation (which, I argue, needs to be debated in the South African context), they also represent a greater flexibility in doctoral education provision which can be usefully applied to other contexts such as social development. In this

way, they offer opportunities for finding more appropriate forms of doctoral education which can contribute to our other local, as well as economic, needs. These ideas will be pursued further in Chapter 5.

University of Cape Town

CHAPTER FIVE: CONCLUDING COMMENTS

5.1 Introduction

The circumstances in which the Doctor of Philosophy (PhD) degree developed into a modern research doctorate in the 1800s in Germany were vastly different from those within which doctoral education operates today. I have argued in this thesis that globalisation, the global economy and the knowledge society are redefining what constitutes knowledge, why it is produced, who produces it and where. I have also argued that, more than ever before, countries are depending on science and research to achieve national goals. As a primary site for knowledge production and the training of future researchers and professionals, doctoral education is profoundly caught up in these processes. In particular, these developments have drawn into question the purpose and form of doctoral programmes and the knowledge products and training outcomes they produce. The debates and reforms which have ensued over the past two decades internationally, represent some innovative responses to the major challenges of the twenty-first century which take into account both local and global factors.

I have also argued that despite the extensive education policy development in South Africa since 1994 which has focused on the ways in which education can contribute to achieving national goals, there is a complete lack of critical assessment of PhD programmes in the national higher education policy. Neither is there any recognition of the reforms in other countries. A reflection on the findings of this research leads me to believe that *there is an urgent need for debate, research and policy development with respect to doctoral education in this country*. It is also apparent that the innovations in *the international reforms offer some interesting opportunities for us, but that we need to consider these in relation to our own context*.

This chapter summarises the key findings of my research in relation to this argument. It also contains some reflections on the potential benefits of the international reforms to South Africa, through the lens of our particular context. My argument is that we need to look at both the product(s) and process(es) of our current doctoral programmes with a view to developing a more flexible system which can contribute to achieving our national goals through social, economic and academic development. In addition, the debate about doctoral education in South Africa should be supported and informed by research. I therefore also highlight some areas for further research which would form a useful basis for our own debates.

5.2 The need for debate and policy development around doctoral education in South Africa

5.2.1 Changing local and global contexts

There are many indications that, like other countries, South Africa is caught up in the wave of change brought about by globalisation and the growth of the global economy. Amongst others, this is evidenced by the increased reliance on microelectronics in business and industry, as well as the shift in our economy away from primary and manufacturing activities towards a more service and export oriented economy (Moja & Cloete 2001:258). As a result, there is a growing demand for highly skilled labour who are able to use the information technology, as well as skilled professionals and managers for the service sector. These developments are both acknowledged and encouraged in our current economic policies.

It is perhaps not surprising then that we are also seeing changes in the purpose and product of knowledge production, both prior to and in response to national policy. As Moja & Cloete (2001:254-255) observe, in line with international developments, there has been an increase in contract research conducted in South African universities and technikons which is largely "directed at strategic (socio-economic and industry) goals". There is also evidence of more applied research in fields such as the natural sciences and social sciences. In other words, there is an increasing emphasis on research which is context- and goal-based and which can employ an interdisciplinary approach in order to investigate complex problems. These are clearly signs of the presence of Mode 2 knowledge production.

But, South Africa is not only grappling with her position in the global economy. For the past ten years, we have been challenged with the enormous task of social, economic and political transformation which would bring about equity amongst all South Africans and which would rid us of poverty and marginalisation. Much of our national policy acknowledges the *dual* challenges associated with the global economy on the one hand, and our social development and redistribution priorities, on the other. And, no doubt, the implications of these challenges are being debated in educational institutions, at policy-making and planning tables, at the board meetings in business and industry, and at community centres.

However, neither the new higher education, nor the science and technology, policies¹ – which doctoral education effectively straddles – reflect any critical engagement with what these processes mean for doctoral education in this country. As was shown in Chapter 1.3, the primary focus of the National Plan for Higher Education (2001) in relation to doctoral education

¹ In particular, the Education White Paper 3 (Department of Education 1997), the National Plan for Higher Education (2001), and the White Paper on Science and Technology (DACST 1996).

is to increase the participation and graduation rates at the doctoral level, and to achieve equity in terms of race and gender in the doctoral student profile. These are both important issues which must be addressed. But the national policy does not problematise what we are increasing numbers *in*, particularly in relation to the nature of the training provided, as well as the fields of study in which doctorates are undertaken.

5.2.2 The skewed profile of South African doctoral candidates and awards

The need for debate and policy development in South Africa around doctoral education is also clearly evident in the analysis of doctoral awards in 1996 presented in Chapter 3. The distribution of doctorates awarded at South African universities in 1996 was very skewed across the race and gender categories, as well as fields of study. A picture also emerged of the dominance of a handful of universities – essentially a group of seven historically advantaged universities – over doctoral education in this country. While these figures alone provide only a narrow glimpse of the broader pattern of distribution across time, the enrolment figures for the same year indicated that little change could be expected in the profile of a slightly later cohort of doctoral candidates, three or four years later. In this regard, some of the findings from Chapter 3 are briefly summarised below.

At an institutional level, the distribution of doctoral degrees awarded in South Africa in 1996 was very skewed in favour of the historically advantaged universities (HAUs). In broad terms, no less than 84% of all the university doctorates awarded that year were awarded at the six Afrikaans and the four English HAUs, with an additional 13% awarded at the University of South Africa. As noted above, the doctoral awards were even further concentrated around a few institutions, with over three-quarters (78%) awarded at only seven universities (Pretoria, Unisa, Natal, Cape Town, Stellenbosch, Witwatersrand and Rand).

I have argued that this clustering of doctoral awards in a handful of universities, and notably historically advantaged ones, is undoubtedly the consequence of apartheid. The HAUs were invariably better-resourced than the historically disadvantaged universities (HDUs) in terms of research funding and equipment. At the same time, the research capacity of the HDUs went undeveloped as they were originally established as undergraduate teaching institutions. In the main, the HDUs also failed to attract a critical mass of research scholars to develop postgraduate niches. In short, HAUs have historically had both the resources and the qualified staff available to support doctoral-level education.

The imprint of the apartheid system, and the widespread trend of gender discrimination, were also highly apparent in the data. One of the most obvious examples is that the vast majority of all doctoral degrees awarded in 1996 (608 or 87%) were awarded to White students, and almost

two-thirds of these (383 or 63%) were awarded to White males. These patterns were also evident in the masters degrees awarded at universities and technikons in the same year. The doctorates awarded were also concentrated in a small spread of fields of study and patterns emerged across the race and gender categories. For instance, more than half (56%) of the doctorates were awarded in the National Research Foundation (NRF) cluster of the Social Sciences & Humanities. It was also notable that within the Natural Sciences & Engineering cluster, White women were awarded a considerably higher number of doctorates than women in the other race categories (67 versus 1 each for African and Indian females, and none for Coloured females). This suggests that White women have had greater success in breaking into this traditionally male field at the doctoral level.

At the 22 CESM category level, over four-fifths (83%) of all doctorates awarded were clustered in eight categories including the Life Sciences & Physical Sciences; Education; Philosophy, Religion & Theology; Health Care & Health Sciences; Engineering & Engineering Technology; Languages, Linguistics & Literature; Social Sciences & Social Studies; and, Psychology. The gender imbalances within the Life Sciences & Physical Sciences category, as well as the large gap between White and other racial categories, were clearly evident as the majority of doctoral degrees were awarded to White males (54%) and White females (34%).

At the most disaggregated level of analysis, namely by the 149 sub-CESMs, the concentration of doctoral awards in a handful of specialisations was even more startling. Almost one-fifth (18%) of the doctorates awarded were in the three sub-CESM specialisms of All Other Education, Christianity, and All Other Psychology. There were also clear differences in terms of race and gender. For example, the highest proportion of doctorates awarded to White males was in Christianity (10%), Zoology (5%), and All Other Psychology (4%). White women, by contrast, were awarded the highest number of doctorates in All Other Education, and All Other Psychology (10% each) and Botany (5%). Most of the doctorates awarded to African males were in one of two fields of education, namely All Other Education (15%) or Secondary Education (13%).

The reasons for the skewed distribution of awards across fields of study are unclear. In Chapter 3 I suggested that the concentration of awards in what might be termed 'traditional disciplinary areas' (for example, Philosophy, Religion & Theology, or the Life Sciences & Physical Sciences) could have to do with the long history of doctoral education in these fields in comparison to the newer applied sciences or disciplinary areas (such as Computer Sciences & Data Processing, or Industrial Arts, Trade & Technology). Not all universities offer doctorates in these new areas and only certain occupations require doctoral-level qualifications.

The reality that there are only employment opportunities for doctoral-level graduates in certain fields has possibly also influenced doctoral students' choices. As I highlighted in Chapter 3, according to Professor Reddy,² there are good jobs available for chemistry doctoral graduates, particularly in the expansive and lucrative oil and pharmaceutical industries. By contrast, the industrial sectors in South Africa which are likely to require the expertise of graduates in physics are comparatively underdeveloped. He argued that the lack of employment opportunities makes it difficult for faculties to attract postgraduate students, particularly in fields like Physics and Maths.

Certainly, the widespread discriminatory practices in this country explain some of the patterns across the race and gender categories. For instance, women doctoral recipients were mainly to be found in the Social Sciences & Humanities, and within those, education and certain health services. These fields and occupations have traditionally been considered more 'appropriate' to women. The same might be said of the concentration of black doctoral recipients in fields such as education since, during apartheid, positions in public sector services such as health, education and public administration were amongst the only 'non-menial' occupations open to black people which called for higher qualifications. Even while perceptions about these types of gendered and racialised labour divisions are changing, it would be useful to explore the reasons for their persistence in the post-apartheid era.

Finally, it also appears that some interest groups in South Africa place considerable emphasis on doctoral education and the culture of scholarship. I argued in Chapter 3, for example, that the value placed on the scholarship associated with doctoral degrees in addressing the religious questions in the Dutch Reformed Church might explain the high number of doctorates awarded to White males in Christianity. Similarly, the emphasis on environmental conservation in this country might explain the concentration of doctorates awarded to White females in Botany and to White males in Zoology.

Whatever the reason for the clustering of research doctorates in fields such as Christianity, Zoology and Botany, the question is: *are these the only expertise that South Africa needs at this critical juncture in our social, economic and political transformation?* The list of urgent social and economic problems in this country is still very long and includes, amongst others, widespread poverty, homelessness and high unemployment rates; HIV/AIDS and other health-related concerns; our social, political and economic transformation; and establishing sustainable agricultural and environmental practices. We can see that the distribution of doctoral awards across fields of study does not reflect this diversity of needs. The comparatively low enrolment and graduation figures in fields such as Public Administration & Social Services, Agriculture & Renewable Natural Resources; Computer Sciences & Data Processing; and the Mathematical

² Dean of Science at the University of Cape Town; personal telephonic communication (August 2001).

Sciences are cases in point. These fields speak directly to the heart of many of our national goals. Some focus on ensuring that that our political transformation is successful, that government is able to deliver, and that there will always be enough food to feed the entire population. Others give consideration to our ability to participate and compete effectively in the global economy.

The National Plan (2001:4.3) proposes that institutional diversity will be ensured through "mission and programme differentiation based on the type and range of qualifications offered". In this regard, we need to consider whether what appear to be 'niche' areas in doctoral education in universities should be strengthened, and how the development of research capacity at the HDUs should unfold. We could also think about whether (and how) doctoral education at technikons should be encouraged and expanded and whether science, technology and business studies would form logical niche areas for these institutions.

In summary, we need to ask whether the current structure and form of PhD programmes is producing doctoral graduates who, as professionals and/or researchers, are equipped to contribute effectively and appropriately to achieving academic, national and market goals. We also need to engage with the critiques of traditional PhD programmes, and particularly those programmes on which our own are based. As Nyquist & Woodford (2000:20) have commented:

Lack of attention paid to how PhDs can really expect to use their degrees contributes, unintentionally, to a mismanagement of human capital. The professional preparation of doctoral students needs ... to create stronger bridges to connect doctoral level knowledge and skills to the contexts of need, both within and outside of higher education.

The following section contemplates the implications of this orientation to PhD reform in the South African context.

5.3 Reflections on the debates and reforms in the US and Australia in the South African context

The American and Australian reforms present some interesting options for debate in South Africa. Clearly, however, we need to consider these carefully in relation to our own specific context. This section highlights those aspects of the reforms which I believe would be particularly useful in the South African context. It also problematises the new directions in doctoral education in relation to its purpose and to whom it is accountable, with particular reference to the closer interaction with business and industry that the current PhD reforms imply.

5.3.1 Possibilities for South Africa in the international reforms

The United States and Australia represent two different approaches to reform which have arisen as a result of their differing doctoral education systems. In American universities, many of which already offer the professional doctorate, reforms around problematic aspects of the PhD focus on the structure and orientation of the PhD programme itself. In other words, the problematic areas of the traditional PhD programme – which includes both coursework and thesis development – are addressed through add-ons and interventions, while the core features of the degree remain as they are. In Australia, on the other hand, where the dominant form of the doctorate is the thesis-based PhD, a change in focus to the concept of the professional doctorate is evident in both policy and practice.

Clearly, in South Africa at the present time, we do not have the money or the infrastructure to support widespread innovation and change. It might be that in the short term, reform of our PhD programmes will have to follow the American example of add-ons and improvements. However, we can also find ways of working creatively with the resources we have in relation to a more fundamental transformation of our doctoral education system, where appropriate. In this regard, the Australian reforms provide some interesting options for us to consider.

Conceptually, what have been termed the second, and even third, generation professional doctorates in Australia present some new ideas about the purpose and form of doctoral education provision. Although still relatively few in number, they constitute a fundamental reconceptualisation of doctoral education, particularly the shift in emphasis towards improving professional practice, and the flexibility of research methods and approaches. In my view, the concept of the professional doctorate could be beneficially applied in the South African context. The flexibility in terms of research approaches and methods (transdisciplinarity), the emphasis on goal-directed and problem-solving inquiry, and the potential for involving a wide range of stakeholders, would be useful in the investigation of our complex social and economic problems.

An example of the above is the use of the research portfolio in place of the thesis in some programmes. The purpose of the research portfolio is to facilitate a transdisciplinary and multiple methods approach to research, based as it is in a specific context. Instead of the single monograph format of the doctoral thesis, the research portfolio comprises a number of separate parts – either written texts or other media – which may be developed using a variety of methods. One of the texts serves the purpose of pulling all the pieces together through an overarching commentary on the whole study. While it could be argued that this does not represent a radical departure from the thesis, the different chapters of which are pulled together via the concluding chapter, it does offer much greater flexibility in terms of appropriate research

approaches and methods, and the presentation of findings. It also allows for greater transdisciplinarity insofar as it accommodates 'sub-specialisms' in each textual 'piece' which the chapters of a thesis usually do not.

The elaborate networking model is also an innovative concept which represents quite a radical departure from the traditional PhD programme and the first generation professional doctorates. Rather than a structured coursework programme followed by research, candidates are given opportunities to develop their thinking and to gather information in group discussions, seminars and conferences, together with other students and supervisors, and scholars or professionals in the field. In addition, a team of external advisors, who are internationally renowned scholars and researchers from different countries, are drawn into the doctoral process. This 'network' of people provides input and support to the candidate during the degree process, as well as in relation to continuing professional development in the candidate's future career.

Clearly, however, the financial implications of introducing innovations such as those described above are not the only concerns we need to consider. The following section highlights some of the 'debates about the reforms' which I believe would be important for us to reflect upon.

5.3.2 Negotiating the potential conflicts between academic, social and market interests

The debates in the US and Australia have taken place between a wide range of stakeholders who have different interests in, and therefore give different emphasis to, doctoral education reform. This is particularly so with regard to the purpose of doctoral education and to whom it is accountable. These orientations are encapsulated in the following questions: Is doctoral education about *replenishing the cadre of academics* who teach and research within universities, and *extending the boundaries of disciplinary knowledge*, as has historically been the case? Or is it about producing new *knowledge for profit* in business and industry, and *training highly skilled professionals* as leaders in these sectors? Or should doctoral programmes focus on producing *professionals for social development*? Orr's (1997:64) distinction between academic, market and social knowledge which was outlined in Chapter 1 speaks to each of these orientations, all of which ultimately relate to national goals.

The question is whether all three orientations could or should be incorporated into doctoral education. Not all role players in doctoral education consider it desirable to pursue the business and industry route, particularly with regard to the private intellectual property rights associated with research for these sectors, as well as the influence on the research agenda. From this perspective, the involvement of business and industry in doctoral education implies a threat to academic freedom and thus a conflict of interest between academia and the market. Clearly, as

the concept of the 'ivory tower' reflects, knowledge production in universities has always been partisan, particularly to academic or disciplinary, and elite interests. Nevertheless, to some extent universities have responded to the needs of society via the application of theoretical knowledge to specific problems. In this sense, the knowledge produced in universities is 'public' insofar as it is, in principle, accessible to everyone. However, the argument is that the shift to market-oriented knowledge production, which is proprietary and protected through intellectual property rights and patents, impinges on public access to knowledge, and draws the focus away from knowledge production for the public good. As Seddon (2000:11) puts it, market knowledge is taking up the space that was previously protected as public knowledge.

In a similar way, some stakeholders are wary of orientating doctoral education to the needs of business and industry as it implies a threat to the academic and research focus of PhD training. In other words, it has raised the question as to whether doctoral education should focus on *research* training, or whether it should respond to the *wider professional development* needs of business and industry as employers of PhD graduates. Clearly, the growing employment opportunities for doctoral graduates outside of the university context require a different type of career preparation. The add-on programmes in the US, and the combination of research and professional development courses in the Australian professional doctorate, are attempts to embrace both these emphases in doctoral education. However, this dispute is not only about relevant skills for business and industry. It goes to the heart of the debate about whether (and how) doctoral education should prepare graduates for operating in both Mode 1 and Mode 2 knowledge production contexts.

These are important debates for South Africa where the implications of pursuing the route of greater responsiveness to business and industry have an added dimension. I have argued that while globalisation and the global economy are, by their nature, impacting on everyone worldwide, the way in which nations are responding to these macro influences varies. Broadly speaking, developing countries such as in Latin America or Asia have focused their reforms on expanding their comparatively small doctoral programmes. As was shown in Chapter 1.3, this is also the case in South Africa where the priority for doctoral education in the National Plan (2001) is to increase the participation and graduation rates at the masters and doctoral levels. Reforms in the industrially advanced countries in North America and Europe, on the other hand, have focused on broadening PhD programmes to better equip graduates for employment outside of academia.

The dual nature of the South African economy effectively places us in both the developing and industrially advanced categories. This poses some unique challenges for us in terms of creating a doctoral education system which can contribute to addressing the often competing demands of both our global and local contexts. As Subotzky (1998:2) has argued, the "prevailing

economically-oriented paradigm and ideological underpinnings of globalisation are in direct tension with the social purpose of higher education and its contribution towards the public good, social renewal and basic development". The tensions between meeting the challenges of the global economy, on the one hand, and our social development and redistributive needs on the other, are reflected in the government's Growth, Employment and Redistribution (GEAR) strategy (1996) and the Reconstruction and Development Programme (RDP) (1994), respectively (Subotzky 1998:6).

The higher education policy also reflects these challenges, but does not formulate clear policy directives on where the emphasis should be, how both could be managed, and how doctoral education might be reshaped in order to meet these dual needs. Within the South African context, we need to debate the extent to which doctoral education should be oriented towards the market and competing effectively in the global economy, as opposed to the social development and upliftment of disadvantaged communities. It is naïve to assume that orientating doctoral education to the needs of business and industry will lead to economic benefits for all. In a system where knowledge is a commodity that is bought in order to make a profit, it is likely that those who are economically marginalised or excluded from the 'knowledge market' will not benefit. As Ang (1999:4) points out, the increasing emphasis on contract research introduces a bias towards the interests of big business and far less of a focus on, and commitment or accountability to, the majority in society. In addition, the significance of research which is not financially advantageous is diminished. This impacts mainly on the humanities and social sciences where the research is often not economically viable (in the sense that it does not result in new ways of making a profit) although it often addresses the concerns of the poor and marginalised.

The emphasis on privately-funded contract and applied research can also be at the expense of basic and disciplinary research. As Moja & Cloete (2001:255) have argued, there is a need for a sustained emphasis on basic research because it informs applied research and provides "the basis for high-quality postgraduate training". Both the Education White Paper 3 (1997) and the White Paper on S&T (1996) emphasise the importance of basic and applied science and research. Speaking of basic research, the White Paper on S&T (DACST 1996:2.7) states that: "It is important that fundamental research activity not be regarded as impractical, because it is the preserver of standards without which, in the long term, the applied sciences will also die". In addition, the important role of the humanities and the social sciences, as well as the sciences, engineering and technology, is also emphasised (White Paper on S&T 1996:2.8).

Finally, the extent to which developing countries are able, and consider it important, to link their doctoral education systems to business and industry depends on a number of factors. For instance, in some countries there is "little tradition of industry involvement in research at all"

which may limit the extent to which business and industry see the worth in employing individuals with advanced degrees (Johnson & Coward 2000:9). Similarly, only some disciplines within universities have, over time, developed linkages with business and industry. These factors influence the importance given to business and industry partnerships, as well as the ease with which such linkages can be established. This might well be the case in South Africa where the idea of universities being responsive to business and industry is a relatively new one.

In summary, the challenge to South African policy-makers is to find an appropriate balance in the purpose and form of doctoral education in relation to addressing our equity redress, and social, economic and academic development needs. To achieve this, we need a more flexible doctoral education system which incorporates different approaches to knowledge production and training. In other words, we need to look at the fields of study within which doctorates are undertaken, as well as the nature of the training provided (research training and/or professional development, the ability to operate in both Mode 1 and Mode 2 knowledge production contexts). Finally, with respect to equity, we need to find ways of democratising knowledge production in this country.

5.4 Areas for further research

This research study has proposed some initial ideas about doctoral education in South Africa. There are many other dimensions which could have been explored, and the aspects which have been covered here could be examined in greater detail. There is also currently a dearth of research in this country around doctoral education provision. For us to be able to engage in debate and policy development, we will need a much more extensive foundation of research. The following are some ideas about areas for further research.

5.4.1 Extending the profile of doctoral education in South Africa

The profile of doctoral education developed in this study has focused on institutional definitions of PhD degrees offered in South African universities and the award of doctoral degrees in 1996. This profile could be expanded in a number of ways. For instance, it would be useful to develop a more detailed demographic profile of doctoral candidates, and to explore the motivations, expectations and experiences of doctoral graduates in this country. This would include questions such as: Why do people pursue PhD degrees, and what are their expectations of obtaining the qualification? What kinds of problems do they encounter during the PhD process and how has the PhD benefited them in terms of employment? How many of our PhD graduates are leaving South Africa to seek employment elsewhere? What are the barriers to doctoral education for black people and women in this country?

5.4.2 Social needs and labour market review

With regard to the fields of study in which doctorates are undertaken, and the nature of the training provided in the PhD programme, we need to identify the research and professional skills needed in both the public and private sectors. Which professions and industries employ doctoral-level graduates, and why? What are PhD graduates expected to be able to do? What are the future labour market needs of this country and how can this inform the way we structure our doctoral education? We also need to match doctoral education provision to our social development needs.

5.4.3 The funding of doctoral education

As was mentioned in Chapter 4, the financial aspect of doctoral study often poses considerable challenges to doctoral students. This raises a number of questions in the South African context. For example, what are the funding mechanisms in place in South Africa to support doctoral students, and are these adequate? What other sources of funding do doctoral students rely on? To what extent do financial problems impact on the process of undertaking a PhD in this country?

This study has only touched on some of the implications of the changes in funding for university-based research and doctoral education. In the context of the cuts in public expenditure and the pressure from government for institutions to find contracts and money in business and industry, how are we going to fund the increased enrolments at the masters and doctoral levels that the National Plan calls for?³ Will we have to depend to a greater extent on external funding, and partnerships with business and industry? As Johnson & Coward (2000:10) have pointed out, every country has a different way of funding doctoral education, with "variations in the patterns of national, regional or local, industrial, and self-support for graduate education". It might be useful to explore the ways in which other countries, particularly those with a similar economic status to our own, fund their doctoral education systems.

5.4.4 The role of technikons in doctoral provision in South Africa

As was shown in Chapter 3, technikons currently award a far smaller number of doctoral degrees than do universities. According to the National Plan (2001:4.3.2), the National DoE

³ At the time of writing, the proposed new funding framework which is linked to the National Plan is currently under discussion. A new feature of the funding framework is that, for the first time, masters and doctoral students are grouped under 'research outputs' rather than 'teaching outputs'. However, since the funding framework is linked to the National Plan's goals, there is no suggestion of critical change with respect to the purpose or form of PhD programmes, or the focus of the research undertaken. (Personal communication, David Cooper, August 2001)

intends to continue treating universities and technikons as different types of institutions in the short-term. It would be useful to explore how doctoral education differs in these institutions, and whether technikons might occupy a vital niche in our knowledge production and research training needs. In other words, could we harness the science, technology and business studies focus of the technikons in terms of doctoral education?

5.4.5 A national or international conference on doctoral education in South Africa

Finally, it would be useful if a body such as the NRF could support the debate around doctoral education in South Africa by funding a national or international conference in the near future. Such a conference would provide a platform for all the role players who have a vested interest in doctoral education to begin to explore their experiences, concerns and ideas. Furthermore, it would be useful to obtain the input of international scholars who have been involved in reform and innovation in their own countries, as well as individuals from South African institutions where there are examples of innovative practices in relation to PhD programmes.

In conclusion, South Africa as a whole, and our higher education institutions in particular, would benefit from an informed and co-ordinated interaction between the National DoE, DACST and other stakeholders in terms of developing appropriate policy which strengthens our doctoral education system in relation to achieving our national goals of equity redress, and social, economic and academic development. As Bob Weisbuch, President of the Woodrow Wilson National Fellowship Foundation, observed: "When it comes to doctoral education, nobody is in charge, and that may be the secret of its success. But laissez-faire is less than fair to students and to the social realms that graduate education can benefit" (Nyquist & Woodford 2000:4).

University of Cape Town

APPENDICES

University of Cape Town

University of Cape Town

Appendix 1

Defining the senior doctorates offered in South African universities

The university prospectuses in South Africa refer to the degrees of Doctor of Science (DSc), Doctor of Education (DEd), Doctor of Music (DMus), Doctor of Pharmacy (DPharm), Doctor of Veterinary Science (DVSc), Doctor of Business Leadership (DBL), Doctor of Fine Arts (DFA), amongst others. While many of these doctoral titles refer to research doctorates that are equivalent to PhDs, in some institutions they represent the most senior formal qualification on offer – the senior doctorate. It is more than likely that the award of these types of doctorates follows the British tradition of higher doctorates awarded to mature scholars at universities such as Oxford, Cambridge and London (see Chapter 2).

The senior doctorate in South Africa is a degree that follows on from the PhD degree and is thus the highest and most prestigious degree awarded at a university. It is awarded on the basis of work in a specific field that has already been published. In most cases, the published work would be based on continuous independent research, except for the Doctor of Music which could include a set of musical compositions such as at Rand University (*General Regulations 2000*).

Senior doctorates are awarded to individuals who are considered to be internationally renowned in their field and who have published internationally recognised research, such as the DSc awarded at Medunsa (Faculty of Science website, December 2000). It is also implicitly or explicitly stated that the individual, as an authority in his/her field, should be rated as excellent. The UCT *Faculty of Humanities Handbook 2000*, for example, states that senior doctorates are awarded "only to persons of exceptional academic merit".

In general, the published work must make a substantial, original and significant contribution to the field. Institutional guidelines describe these criteria in slightly different ways. For example, at the University of Cape Town, the published work submitted for a DSc in the Faculty of Science "is likely to be regarded as 'benchmark' research in the relevant field in years to come" (*Faculty of Science Handbook 2000*), while in the Faculty of Humanities, published work submitted for a senior doctorate should "have established the candidate's position as an authority in the field" (*Faculty of Humanities Handbook 2000*). The published work submitted for a senior doctorate at Rand University should "constitute a distinguished contribution to the advancement of knowledge" (*General Regulations 2000*). The senior doctorate is thus very rarely awarded¹ and only to individuals who have been working and publishing in the specific field for a long period of time. The Faculty of Science at UCT, for example, specifies a minimum of 10 years in the given field.

¹ Apparently, on average, less than one senior doctorate is awarded per year in South Africa (personal communication from Professor Bunting via my supervisor, July 2001).

The main aspects of the senior doctorates awarded in South Africa are encapsulated in the quotations below.

[Senior Doctorates] are not intended for persons who wish to pursue further study based on their thesis material alone. These degrees are intended for persons who are already in possession of doctorates, and who, owing to the notable number of articles that have been published in a specific field, and deemed to be of a particularly high standard, may register for this doctorate. In exceptional cases the Senate may also allow a person who has not yet obtained a doctorate the opportunity to register for a doctor's degree under the same conditions.

(Faculty of Economics & Management Sciences website, University of the Free State, December 2000)

The degree of Doctor of Architecture is the highest and most prestigious degree awarded in the fields of architecture, planning, urban design and construction economics by the University of Cape Town. It is awarded rarely, for substantial, original and scholarly contributions to knowledge, which would normally be the result of work carried out, built and/or published over a period of years.

(*Faculty of Engineering and the Built Environment Handbook 2000*, University of Cape Town)

The DMus degree follows the PhD and is awarded for continuous research of a high standard. A candidate who hasn't yet obtained the PhD degree, can apply for PhD status to be admitted to study for the DMus degree.

(Department of Music website, Potchefstroom University, December 2000)

Some of the aspects of the senior doctorate, such as the basis of research and the requirement that it makes a distinct contribution to knowledge in the field, are the same as the research doctorate. The distinguishing factor, however, is that the senior doctorate is awarded retrospectively and in lieu of many years of scholarly work to academics who, essentially, are regarded as international leaders in a sub-field.

Appendix 2

About the data used in Chapter 3

2.1 Source of the degree awards and enrolments data

The data on degree awards and enrolments in 1996 at universities and technikons which were used for Chapter 3, was obtained from the Education Policy Unit (EPU) at the University of the Western Cape, and is based on the SAPSE 1996 data obtained from the National Department of Education. This particular dataset was chosen for this study for a number of reasons:

- Firstly, when I began my research in 1998, the 1996 SAPSE data was the latest available.
- Secondly, the SAPSE datasets which are based on the "Financial and Related Statements" reports from each university and technikon in South Africa are the only ones which contain data that is disaggregated to the sub-CESM level (Tables 2.12 and 2.13). We had thought that it would be valuable to explore the data at the discipline (departmental) level as this would hopefully yield new and interesting insights. It turned out that our instincts were correct, as is shown in the analysis in section 3.5 of Chapter 3.
- Thirdly, it was fortuitous that the data manager of the EPU, Andre Burness, had combined the datasets from the 34 institutions² into two tables – one for universities and the other for technikons, as part of a project for the National Research Foundation (NRF). Andre had also reworked the data into a Microsoft Excel format and added new column data, such as those for the university and technikon codes. The composite data I received from the EPU thus contained columns for individual institutions, institutional types and sub-types; the three NRF clusters, 22 CESM categories and 149 sub-CESMs; qualification types, and race and gender.

I spent considerable time exploring Tables 2.13 and 2.12 of the SAPSE dataset using the pivot table function in Excel which yielded some interesting results. For instance, I discovered that it was useful to analyse the degree awards and enrolments by individual institutions as this highlighted how the doctoral and masters students were clustered in a handful of universities. In addition, I found that while the three NRF clusters (broad fields of study) provided a useful overview of the doctorates awarded, the analysis of the distribution of degrees by the six NRF sub-categories did not add to the insights of the analysis at the more disaggregated level. These categories have since been omitted from the analysis. The results of the exploration and analysis of the SAPSE data are presented in the form of tables in Chapter 3 and Appendix 4.

² All universities and technikons, except for Natal Technikon and the University of the North West.

2.2 Missing data and rounding off

The Natal Technikon and the University of the North West data were not included in the SAPSE 1996 dataset. Quite early on I managed to obtain a copy of the Natal Technikon Graduation Ceremony Programme for 1996 through their Public Relations Office which enabled me to include the overall figures for degrees awarded at the technikon for that year. However, because the information was not disaggregated by the categories used in Chapter 3 (for example, race and gender, or CESM categories and sub-CESM specialisms) the figures are not included in all of the tables. After numerous phone calls, I also received a copy of the University of the North West's Graduate Ceremony Programme for 1996 which confirmed that only one PhD degree was awarded in that year and that it was in Physics. This figure is not included in any of the tables in Chapter 3.

The numbers used in Chapter 3 have been rounded off to whole numbers for the purposes of easy reading and analysis. The head counts of degree awards (Table 2.13) and enrolments (Table 2.12) by fields of study (CESM categories) and sub-fields (sub-CESM specialisms) in the original data set were often in fractions. This is because in many cases students were enrolled in more than one major or field of study. Thus, the totals presented in the tables in Chapter 3 do not always match the totals from the original figures.

2.3 Accuracy of data

In terms of the level of accuracy of the SAPSE 1996 dataset, it is my assumption that as most institutions award relatively small numbers of doctoral degrees (compared to the large undergraduate numbers) that this particular information will be reasonably accurate. However, there are probably differences in the level of accuracy of the data supplied by the HAUs and the HDUs. The majority of the data used in Chapter 3 relates to the seven universities (6 HAUs plus Unisa) which awarded the highest number of doctorates. These institutions generally have full-time SAPSE officers who are responsible for coding and capturing the data, and who are usually well-trained. There is probably about a 5% margin of error in this data. It is possible that the data from the HDUs has about a 5 – 10% error (see Cooper & Subotzky 2001:271) but, since the numbers of doctorates awarded at these institutions were relatively small, the margin of error does not distort the overall picture too significantly.

Appendix 3

Categories used in Chapter 3

3.1 Institutional sub-types

The following categories were originally created for a study of Historically Black Universities conducted by the EPU of the University of the Western Cape in 1997 (EPU 1997), and used subsequently in Cooper & Subotzky (2001:2). I found these categories useful to employ in the analysis of the degrees awarded in 1996 because of the differences they revealed between, for example, the historically advantaged and disadvantaged institutions, but also within categories such as the African and non-African HDU categories. The individual universities and technikons which fall within each institutional sub-type category are listed in the tables below.

Appendix Table 3.1 : Categorisation of universities

University type	University sub-type	Universities
Historically advantaged universities (HAUs)	Afrikaans HAUs	Orange Free State
		Port Elizabeth
		Potchefstroom
		Pretoria
		Rand Afrikaans
		Stellenbosch
	English HAUs	Cape Town
		Natal
		Rhodes
		Witwatersrand
Historically disadvantaged universities (HDUs)	African HDUs	Fort Hare
		North West
		North
		Transkei
		Venda
		Zululand
	Non-African HDUs	Durban-Westville
		Western Cape
	Special Purpose HDUs	Medunsa
		Vista
Unisa	Unisa	Unisa

Appendix Table 3.2 : Categorisation of technikons

Technikon type	Technikon sub-type	Technikon
Historically advantaged technikons (HATs)	HATs	Cape
		Free State
		Natal
		Port Elizabeth
		Pretoria
		Vaal Triangle
		Witwatersrand
Historically disadvantaged technikons (HDTs)	African HDTs	Border
		Eastern Cape
		Mangosuthu
		North Gauteng
	Non-African HDTs	North West
		ML Sultan Peninsula
Technikon South Africa	Technikon South Africa	South Africa

3.2 Qualification sub-levels

In order to facilitate the comparison of doctoral degrees with other degree types, all university and technikon degrees have been categorised into 3 qualification sub-levels (following Cooper & Subotzky 2001:102, 165). The groupings are as follows:

Appendix Table 3.3 : University qualification sub-levels

Qualification levels used in this study	University qualification sub-levels used in SAPSE 1996 Table 2.13
Undergraduate	- Undergraduate Diploma/Certificate - General Academic First Degree - Professional First Bachelor Degree
Lower postgraduate	- Postgraduate Diploma/Certificate - Postgraduate Bachelor Degree - Honours Degree
Upper postgraduate	- Masters Degree - Doctoral Degree

Appendix Table 3.4 : Technikon qualification sub-levels

Qualification levels used in this study	Technikon qualification sub-levels used in SAPSE 1996 Table 2.13
Lower undergraduate	- National Certificate - National Higher Certificate - National Diploma
Upper undergraduate	- Post-Diploma Diploma - National Higher Diploma - Baccalaureus Technologiae Degree
Postgraduate	- Masters Diploma in Technology - Magister Technologiae Degree - Laureatus Technology - Doctor Technologiae Degree

The analysis by qualification sub-levels is useful because of the vast differences in student patterns between them; for instance, the differences between the masters and doctoral levels (upper postgraduate) in comparison with the other postgraduate levels (lower postgraduate) in universities.

3.3 Three NRF clusters, 22 CESM categories and 149 sub-CESMs

Appendix Table 3.5 : Categorisation of the three NRF clusters into 22 CESM categories as used in SAPSE Table 2.13

Three NRF clusters	CESM no	CESM categories
Health sciences	9	Health care & health sciences
Natural sciences & engineering	1	Agriculture & renewable resources
	2	Architecture & environmental design
	6	Computer science & data processing
	8	Engineering & engineering technology
	15	Life sciences & physical sciences
	16	Mathematical sciences
	17	Military sciences
Social sciences & humanities	3	Arts, visual & performing
	4	Business, commerce & management sciences
	5	Communication
	7	Education
	10	Home economics
	11	Industrial arts, trades & technology
	12	Language, linguistics & technology
	13	Law
	14	Libraries & museums
	18	Philosophy, religion & theology
	19	Physical education, health education & leisure
	20	Psychology
	21	Public administration & social services
	22	Social sciences & humanities

Appendix Table 3.6 : Sub-CESM specialisms in SAPSE Table 2.13

1	AGRICULTURE AND RENEWABLE NATURAL RESOURCES
101	Agricultural economics
102	Agricultural extension
103	Agricultural food technology
104	Animal sciences
105	Horticulture
106	Plant sciences
107	Soil sciences
108	Fisheries
109	Forestry
110	Outdoor recreation
111	Wildlife
112	Land reclamation
113	Renewable natural resources
114	All other agricultural and renewable natural resources
2	ARCHITECTURE & ENVIRONMENTAL DESIGN
201	Environmental design (incl architecture)
202	Design and planning technology (incl quantity surveying)
203	Construction and design implementation (incl building science)
204	Management in architecture and environmental design (incl building management)
205	Planning (incl town and regional planning)
206	All other architecture and environmental design
3	ARTS, VISUAL AND PERFORMING
301	Dance (incl ballet)
302	Music
303	History of music
304	Drama
305	History of drama
306	Fine arts
307	History of art
308	All other arts, visual and performing
4	BUSINESS, COMMERCE & MANAGEMENT SCIENCES
401	Accounting
402	Banking and finance
403	Business data systems
404	Business economics etc
405	Quantitative methods (incl operations research/management science)
406	All other business, commerce and management sciences
5	COMMUNICATION
501	Journalism
502	Communication
503	All other communication
6	COMPUTER SCIENCE & DATA PROCESSING
7	EDUCATION
701	Pre-primary
702	Primary
703	Secondary
704	Tertiary
705	Special
706	All other education
8	ENGINEERING & ENGINEERING TECHNOLOGY
801	Aerospace and aeronautical engineering and technology

802	Agricultural engineering and technology
803	Chemical engineering and technology
804	Civil engineering and technology
805	Computer engineering and technology
806	Electrical engineering and technology
807	Geological engineering
808	Industrial engineering and technology
809	Marine engineering and naval architecture
810	Materials engineering and technology
811	Mechanical engineering and technology
812	Metallurgical engineering and technology
813	Mining engineering and technology
814	Surveying and mapping
815	All other engineering and engineering technology
9	HEALTH CARE & HEALTH SCIENCES
901	Anatomy
902	All other basic health care sciences
903	Medicine/surgery
904	Dentistry
905	Nursing
906	Radiology
907	All other clinical health sciences
908	Audiology and speech pathology (incl speech therapy/logopaedics)
909	Occupational therapy
910	Physiotherapy
911	Radiotherapy
912	All other rehabilitation and therapy
913	Pharmaceutical science (incl pharmacy)
914	Hospital and health care administration
915	Veterinary medical sciences (incl veterinary science)
916	All other health care and health sciences
10	HOME ECONOMICS
1001	Food nutrition (incl dietetics)
1002	All other home economics
11	INDUSTRIAL ARTS, TRADES & TECHNOLOGY
12	LANGUAGE, LINGUISTICS & LITERATURE
1201	Linguistics
1202	Literary studies
1203	Afrikaans - Nederlands
1204	English
1205	French
1206	German
1207	Greek
1208	Hebrew
1209	Latin
1210	Sesotho sa Leboa
1211	Sesotho
1212	siSwati
1213	Xitsonga
1214	Setswana
1215	Tshivenda
1216	isiXhosa
1217	isiZulu
1218	isiNdebele

1219	All other African languages
1220	South Asian languages
1221	All other languages, linguistics and literature
13	LAW
1301	Indigenous law and the law of African administration
1302	All other law
14	LIBRARIES & MUSEUMS
1401	Library science
1402	All other library and museums
15	LIFE SCIENCES & PHYSICAL SCIENCES
1501	Astronomy
1502	Atmospheric sciences
1503	Biology
1504	Botany
1505	Entomology
1506	Genetics
1507	Microbiology
1508	Physiology
1509	Zoology
1510	Chemistry
1511	Biochemistry
1512	Geology
1513	Oceanology
1514	Physics
1515	General earth-space science
1516	All other life sciences and physical sciences
16	MATHEMATICAL SCIENCES
1601	Mathematics
1602	Probability and statistics
1603	Applied mathematics
1604	All other mathematical sciences
17	MILITARY SCIENCE
18	PHILOSOPHY, RELIGION AND THEOLOGY
1801	Philosophy
1802	Science of religion
1803	Buddhism
1804	Christianity
1805	Hinduism
1806	Islam
1807	Judaism
1808	Primal religions
1809	All other philosophy, religion and theology
19	PHYSICAL EDUCATION, HEALTH EDUCATION & LEISURE
20	PSYCHOLOGY
2001	Clinical psychology
2002	Industrial psychology
2003	All other psychology
21	PUBLIC ADMINISTRATION & SOCIAL SERVICES
2101	Public administration
2102	Development administration
2103	Safety and correctional services (incl police science and penology)
2104	Social work
2105	All other public administration and social services
22	SOCIAL SCIENCES & SOCIAL STUDIES

2201	Archaeology
2202	Anthropology
2203	Economics
2204	Geography
2205	African history
2206	History
2207	African political systems
2208	Political science and government
2209	Criminology
2210	Sociology
2211	All other social sciences and social studies

University of Cape Town

Appendix 4

Additional statistics for universities in Chapter 3

Appendix Table 4.1 : Doctoral degrees awarded at universities in 1996 by sub-CESMs, and race and gender

CESM categories and sub-CESMs	African females		African males		Coloured females		Coloured males		Indian females		Indian males		White females		White males		Totals	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
1 Agriculture & renewable resources																		
101 Agricultural economics	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
102 Agricultural extension	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
103 Agricultural food technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	2	0%
104 Animal sciences	1	13%	1	2%	0	0%	0	0%	0	0%	0	0%	1	0%	3	1%	6	1%
105 Horticulture	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	3	1%	3	0%
106 Plant sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	3	1%	3	0%
107 Soil sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	2	0%
108 Fisheries	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
109 Forestry	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
110 Outdoor recreation	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
111 Wildlife	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%
112 Land reclamation	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
113 Renewable natural resources	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
114 All other agricultural & renewable natural resources	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Total Agriculture & renewable resources	1	13%	1	2%	0	0%	0	0%	0	0%	0	0%	1	0%	14	5%	17	2%
2 Architecture & environmental design																		
201 Environmental design	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	2	0%
202 Design & planning technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
203 Construction & design implementation	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
204 Management in architecture & environmental design	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
205 Planning	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
206 All other architecture & environmental design	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%
Total Architecture & environmental design	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	3	0%

CESM categories and sub-CESMs		African females		African males		Coloured females		Coloured males		Indian females		Indian males		White females		White males		Totals	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
3	Arts, visual & performing																		
301	Dance	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
302	Music	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	2	1%	4	1%	7	1%
303	History of music	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
304	Drama	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
305	History of drama	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
306	Fine arts	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
307	History of art	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	0	0%	2	0%
308	All other arts, visual & performing	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Arts, visual & performing	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	4	2%	4	1%	9	1%
4	Business, commerce & management sciences																		
401	Accounting	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	4	1%	4	1%
402	Banking & finance	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
403	Business data systems	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
404	Business economics etc	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	15	4%	16	2%
405	Quantitative methods	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	0	0%	1	0%
406	All other business, commerce & management sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	2	0%
	Total Business, commerce & management sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	21	6%	23	3%
5	Communication																		
501	Journalism	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0
502	Communication	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%	2	0%
503	All other communication	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Communication	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%	2	0%
6	Computer science & data processing	0	0%	0	0%	0	0%	0	0%	0	0%	1	7%	2	1%	4	1%	8	1%

CESM categories and sub-CESMs		African females		African males		Coloured females		Coloured males		Indian females		Indian males		White females		White males		Totals	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
7	Education																		
701	Pre-primary education	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
702	Primary education	0	0%	0	0%	0	0%	0	0%	0	0%	1	7%	1	0%	1	0%	3	0%
703	Secondary education	0	0%	6	13%	1	25%	0	0%	0	0%	1	7%	9	4%	14	4%	31	4%
704	Tertiary education	1	13%	3	6%	0	0%	0	0%	0	0%	1	7%	5	2%	3	1%	13	2%
705	Special education	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
706	All other education	1	13%	7	15%	0	0%	1	9%	2	29%	3	21%	22	10%	16	4%	52	7%
	Total Education	2	26%	16	34%	1	25%	1	9%	2	29%	6	42%	37	16%	34	9%	99	14%
8	Engineering & engineering technology																		
801	Aerospace & aeronautical engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
802	Agricultural engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
803	Chemical engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	5	2%	6	2%	11	2%
804	Civil engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	8	2%	9	1%
805	Computer engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
806	Electrical engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	16	4%	18	3%
807	Geological engineering	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
808	Industrial engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	2	0%
809	Marine engineering & naval architecture	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
810	Materials engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
811	Mechanical engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	4	1%	5	1%
812	Metallurgical engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	2	0%
813	Mining engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	3	1%	3	0%
814	Surveying & mapping	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
815	All other engineering & engineering technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	4	1%	6	1%
	Total Engineering & engineering technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	11	4%	45	13%	56	8%

CESM categories and sub-CESMs		African females		African males		Coloured females		Coloured males		Indian females		Indian males		White females		White males		Totals	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
9	Health care & health sciences																		
901	Anatomy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	4	2%	1	0%	5	1%
902	All other basic health care sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	4	2%	10	2%	14	2%
903	Medicine/surgery	0	0%	0	0%	0	0%	0	0%	2	29%	0	0%	7	3%	3	1%	12	2%
904	Dentistry	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	3	1%	4	1%
905	Nursing	2	25%	0	0%	0	0%	0	0%	0	0%	0	0%	6	3%	0	0%	8	1%
906	Radiology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
907	All other clinical health sciences	0	0%	0	0%	0	0%	1	9%	0	0%	0	0%	2	1%	4	1%	7	1%
908	Audiology & speech pathology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
909	Occupational therapy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
910	Physiotherapy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
911	Radiotherapy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
912	All other rehabilitation & therapy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
913	Pharmaceutical sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	4	2%	3	1%	7	1%
914	Hospital & health care administration	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
915	Veterinary medical sciences	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	1	0%	2	1%	4	1%
916	All other health care & health sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	5	2%	4	1%	9	1%
	Total Health care & health sciences	2	25%	1	2%	0	0%	1	9%	2	29%	0	0%	34	15%	30	8%	70	10%
10	Home economics																		
1001	Food nutrition	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%	2	0%
1002	All other home economics	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Home economics	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%	2	0%
11	Industrial arts, trades & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%

CESM categories and sub-CESMs		African females		African males		Coloured females		Coloured males		Indian females		Indian males		White females		White males		Totals	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
12	Language, linguistics & literature																		
1201	Linguistics	1	13%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	0	0%	2	0%
1202	Literary studies	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	2	0%
1203	Afrikaans - Nederlands	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	10	4%	0	0%	10	1%
1204	English	0	0%	2	4%	0	0%	0	0%	0	0%	0	0%	5	2%	4	1%	11	2%
1205	French	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%	2	0%
1206	German	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	0	0%	1	0%
1207	Greek	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%
1208	Hebrew	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	0	0%	3	1%	4	1%
1209	Latin	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%	2	0%
1210	Sesotho sa Leboa	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%
1211	Sesotho	1	13%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%
1212	siSwati	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1213	Xitsonga	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1214	Setswana	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1215	Tshivenda	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1216	isiXhosa	0	0%	2	4%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	0%
1217	isiZulu	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	2	0%
1218	isiNdebele	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	0	0%	2	0%
1219	All other African languages	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1220	South Asian languages	0	0%	2	4%	1	25%	0	0%	0	0%	0	0%	1	0%	2	1%	6	1%
1221	All other languages, linguistics & literature	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Language, linguistics & literature	2	26%	9	18%	1	25%	0	0%	0	0%	0	0%	22	7%	15	4%	49	7%
13	Law																		
1301	Indigenous law & the law of African administration	0	0%	0	0%	0	0%	0	0%	1	14%	0	0%	1	0%	0	0%	2	0%
1302	All other law	0	0%	2	4%	0	0%	0	0%	0	0%	0	0%	3	1%	12	3%	17	2%
	Total Law	0	0%	2	4%	0	0%	0	0%	1	14%	0	0%	4	1%	12	3%	19	3%

CESM categories and sub-CESMs		African females		African males		Coloured females		Coloured males		Indian females		Indian males		White females		White males		Totals	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
14	Libraries & museums																		
1401	Library science	0	0%	0	0%	0	0%	0	0%	0	0%	1	7%	2	1%	0	0%	3	0%
1402	All other library & museums	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Libraries & museums	0	0%	0	0%	0	0%	0	0%	0	0%	1	7%	2	1%	0	0%	3	0%
15	Life sciences & physical sciences																		
1501	Astronomy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1502	Atmospheric sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1503	Biology	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	2	1%	0	0%	3	0%
1504	Botany	0	0%	2	4%	0	0%	0	0%	1	14%	0	0%	12	5%	3	1%	18	3%
1505	Entomology	0	0%	0	0%	0	0%	0	0%	0	0%	1	7%	1	0%	3	1%	5	1%
1506	Genetics	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	4	1%	5	1%
1507	Microbiology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	5	2%	8	2%	13	2%
1508	Physiology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	0	0%	1	0%
1509	Zoology	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	6	3%	19	5%	26	4%
1510	Chemistry	0	0%	4	9%	0	0%	0	0%	0	0%	2	14%	11	5%	13	3%	30	4%
1511	Biochemistry	0	0%	1	2%	0	0%	1	7%	0	0%	0	0%	4	2%	7	2%	13	2%
1512	Geology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	4	1%	6	1%
1513	Oceanology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%	2	0%
1514	Physics	0	0%	0	0%	0	0%	2	18%	0	0%	0	0%	1	0%	11	3%	14	2%
1515	General earth-space science	0	0%	0	0	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1516	All other life sciences & physical sciences	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	2	0%
	Total Life sciences & physical sciences	0	0%	10	21%	0	0%	3	25%	1	14%	3	21%	47	19%	74	19%	138	20%
16	Mathematical sciences																		
1601	Mathematics	0	0%	0	0%	0	0%	1	11%	0	0%	0	0%	2	1%	1	0%	4	1%
1602	Probability & statistics	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	2	1%	3	0%
1603	Applied mathematics	0	0%	1	1%	0	0%	0	0%	0	0%	1	7%	1	0%	5	1%	8	1%
1604	All other mathematical sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Mathematical sciences	0	0%	1	1%	0	0%	1	11%	0	0%	1	7%	4	1%	8	2%	15	2%

CESM categories and sub-CESMs		African females		African males		Coloured females		Coloured males		Indian females		Indian males		White females		White males		Totals	
		No		No		No		No		No		No		No		No		No	
		%		%		%		%		%		%		%		%		%	
17	Military science	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
18	Philosophy, religion & theology																		
1801	Philosophy	0	0%	0	0%	0	0%	2	18%	0	0%	0	0%	1	1%	5	1%	8	1%
1802	Science of religion	0	0%	0	0%	0	0%	0	0%	0	0%	1	7%	2	1%	4	1%	7	1%
1803	Buddhism	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1804	Christianity	1	13%	2	4%	0	0%	1	9%	0	0%	1	7%	0	0%	39	10%	44	6%
1805	Hinduism	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1806	Islam	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1807	Judaism	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%	2	0%
1808	Primal religions	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1809	All other philosophy, religion & theology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	12	3%	12	2%
	Total Philosophy, religion & theology	1	13%	2	4%	0	0%	3	27%	0	0%	2	14%	4	2%	61	15%	73	10%
19	Physical education, health education & leisure	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	1%	2	0%
20	Psychology																		
2001	Clinical psychology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	1	0%	2	0%
2002	Industrial psychology	0	0%	0	0%	1	25%	0	0%	0	0%	0	0%	1	0%	3	1%	5	1%
2003	All other psychology	0	0%	0	0%	0	0%	0	0%	1	14%	0	0%	22	10%	14	4%	37	5%
	Total Psychology	0	0%	0	0%	1	25%	0	0%	1	14%	0	0%	24	10%	18	5%	44	6%
21	Public administration & social services																		
2101	Public administration	0	0%	1	2%	0	0%	1	9%	0	0%	0	0%	1	0%	3	1%	6	1%
2102	Development administration	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
2103	Safety & correctional services	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	0	0%	1	0%
2104	Social work	0	0%	0	0%	0	0%	1	9%	0	0%	0	0%	10	4%	2	1%	13	2%
2105	All other public administration & social services	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Public administration & social services	0	0%	1	2%	0	0%	2	18%	0	0%	0	0%	12	4%	5	2%	20	3%

CESM categories and sub-CESMs	African females		African males		Coloured females		Coloured males		Indian females		Indian males		White females		White males		Totals	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
22 Social sciences & social studies																		
2201 Archaeology	0	0%	0	0%	1	25%	0	0%	0	0%	0	0%	2	1%	2	1%	5	1%
2202 Anthropology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	3	1%	4	1%
2203 Economics	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	10	3%	11	2%
2204 Geography	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	1	0%	4	1%	6	1%
2205 African history	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
2206 History	0	0%	1	2%	0	0%	0	0%	0	0%	0	0%	4	2%	7	2%	12	2%
2207 African political systems	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
2208 Political science & government	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	2	0%	3	0%
2209 Criminology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
2210 Sociology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%	4	1%	5	1%
2211 All other social sciences & social studies	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Total Social sciences & social studies	0	0%	2	4%	1	25%	0	0%	0	0%	0	0%	11	3%	32	9%	46	7%
Totals	8	100%	47	100%	4	100%	11	100%	7	100%	14	100%	225	100%	383	100%	699	100%

Source: SAPSE 1996 Table 2.13 for universities

Note: The University of the North West is not included in this table. However, according to the University's Graduate Ceremony Programme for 1996, only one PhD degree was granted that year and thus the figures in this and the following tables are not too distorted.

Appendix Table 4.2 : Doctorates and masters degrees awarded at universities in 1996 by CESM categories and sub-CESMs

CESM categories and sub-CESMs		Doctorates awarded		Masters awarded	
		No	%	No	%
101	Agricultural economics	0	0%	18	0%
104	Animal sciences	6	1%	13	0%
106	Plant sciences	3	0%	11	0%
111	Wildlife	1	0%	6	0%
109	Forestry	0	0%	4	0%
107	Soil sciences	2	0%	4	0%
103	Agricultural food technology	2	0%	4	0%
105	Horticulture	3	0%	3	0%
102	Agricultural extension	0	0%	1	0%
	Total Agriculture & renewable resources	17	2%	64	2%
205	Planning	0	0%	56	1%
203	Construction and design implementation	0	0%	8	0%
201	Environmental design	2	0%	4	0%
204	Management in architecture and environmental design	0	0%	2	0%
206	All other architecture and environmental design	1	0%	0	0%
	Total Architecture & environmental design	3	0%	70	2%
302	Music	7	1%	27	1%
306	Fine arts	0	0%	19	0%
307	History of art	2	0%	6	0%
304	Drama	0	0%	5	0%
308	All other arts, visual and performing	0	0%	1	0%
	Total Arts, visual & performing	9	1%	58	1%
406	All other business, commerce and management sciences	2	0%	404	10%
404	Business economics etc	16	2%	362	9%
401	Accounting	4	1%	54	1%
403	Business data systems	0	0%	11	0%
405	Quantitative methods	1	0%	4	0%
	Total Business, commerce & management sciences	23	3%	835	21%
502	Communication	2	0%	6	0%
501	Journalism	0	0%	4	0%
503	All other communication	0	0%	1	0%
	Total Communication	2	0%	11	0%
600	Total Computer science & data processing	8	1%	49	1%
703	Secondary	31	4%	221	6%
706	All other education	52	7%	147	4%
704	Tertiary	13	2%	34	1%
705	Special	0	0%	3	0%
702	Primary	3	0%	0	0%
	Total Education	99	14%	405	10%
806	Electrical engineering and technology	18	3%	65	2%
811	Mechanical engineering and technology	5	1%	44	1%
804	Civil engineering and technology	9	1%	39	1%
803	Chemical engineering and technology	11	2%	33	1%
815	All other engineering and engineering technology	6	1%	25	1%
810	Materials engineering and technology	0	0%	22	0%
808	Industrial engineering and technology	2	0%	20	0%
813	Mining engineering and technology	3	0%	12	0%

CESM categories and sub-CESMs		Doctorates awarded		Masters awarded	
		No	%	No	%
814	Surveying and mapping	0	0%	10	0%
812	Metallurgical engineering and technology	2	0%	5	0%
805	Computer engineering and technology	0	0%	2	0%
	Total Engineering & engineering technology	56	8%	277	7%
903	Medicine/surgery	12	2%	121	3%
907	All other clinical health sciences	7	1%	79	2%
902	All other basic health care sciences	14	2%	74	2%
905	Nursing	8	1%	45	1%
913	Pharmaceutical science	7	1%	38	1%
904	Dentistry	4	1%	20	0%
916	All other health care and health sciences	9	1%	19	0%
915	Veterinary medical sciences	4	1%	15	0%
906	Radiology	0	0%	11	0%
908	Audiology and speech pathology	0	0%	7	0%
901	Anatomy	5	1%	5	0%
909	Occupational therapy	0	0%	5	0%
910	Physiotherapy	0	0%	5	0%
914	Hospital and health care administration	0	0%	3	0%
911	Radiotherapy	0	0%	1	0%
	Total Health care & health sciences	70	10%	448	11%
1001	Food nutrition	2	0%	5	0%
1002	All other home economics	0	0%	1	0%
	Total Home economics	2	0%	6	0%
1100	Total Industrial arts, trades and technology	1	0%	0	0%
1204	English	11	2%	43	1%
1201	Linguistics	2	0%	33	1%
1203	Afrikaans - Nederlands	10	1%	31	1%
1216	isiXhosa	2	0%	25	1%
1210	Sesotho sa Leboa	1	0%	16	0%
1202	Literary studies	2	0%	13	0%
1220	South Asian languages	6	1%	12	0%
1208	Hebrew	4	1%	11	0%
1217	isiZulu	2	0%	6	0%
1218	isiNdebele	2	0%	6	0%
1214	Setswana	0	0%	6	0%
1209	Latin	2	0%	4	0%
1206	German	1	0%	2	0%
1207	Greek	1	0%	2	0%
1205	French	2	0%	0	0%
1211	Sesotho	1	0%	0	0%
	Total Language, linguistics & literature	49	7%	210	5%
1302	All other law	17	2%	218	5%
1301	Indigenous law and the law of African administration	2	0%	0	0%
	Total Law	19	3%	218	5%
1401	Library science	3	0%	14	0%
1402	All other library and museums	0	0%	13	0%
	Total Libraries & museums	3	0%	27	1%

CESM categories and sub-CESMs		Doctorates awarded		Masters awarded	
		No	%	No	%
1509	Zoology	26	4%	65	2%
1510	Chemistry	30	4%	52	1%
1512	Geology	6	1%	51	1%
1511	Biochemistry	13	2%	42	1%
1504	Botany	18	3%	37	1%
1507	Microbiology	13	2%	36	1%
1516	All other life sciences and physical sciences	2	0%	34	1%
1514	Physics	14	2%	26	1%
1503	Biology	3	0%	18	0%
1506	Genetics	5	1%	13	0%
1508	Physiology	1	0%	12	0%
1505	Entomology	5	1%	9	0%
1513	Oceanology	2	0%	6	0%
1501	Astronomy	0	0%	1	0%
Total Life sciences & physical sciences		138	20%	402	10%
1602	Probability and statistics	3	0%	14	0%
1601	Mathematics	4	1%	12	0%
1603	Applied mathematics	7	1%	10	0%
1604	All other mathematical sciences	0	0%	3	0%
Total Mathematical sciences		14	2%	39	1%
1804	Christianity	44	6%	122	3%
1809	All other philosophy, religion and theology	13	2%	23	1%
1801	Philosophy	8	1%	10	0%
1802	Science of religion	7	1%	34	1%
1807	Judaism	2	0%	0	0%
1806	Islam	0	0%	4	0%
Total Philosophy, religion and theology		74	11%	193	5%
1900	Total Physical education, health education and leisure	2	0%	15	0%
2003	All other psychology	37	5%	151	4%
2001	Clinical psychology	2	0%	97	2%
2002	Industrial psychology	5	1%	34	1%
Total Psychology		44	6%	282	7%
2104	Social work	13	2%	88	2%
2101	Public administration	6	1%	33	1%
2102	Development administration	0	0%	8	0%
2103	Safety and correctional services	1	0%	1	0%
Total Public administration & social services		20	3%	130	3%
2203	Economics	11	2%	60	2%
2204	Geography	6	1%	50	1%
2206	History	12	2%	35	1%
2208	Political science and government	3	0%	32	1%
2202	Anthropology	4	1%	29	1%
2210	Sociology	5	1%	28	1%
2201	Archaeology	5	1%	6	0%
2211	All other social sciences and social studies	0	0%	4	0%
Total Social sciences & social studies		46	6%	244	6%
Totals		699		3980	

Source: SAPSE 1996 Table 2.13 for universities.

Note: The University of the North West is not included in this table.

Appendix Table 4.3 : Top seven doctorate awarding universities by sub-CESMs

Sub-CESMs		Cape Town		Natal		Pretoria		Rand		Stellenbosch		Unisa		Wits	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%
101	Agricultural economics	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
102	Agricultural extension	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
103	Agricultural food technology	0	0%	0	0%	0	0%	0	0%	2	3%	0	0%	0	0%
104	Animal sciences	0	0%	1	1%	3	3%	0	0%	0	0%	0	0%	0	0%
105	Horticulture	0	0%	2	3%	0	0%	0	0%	0	0%	0	0%	0	0%
106	Plant sciences	0	0%	3	4%	0	0%	0	0%	0	0%	0	0%	0	0%
107	Soil sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
108	Fisheries	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
109	Forestry	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
110	Outdoor recreation	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
111	Wildlife	0	0%	0	0%	0	0%	0	0%	1	2%	0	0%	0	0%
112	Land reclamation	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
113	Renewable natural resources	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
114	All other agricultural & renewable natural resources	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Agriculture & renewable natural resources	0	0%	6	8%	3	3%	0	0%	3	4%	0	0%	0	0%
201	Environmental design	0	0%	0	0%	1	1%	0	0%	0	0%	0	0%	1	2%
202	Design & planning technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
203	Construction & design implementation	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
204	Management in architecture & environmental design	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
205	Planning	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
206	All other architecture & environmental design	1	1%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Architecture & environmental design	1	1%	0	0%	1	1%	0	0%	0	0%	0	0%	1	2%
301	Dance	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
302	Music	1	1%	0	0%	3	3%	0	0%	0	0%	1	1%	1	2%
303	History of music	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
304	Drama	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
305	History of drama	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
306	Fine arts	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
307	History of art	0	0%	0	0%	0	0%	0	0%	0	0%	1	1%	1	2%
308	All others arts, visual & performing	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Arts, visual & performing	1	1%	0	0%	3	3%	0	0%	0	0%	2	2%	2	3%
401	Accounting	0	0%	0	0%	1	1%	0	0%	1	2%	1	1%	0	0%
402	Banking & finance	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
403	Business data systems	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
404	Business economics etc	0	0%	1	1%	3	3%	5	8%	2	3%	3	3%	1	2%
405	Quantitative methods	0	0%	0	0%	0	0%	0	0%	0	0%	1	1%	0	0%
406	All other business, commerce & management sciences	0	0%	0	0%	1	1%	0	0%	0	0%	0	0%	0	0%
	Total Business, commerce & management sciences	0	0%	1	1%	5	5%	5	8%	3	4%	5	6%	1	2%
501	Journalism	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
502	Communication	0	0%	0	0%	0	0%	0	0%	0	0%	2	2%	0	0%

Sub-CESMs		Cape Town		Natal		Pretoria		Rand		Stellenbosch		Unisa		Wits	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%
503	All other communication	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Communication	0	0%	0	0%	0	0%	0	0%	0	0%	2	2%	0	0%
600	Computer science & data processing	1	1%	1	1%	0	0%	1	2%	1	2%	0	0%	1	2%
	Total Computer science & data processing	1	1%	1	1%	0	0%	1	2%	1	2%	0	0%	1	2%
701	Pre-primary education	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
702	Primary education	0	0%	0	0%	0	0%	0	0%	0	0%	3	3%	0	0%
703	Secondary education	0	0%	0	0%	0	0%	11	18%	6	9%	0	0%	0	0%
704	Tertiary education	0	0%	0	0%	0	0%	7	11%	0	0%	0	0%	0	0%
705	Special education	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
706	All other education	1	1%	4	5%	11	11%	3	5%	0	0%	26	29%	2	3%
	Total Education	1	1%	4	5%	11	11%	21	33%	6	9%	29	33%	2	3%
801	Aerospace & aeronautical engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
802	Agricultural engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
803	Chemical engineering & technology	4	6%	1	1%	0	0%	0	0%	1	2%	0	0%	4	6%
804	Civil engineering & technology	2	3%	0	0%	3	3%	0	0%	3	4%	0	0%	1	2%
805	Computer engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
806	Electrical engineering & technology	3	4%	5	7%	3	3%	1	2%	2	3%	0	0%	3	5%
807	Geological engineering	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
808	Industrial engineering & technology	0	0%	0	0%	1	1%	0	0%	0	0%	0	0%	1	2%
809	Marine engineering & naval architecture	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
810	Materials engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
811	Mechanical engineering & technology	2	3%	2	3%	1	1%	0	0%	0	0%	0	0%	0	0%
812	Metallurgical engineering & technology	0	0%	0	0%	1	1%	0	0%	0	0%	0	0%	1	2%
813	Mining engineering & technology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	3	5%
814	Surveying & mapping	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
815	All other engineering & engineering technology	3	4%	0	0%	3	3%	0	0%	0	0%	0	0%	0	0%
	Total Engineering & engineering technology	14	19%	8	10%	12	11%	1	2%	6	9%	0	0%	13	20%
901	Anatomy	1	1%	0	0%	0	0%	0	0%	0	0%	0	0%	4	6%
902	All other basic health care sciences	3	4%	1	1%	2	2%	0	0%	4	6%	0	0%	3	5%
903	Medicine/surgery	4	6%	3	4%	0	0%	0	0%	0	0%	0	0%	0	0%
904	Dentistry	0	0%	0	0%	2	2%	0	0%	0	0%	0	0%	2	3%
905	Nursing	0	0%	2	3%	0	0%	2	3%	0	0%	3	3%	0	0%
906	Radiology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
907	All other clinical health sciences	3	4%	0	0%	4	4%	0	0%	0	0%	0	0%	0	0%
908	Audiology & speech pathology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
909	Occupational therapy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
910	Physiotherapy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
911	Radiotherapy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
912	All other rehabilitation & therapy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
913	Pharmaceutical science	0	0%	0	0%	0	0%	0	0%	2	3%	0	0%	0	0%
914	Hospital & health care administration	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
915	Veterinary medical sciences	0	0%	0	0%	4	4%	0	0%	0	0%	0	0%	0	0%

Sub-CESMs		Cape Town		Natal		Pretoria		Rand		Stellenbosch		Unisa		Wits	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%
916	All other health care & health sciences	2	3%	0	0%	1	1%	0	0%	0	0%	0	0%	5	8%
	Total Health care & health sciences	13	18%	6	8%	13	12%	2	3%	6	9%	3	3%	14	21%
1001	Food nutrition	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1002	All other home economics	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Home economics	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1100	Industrial arts, trades & technology	0	0%	0	0%	0	0%	0	0%	1	2%	0	0%	0	0%
	Total Industrial arts, trades & technology	0	0%	0	0%	0	0%	0	0%	1	2%	0	0%	0	0%
1201	Linguistics	0	0%	0	0%	0	0%	1	2%	0	0%	0	0%	1	2%
1202	Literary studies	0	0%	0	0%	0	0%	0	0%	0	0%	1	1%	1	2%
1203	Afrikaans-Nederlands	1	1%	0	0%	0	0%	1	2%	1	2%	0	0%	0	0%
1204	English	1	1%	3	4%	1	1%	0	0%	0	0%	1	1%	2	3%
1205	French	0	0%	0	0%	0	0%	1	2%	1	2%	0	0%	0	0%
1206	German	0	0%	0	0%	0	0%	0	0%	1	2%	0	0%	0	0%
1207	Greek	0	0%	0	0%	1	1%	0	0%	0	0%	0	0%	0	0%
1208	Hebrew	0	0%	0	0%	0	0%	0	0%	2	3%	0	0%	0	0%
1209	Latin	0	0%	0	0%	0	0%	1	2%	1	2%	0	0%	0	0%
1210	Sesotho sa Leboa	0	0%	0	0%	0	0%	1	2%	0	0%	0	0%	0	0%
1211	Sesotho	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1212	siSwati	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1213	Xitsonga	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1214	Setswana	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1215	Tshivenda	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1216	isiXhosa	0	0%	0	0%	0	0%	0	0%	2	3%	0	0%	0	0%
1217	isiZulu	0	0%	1	1%	0	0%	0	0%	0	0%	0	0%	0	0%
1218	isiNdebele	1	1%	0	0%	1	1%	0	0%	0	0%	0	0%	0	0%
1219	All other African languages	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1220	South Asian languages	0	0%	1	1%	0	0%	0	0%	0	0%	3	3%	1	2%
1221	All other languages, linguistics & literature	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Languages, linguistics & literature	3	4%	5	7%	3	3%	5	8%	8	12%	5	6%	5	8%
1301	Indigenous law & the law of African administration	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1302	All other law	0	0%	1	1%	2	2%	1	2%	2	3%	7	8%	2	3%
	Total Law	0	0%	1	1%	2	2%	1	2%	2	3%	7	8%	2	3%
1401	Library sciences	0	0%	2	3%	0	0%	0	0%	0	0%	0	0%	0	0%
1402	All other library & museums	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Libraries & museums	0	0%	2	3%	0	0%	0	0%	0	0%	0	0%	0	0%
1501	Astronomy	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1502	Atmospheric sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1503	Biology	0	0%	1	1%	0	0%	0	0%	0	0%	0	0%	0	0%
1504	Botany	1	1%	5	7%	5	5%	0	0%	2	3%	0	0%	1	2%
1505	Entomology	0	0%	3	4%	0	0%	0	0%	0	0%	0	0%	0	0%
1506	Genetics	0	0%	2	3%	0	0%	0	0%	0	0%	0	0%	3	5%
1507	Microbiology	4	6%	1	1%	3	3%	0	0%	2	3%	0	0%	0	0%

Sub-CESMs		Cape Town		Natal		Pretoria		Rand		Stellenbosch		Unisa		Wits	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%
1508	Physiology	1	1%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1509	Zoology	3	4%	3	4%	5	5%	3	5%	1	2%	0	0%	2	3%
1510	Chemistry	6	8%	6	8%	0	0%	3	5%	2	3%	0	0%	3	5%
1511	Biochemistry	1	1%	0	0%	2	2%	0	0%	1	2%	0	0%	5	8%
1512	Geology	2	3%	1	1%	0	0%	1	2%	0	0%	0	0%	2	3%
1513	Oceanology	1	1%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1514	Physics	3	4%	6	8%	1	1%	1	2%	1	2%	0	0%	1	2%
1515	General earth-space science	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1516	All other life sciences & physical sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Life sciences & physical sciences	22	30%	28	36%	16	15%	8	13%	9	13%	0	0%	17	26%
1601	Mathematics	1	1%	0	0%	1	1%	1	2%	1	2%	0	0%	0	0%
1602	Probability & statistics	1	1%	0	0%	1	1%	0	0%	0	0%	0	0%	0	0%
1603	Applied mathematics	0	0%	2	3%	0	0%	1	2%	0	0%	0	0%	4	6%
1604	All other mathematical sciences	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Mathematical sciences	2	3%	2	3%	2	2%	2	3%	1	2%	0	0%	4	6%
1801	Philosophy	0	0%	1	1%	0	0%	0	0%	1	2%	1	1%	1	2%
1802	Science of religion	0	0%	2	3%	3	3%	0	0%	0	0%	2	2%	0	0%
1803	Buddhism	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1804	Christianity	0	0%	1	1%	12	11%	1	2%	9	13%	17	19%	0	0%
1805	Hinduism	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1806	Islam	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1807	Judaism	0	0%	0	0%	0	0%	0	0%	0	0%	2	2%	0	0%
1808	Primal religions	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
1809	All other philosophy, religion & theology	4	6%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Philosophy, religion & theology	4	6%	4	5%	15	14%	1	2%	10	15%	22	25%	1	2%
1900	Physical education, health education & leisure	0	0%	0	0%	1	1%	0	0%	0	0%	0	0%	0	0%
	Total Physical education, health education & leisure	0	0%	0	0%	1	1%	0	0%	0	0%	0	0%	0	0%
2001	Clinical psychology	0	0%	1	1%	0	0%	0	0%	0	0%	0	0%	0	0%
2002	Industrial psychology	0	0%	0	0%	0	0%	1	2%	1	2%	2	2%	0	0%
2003	All other psychology	3	4%	1	1%	7	7%	10	16%	0	0%	5	6%	0	0%
	Total Psychology	3	4%	2	3%	7	7%	11	18%	1	2%	7	8%	0	0%
2101	Public administration	0	0%	0	0%	2	2%	0	0%	3	4%	1	1%	0	0%
2102	Development administration	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
2103	Safety & correctional services	0	0%	0	0%	0	0%	0	0%	0	0%	1	1%	0	0%
2104	Social work	0	0%	0	0%	5	5%	1	2%	4	6%	1	1%	0	0%
2105	All other public administration & social services	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Public administration & social services	0	0%	0	0%	7	7%	1	2%	7	10%	3	3%	0	0%
2201	Archaeology	4	6%	0	0%	0	0%	0	0%	0	0%	0	0%	1	2%
2202	Anthropology	0	0%	0	0%	1	1%	1	2%	0	0%	0	0%	0	0%
2203	Economics	1	1%	1	1%	0	0%	3	5%	2	3%	1	1%	0	0%
2204	Geography	0	0%	3	4%	0	0%	0	0%	1	2%	0	0%	0	0%
2205	African history	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%

Sub-CESMs		Cape Town		Natal		Pretoria		Rand		Stellenbosch		Unisa		Wits	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%
2206	History	3	4%	3	4%	0	0%	0	0%	1	2%	2	2%	0	0%
2207	African political systems	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
2208	Political science & government	0	0%	0	0%	1	1%	0	0%	0	0%	1	1%	1	2%
2209	Criminology	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
2210	Sociology	0	0%	0	0%	2	2%	0	0%	0	0%	0	0%	1	2%
2211	All other social sciences & social studies	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
	Total Social sciences & social studies	8	11%	7	9%	4	4%	4	6%	4	6%	4	5%	3	5%
Totals		73	100%	77	100%	105	100%	63	100%	68	100%	89	100%	66	100%

Source: SAPSE 1996 Table 2.13 for universities.

Appendix 5

Descriptions of research studies reviewed in Chapter 4

The research projects reviewed in section 4.2 of Chapter 4 included the following:

- The environmental scan of PhD education in the United States conducted in 1998 by the *Re-envisioning the PhD* project based at the University of Washington, and directed by Jody Nyquist. The research was based on interviews with more than 375 individuals, as well as focus groups. The participants included representatives from "research universities, comprehensive and doctoral universities, liberal arts and community colleges, doctoral students, business and industry, foundations, government, disciplinary and educational associations, K-12 education, and accrediting agencies" (Nyquist & Woodford 2001).
- The 1999 *Survey on doctoral education and career preparation* in the United States conducted by Chris Golde and Timothy Dore. Over 4 000 enrolled doctoral students participated in the survey who were drawn from 11 arts and sciences disciplines, and one cross-institutional programme, in 27 different universities. The survey was designed to answer a range of different questions, including why doctoral students were pursuing a PhD; how effective the career preparation of the PhD was for them; and what students understood about the process of undertaking a degree (Golde & Dore 2001:2-3).
- The international survey of 139 doctoral candidates and graduates from the United States, Canada, Australia, the United Kingdom, New Zealand and other countries conducted in 1995/96 and published in 1999 by Steve Dinham and Catherine Scott. The research explored doctoral candidates' experiences of the entire doctoral process including entry to the programme; the nature of the support given by the university and others; supervision of the programme; programme requirements; impact on personal life; impact of career after graduation; etc (Dinham & Scott 1999:8-9).
- Maresi Nerad and Joseph Cerny's 1999 study on the career outcomes of students who did their PhDs in the subject of English in the United States. This study formed part of a larger mail survey of 6 000 PhD graduates from 61 doctoral-granting institutions in the United States. The sample of the cohort of English PhDs was 1 217. The questionnaire covered topics such as "employment history, the job-search process" as well as "a retrospective evaluation of the doctoral program and the usefulness of the doctoral degree" (Nerad & Cerny 1999:1-2).
- Scott Kerlin's 1994 survey of doctoral candidates and graduates in the United States and Canada. The questionnaire covered topics such as support and financial circumstances during the doctoral process; experiences of the academic labour market; and factors affecting the quality of their doctoral experiences (Kerlin 1995b:17).

University of Cape Town

List of sources

- Ang, I. (1999) "Who needs cultural research?" Working paper published by the Consortium of Humanities Centers and Institutes. Website accessed in June 2001 at <http://chcinetwork.org/angfv.htm>
- Bartelse, J. (1995) "Reforms in doctoral education: A comparative perspective". Paper presented at the 17th Annual EAIR Forum, Zurich, Switzerland, 27-30 August 1995
- Bartelse, J., Beerkens, E. & Maassen, P. (2000a) "Netherlands" in National Science Foundation, Division of Science Resources Studies, *Graduate education reform in Europe, Asia, and the Americas and international mobility of scientists and engineering: Proceedings of an NSF workshop*. Arlington, VA.: National Science Foundation
- Bartelse, J., Beerkens, E. & Maassen, P. (2000b) "The United Kingdom" in National Science Foundation, Division of Science Resources Studies, *Graduate education reform in Europe, Asia, and the Americas and international mobility of scientists and engineering: Proceedings of an NSF workshop*. Arlington, VA.: National Science Foundation
- Baumgart, N. & Linfoot, K. (1998) "The professional Doctorate in Education: A new model" in T.W. Maxwell & P.J. Shanahan (eds), *Professional doctorates: Innovations in teaching and research*. Armidale: University of New England
- Bell, S. (1998) "The Doctor of Creative Arts: Mature cheese or bad wine?" in T.W. Maxwell & P.J. Shanahan (eds), *Professional doctorates: Innovations in teaching and research*. Armidale: University of New England
- Ben-David, J. (1977) *Centers of learning: Britain, France, Germany, United States*. New York: McGraw-Hill Book Company
- Borbasi, S., Pearson, A. & Gott, M. (1998) "Rethinking the single topic, single method approach to the PhD thesis: Moving towards research training that accommodates and values innovation in the world of practice" in T.W. Maxwell & P.J. Shanahan (eds), *Professional doctorates: Innovations in teaching and research*. Armidale: University of New England
- Boucher, M. (1973) *Spes in Arduis: A history of the University of South Africa*. Pretoria: University of South Africa

- Carpenter, S. (2000) "Greater diversity and more interdisciplinary offerings needed in science PhDs". *Monitor on Psychology*, Volume 31, number 10
- Castells, M. (2001a) "The new global economy" in J. Muller, N. Cloete & S. Badat (eds), *Challenges of globalisation: South African debates with Manuel Castells*. Cape Town: Maskew Miller Longman
- Castells, M. (2001b) "Information technology and global development" in J. Muller, N. Cloete & S. Badat (eds), *Challenges of globalisation: South African debates with Manuel Castells*. Cape Town: Maskew Miller Longman
- Castells, M. (2001c) "Universities as dynamic systems of contradictory functions" in J. Muller, N. Cloete & S. Badat (eds), *Challenges of globalisation: South African debates with Manuel Castells*. Cape Town: Maskew Miller Longman
- Clark, B.R. (1995) *Places of inquiry: Research and advanced education in modern universities*. Berkeley: University of California Press
- Cooper, D. & Subotzky, G. (2001) *The skewed revolution: Trends in South African higher education: 1988-1998*. Bellville: Education Policy Unit, University of the Western Cape
- Department of Arts, Culture, Science and Technology (1996) *White Paper on Science and Technology: Preparing for the 21st century*. Website accessed on 22 March 2001 at <http://www.gov.za/whitepaper/1997/sc&tecwp.htm>
- Department of Education (1997) *Education White Paper 3: A programme for the transformation of higher education*. Pretoria: Government Gazette No 18207
- Dinham, S. & Scott, C. (1999) *The doctorate: Talking about the degree*. Sydney: University of Western Sydney
- Education Policy Unit (1997). *The enhancement of graduate programmes and research capacity at the Historically Black Universities*. Final Report. Cape Town: EPU, UWC
- Ekong, D. & Cloete, N. (1997) "Curriculum responses to a changing national and global environment in an African context" in N. Cloete, J. Muller, M.W. Makgoba & D. Ekong (eds), *Knowledge, identity and curriculum transformation in Africa*. Cape Town: Maskew Miller Longman

- Evans, T. (1998) "Are current innovations in professional doctorates all for the best?" in T.W. Maxwell & P.J. Shanahan (eds), *Professional doctorates: Innovations in teaching and research*. Armidale: University of New England
- Gibbons, M. (1994) "Innovation and the developing system of knowledge production". Paper presented to the *Trinational Summer Institute on Innovation, Competitiveness and Sustainability*, Simon Fraser University, 14-21 August 1994, Vancouver. Brighton: SPRU
- Golde, C.M. & Dore, T.M. (2001) *At cross purposes: What the experiences of today's doctoral students reveal about doctoral education*. Survey on Doctoral Education and Career Preparation. Wisconsin: Wisconsin Center for Education Research
- Guo, Y. (2000) "Graduate education reforms and international mobility of scientists and engineers in China" in National Science Foundation, Division of Science Resources Studies, *Graduate education reform in Europe, Asia, and the Americas and international mobility of scientists and engineering: Proceedings of an NSF workshop*. Arlington, VA.: National Science Foundation
- Hall, M. (2001) "Education and the margins of the network society". in J. Muller, N. Cloete & S. Badat (eds), *Challenges of globalisation: South African debates with Manuel Castells*. Cape Town: Maskew Miller Longman
- Johnson, J.M. & Coward, H.R. (2000) "Summary of proceedings" in National Science Foundation, Division of Science Resources Studies, *Graduate education reform in Europe, Asia, and the Americas and international mobility of scientists and engineers: Proceedings of an NSF workshop*. Arlington, VA.: National Science Foundation
- Kerlin, S.P. (1995a) "Pursuit of the PhD: 'Survival of the fittest', or is it time for a new approach?" *Education Policy Analysis Archives*, 3(16):1-30
- Kerlin, S.P. (1995b) "Surviving the doctoral years: Critical perspectives". *Education Policy Analysis Archives*, 3(17):1-38
- Knowles, A.S. (ed) (1978) *The international encyclopedia of higher education. Volume 4*. San Francisco: Jossey-Bass Publishers
- Kraak, A. (1997) "Globalisation, changes in knowledge production, and the transformation of higher education" in N. Cloete, J. Muller, M.W. Makgoba & D. Ekong (eds), *Knowledge, identity and curriculum transformation in Africa*. Cape Town: Maskew Miller Longman

- Martin, B.R. & Etzkowitz, H. (2000) "The origin and evolution of the university species". *Electronic Working Paper Series, Paper No. 59*. Brighton: Science and Technology Policy Research
- Maxwell, T.W. & Shanahan, P.J. (eds) (1998) *Professional doctorates: Innovations in teaching and research*. Armidale: University of New England
- Maxwell, T.W. & Shanahan, P.J. (2000) "Current issues in professional doctoral education in Australia and New Zealand". Paper presented at the 3rd International Professional Doctorates Conference entitled *Doctoral Education and Professional Practice: The next generation?* Armidale, 10-12 September 2000
- Maxwell, T.W. & Vine, K. (1998) "The EdD at UNE: The view through conceptual bifocals". in T.W. Maxwell & P.J. Shanahan (eds), *Professional doctorates: Innovations in teaching and research*. Armidale: University of New England
- McClelland, C.E. (1980) *State, society and university in Germany 1700-1914*. Cambridge: Cambridge University Press
- McDevitt, T.M. (1999) *World population profile: 1998*. US Agency for International Development and the US Department of Commerce
- Meredith, G. (1998) "Global DBA delivery via the internet" in T.W. Maxwell & P.J. Shanahan (eds), *Professional doctorates: Innovations in teaching and research*. Armidale: University of New England
- Moja, T. & Cloete, N. (2001) "Vanishing borders and new boundaries" in J. Muller, N. Cloete & S. Badat (eds), *Challenges of globalisation: South African debates with Manuel Castells*. Cape Town: Maskew Miller Longman
- Morley, C. & Priest, J. (1998) "RMIT reflects on its Doctor of Business Administration program". in T.W. Maxwell & P.J. Shanahan (eds), *Professional doctorates: Innovations in teaching and research*. Armidale: University of New England
- Muller, J., Cloete, N. & Badat, S. (eds) (2001) *Challenges of globalisation: South African debates with Manuel Castells*. Cape Town: Maskew Miller Longman

Mullins, G. (1997) "The Australian postgraduate experience". Paper presented at the *Postgraduate Experience Conference*, Cape Town, 4-5 December 1997

⊗ Murray, B. (2000) "The growth of the new PhD". *Monitor on Psychology*, Volume 31, number 10

⊗ National Plan for Higher Education (2001). Ministry of Education. Website accessed on 16 April 2001 at http://education.pwv.gov.za/nat_plan_he.htm

Nerad, M. & Cerny, J. (1999) "From rumors to facts: Career outcomes of English PhDs". *Communicator*, 32(7):1-12

Noble, K.A. (1994) *Changing doctoral degrees: An international perspective*. Society for Research into Higher Education & Open University Press

Nyquist, J. & Woodford, B. (2001) *Meta-themes from the Re-envisioning Conference*. Website accessed on 15 March 2001 at <http://depts.washington.edu/envision/metathemes.html>

Nyquist, J.D. & Woodford, B.J. (2000) *Re-envisioning the PhD: What concerns do we have?* Concerns Brief of the Re-envisioning the PhD Degree Project. University of Washington

Orr, L. (1997) "Globalisation and universities: Towards the 'market university'? *Social Dynamics* 23(1):42-67

Parton, K.A. *et al.* (1998) "A difficult birth: The Doctor of Health Services Management at the University of New England" in T.W. Maxwell & P.J. Shanahan (eds), *Professional doctorates: Innovations in teaching and research*. Armidale: University of New England

Phillips, M. & Pugh, D.S. (1994) *How to get a PhD: A handbook for students and their supervisors*. 2nd edition. Buckingham: Open University Press

Retallick, J. & Barnsley, R. (1998) "The EdD at Charles Sturt University: The experience of distance education" in T.W. Maxwell & P.J. Shanahan (eds), *Professional doctorates: Innovations in teaching and research*. Armidale: University of New England

Reynolds, R. (1998) "Motivations and destinations: An examination of EdD experiences at Flinders University". Paper presented at the 2nd Biennial International Conference on Professional Doctorates, Coffs Harbour, 8-10 July 1998

Ritchie, W. (1918) *The history of the South African College 1829-1918*. Volumes I and II. Cape Town: T Maskew Miller

⊗ Roseth, R. (2000) "Stakeholders in higher education re-think the PhD". *Northwest Science & Technology*, Autumn 2000, p47

Ross, M.G. (1976) *The university: The anatomy of academe*. New York: McGraw-Hill Book Company

Rüegg, W. (1992) "Chapter 1: Themes" in: H. De Ridder-Symoens (ed), *A history of the university in Europe. Volume I: Universities in the Middle Ages*. Cambridge: Cambridge University Press

Seddon, T. (2000) "What is doctoral in doctoral education?" Paper presented at the 3rd Biennial International Conference on Professional Doctorates entitled *Doctoral Education and Professional Practice: The next generation?* Armidale, 10-12 September 2000

Simpson, R. (1983) *How the PhD came to Britain: A century of struggle for postgraduate education*. Surrey: Society for Research into Higher Education

Spear, R.H. (1997) "Professional doctorates: A discussion paper". *Occasional Paper GS97/3*, Australian National University

Spurr, S.H. (1970) *Academic degree structures: Innovative approaches*. New York: McGraw-Hill Book Company

Subotzky, G. (1998) "Alternatives to the entrepreneurial university: New modes of knowledge production in community service programs". Paper presented at the *Annual ASHE International Conference*, Miami, Florida, 4-7 November 1998

South African Qualifications Authority (2000) "The development of level descriptors for the NQF: Discussion document for public comment". *Government Gazette* 424(21679)

Turner, R.S. (1975) "University reformers and professorial scholarship in Germany 1760-1806" in L. Stone (ed), *The university in society: Volume II – Europe, Scotland, and the United States from the 16th to the 20th century*. London: Oxford University Press

TURP (1997) *South Africa in the global economy*. Department of Sociology, University of Natal

Usher, N. & Solomon, N. (1998) "Disturbing the ivory tower? Educational research as performance and performativity". Paper presented to the 1998 Annual Conference of the Australian Association for Research in Education entitled *Research in education: Does it count?* Adelaide

University of Cape Town

