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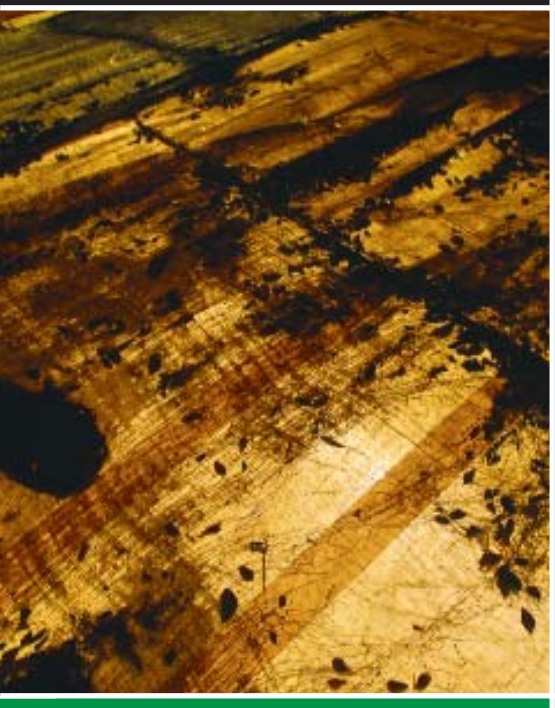

Higher Education Monitor

Postgraduate Studies in South Africa: A Statistical Profile

A report commissioned by the Council on Higher Education

crest
Centre for Research on Science and Technology

HE Monitor No. 7
March 2009

CHE

Council on Higher Education

POSTGRADUATE STUDIES IN SOUTH AFRICA:

A STATISTICAL PROFILE

A report commissioned by the Council on Higher Education

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CONTENTS

LIST OF TABLES AND FIGURES

Tables

Figures

PREFACE

With growing recognition that knowledge and innovation are critical contributors to national wealth and welfare, postgraduate education has assumed greater significance within the broader national strategy to accelerate human capital development. This significance is reflected in the national funding framework for higher education and in several of the new programmes launched by funding agencies and science councils. In the current funding framework doctoral graduates are weighted such that this indicator has a considerable impact on an institution's research output subsidy.

The National Research Foundation launched its PhD project two years ago with the specific intention of ramping up the number of doctoral graduates produced annually by the South African higher education system. Higher education institutions have been receptive with each institution making a concerted effort to increase doctoral enrolments through a range of means such as fee waivers, offers of research fellowships and competitive scholarships. This report, commissioned by the CHE in 2006, provides a clear quantitative account of postgraduate studies in South African higher education institutions for the five-year period 2005.

The data presented in the report constitutes a sound basis for assessing the effects of many programmatic and other interventions aimed at increasing postgraduate enrolments and graduation rates. The current policy framework on funding of public higher education was introduced in the 2004/5 financial year and it has been implemented in phases since then. By presenting data before the implementation of this policy, this CHE report provides a useful basis from which we will in the future assess the impact of key components such as the weighting of doctoral graduates as a research output indicator. By virtue of our responsibility for monitoring the state of higher education, the CHE will publish periodic updates of the data so that we are able to track changes and trends.

Quantitative data provides an important but partial view. Much more needs to be done for us to gain a better understanding of postgraduate education in South Africa - the obstacles, the challenges and the success stories. Further qualitative research is in the pipeline therefore, this report is part of a broader CHE portfolio of work on postgraduate education. We are very grateful to CREST and particularly, Professor Mouton, for undertaking this project on our behalf. I also wish to acknowledge the important role played by Dr Lis Lange who, in her then role as the Director: Monitoring and Evaluation, commissioned this work. I am confident that the data in this report will be referred to frequently in institutional and other sites of debate about access, quality and relevance of postgraduate education today.

Dr Cheryl de la Rey
Chief Executive Officer

ACKNOWLEDGEMENTS

The Council on Higher Education would like to thank the National Research Foundation for their contribution towards this project.

FOREWORD

The 1996 report of the National Commission on Higher Education (NCHE), A Framework for Transformation, indicated that the research output of universities and technikons offered evidence of the inequalities of the higher education system. It highlighted the dominance of historically white institutions in the production of both research publications and postgraduates at master's and doctoral level. The commission's report pointed out that "in 1993 this group of universities (historically white research intensive universities) employed 51% of the permanently appointed academic (teaching and research) staff in the university and technikon sectors, and produced 83% of the research articles and 81% of the master's and doctors (or equivalent) graduates" (NCHE, 1996: 40).

Five years later, the National Plan on Higher Education took the White Paper's goal, "To secure and advance high-level research capacity which can ensure both the continuation of self-initiated, open-ended intellectual inquiry, and the sustained application of research activities to technological improvement and social development" (White Paper, 1997: 1.27), as the framework to establish and give effect to five priorities: increase the graduate output, especially doctoral graduates; increase research outputs; sustain existing research capacity and create new centres of excellence, facilitate partnerships and collaboration in research and postgraduate training; and promote articulation between the different elements of the research system (National Plan, 2001: 70).

Parallel to this process of policy making and implementation, in the area of science and technology the Green and White papers in science and technology informed a succession of policies which have culminated in the most recent draft Science, Engineering and Technology Human Capital Development Strategy (DST 2008).

All of these documents have in common their concern with postgraduate education, particularly doctoral education, as the basis for the production of both high-level skills and research. The arguments as to why this was regarded as important are too well-known to be repeated here. Informed by this argument and as a response to a combination of policy directives and institutional and individual conviction, a host of programmes, support mechanisms, and locally and internationally funded capacity development initiatives focused on increasing the numbers of graduates with Master's and PhDs have flourished in the last decade and a half.

The statistical analysis presented here is by no means an assessment of the effectiveness of any of these initiatives and policies. It does not explicitly suggest the reasons for the success or failure of any policy. It, however, provides much needed evidence to diagnose at least some aspects of the state of the production of postgraduates in the South African public higher education system. The Council on Higher Education commissioned this research from the Centre for Research on Science and Technology (CREST) of the University of Stellenbosch in 2006 as part of a much larger study on the state of postgraduate education in the country, which was also supported by the National Research Foundation. Like most studies of this kind, its completion took longer than anticipated. Yet, this report is being published at a time in which there is renewed interest both locally and abroad in postgraduate education and its relationship with the development of knowledge on which to base sustainable development and competitiveness as well as democratic societies (EUA, 2007).

This analysis shows that in the 13 years since the publication of the NCHE report, higher education has made progress in changing the demographics of postgraduate enrolment and graduations in relation to both race and gender; and that the number of enrolments at postgraduate level has increased considerably since 1995. The report also shows that while students who complete their degrees do so in more or less the same time as their counterparts in Europe and the United States, South Africa's Master's and doctoral graduates are considerably older than their counterparts. Particularly important findings in terms of trends that suggest the need for policy intervention are what the report calls the 'pile-up' effect at higher education institutions, i.e. the ongoing enrolment of students who neither graduate nor drop out; and the increasing burden of supervisors, given the shrinking of the academic workforce mostly through retirement. The fact that the distribution of postgraduate enrolments and graduations across public higher education institutions is not too dissimilar from the description in the NCHE's report is a matter of concern; yet, the list of universities that carry the largest part of postgraduate enrolments has ceased to be limited to historically white and advantaged institutions. This fact could open much needed debate on the different purposes of universities in the higher education system. The report's findings mentioned here and several others, such as the internationalisation of postgraduate enrolments, require closer scrutiny by institutions, funding agencies and government departments. Greater dialogue among organisations, universities, academics, students and state departments is required in order to respond to the daunting challenges facing South Africa in this regard.

The CHE hopes that this publication will generate debate among higher education institutions, stimulate much needed institutional research, open debate about the nature and quality of postgraduate education in South Africa and occasion careful consideration by policy makers.

Dr Lis Lange
Executive Director
Higher Education Quality Committee
(Director Monitoring and Evaluation 2003-2007)

ABBREVIATIONS AND ACRONYMS

AAG	Annual average growth
AAGR	Annual average growth rate
CESM	Classification of educational subject matter
CREST	Centre for Research on Science and Technology
DoE	Department of Education
Eng & Appl Tech	Engineering and Applied Technologies
EUA	European University Association
FTE	Full time equivalents
Health Sc	Health Sciences
HEMIS	Higher Education Management and Information System
Nat & Agri Sc	Natural and Agricultural Sciences
NCHE	National Commission on Higher Education
SADC	Southern African Development Communitity
Sapse	South African Post-Secondary Education System
Soc Sc	Social Sciences

LIST OF INSTITUTIONS

CPUT	Cape Peninsula University of Technology
CUT	Central University of Technology
DUT	Durban University of Technology
MUT	Mangusutho University of Technology
NMMU	Nelson Mandela Metropolitan University
NWU	North West University
RHODES	Rhodes University
SU	Stellenbosch University
TUT	Tshwane University of Technology
UCT	University of Cape Town,
UFH	University of Fort Hare
UFS	University of the Free State
UJ	University of Johannesburg
UKZN	University of Kwa-Zulu Natal
UL	University of Limpopo
UNISA	University of South Africa
UNIVEN	University of Venda
UP	University of Pretoria,
UWC	University of the Western Cape
UZULU	University of Zululand
VUT	Vaal University of Technology
WITS	University of the Witwatersrand
WSU	Walter Sisulu University

EXECUTIVE SUMMARY: HIGH-LEVEL TRENDS

INTRODUCTION

The production of university graduates - and especially postgraduate students - is an essential component of the national system of innovation of modern industrialised societies. Such graduates have acquired the necessary knowledge and skills that underpin the modern knowledge economy and are able to produce new knowledge. In a globalised world their skills are in high demand, whether they are in Engineering, Informtion and Communication Technology, Medicine or the Social Sciences and Humanities. It is generally recognised that South Africa does not have sufficient numbers of highly skilled people in most professions, hence the priority given to a host of initiatives by state departments, focused on fast-tracking skills development. The greatest shortage is at postgraduate level and recent initiatives, such as those by the Department of Science and Technology and the National Research Foundation to accelerate the production of PhDs in the system, target this reality. High international demand for South African graduates, together with the continuing brain drain of professionals, provide an urgent imperative to increase the production of postgraduate students in order for the country to remain competitive and to be able to generate knowledge that is responsive to a wide range of societal needs. In this report we present the most salient findings of a comprehensive statistical analysis of the state of postgraduate studies in South Africa. The results presented here reaffirm the pressing need to prioritise the support and funding of greater numbers of postgraduate students and to ensure that there is a clear, easily-accessible and sought-after transition from undergraduate to postgraduate studies at our higher education institutions.

THIS EXECUTIVE SUMMARY IS ORGANISED AROUND SIX MAIN THEMES:

- Growth in enrolments and graduations
- Pile-up effects
- Completion rates
- The burden of supervision
- Demographics
- Participation rates.

THE CONTEXT

In order to understand the more recent postgraduate enrolment and graduation trends, some history of the higher education sector in South Africa and general growth trends is required. As Figure 1 shows, the total number of enrolments and graduates almost doubled in the 16-year period between 1990 and 2005. However, the growth patterns of enrolment and graduation are very different. Enrolments grew steadily between 1990 and 1996, after which they declined for four years, before growing again quite significantly between 2000 and 2004. The decline in 2005 is a potential source of concern. The graduation trend is much more consistent - although there was a slight 'dip' between 1997 and 1999.

A closer look at the graduation trends for undergraduate students, lower postgraduate (Diploma and Honours) and upper postgraduate (Master's and Doctoral) students (see Figure 2) provides better insight into these general trends and shows that there was consistent growth over this period. Although there was a significant decline in the number of lower postgraduate students between 1996 and 2001, this can possibly be explained by the introduction of two-year structured Master's (mostly taught) programmes at many universities during this period. These were viewed as a more attractive option (than a separate Honours and Thesis Master's) by many potential postgraduate students.

Figure X.1: Total enrolments and graduates, 1990-2005

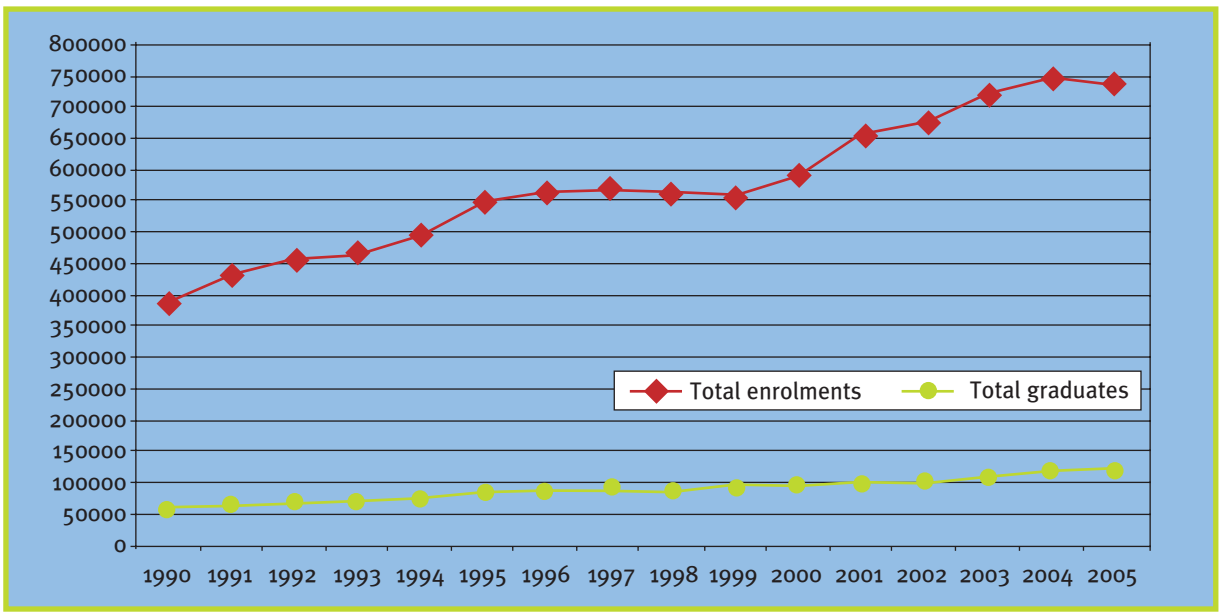
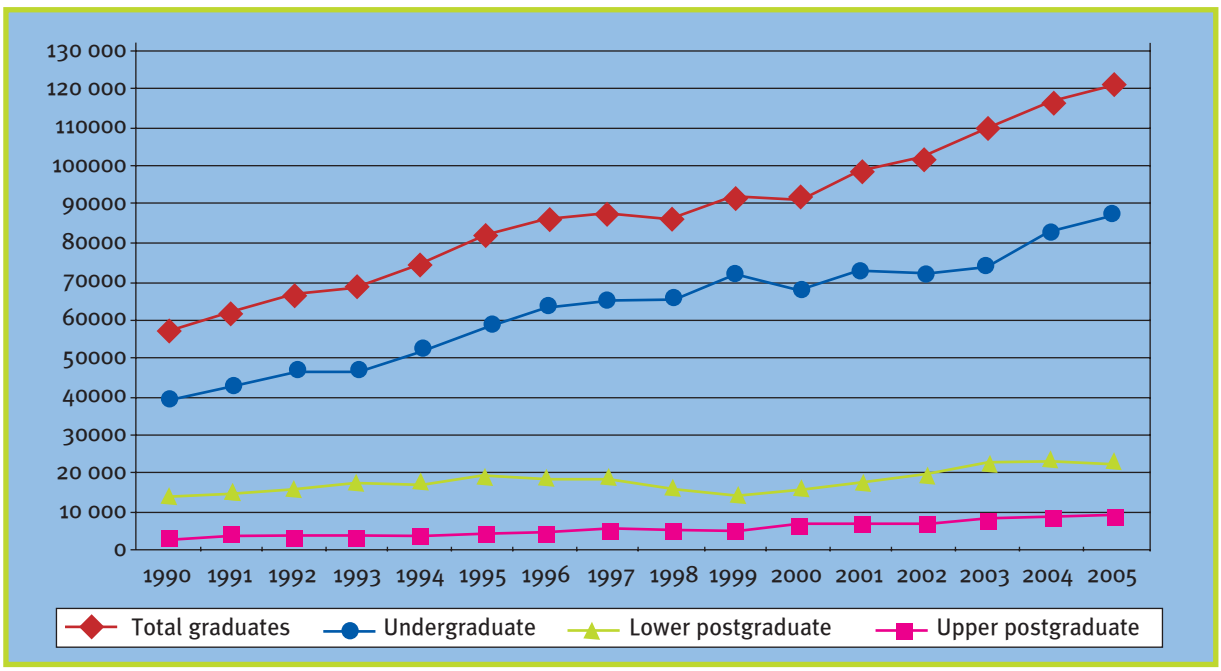
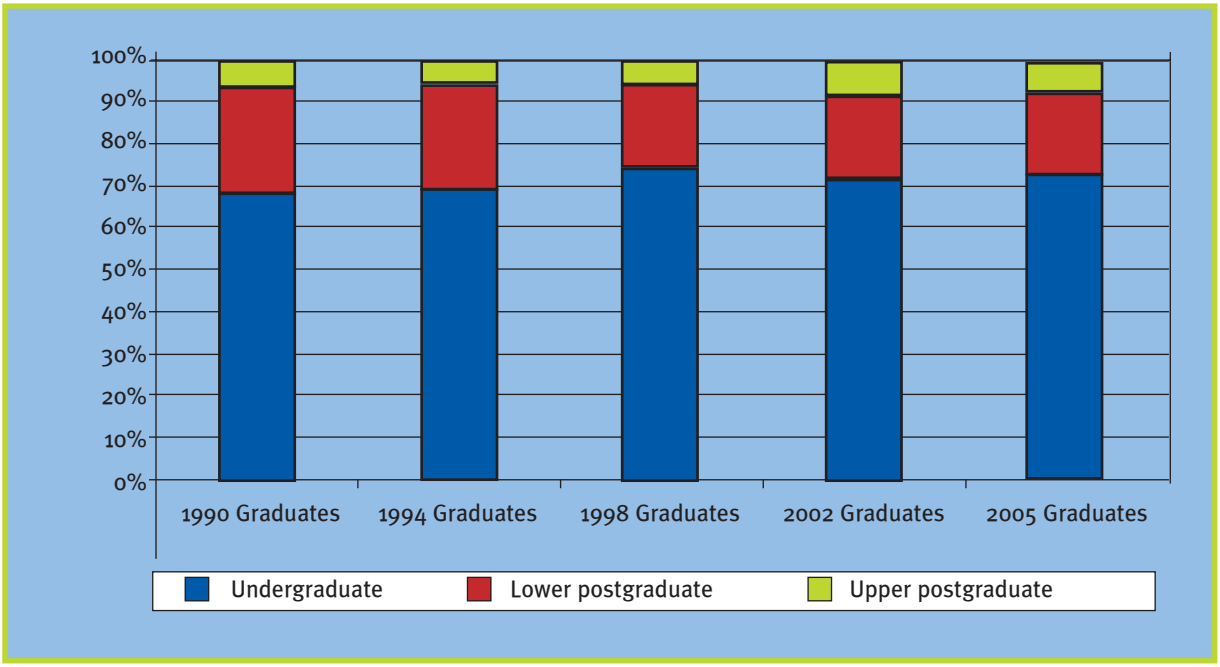


Figure X.2: Number of graduates by level of qualification - undergraduate, lower postgraduate and upper postgraduate, 1990-2005



But Figure 3 also illustrates that there has been a rather significant change in the shape of graduate output in higher education since 1990. In 1990, postgraduate students constituted 31.3% of all graduates, but by 2005 this had declined to 26.9%, mainly due to the decline in the proportion of Diploma and Honours graduates (lower postgraduate students). In 1990 this category constituted nearly one quarter (24.8%) of all graduates; by 2005 this had declined sharply to less than 20%. Conversely, the share of Master's and Doctoral students increased from 6.3% to 7.7% over this period. This is a significant development - and if it continues - would point to more serious obstacles when attempting to increase overall graduate output.

Figure X.3: Undergraduates, lower postgraduates and upper graduates as share of total graduates, 1990-2005



THE SHAPE OF HIGHER EDUCATION

The South African Higher Education system enjoyed substantial growth between 1990 and 2005. Enrolments nearly doubled (with an increase from 385 700 to 715 800), whilst the number of graduates more than doubled (with an increase from 56 744 to 120 385). These figures also show that the ratio of enrolments to graduates improved from 6.8: 1 in 1995 to 5.9: 1 in 2005. However, the proportion of postgraduate students of the overall number of graduates declined rather significantly from 31.3% to 26.9% over this period, even though the number of Master's and Doctoral enrolments increased during the same period.

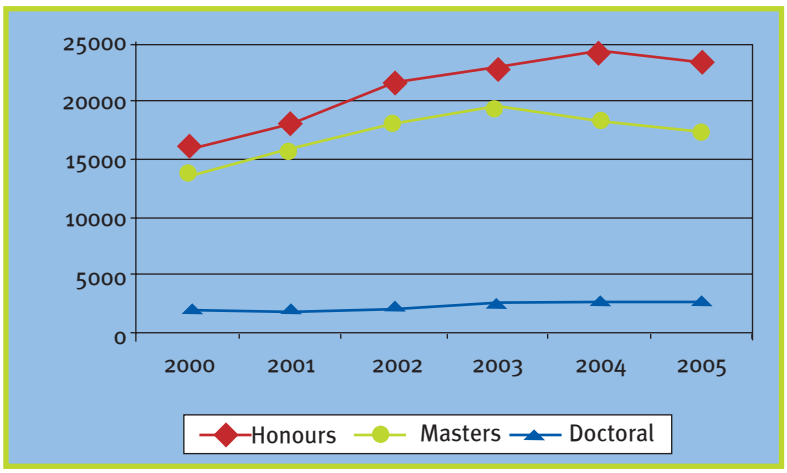
TRENDS IN FIRST-ENROLMENTS

Any attempt to analyse and understand the state of postgraduate studies in a country needs to pay special attention to trends related to new entrants into the system. Although graduate production can be increased through various mechanisms to increase completion rates, such initiatives are dependent on a steady growth in first entrants into the system. The results of our analysis reveal some disturbing trends. In 2000, 49 391

students enrolled for the first time for postgraduate studies at a South African university. This number continued to increase steadily between 2000 and 2004 (from 49 391 to 59 857) but then decreased to 54 494 in 2005. A breakdown by degree below provides a clearer indication of these declines.

Honours first-enrolments increased steadily between 2000 and 2004, but then started to decline after 2004 (Figure 4). The overall average growth rate for Honours first-enrolments was 9.1% between 2000 and 2005 (Table 1). When looking at trends in Honours first-enrolments across the five broad fields, the highest growth rates were in Engineering and Applied Technologies (at 18.1%, although from a very low base) and Social Sciences (10.3%). Natural and Agricultural Sciences showed an increase of almost 6% over the six-year period. However, there was a negative growth rate in Humanities (-1.4%) and almost 0% growth in Health Sciences (-0.2%).

Figure X.4: Headcount of first-enrolments by type of postgraduate qualification, 2000 to 2005



At **Master's** level, there was a steady increase of first-enrolments between 2000 and 2003 (from 14 162 to 19 352), whereafter they declined to 17 398 in 2005 (Figure 4). The average annual growth rate in Master's enrolments for the whole six-year period was 4.4% (Table 1). In terms of growth per field, the decline in first-enrolments from 2003 onwards is mainly due to a decline in enrolments in the Humanities and Social Sciences (Figure 5). In the Humanities there were 2 613 first-enrolments in 2000. Enrolments then peaked in 2003 with 3 334, but declined again to 2 740 in 2005 (which is only slightly higher than at the starting point in 2000). Conversely, there was a steady increase in Natural and Agricultural Sciences from 1 707 first-enrolments in 2000 to 2 447 in 2005. The highest growth rate for Master's' first-enrolments was in Natural and Agricultural Sciences (7.5%) and in Health Sciences (6.6%). Of the remaining fields, the lowest growth rate was in Engineering and Applied Technologies (with 0.8%) and Humanities (1%).

Table X.1: Average annual growth and growth rate of first-enrolments by broad field, 2000 to 2005

Broad Field	Honours		Master's		Doctoral	
	Avg. annual growth	Avg. annual growth rate (%)	Avg. annual growth	Avg. annnual growth rate (%)	Avg. annnual growth	Avg. annnual growth rate (%)
Nat & Agric Sc	144	5.7%	155	7.5%	39	7.1%
Eng & Appl Tech	76	18.1%	8	0.8%	4	2.0%
Health Sc	-2	-0.2%	146	6.6%	18	7.6%
Humanities	-19	-1.4%	28	1.0%	22	5.4%
Social Sc	1550	10.3%	406	4.8%	84	9.9%
All fields	1747	9.1%	704	4.4%	164	7.3%

1) Average annual growth is expressed as headcounts. It represents the mean growth (increasing or decreasing) over the years specified. It was estimated by fitting a linear regression trend line to the annual values.
2) As above, the average annual growth rate was estimated by fitting a linear regression trend line to the annual values but, for this estimate, the values were converted into logarithmic values and the exponents (number of years) of these values were taken.

Doctoral first-enrolments increased at a steady pace over the six-year period; however, the numbers are relatively small (Figure 4). The overall average annual growth rate was 7.3% for Doctoral first-enrolments (Table 1). In terms of broad fields, the highest growth rate was in the Social Sciences (9.9%), followed by the Health Sciences (7.6%). As with Master's first-enrolments, the lowest growth rate for Doctoral first-enrolments was in Engineering and Applied Technologies (2.0%). Although the overall growth of Doctoral first-enrolments shows a steady increase over time, Figure 6 shows that there were very small increases in certain fields, such as the Social Sciences (until 2004 then decreasing in 2005) and Humanities (which decreased from 2003 onward).

Figure X.5: Headcount of Master's first-enrolments by broad field, 2000 to 2005

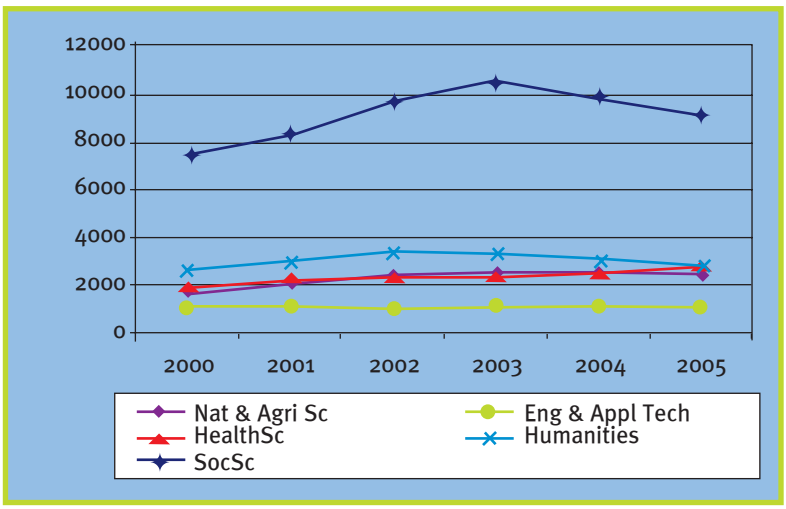
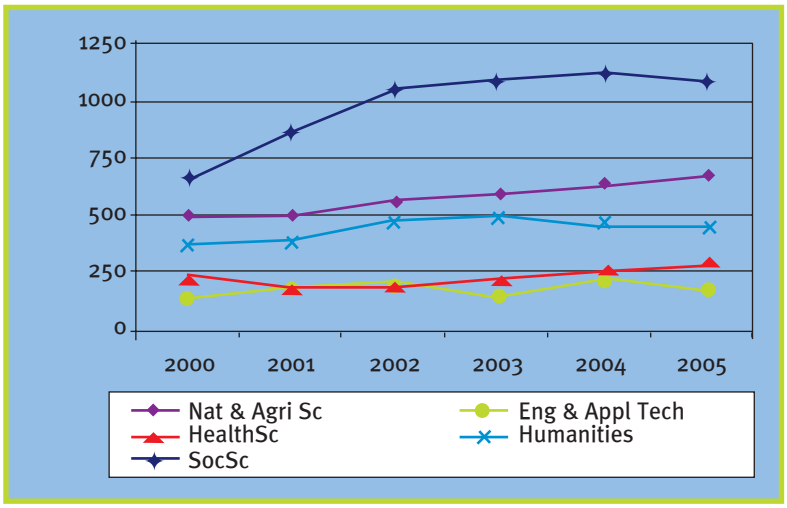


Figure X.6: Headcount of Doctoral first-enrolments by broad field, 2000 to 2005



FIRST ENROLMENTS

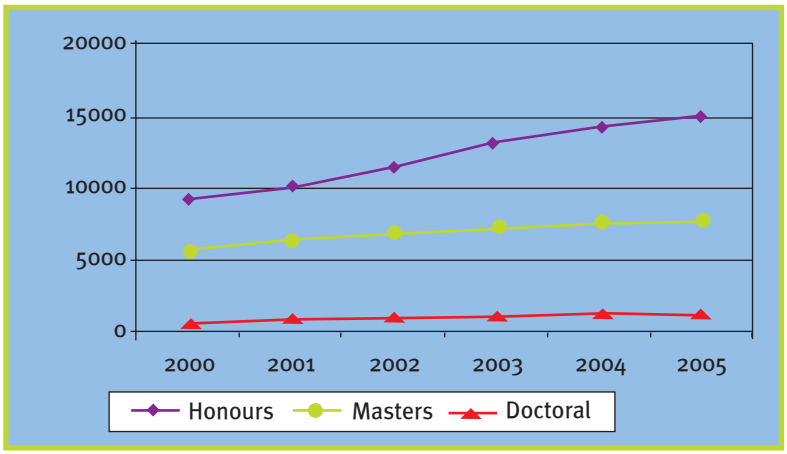
Master's enrolments: Although first-enrolments for Master's degrees have grown at an average annual rate of 4.4% between 2000 and 2005, this trend reversed, with significant declines since 2003. In fact, whereas first-enrolments in 2001 constituted exactly 50% of all total enrolments, this subsequently declined to 43% in 2005. The biggest proportion of this decline is due to decreased numbers of first-enrolments in the Social Sciences and Humanities.

Doctoral enrolments: The average annual growth rate for students enrolling for Doctoral degrees was 7.3% between 2000 and 2005. However, it is disturbing to note that this growth tailed off for the first time in 2005. In fact, the proportion of first-enrolments of total enrolments was lowest in 2005 (29%) and highest in 2001 (33%). The near-zero growth in 2005 is mainly due to fewer first-enrolments for Doctoral studies in the Humanities and Social Sciences.

Growth in graduates

In 2005 a total of 30 803 students graduated with a postgraduate qualification from a South African university. This figure is slightly less than the 31 573 graduates recorded for 2004 but still represents a significant improvement on the 21 572 headcounts in 1995.

Figure X.7: Headcount of graduates by type of postgraduate qualification, 2000 to 2005



Honours graduates showed a steady increase between 2000 and 2005, from 9 135 in 2000 to 15 077 in 2005 (Figure 7). The highest average annual growth rate for Honours graduates was recorded in Engineering and Applied Technologies (28.3%) although from a relatively small base, while there was almost zero growth in the Humanities (Table 2).

Master's graduates showed a steady but relatively small increase between 2000 and 2005, with almost 5 800 students in 2000, and almost 7 900 students in 2005. The largest average annual growth rate was recorded in the Natural and Agricultural Sciences (9.4%) and the smallest growth rate was in Health Sciences (5.2%).

The number of Doctoral graduates increased slightly between 2000 and 2005, with 822 graduates in 2000 and 1 176 in 2005. The largest growth rate for Doctoral graduates was in the Social Sciences (11.6%) and the smallest in Engineering and Applied Technologies (2.6%). In Engineering and Applied Technologies the growth rate per qualification type tends to decline as the qualification becomes more 'advanced' (28.3% growth for Honours, 8.2% growth for Master's and 2.6% growth for Doctorates).

Figure X.2: Average annual growth and growth rate of graduates by broad field, 2000 to 2005

Broad Field	Honours		Master's		Doctoral	
	Avg. annual growth	Avg. annual growth rate (%)	Avg. annual growth	Avg. annnual growth rate (%)	Avg. annnual growth	Avg. annnual growth rate (%)
Nat & Agric Sc	113	5.8%	83	9.4%	17	6.8%
Eng & Appl Tech	70	28.3%	41	8.2%	2	2.6%
Health Sc	18	4.6%	42	5.2%	11	9.5%
Humanities	-8	-0.7%	94	8.1%	9	4.6%
Social Sc	1065	12.9%	55	7.0%	34	11.6%
All fields	1257	11.1%	408	6.2%	73	7.7%

1) Average annual growth is expressed as headcounts. It represents the mean growth (increasing or decreasing) over the years specified. It was estimated by fitting a linear regression trend line to the annual values.
2) As in 1) above, the average annual growth rate was estimated by fitting a linear regression trend line to the annual values but, for this estimate, the values were converted into logarithmic values and the exponents (number of years) of these values were taken.

GRADUATION RATES

Average growth rates in Honours, Master's and Doctoral students remain small with significant field differences. Overall, growth has been highest for the social sciences and lowest for the humanities and health sciences. The average annual growth rate of Doctoral graduates of 7.7% translates into an annual gain of only 73 headcounts - signifying in another way the huge challenge of making substantial inroads into increasing overall Doctoral output in the country.

Pile-up effects

We use the term 'pile-up' to refer to the state of affairs where students remain enrolled for their degree for much longer than expected (or desirable). When the number of 'recurring' students becomes too large, this inevitably puts strain on the resources of universities and affects the efficiency of the postgraduate system in general, as its leads to increasingly large numbers of students who need supervision and support. We constructed two indicators to measure this pile-up effect: *(1) Ongoing enrolments as percentage of total enrolments and (2) Graduates as percentage of ongoing enrolments*. When there is an increase in the value of the first indicator, it shows that more students are remaining, or "piling up", in the system, while a decrease in the value of the second indicator means the system is producing fewer graduates.

Overall, Master's ongoing enrolments as percentage of total enrolments remained relatively constant between 2000 and 2003 (32% and 33%, respectively), after which it increased to 36% in 2004 and 37% in 2005 (Table 3). It would thus appear that the pile-up of Master's students has been growing since 2004. In terms of graduates as a percentage of ongoing enrolments, there was a relatively sharp decline from 2001 onwards (from 67% in 2001 to 52% in 2005). This shows that since 2002 fewer Master's students graduated, relative to the number of ongoing Master's enrolments.

In terms of the first indicator for Master's students, the percentage of women increased from 34% in 2000 to 43% in 2005 while the percentage of men increased from 37% in 2000 to 43% in 2005. It thus appears that the pile-up effect is greater for women than for men (with increases of 9% and 6%, respectively). Concomitantly, graduates as a percentage of ongoing enrolments decreased for both genders, from 54% in 2000 to 41% in 2005 for women and a decrease from 50% in 2000 to 42% in 2005 for men. Once again the decrease was greater for women than for men (13% and 8%, respectively).

Ongoing enrolments increased as a percentage of total enrolments across all race groups; most notably in the Black African (35% in 2000 and 48% in 2005) and Coloured groups (26% in 2000 and 31% in 2005). Graduates as a percentage of ongoing enrolments also declined across all race groups, but most significantly in the Black African group (39% in 2000 and 27% in 2005).

Ongoing enrolments as percentage of total enrolments showed an increase in all fields, but especially in the Social Sciences, with 32% in 2000 and 43% in 2005.

While Master's graduates as a percentage of ongoing enrolments have been declining in most broad fields, especially in the Social Sciences (61% in 2000 and 40% in 2005), this trend is reversed for the Natural and Agricultural Sciences, and Engineering and Applied Technologies. This means that over time the Social Sciences are producing fewer graduates relative to the number of recurring students.

Table X.3: Pile-up effects of Master's postgraduate students

DOCTORAL	2000	2001	2002	2003	2004	2005
Headcounts						
First-enrolments (X)	14162	15888	18062	19352	18279	17398
Graduates (Y)	5795	6426	6871	7396	7536	7881
Ongoing enrolments (Neither first enrolment nor graduate) (Z)	9556	9642	11648	13091	14671	15105
Total enrolments (X+Y+Z)	29513	31956	36581	39839	40486	40384
Indicators						
Ongoing enrolments as % of total enrolments [Z/(X+Y+Z)]*100	32%	30%	32%	33%	36%	37%
Graduates as % of ongoing enrolments [Y/Z]*100	61%	67%	59%	56%	51%	52%
Graduates as % of total enrolments [Y/(X+Y+Z)]*100	20%	20%	19%	19%	19%	20%

Ongoing Doctoral enrolments as a percentage of total enrolments remained relatively constant between 2000 and 2002, whereafter they increased from 55% to 59% in 2005 (Table 4). There has thus been an increase in recurring Doctoral students in the system. In terms of graduates as a percentage of ongoing enrolments, there has been a steady decline since 2000 (from 25% to 21% in 2005), which means that fewer Doctoral students have been graduating relative to the number of students re-registering.

The percentage of ongoing Doctoral enrolments (of total enrolments) increased for both men and women from 2000 to 2005, from 56% to 59%, and 52% to 59%, respectively. As with Master's, the increase for women (7%) was greater than for men (3%). There was also a decrease in graduates as a percentage of ongoing enrolments for both women and men from 2000 to 2005 - from 29% to 22% for women, and 24% to 20% for men. Once again, the percentage decrease was greater for women (7%, compared with 4% for men).

Ongoing enrolments as a percentage of total enrolments increased across all race groups by 5-6%, and graduates as a percentage of ongoing enrolments declined across all race groups at relatively the same rate 4-6%.

Ongoing Doctoral enrolments as a percentage of total enrolments increased in all fields except in the Natural and Agricultural Sciences, which declined from 59% in 2000 to 53% in 2005. The proportion of graduates as a percentage of ongoing enrolments also declined across all fields, except, once again, in the Natural and Agricultural Sciences (which increased from 20% in 2000 to 26% in 2005). For this indicator, the Social Sciences showed the largest decline of all five broad fields (from 32% in 2000 to 19% in 2005).

Table X.4: Pile-up effects of Doctoral postgraduate students

DOCTORAL	2000	2001	2002	2003	2004	2005
Headcounts						
First-enrolments (X)	1897	2122	2480	2519	2693	2692
Graduates (Y)	822	843	981	1031	1087	1176
Ongoing enrolments (Neither first enrolment nor graduate) (Z)	3236	3495	4307	4829	5323	5566
Total enrolments (X+Y+Z)	5955	6460	7768	8379	9103	9434
Indicators						
Ongoing enrolments as % of total enrolments [Z/(X+Y+Z)]*100	54%	54%	55%	58%	58%	59%
Graduates as % of ongoing enrolments [Y/Z]*100	25%	24%	23%	21%	20%	21%
Graduates as % of total enrolments [Y/(X+Y+Z)]*100	14%	13%	13%	12%	12%	12%

PILE-UP

There is a significant pile-up of both Master's and Doctoral students across most fields between 2000 and 2005. Firstly, the proportion of ongoing enrolments as percentage of total enrolments has increased for both Master's and Doctoral students. In 2005, nearly two out of five (37%) of all enrolled Master's students and three out of five (59%) of all enrolled Doctoral students were historical (i.e. ongoing) enrolments. Secondly, the number of Master's graduates as proportion of total enrolments remained the same (1 out of 5), but the situation for Doctoral students has deteriorated from 14% in 2000 to 12% in 2005. The pile-up effect is more prevalent amongst female students and higher for African and Coloured students at the Master's level. No race differences were found at the Doctoral level.

Completion rates: Time to degree

How long does the average Master's and Doctoral student take to complete his or her degree and did this situation change between 2000 and 2005? Overall the findings show that the average Master's student takes about three years to graduate, whereas the average Doctoral student takes slightly more than four and a half years. Interestingly, we found no significant changes at either level between 2000 and 2005, although there are small differences between fields (Table 5).

Table X.5: Time (in years) to degree completion of Master's and Doctoral students by broad field, 2000 and 2005[1]

	Honours				Doctoral			
	2000		2005		2000		2005	
Broad Field	Mean	N	Mean	N	Mean	N	Mean	N
Nat & Agric Sci	2.9	704	2.9	1119	4.8	194	4.9	281
Eng & Appl Tech	2.9	428	3.2	635	5.0	62	4.5	75
Health Science	3.6	748	3.5	965	4.8	103	4.5	155
Humanities	2.4	995	2.6	1408	4.2	140	5.0	224
Social Science	3.0	3020	2.9	3869	4.4	216	4.6	358
All fields	3.0	5795	2.9	7881	4.6	719	4.7	1093

As far as **gender** is concerned, there were no differences between male and female Master's students in 2000 or 2005 in the time taken to graduate. At the Doctoral level, the data shows that female students completed their degrees slightly faster in 2000 compared with male students (4.4 years compared to 4.7). However, by 2005, these differences had disappeared with both groups taking equally long (4.7 years). With regard to **race**, small differences for both qualifications and years were recorded. However, none of these differences suggests any major race effect. Differences in **age** are strongly correlated with differences in completion rates. Not surprisingly, older students take significantly longer to complete their degrees and this effect is more pronounced at the Doctoral level (Table 6).

[1] For Doctoral graduates, there was an error in the dataset where certain cases were indicated as both first-enrolments and graduates. In other words, it was indicated that some Doctoral students took only one year to graduate. These cases have been removed and for that reason the numbers of graduates shown in Table 5 are less than those in the original dataset.

Table X.6: Time (in years) to degree completion of Master's and Doctoral students by age group, 2000 and 2005

Age group	Honours				Doctoral			
	2000		2005		2000		2005	
	Mean	N	Mean	N	Mean	N	Mean	N
‹···30	2.4	1930	2.4	2945	3.7	89	3.5	139
30 to 39	3.4	2053	3.1	3091	4.5	251	4.7	443
40 to 49	3.3	847	3.4	1420	5.0	171	4.9	321
50 to 59	3.2	189	3.6	358	5.7	62	5.3	150
60 or older	5.0	28	3.5	42	5.1	15	5.5	40
Total	**3.0**	**5047**	**2.9**	**7856**	**4.6**	**588**	**4.7**	**1093**

TIME TO DEGREE

Time to degree refers to the time that successful (i.e. graduating) students take to complete their studies. Our analyses reveal that that the average Master's student takes approximately 3 years and the average Doctoral students on average 4.5 years to complete their studies. These rates are highly comparable to similar findings in Europe, Australia and North America. If one further takes into consideration that large proportions of South African students do not study full-time, these completion rates are even more acceptable and certainly do not signify whole scale inefficiencies in the system.

The burden of supervision

We introduce in this report the term 'burden of supervision' to refer to the phenomenon that - due to a number of trends highlighted in this report - South African academics are increasingly burdened with an unrealistically high number of postgraduate students to supervise. The number of postgraduate students has more than doubled over the past 15 years, whilst the number of permanent academics has only increased by 40% over the same period. In addition, the pile-up effect of postgraduate students places more demands on the supervisory capacity of the system.

We refer to the *burden of supervision* as the number of students (Master's and Doctoral) relative to the number of permanent academic staff who are qualified to supervise such students. As Figures 8 and 9 show, the burden of supervision at both levels increased across all fields of science between 2000 and 2005, as the average number of students per supervisor in all fields has increased substantially. At the Master's level, this has increased from 3.8 to 5.2; and at the Doctoral level from 1.3 to 2.2.

Figure X.8: Burden of supervision by field - Average number of Master's students per academic

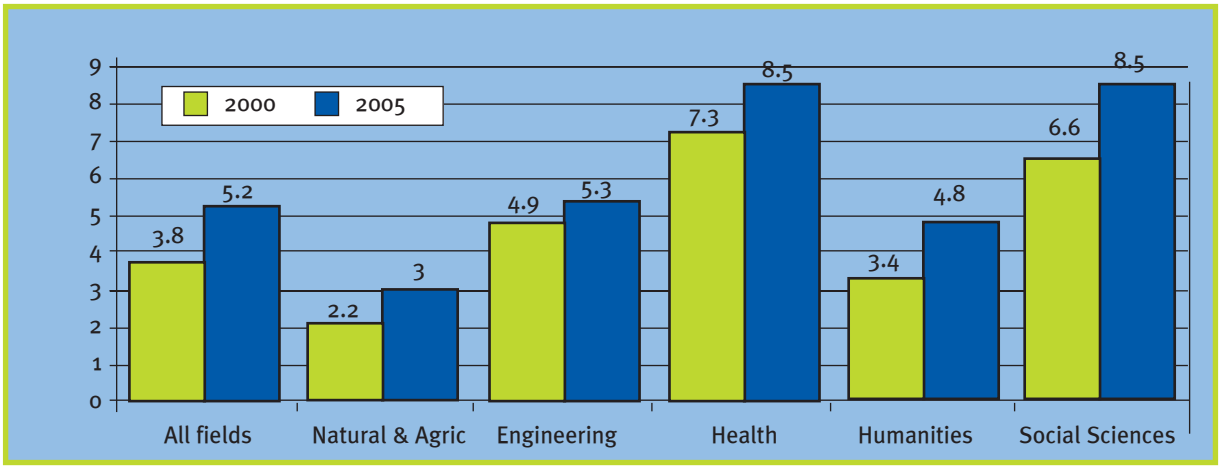
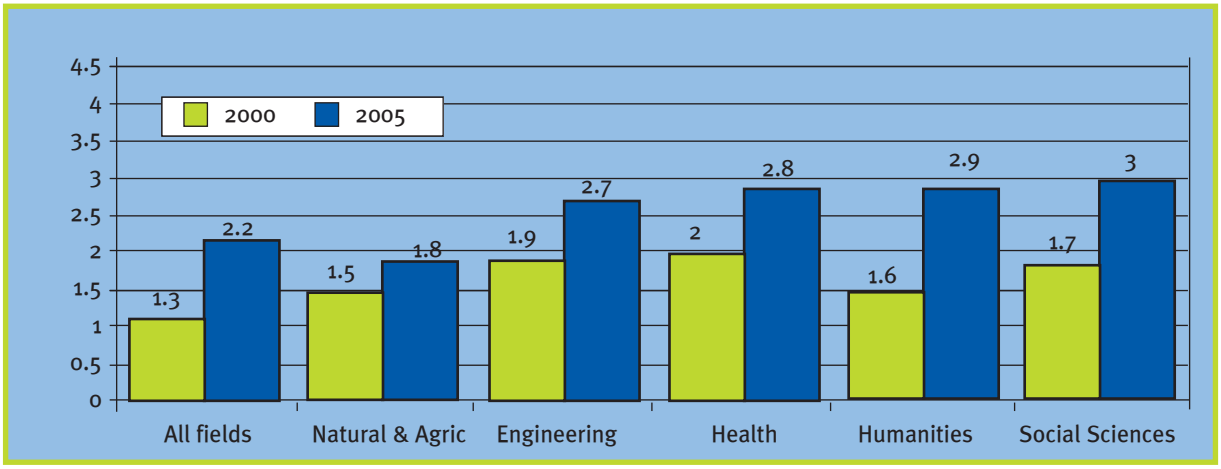


Figure X.9: Burden of supervision by field - Average number of Doctoral students per academic



THE BURDEN OF SUPERVISION

Supervisors of Master's and Doctoral students at South African universities face an increasing burden as the average number of students to supervise continues to increase. The "average" supervisor in 2005 would have to supervise 7 Master's and Doctoral students. This is high by international standards and does not take into account the unavailability of young lecturers to supervise immediately or the ageing of the more senior supervisory cohort who do not take on new students. There are also huge field differences with the burden of supervision in the social sciences estimated at nearly 12 students per supervisor.

Demographics

Gender: Female postgraduate enrolments show that female students constitute slightly more than 50% of all Honours enrolments, but less than half at the Master's (46% in 2005) and Doctoral (40% in 2005) levels (Figure 10). As far as graduates by field are concerned, female students show increased representation in most fields (except for the Natural and Agricultural Sciences). Although female graduates constitute significant proportions of the graduates in the Social Sciences, this is the exception. In all other fields and for both Master's and Doctoral degrees, female graduates are in the minority.

Figure X.10: Percentage women first-enrolments by qualification, 2000 to 2005

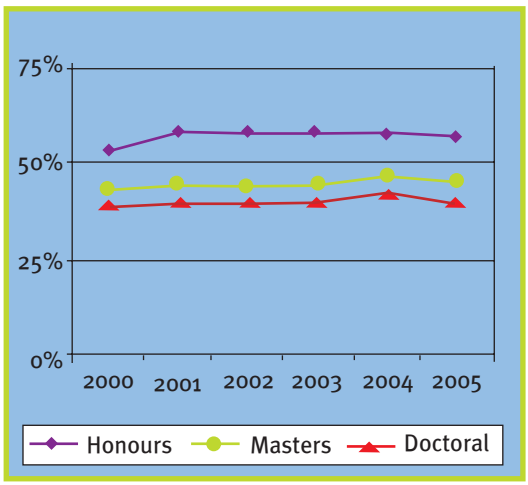


Figure X.11: Percentage Black graduates by qualification, 2000 to 2005

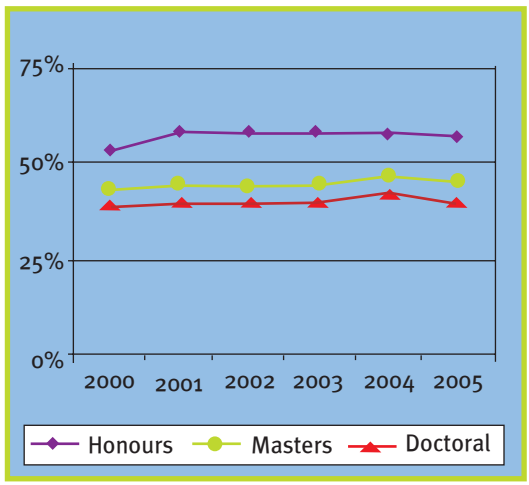


Table X.7: Broad field distribution of women graduates per qualification, 2000 and 2005

Broad Field	Honours		Master's		Doctoral	
	2000	2005	2000	2005	2000	2005
Nat & Agric Sc	15%	11%	12%	13%	25%	21%
Eng & Appl Tech	0%	2%	2%	3%	3%	3%
Health Sc	4%	3%	17%	16%	19%	18%
Humanities	12%	11%	18%	20%	14%	17%
Social Sc	68%	78%	51%	48%	37%	41%
All fields	100%	100%	100%	100%	100%	100%

Race: There was a steady increase between 2000 and 2005 in the proportion of Black[2] first-enrolments at all levels (Honours from 47% to 57%; Master's: from 57% to 63% and Doctoral: from 47% to 59% - Figure 11). The proportion of African graduates also increased significantly between 2000 and 2005 at all levels, even though white graduates still constitute the largest single group of graduates at the Master's and Doctoral levels. African Doctoral graduates were increasingly represented in all fields between 2000 and 2005, particularly in the Natural and Agricultural Sciences (34% in 2005), while the proportion of White Doctoral graduates declined in all fields over the same period.

Table X.8: Race distribution of graduates per qualification, 2000 and 2005

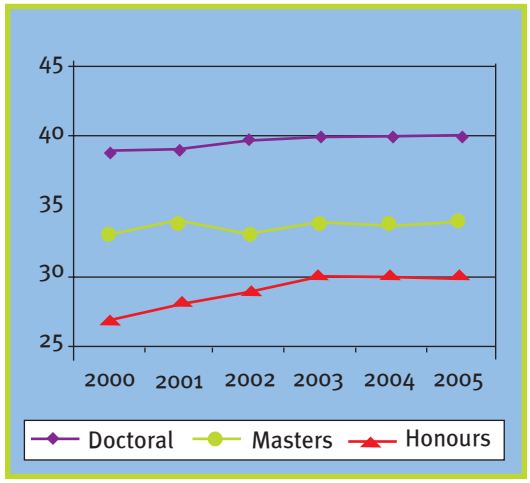
Race	Honours		Master's		Doctoral	
	2000	2005	2000	2005	2000	2005
Black African	34%	44%	27%	33%	19%	29%
Coloured	5%	5%	5%	6%	5%	6%
Indian	8%	8%	7%	8%	6%	7%
White	53%	43%	61%	52%	70%	59%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

[2] The word 'Black' is used here as a collective term, referring to Africans, Coloureds and Indians.

Age: There was little difference in the age of students for Master's first-enrolments in the under-30s between 2000 and 2005 (with 41% and 45%, respectively). However, Doctoral first-enrolments under 30 decreased, comprising 28% and 21% respectively in 2000 and 2005.

One of the most striking and disturbing findings concerns the changing mean age of postgraduate students (at graduation) in South Africa over the past few years (Figure 12). The mean age of Honours students increased significantly from 27 to 30 by 2005, and most Master's students now graduate at age 34, and most Doctoral students at age 40. There were no significant gender or race differences in these data.

Figure X.12: Mean age at graduation by qualification, 2000 to 2005



These findings are disturbing for two reasons: firstly, it means that many Master's and Doctoral students typically interrupt their studies after having completed their Bachelors and Honours degree to enter the job market, only taking up their Master's studies later on. This interruption, probably due to the lack of financial resources, invariably impacts on their preparedness for advanced studies and might mean they take longer to graduate. Secondly, and more importantly, it also means that Doctoral students who make a career of academic scholarship or science would probably only become productive quite late in their careers. There is a well-established correlation between holding a Doctoral degree and publication productivity. Against a background of an ageing academic and scientific cohort, it is imperative that South African Doctoral graduates start publishing as early on in their careers as possible.

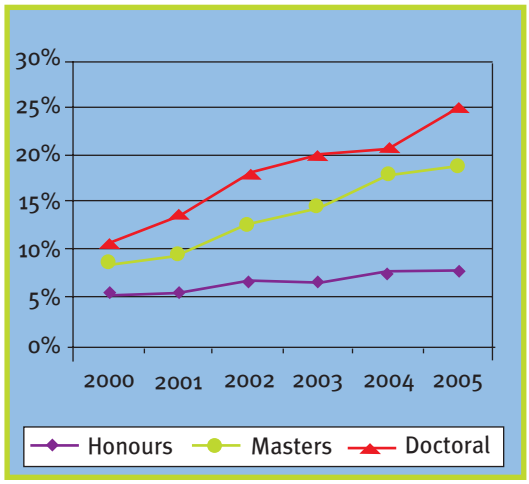
DEMOGRAPHIC SHIFTS

Our analysis of the demographics revealed some positive trends and most notably substantial increases in the number of Black and female enrolments and graduates at all levels of the postgraduate system. However, the mean age of Honours students at graduation increased significantly from 27 in 2000 to 30 by 2005 whilst most Master's students now graduate at age 34, and most Doctoral students at age 40. These age profiles are significantly higher than international norms and point to another serious "blockage" in our system when we face the challenge of increasing the research output of universities. The reality is that the potential pool of "knowledge producers" that flow from the Doctoral process are very late entrants into the system and will have limited impact on overall research output.

Internationalisation of South African Higher Education: The proportion of non-South African Master's first-enrolments increased from 9% in 2000 to 16% in 2005, with exactly 70% of these coming from other African countries, of whom approximately half were from the South African Development Community (SADC) countries. The share of non-South African Master's graduates increased by 10% over this six-year period, from 9% in 2000 to 19% in 2005 (Figure 13).

The proportion of non-South African Doctoral first-enrolments increased from 18% in 2000 to 26% in 2005, the majority coming from other African countries and the SADC. The proportion of non-South African Doctoral graduates increased by 14% over this six-year period, from 9% in 2000 to 25% in 2005, the highest proportion being in the Humanities, with an increase of 19% (from 9% in 2000 to 28% in 2005). This pattern is similar for Doctoral graduates, where the largest proportion of non-SA graduates was from SADC countries (43% in 2000 and 32% in 2005).

Figure X.13: Percentage of non-South African graduates per qualification, 2000 to 2005



Participation rates

The participation rate refers to the number of Master's and Doctoral students (in terms of first-enrolments and graduates) per 1 000 of the population of those aged between 25 and 34, and 35 and 44 years. In terms of participation, the number of White Master's first-enrolments is still substantially higher than that of any other race group in the 25- to 34-year age group, and this has continued to increase over time. Master's first-enrolments in the 35- to 44-year age group differ slightly from those in the younger age group, with Indian first-enrolments being the highest participation figure in both 2001 and 2005. African first-enrolments have the lowest participation rate.

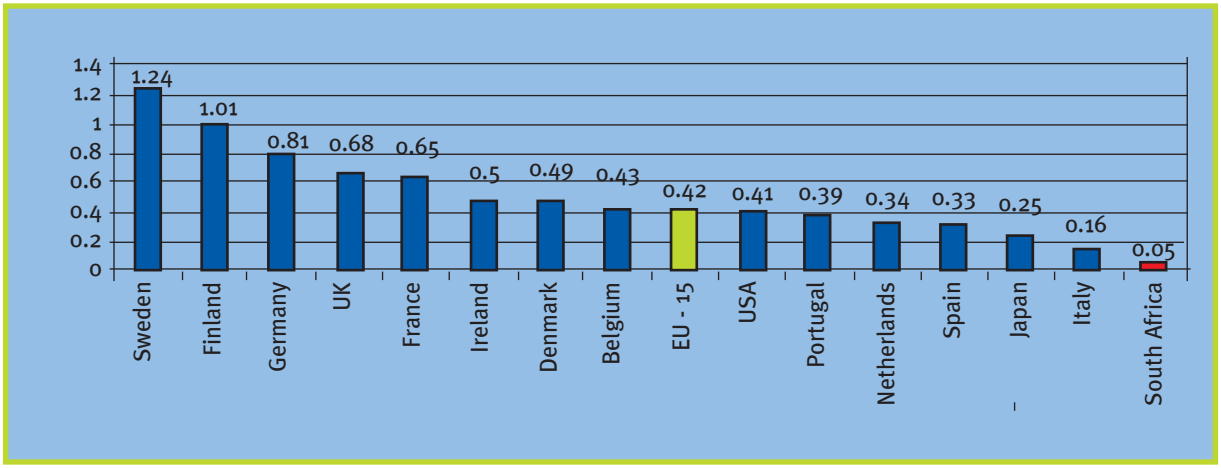
Table X.9: Number of Master's and Doctoral Graduates per 1 000 in the 25 to 34 age group and the 35 to 44 age group, 2001 and 2005

	25-34 Age Group		35-44 Age Group	
Master's Graduates	**2000**	**2005**	**2000**	**2005**
Black African	0.32	0.40	0.51	0.70
Coloured	0.42	0.59	0.56	0.76
Indian	2.57	3.43	2.95	4.03
White	6.71	8.53	5.22	6.24
Total	**0.88**	**0.98**	**1.26**	**1.52**
Doctoral Graduates				
Black African	0.03	0.05	0.05	0.09
Coloured	0.04	0.09	0.05	0.11
Indian	0.28	0.41	0.32	0.49
White	1.02	1.43	0.80	1.05
Total	**0.12**	**0.15**	**0.17**	**0.23**

Source: Calculated by using Mid-year Population Estimates (obtained from Statistics South Africa Website) - only available from 2001 onwards.

There was an increase in the participation figure of Doctoral graduates between 2001 and 2005 across all race groups (from 0.12 to 0.15). However, White participation rates were significantly higher than any other race group and increased the most over this five-year period (with an increase from 1.02 in 2001 to 1.43 in 2005). African graduates remain the smallest proportion of the older age group (with 0.05 in 2001 and 0.09 in 2005), while there are many more White Doctoral graduates than those from any other racial group (with 0.8 in 2001 and 1.05 in 2005). South Africa has 0.05 Doctoral degrees in Science and Engineering per 1 000 of the population in this age group (25-34). This does not compare favourably with most developed nations (Figure 14).

Figure X.14: Doctoral degrees in S&E per 1 000 in the 25-34 age group (2000)



PARTICIPATION RATES

We have witnessed an increase in the participation rates of Master's and Doctoral students (in terms of first-enrolments and graduates) between 2001 and 2005. Overall the rate of participation by Master's students increased from 0.88 to 0.98 (per 1 000 of the age cohort 25 -34) and for Doctoral students from 0.12 to 0.15. These rates compare unfavourably with international benchmarks (at least when focusing on SET fields only). It is also important to point out that the participation rates of White Doctoral students remain the highest (1.43 in 2005) and are on par with international levels. The extent of the challenge, however, is starkly illustrated when one looks at the gap between White and African participation rates at the Doctoral level (1.43 compared to 0.05). This effectively means that Whites in the age group 25 - 34 are 28 times more likely than their African counterparts to engage in and complete Doctoral studies in South Africa.

CHAPTER 1
BACKGROUND AND DATA SOURCES

1.1 BACKGROUND

The state of postgraduate studies in South Africa has come under renewed scrutiny in recent years. The challenge to regenerate the academic and scientific workforce of the country, discussions about the presumed inefficiency of the higher education system and the increasing realization of the challenges we face in the area of scarce skills underpin these debates. The state of postgraduate studies has also been affected by fundamental changes in the Higher Education sector over the past 10-15 years, including rapid massification of the student body, increased internationalisation especially of postgraduate students, significant transformation of the demographics of postgraduate students and, more recently, by the mergers of a number of South African universities and technikons. This study was born out of the need for a first, comprehensive and detailed study of the state of postgraduate studies in the country amidst all these changes.

1.2 DATA SOURCE

The data source for the statistical profile is the Higher Education Management and Information System (HEMIS) of the South African Department of Education (DoE). HEMIS requires state-subsidised universities to submit annual data returns, which include details of:

- their approved qualifications and fields of study;
- the courses offered within their academic programmes;
- the courses for which each student is registered;
- the fields in which each academic staff member is active.

Every year the DoE makes available on their website a subset of these HEMIS statistics in summary (Excel) format. In this report we only relied on these summary statistics for the period 1995 to 1999, when the figures were still collected under the former South African Post-Secondary Education (SAPSE) system. Until 1998/1999, SAPSE was the official statistical reporting system on higher education in the country before it was replaced by HEMIS in 1999/2000. SAPSE collected data in the form of table templates, whereas HEMIS collects unit record data (a unit corresponds to an individual student or staff member). Thus, from 2000 onwards datasets are available that allow for more sophisticated analyses of data collected for students and staff at South African universities. We used these datasets containing unit-record data for the years 2000 to 2005.

A number of variables were extracted from HEMIS and manipulated for this report.

- *Variable 1: Field of postgraduate studies*

HEMIS, when introduced in 1999/2000, continued with the Classification of Educational Subject Matter (CESM) that was used under the former SAPSE system. The subject matter classification, originally developed in 1982, confines itself to the various knowledge components (courses or also sometimes called modules) that appear in an academic programme.[3] The classification consists of 22 broad subject categories, described as

[3] The structure and discription of the CESM categories were published by the former Department of National Education in 1982 (Classification of Education Subject to Matter (SA-CESM), Report SAPSE 03, October 1982). THe DOE has recently (in 2008) revised the CESM system.

'first-order categories'. These first-order categories, in turn, are broken down into a set of second-order categories, and then each of these second-order categories into a set of third-order categories. Some third-order categories are also disaggregated in terms of fourth-order categories.

Three reasons motivated the research team not to employ the CESM categories 'as is' but to use a re-grouping of the CESM categories.

- Firstly, the 22 first-order categories are skewed in terms of the nature and distribution of main fields and sub-fields - e.g. Home Economics (CESM 10) and Libraries and Museums (CESM 14) both constitute first-order categories whereas Biological Sciences (CESM 15.03) and Chemistry (15.04) are second-order categories within the first-order category of Life Sciences and Physical Sciences (CESM 15).
- Secondly, a field such as Veterinary Health Sciences (CESM 09.08) is classified by HEMIS as belonging to Health Care and Health Sciences (CESM 09) whereas, in the South African context, it traditionally falls under Agricultural Sciences.
- Thirdly, in 2004 the Center for Research on Science and Technology (CREST) developed a field classification framework of scientific article output, which is also reconcilable with the CESM categories of HEMIS. The Appendix shows how the CESM categories can be amalgamated into the CREST classification framework (at the level of the second-order CESMs). The CREST framework comprises five main fields and 25 sub-fields (Table 1.1).

Hence, the second-order CESM categories of HEMIS were converted into the CREST scientific field framework. An example will clarify the process followed. In Table 1.2 we observe for each of eight students the second-order CESMs that indicate the subject nature of their qualification. For instance, HEMIS classified the qualification followed by Student 1 as belonging to both CESM 02.11 and CESM 08.06. On the basis of the CREST framework in the Appendix, these two CESMs must change into the main fields of Social Sciences, and Engineering Sciences and Applied Technologies, respectively.

Moreover, in HEMIS a fractional count of 0.5 is assigned to each of these two CESMs, to give a total of 1. In the application of the CREST framework, however, unit counts instead of fractional counts were used. This means that the qualification by Student 1 would be fully counted in both Social Sciences and Engineering and Applied Technologies. Similarly, the qualification by Student 4 will be fully counted in two main fields in the CREST framework (Humanities, and Social Sciences).

The real value of the new integrated classification framework is that it allows CREST to undertake analyses which combines data from the HEMIS system (about student and staff) with analyses of research output (utilising the international field classification of the ISI Web of Science). This means that for the first time one can compare certain input data (on staff resources) with output measures (journal article production).

Table 1.1: CREST scientific field framework

Main field	Sub-field
Natural and agricultural sciences	(1) Plant sciences; (2) Veterinary sciences; (3) Other agricultural sciences; (4) Biological sciences; (5) Chemical sciences; (6) Earth sciences; (7) Mathematical sciences; (8) Information, computer and communication technologies; (9) Physical sciences
Engineering and applied technologies	(10) Mechanical engineering; (11) Mining engineering; (12) Electrical and electronic engineering; (13) Other engineering and applied technologies; (14) Materials sciences
Health sciences	(15) Basic health sciences; (16) Clinical and public health
Humanities	(17) Law; (18) Religion; (19) Language and linguistics; (20) Other humanities and arts
Social sciences	(21) Economic and management sciences; (22) Sociology and related studies; (23) Education; (24) Psychology; (25) Other social sciences

Table 1.2: Example of conversion of HEMIS CESMs into CREST scientific field framework

Student	Field 026	Field 027	Field 028	Field 029
Second-order CESM categories (Before conversion)				
1	02.11 Planning	08.06 Civil Engineering & Technology		
2	08.08 Electrical Engineering &Technology	02.99 Other Architecture & Environmental Design		
3	08.19 Mechanical Engineering & Technology	02.99 Other Architecture & Environmental Design		
4	22.04 History	03.05 Visual Arts	05.99 Other Communication	
5	07.11 Educational Evaluation & Research	07.99 Other Education		
6	07.99 Other Education			
7	03.05 Visual Arts	04.09 Management	06.01 Applications in Computer Science & Data Processing	06.03 Computer Hardware Systems
8	09.02 Clinical Health Sciences			
Main scientific fields in CREST framework (After conversion)				
1	Social sciences	Engineering sciences & applied technologies		
2	Engineering sciences & applied technologies	Engineering sciences & applied technologies		
3	Engineering sciences & applied technologies	Engineering sciences & applied technologies		
4	Humanities	Humanities	Social sciences	
5	Social sciences	Social sciences		
6	Social sciences			
7	Humanities	Social sciences	Natural & agricultural sciences	Natural agricultural sciences
8	Health sciences			

Note: HEMIS allows for a qualification to be classified in up to four CESMs - these are captured in HEMIS in four data columns, with the following headings: Field 026, Field 027, Field 028 and Field 029.

- *Variable 2: Postgraduate qualification*

Field 005 ('Qualification type') in HEMIS was used to extract the postgraduate student qualifications. Altogether 10 postgraduate qualifications in HEMIS served this purpose and these qualifications were grouped into seven qualification categories, as is illustrated in Table 1.3.

Table 1.3: Qualification types in HEMIS used to define postgraduate student population

Qualification category used in this report	Qualification type in HEMIS	Description in HEMIS
Postgrad Diploma/ Certificate	Postgraduate certificate	A qualification that has a minimum entry requirement of a bachelor's degree and which has a minimum duration of 1 year or less.
	Postgraduate diploma	A qualification that has a minimum entry requirement of a first bachelor's degree and which has a minimum duration of 1 year.
Postgraduate Bachelors	Postgraduate bachelor's degree	A qualification that has a minimum entry requirement of a first bachelor's degree and has a minimum duration of either 1 or 2 years.
Honours	Honours degree	A qualification that has a minimum entry requirement of a first bachelor's degree and which has a minimum duration of 1 year.
Master's Diploma in Technology	Master's diploma in technology	A qualification which has (a) a minimum duration of 5 years with a grade 12 pass as a minimum entry requirement or (b) a minimum duration of 1 year with a national higher diploma as a minimum entry requirement.
Master's	Master's degree	A qualification which has either a first bachelor's degree or an honours degree as a minimum entry requirement, which is of a level higher than that of an honours degree, and which has a minimum duration of 1 year.
	Magister technologiae degree	A qualification which has a minimum duration of (a) 5 years with a grade 12 pass as a minimum entry requirement or (b) 1 year with a BTech as a minimum entry requirement.
Doctoral	Doctoral degree	A qualification which has either an honours or master's degree as a minimum entry requirement, which is of a level higher than a master's degree, and which has a minimum duration of 2 years.
	Doctor technologiae degree	A qualification which has a minimum duration of (a) 7 years with a grade 12 pass as a minimum entry requirement or (b) 2 years with a master's qualification as a minimum entry requirement.
Laureatus in Technology	Laureatus in technology	A qualification which has a minimum duration of (a) 7 years with a grade 12 pass as a minimum entry requirement or (b) 2 years with a master's qualification as a minimum entry requirement.

- *Variables 3 & 4: Graduates and total enrolments*

Field 025 ('Qualification requirement status') in HEMIS was used to identify student graduates. The field contains two values, namely 'F' and 'N', with the following descriptions:

F: Requirements of the qualification have been fulfilled and the student will be taking his/her award

N: Requirements of the qualification have been fulfilled but the student is deferring taking the award in order to undertake additional courses

OR

Requirements of the qualification have not been fulfilled.

All students with an 'F' for this particular field were taken as graduates.
Total enrolments were students with either an 'F' or 'N' entered for this field.

- *Variable 5: First-enrolments*

This variable was created by taking the difference between Field 009 ('Qualification commencement date') and Field 529 ('Reporting year'). The 'Qualification commencement date' refers to the date on which a student first enrolled for the qualification at the reporting institution. HEMIS has specific criteria for determining this date:

(1) If a student is given credit for a qualification commenced at another institution, the date to be reported is NOT the date they commenced at the other institution.

(2) If a student is granted leave of absence from a qualification prior to sitting for any examination for any course in the qualification, the commencement date is the date he/she recommences the qualification.

(3) If a student commenced a qualification and was granted leave of absence after sitting the examination for any courses in the qualification, the commencement date is the date he/she initially commenced the qualification, not the recommencement date.

(4) For research qualifications, the date is that on which the first effective registration was made in the qualification.

A person was classified as being a first enrolment in cases where the 'Qualification commencement date' was the same as the 'Reporting year'.

However, it was discovered that 5% of Doctoral students in their first year of enrolment were also indicated by HEMIS as graduates (according to Field 025 in HEMIS). In other words, a small number of students were both first-enrolments and graduates in the same year, which is impossible because the requirements for a Doctoral degree cannot be met within a single year. These cases probably fall under point (2) above - students who were granted leave of absence and whose 'commencement date' reflects a recommencement date, and not the original commencement date. As a result, such cases were excluded in all analyses involving Doctoral first-enrolments.

- *Variable 6: Age at commencement of postgraduate qualification*

The 2005 HEMIS dataset included a field (Field 009) that provides the date of birth of respondents. The 2000-2004 datasets however did not include this field but contained the South African identification numbers of students, from which the year of birth can be deduced. The age at commencement of a postgraduate qualification was calculated by taking the difference between 'Qualification commencement date' (Field 009) and the students' year of birth. However, in the process, some anomalies emerged - negative ages and ages such as 105 years. Consequently, we decided that only ages from 21 to 75 years were valid for the commencement of postgraduate qualifications. This resulted in about 10% of all postgraduate students being excluded in the age analyses, because they either had no year of birth recorded in HEMIS or their ages fell outside the specified range.

- *Variable 7: Age at graduation*

Age at time of graduation was calculated by taking the difference between 'Reporting year' (Field 529) and the student's year of birth - obviously only in cases where the students were graduates in the reporting year (see again Variable 3).

- *Variables 8 & 9: Gender and race*

Gender and race were respectively obtained from Field 012 and Field 013 in HEMIS.

- *Variable 10: Nationality*

Student nationality was taken from Field 014 in HEMIS - a series of codes indicating the student's nationality (e.g. SAF = South Africa, BOT = Botswana; EUR = European countries). Non-South Africans were grouped into four categories for the purposes of this report (SADC; Other African countries; Europe; Rest of world).

- *Variable 11: Academic staff qualifications*

Field 046 ('Qualification type') in HEMIS provided the qualifications of academic staff. The field consists of a series of codes that indicate the highest, most relevant qualification of a staff member (in cases where the personnel category is instruction/research professional).

- *Variable 12: Scientific field of academic staff*

In HEMIS, the fields in which academics (i.e. instructional and research staff) are working are not expressed in terms of headcounts. The fields are expressed in terms of full-time equivalents (FTEs). An FTE takes into account the time an academic spends at an institution and on a staff programme, with a full year of employment representing one FTE. For example, someone who was at an institution for six months would receive an FTE value of 0.5. This would then be distributed across the academic's programme. If, for instance, the person's time was split into 75% instruction, 20% research and 5% public service, it would yield the following FTE values: instruction (0.375), research (0.10) and public service (0.025).

CHAPTER 2
THE EFFICIENCY OF THE SOUTH AFRICAN POSTGRADUATE SYSTEM

2.1 INTRODUCTION

The efficiency of any system is usually defined as the ratio of output to input of the system. In this chapter, within the context of the South African postgraduate system, efficiency is taken to refer specifically to the conversion of postgraduate student inputs (first-enrolments) into postgraduate student outputs (graduates). The growth patterns in first-enrolments and graduates are first investigated, followed by a closer look at the conversion of first-enrolments into graduates. The 'quality' of the conversion is assessed through a series of indicators that consider completion rates (time taken to complete a degree) and evidence of postgraduate students 'piling up' in the system. Supervisory capacity (in terms of academic staff qualifications and the number of postgraduate students per academic staff member) is also investigated, given the centrality of supervisors in the transition from first-enrolment to eventual graduate status.

2.2 GROWTH PATTERNS

Growth patterns for the South African postgraduate system are reported in terms of three indices: (1) headcounts, (2) the average annual growth rate, and (3) the average annual growth (in headcounts). The average annual growth rate (AAGR) gives the overall percentage increase (or decrease) in student numbers across the respective years, whereas the average annual growth (AAG) translates the percentage into the average number of headcounts by which the students increased or decreased. For instance, an AAGR of 18% and an AAG of 76 for the years 2000-2005 would mean that student numbers, on average, increased by 18% over the total six-year period, translating into an average annual increase of about 76 students. A negative AAGR or AAG implies a decrease or declining growth.

2.2.1 FIRST-ENROLMENTS

Overall

- In 2005 a total of 54 494 students enrolled for the first time for a postgraduate qualification at a South African university (Table 2.1). This figure is less than the 59 857 first-enrolments recorded for 2004, but an improvement on the 49 391 headcount in 2000. Moreover, postgraduate first-enrolments represented 48% of postgraduate enrolments in 2005, compared to 56% in 2000.

Honours

- Table 2.1 and Figure 2.1 show that Honours first-enrolments increased steadily between 2000 (15 700) and 2004 (24 465), but then started declining (to 23 692 in 2005).
- The overall average growth rate for Honours first-enrolments was 9.1% between 2000 and 2005 (Table 2.2).
- When looking at trends for Honours first-enrolments across the five broad fields (in Table 2.3), it can be seen that in terms of the average annual growth rate, the highest growth rates were in Engineering and Applied Technologies (at 18.1%, although from a very low base) and Social Sciences (10.3%). Natural and Agricultural Sciences showed an increase of almost 6% over the six-

year period. There was a negative growth rate in Humanities (-1.4%) and almost 0% growth in Health Sciences (-0.2%).

- These growth rates are best illustrated when looking at the absolute values (in Table 2.4); for instance, in Humanities the 1 369 headcounts recorded for 2005 are only slightly higher than the 1 308 headcounts for 2001, yet lower than the 1 505 headcounts for 2002.

Master's

- Master's first-enrolments increased steadily from 2000, but started declining from 2003 (shown in Figure 2.1). For this whole six-year period, the average annual growth rate was 4.4% (Table 2.2).
- This declining trend after 2002 for Master's first-enrolments is reflected in the broad field analysis (shown in Figure 2.2). The sharpest decline was in Master's first-enrolments in the Social Sciences and Humanities; Table 2.4 shows there were 2 613 in 2000, a peak of 3 334 in 2003, followed by a decline to 2 740 in 2005 (which is only slightly higher than 2000). There was also a steady increase in Natural and Agricultural Sciences; from 1 707 first-enrolments in 2000 to 2 447 in 2005.
- The highest growth rate for Master's first-enrolments, shown in Table 2.3, was in Natural and Agricultural Sciences (7.5%) and in Health Sciences (6.6%). Of the remaining fields, the lowest growth rate was experienced in Engineering and Applied Technologies (with 0.8%) and Humanities (1%).

Doctoral

- Doctoral first-enrolments increased at a steady pace over the six-year period, however these numbers are relatively small (Figure 1.1). There was virtually no change in the number of Doctoral first-enrolments between 2004 and 2005, which stood at 2 693 and 2 692, respectively (Table 2.1).
- The overall average growth rate was 7.3% for Doctoral first-enrolments (Table 2.2). In terms of broad field (shown in Table 2.3) the highest growth rate for Doctoral first-enrolments was in the Social Sciences (9.9%) and Health Sciences (7.6%). As with Master's first-enrolments, the lowest growth rate for doctoral first-enrolments was in Engineering and Applied Technologies (2.0%).
- Although the overall growth of doctoral first-enrolments shows a steady increase over time, Figure 2.3 shows very small increases in certain fields, such as the Social Sciences (until 2004, followed by a decrease in 2005), and Humanities (which decreased from 2003 onward).

Table 2.1: Headcount of postgraduate first-enrolments by qualification level, 1995 to 2005

Qualification	2000	2001	2002	2003	2004	2005
Postgraduate Diploma/ Certificate	8601	8562	10930	11635	11966	8833
Postgraduate Bachelors	9013	5158	3310	2427	2448	1878
Honours	15700	17914	21416	22959	24465	23692
Master's	14162	15888	18062	19352	18279	17398
Doctoral	1897	2122	2480	2519	2693	2692
Master's Diploma in Tech	17	9	23	0	6	1
Laureatus in Technology	1	0	1	0	0	0
Total	**49391**	**49653**	**56222**	**58892**	**59857**	**54494**

Figure 2.1: Headcount of first-enrolments by type of postgraduate qualification, 2000 to 2005

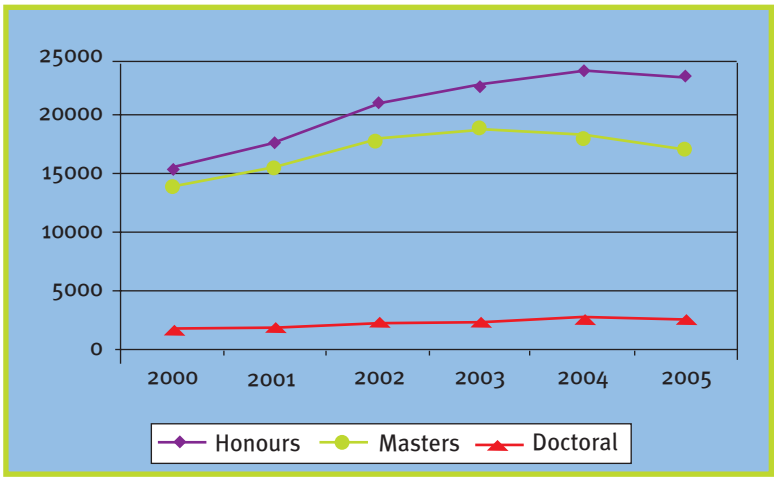


Table 2.2: Average annual growth and growth rate of first-enrolments, 2000 to 2005

Qualification	2000-2005	
	Avg. annual growth	Avg. annual growth rate (%)
Postgraduate Diploma/Certificate	345	3.5%
Postgraduate Bachelors	-1277	-25.7%
Honours	1747	9.1%
Master's	704	4.4%
Doctoral	164	7.3%

1) Average annual growth is expressed as headcounts. It represents the mean growth (increasing or decreasing) over the years specified. It was estimated by fitting a linear regression trend line to the annual values.

2) Similar to the above, the average annual growth rate was estimated by fitting a linear regression trend line to the annual values but, for this estimate, the values were converted into logarithmic values and the exponents (number of years) of these values were taken.

Table 2.3: Average annual growth and growth rate of first-enrolments by broad field, 2000 to 2005

Broad Field	Postgrad Dipl/Cert		Honours		Master's		Doctoral	
	Avg. annual growth	Avg. annual growth rate (%)	Avg. annual growth	Avg. annual growth rate (%)	Avg. annual growth	Avg. annual growth rate (%)	Avg. annual growth	Avg. annual growth rate (%)
Nat & Agric Sc	45	15.2%	144	5.7%	155	7.5%	39	7.1%
Eng & Appl Tech	55	7.5%	76	18.1%	8	0.8%	4	2.0%
Health Sc	226	23.0%	-2	-0.2%	146	6.6%	18	7.6%
Humanities	-149	-9.0%	-19	-1.4%	28	1.0%	22	5.4%
Social Sc	303	4.0%	1550	10.3%	406	4.8%	84	9.9%

1) Average annual growth is expressed as headcounts. It represents the mean growth (increasing or decreasing) over the years specified. It was estimated by fitting a linear regression trend line to the annual values.

2) Similar to the above, the average annual growth rate was estimated by fitting a linear regression trend line to the annual values but, for this estimate, the values were converted into logarithmic values and the exponents (number of years) of these values were taken.

Table 2.4: First-enrolments by broad field and qualification per year

Qualification	Broad Field	2000	2001	2002	2003	2004	2005
Honours	Nat & Agri Sc	2261	2428	2625	3057	2891	2904
	Eng & Appl Tech	294	362	372	462	665	628
	Health Sc	554	393	446	468	500	469
	Humanities	1432	1308	1505	1375	1237	1369
	Soc Sc	11914	14159	17126	18225	19945	19075
	Total	**16455**	**18650**	**22074**	**23587**	**25238**	**24445**
Master's	Nat & Agri Sc	1707	2064	2296	2469	2579	2447
	Eng & Appl Tech	1081	1092	1053	1140	1072	1134
	Health Sc	1884	2222	2270	2435	2537	2687
	Humanities	2613	2953	3342	3334	3070	2740
	Soc Sc	7418	8288	9668	10595	9833	9151
	Total	**14703**	**16619**	**18629**	**19973**	**19091**	**18159**
Doctoral	Nat & Agri Sc	498	501	555	602	644	679
	Eng & Appl Tech	153	180	202	144	214	169
	Health Sc	217	193	209	216	259	302
	Humanities	355	385	472	488	466	454
	Soc Sc	668	864	1052	1086	1129	1092
	Total	**1891**	**2123**	**2490**	**2536**	**2712**	**2696**

Figure 2.2: Headcount of Master's first-enrolments by broad field, 2000 to 2005

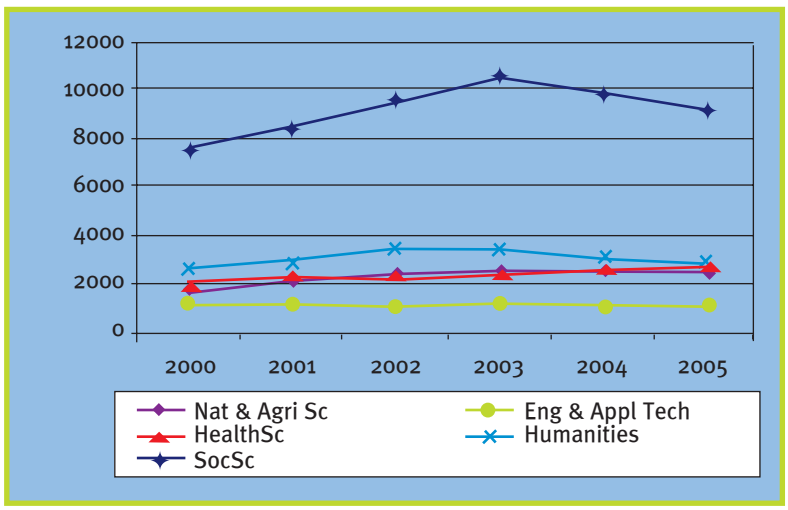
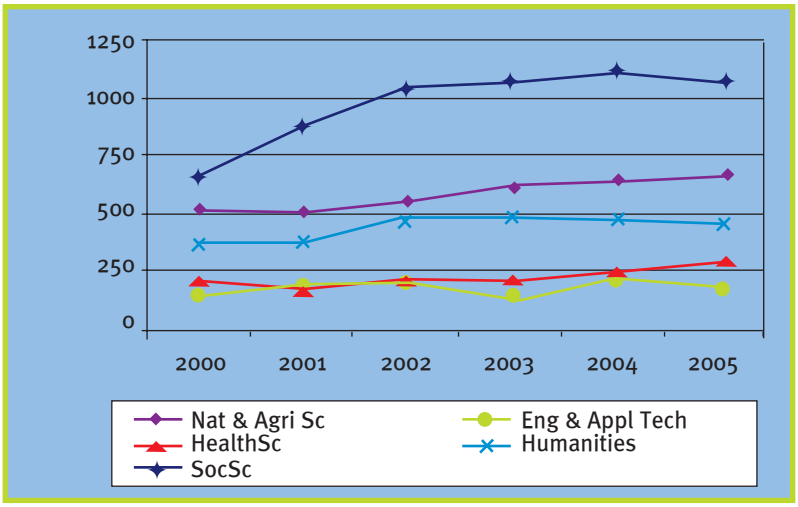


Figure 2.3: Headcount of Doctoral first-enrolments by broad field, 2000 to 2005



FIRST ENROLMENTS

Master's enrolments: Although first-enrolments for Master's' degrees have grown at an average annual rate of 4.4% between 2000 and 2005, this trend reversed, with significant declines since 2003. In fact, whereas first-enrolments in 2001 constituted exactly 50% of all total enrolments, this subsequently declined to 43% in 2005. The biggest proportion of this decline is due to decreased numbers of first-enrolments in the Social Sciences and Humanities.

Doctoral enrolments: The average annual growth rate for students enrolling for Doctoral degrees was 7.3% between 2000 and 2005. However, it is disturbing to note that this growth tailed off for the first time in 2005. In fact, the proportion of first-enrolments of total enrolments was lowest in 2005 (29%) and highest in 2001 (33%). The near-zero growth in 2005 is mainly due to fewer first-enrolments for doctoral studies in the Humanities and Social Sciences.

2.2.2 GRADUATES

Overall

- In 2005, a total of 30 803 students graduated with a postgraduate qualification from a South African university (Table 2.5). This figure is slightly less than the 31 573 graduates recorded for 2004, but a significant improvement on the 21 572 headcount in 1995.

Honours

- Figure 2.4 shows that there was a steady increase in Honours graduates between 2000 and 2005, from 9 135 in 2000 to 15 077 in 2005 (shown in Table 1.5).
- " The average annual growth rate for Honours graduates was 7.9% for the total period (Table 2.6). However, the growth for the whole six-year period 2000-2005 was 11.1%, representing an average increase of 1 257 students per year. The latter is a significant improvement on the 1.4% increase recorded for the period 1995-2000 (representing an increase of only 125 students per year).
- The highest average annual growth rate for Honours graduates was in Engineering and Applied Technologies (28.3%) although this was from a relatively small base, while there was almost no growth (-0.7%) in the Humanities (Table 2.7).

- In terms of absolute values (Table 2.8), Honours graduates in Engineering and Applied Technologies increased steadily from 577 in 2000 to 1 177 in 2005. The growth pattern in Humanities fluctuated somewhat, decreasing from 2 336 in 2000 to 2 038 in 2001, increasing to 2 266 in 2002, decreasing again to 1 867 in 2004 and increasing slightly to 1 955 in 2005.

Master's

- There was a steady but relatively small increase in Master's graduates between 2000 and 2005 (Figure 2.4), with almost 5 800 students in 2000 and 7 900 students in 2005 (Table 2.5).
- The growth rate remained more or less the same between the two sub-periods (1995-2000: 7.7%; 2000-2005: 6.2%), shown in Table 1.6. The overall growth rate for the total period was 8.3%, representing a headcount growth of 450 students a year.
- According to broad field, the largest growth rate for Master's graduates (Table 2.7) was in the Natural and Agricultural Sciences (9.4%) and the smallest in the Health Sciences (5.2%).
- In terms of the Natural and Agricultural Sciences, the growth remained relatively steady, except for a fluctuation between 2001 and 2002 where the number of graduates decreased from 900 to 877 (Table 2.8). In terms of the Health Sciences, the number of graduates was fairly consistent between 2000 and 2002 whereafter there was some fluctuation; an increase from 746 (in 2002) to 856 (in 2003), then a slight decline to 845 in 2004 followed by an increase to 965 in 2005 (which can also be seen in Figure 2.5).

Doctoral

- As seen in Figure 1.4, the number of Doctoral graduates increased very slightly between 2000 and 2005, from 822 graduates in 2000 to 1 176 in 2005 (Table 2.5).
- The growth rate for Doctoral graduates was higher for the period 2000-2005 (7.7%) than the period 1995-2000 (3.6%), shown in Table 2.6. In terms of headcount growth, this means an average increase of 73 students per year between 2000 and 2005, compared to 26 students per year from 1995 to 2000.
- The highest growth rate for Doctoral graduates occurred in the Social Sciences (11.6%) and the smallest in Engineering and Applied Technologies (2.6%), shown in Table 2.7. In Engineering and Applied Technologies the growth rate per qualification type tends to decline as the qualification becomes more 'advanced' (28.3% growth for Honours, 8.2% growth for Master's but only 2.6% growth for Doctorates).
- It can be seen from Table 2.8 that although the Social Sciences experienced the highest growth rate; in terms of absolute numbers, the growth was relatively small from 260 graduates in 2000 to 391 in 2005. Although there are still more graduates in the field of the Social Sciences than in the other fields, the differences at Doctoral level across the five fields are not as pronounced as they are for the Honours and Master's levels discussed above. For instance, in the Natural and Agricultural Sciences there were 205 graduates in 2000 and 306 in 2005 (also shown in Figure 2.6).

Table 2.5: Headcount of postgraduate graduates by qualification level, 1995 to 2005

Qualification	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Postgrad Diploma/ Certificate	4736	5014	5009	4729	4323	3909	4505	5834	6440	7350	5581
Postgrad Bachelors	4455	4108	3759	3386	2826	3512	3090	2615	1603	1156	1087
Honours	7747	7793	8260	7873	7070	9135	10225	11548	13195	14443	15077
Master's	3901	4043	4259	4525	4883	5795	6426	6871	7396	7536	7881
Doctoral	679	684	676	761	723	822	843	981	1031	1087	1176
Master's Diploma in Technology	52	50	0	17	10	8	3	13	0	1	1
Laureatus in Technology	2	1	0	0	0	1	0	0	0	0	0
Total	**21572**	**21693**	**21963**	**21291**	**19835**	**23182**	**25092**	**27862**	**29665**	**31573**	**30803**

Figure 2.4: Headcount of graduates by type of postgraduate qualification, 2000 to 2005

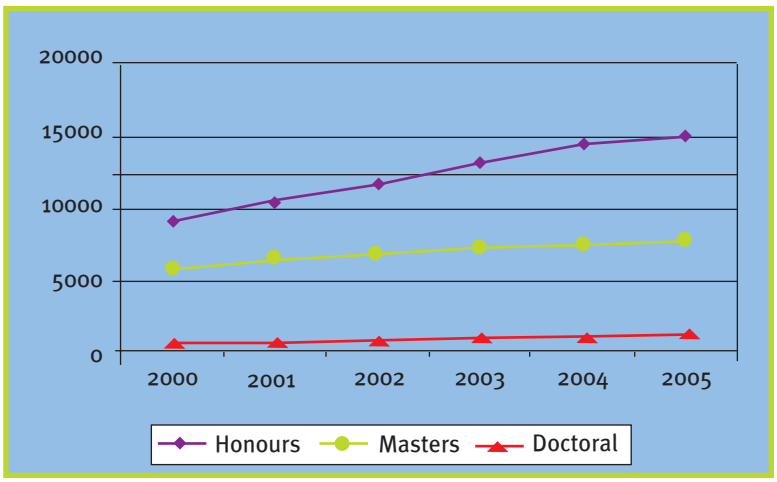


Table 2.6: Average annual growth and growth rate of graduates, 1995 to 2005

Qualifications	Period 1		Period 2		Total Period	
	1995-2000		2000-2005		1995-2005	
	Ave annual growth	Ave annual growth rate (%)	Ave annual growth	Ave annual growth rate (%)	Ave annual growth	Ave annual growth rate (%)
Postgrad Diploma/ Certificate	-185	-4.1%	500	10.0%	184	3.3%
Postgrad Bachelors	-255	-6.7%	-541	-23.3%	-331	-12.8%
Honours	125	1.4%	1257	11.1%	805	7.9%
Master's	350	7.7%	408	6.2%	450	8.3%
Doctoral	26	3.6%	73	7.7%	52	6.1%

1) Average annual growth is expressed as headcounts. It represents the mean growth (increasing or decreasing) over the years specified. It was estimated by fitting a linear regression trend line to the annual values.
2) As above, the average annual growth rate was estimated by fitting a linear regression trend line to the annual values but, for this estimate, the values were converted into logarithmic values and the exponents (number of years) of these values were taken.

Table 2.7: Average annual growth and growth rate of graduates by broad field, 2000 to 2005

Broad Field	Postgrad Dipl/Cert		Honours		Master's		Doctoral	
	Avg. annual growth	Avg. annual growth rate (%)	Avg. annual growth	Avg. annual growth rate (%)	Avg. annual growth	Avg. annual growth rate (%)	Avg. annual growth	Avg. annual growth rate (%)
Nat & Agric Sc	51	20.8%	113	5.8%	83	9.4%	17	6.8%
Eng & Appl Tech	69	14.3%	70	28.3%	41	8.2%	2	2.6%
Health Sc	98	16.1%	18	4.6%	42	5.2%	11	9.5%
Humanities	49	8.3%	-8	-0.7%	94	8.1%	9	4.6%
Social Sc	397	10.5%	1065	12.9%	55	7.0%	34	11.6%

1) Average annual growth is expressed as headcounts. It represents the mean growth (increasing or decreasing) over the years specified. It was estimated by fitting a linear regression trend line to the annual values.

2) As above, the average annual growth rate was estimated by fitting a linear regression trend line to the annual values but, for this estimate, the values were converted into logarithmic values and the exponents (number of years) of these values were taken.

Table 2.8: Graduates by broad field and qualification per year

Qualification	Broad Field	2000	2001	2002	2003	2004	2005
Honours	Nat & Agri Sc	2832	3009	3328	3811	3952	3904
	Eng & Appl Tech	577	588	616	796	1225	1177
	Health Sc	656	612	612	675	660	600
	Humanities	2336	2038	2266	2152	1867	1955
	Soc Sc	17361	21127	29069	33283	37375	37559
	Total	**23762**	**27374**	**35891**	**40717**	**45079**	**45195**
Master's	Nat & Agri Sc	704	900	877	1059	1118	1119
	Eng & Appl Tech	428	468	516	557	591	635
	Health Sc	748	750	746	856	845	965
	Humanities	995	1060	1289	1418	1428	1408
	Soc Sc	3020	3410	3577	3715	3794	3869
	Total	**5895**	**6588**	**7005**	**7605**	**7776**	**7996**
Doctoral	Nat & Agri Sc	205	265	293	307	289	306
	Eng & Appl Tech	65	78	87	77	81	78
	Health Sc	111	92	94	124	123	166
	Humanities	177	187	202	167	211	235
	Soc Sc	260	220	315	360	385	391
	Total	**818**	**842**	**991**	**1035**	**1089**	**1176**

Figure 2.5: Headcount of Master's graduates by broad field, 2000 to 2005

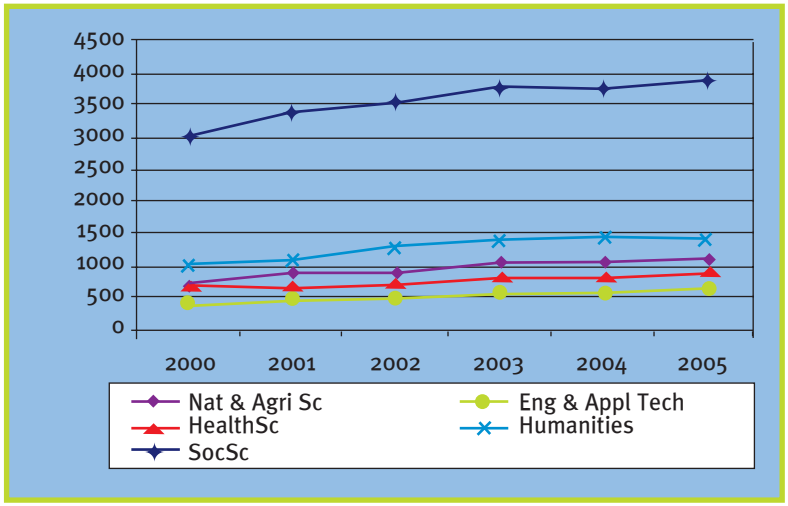
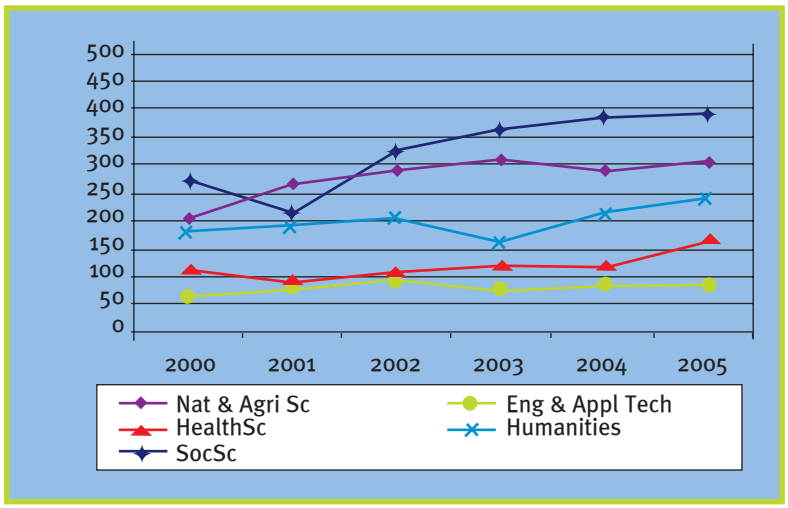


Figure 2.6: Headcount of Doctoral graduates by broad field, 2000 to 2005



GRADUATION RATES

Average growth rates in Honours, Master's and Doctoral student remain small with significant field differences. Overall, growth has been highest for the social sciences and lowest for the humanities and health sciences. The average annual growth rate of Doctoral graduates of 7.7% translates into an annual gain of only 73 headcounts - signifying in another way the huge challenge of making substantial inroads into increasing overall Doctoral output in the country.

2.3 PILE-UP EFFECTS

It would have been ideal to calculate throughput rates, i.e. indicators that show the proportion of students that successfully completed a postgraduate programme of those originally enrolled. The computation of throughput rates, however, requires working with *cohorts* of students, i.e. matching student entries from the different HEMIS datasets (for the years 2000, 2001, 2002, 2003, 2004 and 2005) at the level of the individual, and integrating these entries within a single dataset. This would be a mammoth task with no guaranteed success. We, therefore, followed an alternative approach by calculating the 'pile-up' effects.

The term 'pile-up' refers to the state of affairs where students remain enrolled for their degree much longer than expected. When the number of recurring students becomes too high, this inevitably puts strain on the resources and affects the efficiency of the postgraduate system in general, as its leads to an increasingly greater number of students who need supervision. We constructed two indicators to measure this pile-up effect: *Ongoing enrolments as a percentage of total enrolments and Graduates as a percentage of ongoing enrolments.*[4] When there is an increase in the value of the first indicator, it shows that more students are remaining in or 'piling up' in the system, while a decrease in the value of the second indicator means that the system is producing fewer graduates relative to the number of recurring students.

Master's

- Overall, Master's ongoing enrolments as a percentage of total enrolments remained relatively constant between 2000 and 2003 (32% and 33%, respectively), whereafter this increased to 36% in 2004, and to 37% in 2005 (Table 2.9). It would thus appear that there has been an increased pile-up of Master's students since 2004. In terms of graduates as a percentage of ongoing enrolments, we witness a relatively sharp decline as from 2001 (from 67% in 2001 to 52% in 2005). This means that fewer Master's students, relative to the number of recurring students, have graduated since 2002.
- In terms of the first indicator, the percentage of women increased from 34% in 2000 to 43% in 2005, and the percentage of men from 37% in 2000 to 43% in 2005 (Table 2.10). Thus the pile-up effect is higher for women than for men (with increases of 9% and 6%, respectively). Concomitantly, as a percentage of ongoing enrolments Master's graduates decreased for both women and men; from 54% in 2000 to 41% in 2005 for women, and from 50% in 2000 to 42% in 2005 for men. Once again the decrease was larger for women than for men (13% and 8%, respectively).
- Ongoing enrolments as a percentage of total enrolments across all race groups; increased, most notably in the Black African (35% in 2000 and 48% in 2005) and Coloured groups (26% in 2000 and 31% in 2005), as can be seen in Table 2.11. However, graduates as a percentage of ongoing enrolments declined across all race groups, but also most significantly in the Black African group (39% in 2000 and 27% in 2005).
- Ongoing Master's enrolments as a percentage of total enrolments across all fields increased, but particularly in the Social Sciences, with 32% in 2000 and 43% in 2005 (Table 2.12). In the Natural and Agricultural Sciences and Engineering and Applied Technologies, graduates as a percentage of ongoing enrolments also increased. However, graduates as a percentage of ongoing enrolments shows a decline across the remaining broad fields, especially in the Social Sciences (61% in 2000 and 40% in 2005). This means that over time the Social Sciences are producing fewer graduates relative to the number of recurring students.

[4] The meaning of the key concepts in Tables 2.9 to 2.16 is as follows: *First-enrolments* refer to students who are enrolled for the first time; *graduates* refer to students who have fulfilled the requirements of a programme and can be awarded a qualification; and *ongoing enrolments* are neither first-enrolments nor graduates; *total enrolments* represent the sum of the aforementioned three categories.

Doctoral

- Overall, Doctoral ongoing enrolments as a percentage of total enrolments remained relatively constant between 2000 and 2002, whereafter it increased from 55% to 59% in 2005 (Table 2.13). There has thus been an increase in recurring Doctoral students in the system. In terms of graduates as a percentage of ongoing enrolments, there was a steady decline from 2000 (from 25% to 21% in 2005), which means that, relative to the number of recurring students, less Doctoral students are graduating.
- Both female and male Doctoral ongoing enrolments as a percentage of total enrolments have increased; for women this rose from 52% in 2000 to 59% in 2005 and for men from 56% in 2000 to 59% in 2005 (Table 2.14). As with Master's, the increase was higher for women than for men (7% and 3%, respectively). The percentage of graduates as a percentage of ongoing enrolments for both females and males declined - from 29% in 2000 to 22% in 2005 for women, and from 24% to 20% for men. Once again, the percentage decrease is highest for women (7%, compared to 4% for men).
- Ongoing enrolments as a percentage of total enrolments across all race groups increased by more or less the same degree (increases of between 5 to 6%, see Table 2.15). Graduates as a percentage of ongoing enrolments also declined across all race groups at relatively the same rate (4-6%).
- Doctoral ongoing enrolments as a percentage of total enrolments across all fields increased, except in the Natural and Agricultural Sciences, which showed a decline from 59% in 2000 to 53% in 2005 (Table 2.16). The proportion of graduates of ongoing enrolments also declined across all fields, except once again in the Natural and Agricultural Sciences (an increase from 20% in 2000 to 26% in 2005). The Social Sciences showed the steepest decline of all five broad fields (from 32% in 2000 to 19% in 2005) for this indicator.

The overall diagnosis is that more students are remaining or 'piling up' in the system, and the system is producing fewer graduates relative to the number of recurring students. A notable exception is in the Natural and Agricultural Sciences, where the number of Doctoral graduates is growing faster than the number of ongoing enrolments, which explains why the trend on the two selected indictors is reversed for this field.

Table 2.9: Pile-up effects of Master's postgraduate students

MASTER'S	2000	2001	2002	2003	2004	2005
Headcount						
First-enrolments (X)	14162	15888	18062	19352	18279	17398
Graduates (Y)	5795	6426	6871	7396	7536	7881
Ongoing enrolments (Z) (Neither first-enrolment nor graduate)	9556	9642	11648	13091	14671	15105
Total enrolments (X+Y+Z)	29513	31956	36581	39839	40486	40384
Indicators						
First-enrolments as % of [X/(X+Y+Z)]*100	48%	50%	49%	49%	45%	43%
Graduates as % of total enrolments [Y/(X+Y+Z)]*100	20%	20%	19%	19%	19%	20%
Ongoing enrolments as % of total enrolments [Z/(X+Y+Z)]*100	32%	30%	32%	33%	36%	37%
Graduates as % of ongoing enrolments [Y/Z]*100	61%	67%	59%	56%	51%	52%
First-enrolments per 1 graduate [X/Y]	2.4	2.5	2.6	2.6	2.4	2.2
First- & ongoing enrolments per 1 graduate [(X+Z)/Y]	4.1	4.0	4.3	4.4	4.4	4.1
Total enrolments per 1 graduate [(X+Y+Z)/Y]	5.1	5.0	5.3	5.4	5.4	5.1

Table 2.10: Selected pile-up effects of Master's postgraduate students by Gender

Master's Indicators by Gender	Female		Male	
	2000	2005	2000	2005
Ongoing enrolments as % of total enrolments [Z/(X+Y+Z)]*100	34%	43%	37%	43%
Graduates as % of ongoing enrolments [Y/Z]*100	54%	41%	50%	42%

Table 2.11: Selected pile-up effects of Master's postgraduate students by Race

Master's Indicators by Race	Black African		Coloured		Indian		White	
	2000	2005	2000	2005	2000	2005	2000	2005
Ongoing enrolments as % of total enrolments [Z/(X+Y+Z)]*100	35%	48%	26%	31%	38%	40%	38%	40%
Graduates as % of ongoing enrolments [Y/Z]*100	39%	27%	61%	58%	43%	42%	61%	59%

Table 2.12: Selected pile-up effects of Master's postgraduate students by Field

Master's Indicators by Field	Natural & Agricultural Sciences		Engineering & Applied Technologies		Health Sciences		Humanities		Social Sciences	
	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005
Ongoing enrolments as % of total enrolments [Z/(X+Y+Z)]*100	36%	38%	36%	40%	51%	52%	29%	36%	32%	43%
Graduates as % of ongoing enrolments [Y/Z]*100	51%	52%	50%	53%	27%	25%	68%	59%	61%	40%

Table 2.13: Pile-up effects of Doctoral postgraduate students

DOCTORAL	2000	2001	2002	2003	2004	2005
Headcount						
First-enrolments (X)	1897	2122	2480	2519	2693	2692
Graduates (Y)	822	843	981	1031	1087	1176
Ongoing enrolments (Z) (Neither first-enrolment nor graduate)	3236	3495	4307	4829	5323	5566
Total enrolments (X+Y+Z)	5955	6460	7768	8379	9103	9434
Indicators						
First-enrolments as % of [X/(X+Y+Z)]*100	32%	33%	32%	30%	30%	29%
Graduates as % of total enrolments [Y/(X+Y+Z)]*100	14%	13%	13%	12%	12%	12%
Ongoing enrolments as % of total enrolments [Z/(X+Y+Z)]*100	54%	54%	55%	58%	58%	59%
Graduates as % of ongoing enrolments [Y/Z]*100	25%	24%	23%	21%	20%	21%
First-enrolments per 1 graduate [X/Y]	2.3	2.5	2.5	2.4	2.5	2.3
First- & ongoing enrolments per 1 graduate [(X+Z)/Y]	6.2	6.7	6.9	7.1	7.4	7.0
Total enrolments per 1 graduate [(X+Y+Z)/Y]	7.2	7.7	7.9	8.1	8.4	8.0

Table 2.14: Selected pile-up effects of Doctoral postgraduate students by Gender

Master's Indicators by Gender	Female		Male	
	2000	2005	2000	2005
Ongoing enrolments as % of total enrolments [Z/(X+Y+Z)]*100	52%	59%	56%	59%
Graduates as % of ongoing enrolments [Y/Z]*100	29%	22%	24%	20%

Table 2.15: Selected pile-up effects of Doctoral postgraduate students by Race

Master's Indicators by Race	Black African		Coloured		Indian		White	
	2000	2005	2000	2005	2000	2005	2000	2005
Ongoing enrolments as % of total enrolments [Z/(X+Y+Z)]*100	50%	56%	43%	48%	51%	56%	58%	63%
Graduates as % of ongoing enrolments [Y/Z]*100	22%	18%	28%	25%	22%	18%	27%	23%

Table 2.16: Selected pile-up effects of Doctoral postgraduate students by Field

Master's Indicators by Field	Natural & Agricultural Sciences		Engineering & Applied Technologies		Health Sciences		Humanities		Social Sciences	
	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005
Ongoing enrolments as % of total enrolments [Z/(X+Y+Z)] *100	59%	53%	57%	66%	52%	57%	53%	63%	46%	57%
Graduates as % of ongoing enrolments [Y/Z]*100	20%	26%	23%	16%	31%	27%	28%	19%	32%	19%

PILE-UP

There is a significant pile-up of both Master's and Doctoral students across most fields between 2000 and 2005. Firstly, the proportion of ongoing enrolments of total enrolments has increased for both Master's and Doctoral students. In 2005, nearly two out of five (37%) of all enrolled Master's students and three out of five (59%) of all enrolled Doctoral students were historical (i.e. ongoing) enrolments. Secondly, the number of Master's graduates as proportion of total enrolments remained the same (1 out of 5), but the situation for Doctoral students has deteriorated from 14% in 2000 to 12% in 2005. The pile-up effect is more prevalent amongst female students and higher for African and Coloured students at the Master's level. No race differences were found at the Doctoral level.

2.4 TIME TO DEGREE

In this sub-section we investigate the average number of years postgraduate students take to complete a Master's and Doctoral degree, respectively. The breakdown is by broad field for the years 2000 and 2005. The number of years was calculated by (1) taking the difference between the year of first enrolment for a qualification and the year of graduation (either 2000 or 2005) in that qualification, (2) summing these differences, and (3) dividing the total by the number of cases.

Master's

- There was almost no difference in the average completion time for a Master's degree in 2000 and 2005; those who completed their degree in 2000 took 3 years, compared with 2.9 years in 2005 (Table 2.17).
- In 2000, the average number of years taken to complete a Master's degree in the Health Sciences was about 3.6 years (Table 2.17). This is markedly longer than the time taken in the other broad fields - the shortest time period (2.4 years) being in the Humanities.
- In 2005, a Master's degree in the Health Sciences still took longest to complete (3.5 years in Table 2.17). However, the years taken to complete a degree in both Engineering and Applied Technologies and the Humanities have increased slightly since 2000 from 2.6 years to 3.2 in 2005. For the Social Sciences, however, this time has slightly decreased (to 2.9 years), whereas in the Natural and Agricultural Sciences the time taken to complete a Master's remained the same as in 2000 (at 2.9 years). In general, though, these differences do not point to major field effects.
- There was virtually no difference between the time taken to complete a Master's degree for men and women in either 2000 or 2005. Women took an average number of 2.9 years and men 3 years in both 2000 and 2005 (Table 2.18).
- Coloured Master's students took the least number of years to complete their degree in both 2000 and 2005 (2.6 years and 2.7 years respectively - Table 2.19). White students took the longest time in 2000 (3 years) and Black African students the longest in 2005 (also 3 years). However, these differences do not necessarily point to any significant effects as our data do not differentiate between different types of Master's degrees. It is conceivable that some of these differences can be ascribed to the different demands of coursework and thesis Master's for example.
- Students younger than 30 years completed their Master's degrees faster than those between 30 and 39 (Table 2.20). In both 2000 and 2005, the younger group took 2.4 years, but the older group (30 -39 years) took 3.4 years in 2000 and slightly less in 2005, 3.1 years.

Doctoral

- The average number of years taken to complete a Doctoral degree increased slightly from 4.6 in 2000 to 4.7 in 2005 (Table 2.17).
- In both the Social Sciences and Humanities this increased between 2000 and 2005 (Table 2.17). In the Humanities those who graduated in 2005 took an average of 5 years, which is the longest period associated with any broad field in 2005. In the Social Sciences the degree completion time increased from 4.4 years in 2000 to 4.6 years in 2005.
- The time taken to Doctoral degree completion in the Natural and Agricultural Sciences basically remained unchanged between 2000 and 2005 (at 4.8 and 4.9 years, respectively) in Table 2.17. In the fields of Engineering and Applied Technologies there was some acceleration (from 5 years in 2000 to 4.5 in 2005) and also in the Health Sciences (from 4.8 to 4.5 years).

- In 2000, women took an average of 4.4 years to obtain a Doctorate and men took slightly longer with 4.7 years, the overall average for 2000 being 4.6 years (shown in Table 2.18). In 2005, both women and men took slightly longer to complete a Doctorate than in 2000 (4.7 years), and again men took slightly longer to obtain a Doctorate than women (4.8 years and 4.7 years respectively).
- In 2000, Black African Doctoral students took the least number of years to complete their degree (4.2 years - Table 2.19); and in 2005, Indian students (4.5 years) took the least time. White students took the longest time to graduate in both 2000 and 2005 (4.7 years and 4.8 years respectively).
- As with Master's degrees, the younger Doctoral graduates (in the younger-than-30 age group) completed their degrees sooner (3.7 years in 2000 and 3.5 years in 2005) than those in the older age groups. However, the largest numbers of Doctoral graduates are to be found in the two older age categories: 30-39 years and 40-49 years. The average completion time for these age groups varies between 4.5 and 5 years in 2000 and 2005 (Table 2.20).

Table 2.17: Time (in years) to degree completion of Master's and Doctoral students by broad field, 2000 and 2005[5]

Broad Field	Master's				Doctoral			
	2000		2005		2000		2005	
	Mean	N	Mean	N	Mean	N	Mean	N
Nat & Agri Sc	2.9	704	2.9	1119	4.8	194	4.9	281
Eng & Appl Tech	2.9	428	3.2	635	5.0	62	4.5	75
Health Sc	3.6	748	3.5	965	4.8	103	4.5	155
Humanities	2.4	995	2.6	1408	4.2	140	5.0	224
Soc Sc	3.0	3020	2.9	3869	4.4	216	4.6	358
All Fields	3.0	5795	2.9	7881	4.6	719	4.7	1093

Table 2.18: Time (in years) to degree completion of Master's and Doctoral students by gender, 2000 and 2005

Gender	Master's				Doctoral			
	2000		2005		2000		2005	
	Mean	N	Mean	N	Mean	N	Mean	N
Female	2.9	2389	2.9	3534	4.4	293	4.7	487
Male	3.0	3405	3.0	4347	4.7	426	4.8	606
Total	**2.9**	**5794**	**2.9**	**7881**	**4.6**	**719**	**4.7**	**1093**

Table 2.19: Time (in years) to degree completion of Master's and Doctoral students by race, 2000 and 2005

Race	Master's				Doctoral			
	2000		2005		2000		2005	
	Mean	N	Mean	N	Mean	N	Mean	N
Black African	2.8	1538	3.0	2627	4.2	136	4.7	304
Coloured	2.6	296	2.7	457	4.5	26	4.6	55
Indian	2.9	420	2.9	648	4.6	41	4.5	69
White	3.0	3537	2.9	4133	4.7	516	4.8	664
Total	**2.9**	**5791**	**2.9**	**7865**	**4.6**	**719**	**4.7**	**1092**

[5] For Doctoral graduates, there was an error in the dataset where certain cases were indicated as both first-enrolments and graduates. In other words, it was indicated that some Doctoral students took only one year to graduate. These cases have been removed; the numbers of graduates shown in Tables 2.17 to 2.21 are therefore less than those in the original dataset. After excluding these anomalies, no doctoral graduate figures remained for the University of the Western Cape for 2005 (in Table 2.21).

Table 2.20: Time (in years) to degree completion of Master's and Doctoral students by age group, 2000 and 2005

Age Group	Master's				Doctoral			
	2000		2005		2000		2005	
	Mean	N	Mean	N	Mean	N	Mean	N
‹···30	2.4	1930	2.4	2945	3.7	89	3.5	139
30 to 39	3.4	2053	3.1	3091	4.5	251	4.7	443
40 to 49	3.3	847	3.4	1420	5.0	171	4.9	321
50 to 59	3.2	189	3.6	358	5.7	62	5.3	150
60 or older	5.0	28	3.5	42	5.1	15	5.5	40
Total	3.0	5047	2.9	7856	4.6	588	4.7	1093

Table 2.21: Time (in years) to degree completion of Master's and Doctoral students by institution, 2000 and 2005

Institution	Master's				Doctoral			
	2000		2005		2000		2005	
	Mean	N	Mean	N	Mean	N	Mean	N
NMMU	2.2	171	2.9	298	4.3	11	4.1	30
NWU	2.1	559	2.2	693	3.8	35	3.9	79
RHODES	2.5	86	2.4	167	5.0	26	4.1	29
SU	2.8	741	2.8	895	4.6	80	4.9	117
UCT	2.7	545	2.7	997	5.1	101	5.2	181
UFS	3.1	308	3.4	531	5.2	53	5.3	63
UJ	3.0	542	3.1	426	4.4	85	4.5	84
UKZN	2.7	545	2.7	689	4.4	52	4.9	77
UL	3.8	113	3.7	130	4.4	5	4.2	14
UNISA	3.8	624	3.8	571	4.2	70	4.8	92
UP	3.6	689	3.3	1102	4.4	101	4.8	190
UWC	1.0	128	1.0	296	---	---	---	---
WITS	3.3	549	3.4	728	4.7	78	4.9	99
All Institutions	2.9	5795	2.9	7881	4.6	719	4.7	1093

1) Only the institutions with the highest shares of Master's and Doctoral students in South Africa have been shown.
2) 'All institutions' refers not only to those reflected in the table but also to the rest of the South African institutions.

TIME TO DEGREE

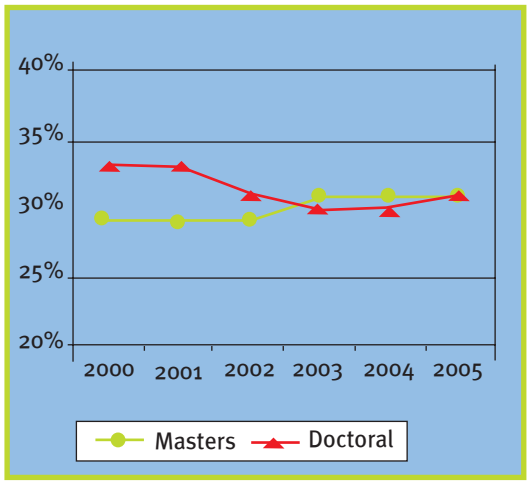
Time to degree refers to the time that successful (i.e. graduating) students take to complete their studies. Our analyses reveal that that the average Master's student takes approximately 3 years and the average Doctoral students on average 4.5 years to complete their studies. It is also interesting that few subgroup differences were recorded: no major gender, race, field or institutional differences were found indicating that completion rates are the same across the whole system. These rates are highly comparable to similar findings in Europe, Australia and North America. If one further takes into consideration that large proportions of South African students do not study full-time, these completion rates are even more acceptable and certainly do not signify whole scale inefficiencies in the system.

2.5 SUPERVISORY CAPACITY

The focus of this sub-section is on the supervisory capacity of academic staff for Master's and Doctoral dissertations. Supervisory capacity for a Master's dissertation was measured in terms of the percentage of permanent academic staff members in possession of at least a Master's qualification, and supervisory capacity for a Doctoral dissertation in terms of the percentage of permanent academic staff members with at least a Doctoral qualification.

- Figure 2.7 shows that, in 2005, the proportion of permanent academic staff in possession of at least a Master's degree stood at 31% and this figure remained constant from 2003. Prior to 2003 the figure was 29%.
- The proportion of permanent academic staff with a Doctoral degree also stood at 31% in 2005 (Figure 2.7). However, this figure is lower than the 33% recorded for 2000, and 2001 and slightly higher than the 30% for 2003 and 2004.

Figure 2.7: Percentage of staff with at least a Master's and Doctoral qualification, 2000 to 2005



The number of Master's enrolments was divided by the number of permanent academic staff members with a Master's qualification in order to obtain the average number of Master's students per staff member holding a Master's qualification (shown in Table 2.22). The same procedure was applied to Doctoral student enrolments and numbers of staff holding a Doctoral qualification (shown in Table 2.23). The calculation of the average number of Master's and Doctoral students per staff member was done per broad field, and for those higher education institutions that had the greatest proportion of Master's and Doctoral graduates in the country.

- At Master's level, the average number of students per staff member across all institutions is lowest for the Natural and Agricultural Sciences (2.2 and 3 in 2000 and 2005). Academic staff members in the Social Sciences and Health Sciences have the largest burden of supervision - both fields recorded about 8.5 Master's students per potential supervisor in 2005.
- Moreover, the average number of Master's students per potential supervisor increased in all main fields between 2000 and 2005.
- At Doctoral level, the average number of students per potential supervisor seems very similar across all fields, except for the Natural and Agricultural Sciences where the average for 2005 (1.8 in 2005) is slightly lower than that for the other fields (2.7 to 3). Also, the average number of Doctoral students per potential supervisor increased across all fields between the years of comparison.
- Although the average number of students per potential supervisor is higher for Master's students than for Doctoral students, Doctoral supervisors carry a heavier supervisory burden. The reason for this may be seen in the overlap between Tables 2.22 and 2.23 - staff with Doctoral qualifications appear in both tables and are largely the ones responsible for supervising both Master's and Doctoral students.

Table 2.22: Average number of Master's students per academic staff member, by broad field and selected institutions (2000 and 2005)

University	All Fields		Natural & Agricultural Sciences		Engineering & Applied Technologies		Health Sciences		Humanities		Social Sciences	
	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005
NMMU	4.3	4.1	1.4	2.1	5.3	5.1	7.2	4.2	3.9	3.5	10.9	9.1
NWU	6.8	6.7	2.2	4.1	3.5	7.6	5.0	9.8	4.3	3.2	17.6	8.9
RHODES	2.1	2.5	2.7	2.6	0.0	0.0	1.3	1.2	2.0	1.5	3.5	6.0
SU	5.1	7.1	1.8	2.8	3.8	5.5	6.0	9.6	7.2	7.3	7.9	12.2
UCT	4.9	5.6	2.9	3.6	7.9	6.0	19.4	9.4	4.0	4.3	7.1	6.6
UFS	4.0	5.2	3.7	3.7	13.3	5.7	2.6	5.1	2.8	3.1	6.3	7.8
UJ	5.1	4.7	1.7	1.8	3.9	4.4	7.2	5.9	5.9	6.6	10.3	8.5
UKZN	3.5	5.1	2.7	3.1	3.7	5.7	7.9	12.8	2.9	4.1	6.5	8.7
UL	2.7	4.4	1.5	3.3	0.0	0.0	19.0	3.6	2.2	12.9	3.1	11.6
UNISA	3.8	7.3	0.7	1.4	0.0	0.0	17.1	19.6	3.8	8.9	6.0	10.6
UP	4.5	5.6	3.4	5.2	6.0	6.3	6.0	6.7	5.1	6.8	8.8	9.7
UWC	3.9	3.4	2.9	4.2	0.0	0.0	6.2	3.5	2.9	2.3	6.5	5.0
WITS	4.5	7.1	1.2	1.0	4.5	7.0	9.7	29.7	2.3	3.0	6.3	7.5
All universities	3.8	5.2	2.2	3.0	4.9	5.3	7.3	8.5	3.4	4.8	6.6	8.5

1) The calculation used above is the number of student enrolments for a Master's qualification divided by number of permanent academic staff with at least an equivalent qualification level for supervisory purposes (i.e. Master's and Doctoral staff qualifications were added together).
2) *'All universities'* refers not only to those reflected in the table but includes the other South African institutions.

Table 2.23: Average number of Doctoral students per academic staff member, by broad field and selected institutions (2000 and 2005)

University	All Fields		Natural & Agricultural Sciences		Engineering & Applied Technologies		Health Sciences		Humanities		Social Sciences	
	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005	2000	2005
NMMU	1.3	1.5	1.8	1.8	7.9	2.5	1.6	1.8	1.1	1.3	1.8	2.5
NWU	1.3	5.2	1.0	3.3	2.1	23.0	1.7	18.5	1.9	6.2	1.9	4.4
RHODES	1.5	1.5	2.7	2.0	0.0	0.0	0.1	2.3	1.0	0.6	2.6	3.6
SU	1.7	2.3	1.1	1.8	2.1	2.1	1.7	2.5	2.5	3.0	2.0	2.9
UCT	1.9	2.6	2.1	2.3	2.8	3.3	7.1	3.2	1.9	1.8	1.4	2.9
UFS	1.7	1.8	1.7	1.6	1.8	3.0	0.8	1.1	2.2	2.7	2.2	1.7
UJ	2.1	2.8	1.6	1.9	4.9	4.5	1.9	2.9	2.9	3.3	3.1	4.7
UKZN	1.3	2.3	1.5	2.3	1.0	2.1	2.5	2.3	1.6	3.4	2.1	4.4
UL	0.4	1.6	0.7	1.2	0.0	0.0	3.1	2.2	0.3	3.1	0.4	2.3
UNISA	0.2	2.1	0.1	0.9	0.0	0.0	1.2	5.6	0.2	3.8	0.2	2.6
UP	2.2	2.5	2.3	2.9	1.3	2.0	1.5	0.7	4.3	5.1	3.8	4.3
UWC	1.0	1.7	1.3	2.3	0.0	0.0	0.2	1.1	0.8	1.3	2.4	2.6
WITS	1.4	1.9	1.5	0.4	1.9	2.4	2.0	9.4	1.0	1.0	1.1	1.5
All universities	1.3	2.2	1.5	1.8	1.9	2.7	2.0	2.8	1.6	2.9	1.7	3.0

1) The calculation used above is the number of student enrolled for a Doctoral qualification divided by number of permanent academic staff with at least an equivalent qualification level for supervisory purposes (i.e. only Doctoral staff qualifications were used).
2) *'All universities'* refers not only to those reflected in the table but includes the other South African institutions.

THE BURDEN OF SUPERVISION

Supervisors of Master's and Doctoral students at South African universities face an increasing burden as the average number of students to supervise continues to increase. The "average" supervisor in 2005 would have to supervise 7 Master's and Doctoral students. This is high by international standards and does not take into account the unavailability of young lecturers to supervise immediately or the ageing of the more senior supervisory cohort who do not take on new students. There are also huge field differences with the burden of supervision in the social sciences estimated at nearly 12 students per supervisor.

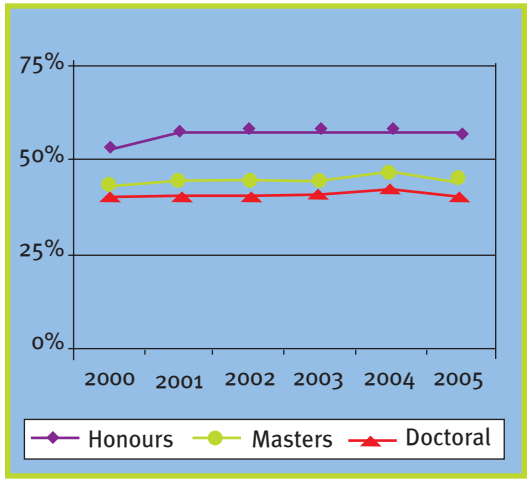
CHAPTER 3
TRANSFORMATION AND PARTICIPATION OF POSTGRADUATE STUDENTS

3.1 FIRST-ENROLMENTS: DEMOGRAPHICS IN TRANSITION

3.1.1 Gender

Figure 3.1 shows the proportion of women first-enrolments by qualification type between 2000 and 2005.

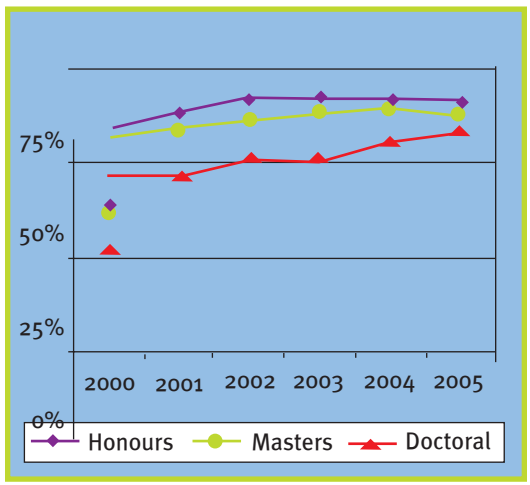
Figure 3.1 Percentage women first-enrolment by qualification type 2000-2005.



- The proportion of women Honours first-enrolments was above the 50% parity level between 2000 and 2005, and has remained relatively constant since 2001 (58% in 2001; 57% in 2005).
- For both Master's and Doctoral qualifications, the proportion of women first-enrolments remained below the 50% parity level, with Master's first-enrolments being closer to the parity level than Doctoral first-enrolments.
- For Master's first-enrolments, the proportion of women remained relatively stable from 2001 onwards (44% in 2001, with a slight increase to 46% in 2004, followed by a decrease to 45% in 2005).
- The proportion of women Doctoral first-enrolments remained at 40% throughout the six-year period, however there was a slight increase to 42% in 2004, after which it returned to 40% in 2005.

The most interesting finding is that there has been no significant increase in female participation in postgraduate studies with the proportion of female Honours, Master's and Doctoral first enrolments remaining very stable between 2000 and 2005.

Figure 3.2: Percentage Black first-enrolments by qualification type, 2000 to 2005



Note: The word Black is used here as a collective term to refer to Africans, Coloureds and Indians

3.1.2 Race

Figure 3.2 combines African, Coloured and Indian students (into a collectively defined category, Black), and shows their first-enrolments per qualification type for the period 2000 to 2005. The inverse of each set of figures represents the share of Whites.

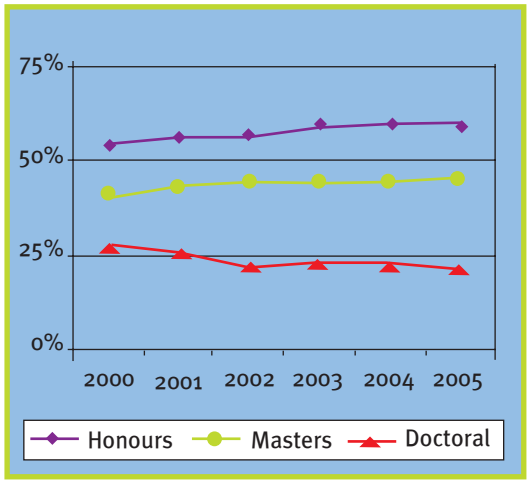
The data show that there has been a steady increase between 2000 and 2005 in the proportion of Black first-enrolments. The increase applies to all three qualification types (Honours: from 59% to 67%; Master's: from 57% to 63%; Doctoral: from 47% to 59%).

3.1.3 Age

Figure 3.3 shows the proportion of first-enrolments, younger than 30 years per qualification. This focus on the below-30 age cohort is useful from the point of view of accelerating graduate output in the country.

- Honours first-enrolments younger than 30 years increased gradually between 2000 and 2005, from 54% in 2000 to 59% in 2005.
- Master's first-enrolments for those younger than 30 years did not differ much between 2000 and 2005 (41% and 45%, respectively).
- Doctoral first-enrolments for the group younger than 30 years decreased from 28% in 2000 to 21% in 2005. This is a significant finding as it may point to a major potential blockage in the pipeline.

Figure 3.3: Percentage first-enrolments younger than 30 years, by qualification type, 2000 to 2005



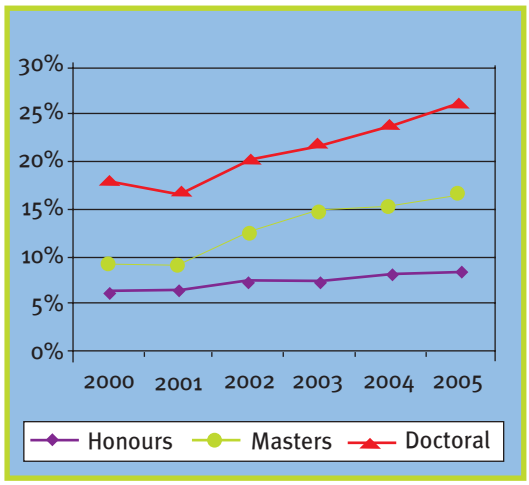
The overall picture is not particularly positive as no substantial increases in first enrolments for the "feeder" age group below 30 occurred for any of the degrees.

3.1.4 Nationality

Figure 3.4 shows the percentage of non-South African first-enrolments per qualification for the period 2000 to 2005.

- Between 2000 and 2005, there was a relatively gradual increase in the proportion of non-South African Honours first-enrolments, from 6% in 2000 to 8% in 2005.
- For both Master's and Doctoral qualifications, the share of first-enrolments increased more sharply than for Honours qualifications over this period, particularly from 2001 onward.
- The proportion of non-South African Master's first-enrolments increased from 9% in 2000 to 16% in 2005.
- Non-South African Doctoral first-enrolments increased from 18% in 2000 to 26% in 2005.

Figure 3.4: Percentage of non-South African first-enrolments per qualification, 2000 to 2005



Figures 3.5 and 3.6 below show the proportions of non-South African Master's and Doctoral first-enrolments and their countries of origin.

- For Master's qualifications, non-South African first-enrolments largely represent students from SADC countries. This number increased steadily from 46% in 2000 to 51% in 2005. Proportions of students from Other African Countries showed some fluctuation over the six-year period (an increase from 24% in 2000 to 27% in 2001, followed by another increase to 31% in 2003, and then

decreasing to 26% in 2005). The share of Master's first-enrolments from Europe steadily decreased from 16% in 2000 to 10% in 2005.

- The largest proportion of Doctoral first-enrolments in 2005 originated from Other African Countries and SADC (both 37%), but Doctoral first-enrolments from both these regions fluctuated over the six-year period. As with Master's first-enrolments, there was also a decline in Doctoral first-enrolments from Europe, from 19% in 2000 to 8% in 2004, then increasing slightly again to 10% in 2005.

The overall picture that emerges from these statistics points to the increasingly important contribution of non-South African students to the pool of South African postgraduate students. In fact, it is clear, that were it not for significant increases in enrolments especially from SADC countries (as well as other African countries), there would be very little growth in our postgraduate enrolment figures.

Figure 3.5: Headcount of Master's first-enrolments by non-South African country, 2000 to 2005

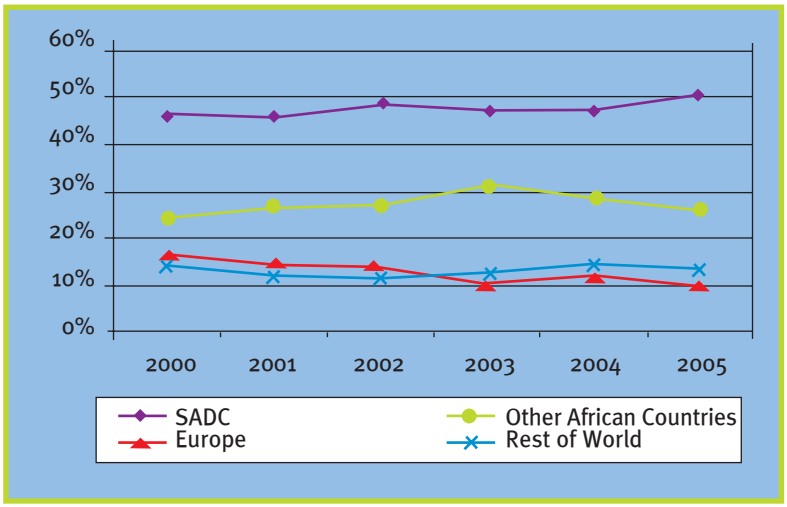
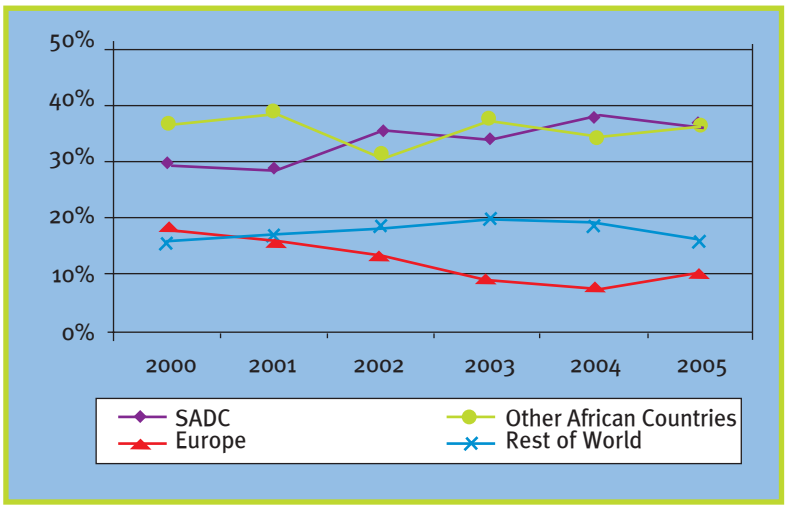


Figure 3.6: Headcount of Doctoral first-enrolments by non-South African country, 2000 to 2005



DEMOGRAPHIC TRENDS OF FIRST ENROLMENTS

Our analysis of the demographics revealed both positive and negative trends. The most interesting finding is that there has been no significant increase in female participation in postgraduate studies with the proportion of female Honours, Master's and Doctoral first enrolments remaining very stable between 2000 and 2005. As far as age is concerned, the overall picture is not particularly positive either as no substantial increases in first enrolments for the "feeder" age group below 30 occurred for any of the degrees. More positive results are recorded as far as race is concerned with a steady increase between 2000 and 2005 in the proportion of Black first-enrolments across all postgraduate degrees. The overall picture that emerges from the data on the nationality of students points to the increasingly important contribution of non-South African students to the pool of South African postgraduate students. In fact, it is clear, that were it not for significant increases in enrolments especially from SADC countries (as well as other African countries), there would be very little growth in our postgraduate enrolment figures.

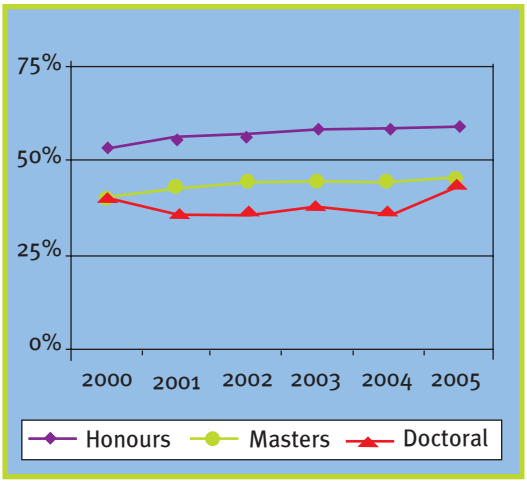
3.2 GRADUATES: DEMOGRAPHICS IN TRANSITION

3.2.1 Gender

Figure 3.7 shows the percentage of women graduates per qualification type, for the period 2000 to 2005. The following salient points emerged:

- The share of women Honours graduates was above the 50% parity level for any year between 2000 and 2005. In fact, it increased from 54% in 2000 to 59% in 2005.
- For both Master's and Doctoral qualifications the proportion of women graduates remained below the 50% parity mark.
- The share of women Master's graduates stabilised between 2002 and 2004 at 44%, whereafter it marginally increased to 45% in 2005.
- The share of women Doctoral graduates fluctuated somewhat between 2000 and 2005 - from 41% in 2000 to 37% in 2001, whereafter it remained steady at about 38% to 39%, before jumping to 44% in 2005.

Figure 3.7: Percentage of women graduates by qualification type, 2000 to 2005



The graduation results for gender are similar to that for first enrolments with none of the degrees showing any significant increases between 2000 and 2005. It seems as if gender representation at the graduate level has stabilised at about 60% for Honours students and just below 50% for Master's and Doctoral level.

Table 3.1 below shows the proportion of women graduates for the same degrees but disaggregated in terms of broad field. The comparison is for the years 2000 and 2005. A first and striking observation is that in none of the broad fields does the share of female graduates exceed the 50% parity level. Specific observations are the following:

- The proportion of women Honours graduates is critically low in all fields except in the Social Sciences, which increased between 2000 and 2005 (from 37% to 41%). No movement was recorded in the other fields (apart from a 1% decline in the Humanities).
- The small share of women Master's graduates is equally critical in all fields. Again the 'best' female representation is associated with the Social Sciences (21% to 22%). However, there is evidence of growth in female representation in some fields - although the increases are slow and almost trivial. These fields are the Natural and Agricultural Sciences (1% increase), Humanities (2% increase) and the Social Sciences (1% increase).
- Most women Doctoral graduates are found in the Social Sciences, and this proportion increased by 3% between 2000 and 2005 (from 15% to 18%). Apart from a 2% increase in the Humanities, there has been no increase in female representation in any other of the fields.
- In both 2000 and 2005 in Engineering and Applied Technologies, there were almost no women graduates at the Honours level, and only 1% of the Master's and Doctoral graduates were women.

Table 3.1: Percentage women graduates by qualification type and by broad field, 2000 to 2005

Broad Field	Honours		Master's		Doctoral	
	2000	2005	2000	2005	2000	2005
Natural & Agric Science	8%	8%	5%	6%	10%	9%
Engineering & Applied Science	0%	0%	1%	1%	1%	1%
Health Science	2%	2%	7%	7%	8%	8%
Humanities	6%	5%	7%	9%	6%	8%
Social Science	37%	41%	21%	22%	15%	18%

The percentages in Table 3.2 below are for women graduates only and show the distribution in terms of broad field for each qualification.

- Women Honours graduates are largely concentrated in the Social Sciences and the proportion of women in this field increased significantly between 2000 and 2005 - from 68% to 78%. However, in the Natural and Agricultural Sciences the proportion of women Honours graduates declined (from 15% to 11%) during this period.
- Women Master's graduates are largely located within the Social Sciences, although this percentage has declined slightly since 2000 (from 51% to 48% in 2005).
- Women Doctoral graduates are mainly found in the Social Sciences and, contrary to the trend at Master's level, this proportion has increased somewhat since 2000 (from 37% to 41% in 2005). Apart from a small increase in the Humanities too (from 14% to 17%), the concentration of women in the other fields did not improve between 2000 and 2005. In fact, there was a decline (from 25% to 21%) in women Doctoral graduates in the Natural and Agricultural Sciences.

Table 3.2: Broad field distribution of women graduates per qualification, 2000 and 2005

Broad Field	Honours		Master's		Doctoral	
	2000	2005	2000	2005	2000	2005
Nat & Agri Sc	15%	11%	12%	13%	25%	21%
Engineering & App Technology	0%	2%	2%	3%	3%	3%
Health Science	4%	3%	17%	16%	19%	18%
Humanities	12%	11%	18%	20%	14%	17%
Soc Science	68%	78%	51%	48%	37%	41%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

3.2.2 Race

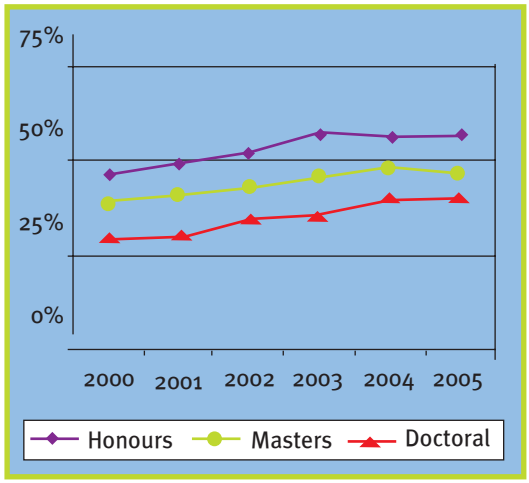
Figure 3.8 combines African, Coloured and Indian students under the category "Black", and shows the proportion of graduates per qualification type for the period 2000 to 2005. The inverse of each set of figures represents the proportion of White graduates.

There was a steady increase in the proportion of Black graduates between 2000 and 2005 for all three qualification types (Honours: from 47% to 57%; Master's: from 39% to 47%; Doctoral: from 30% to 41%).

Table 3.3 below gives the race distribution per qualification for 2000 and 2005.

- For each qualification, the proportion of Black African graduates increased substantially between 2000 and 2005.
- In 2005 the proportion of Black African Honours graduates equalled that of White graduates. However, there are large differences in the proportions of Black African and White graduates for Master's and Doctoral qualifications (33% vs. 52%, and 29% vs. 59%).
- There were insignificant changes in the proportion of Coloured and Indian graduates for all three qualifications.

Figure 3.8: Percentage Black graduates by qualification type, 2000 to 2005



Note: The word Black is used here as a collective term to refer to Africans, Coloureds and Indians.

Table 3.3: Race distribution of graduates per qualification, 2000 and 2005

Race	Honours		Master's		Doctoral	
	2000	2005	2000	2005	2000	2005
Black African	34%	44%	27%	33%	19%	29%
Coloured	5%	5%	5%	6%	5%	6%
Indian	8%	8%	7%	8%	6%	7%
White	53%	43%	61%	52%	70%	59%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 3.4 below shows the race distribution of graduates (per qualification) by broad field. It is a summary table similar to Table 3.3, but includes the percentage for each of the five broad fields.

Honours

- Black African Honours graduates, in 2005, were best represented in the Social Sciences (49%) and in Engineering and Applied Technologies (42%). In both these fields the proportion of Black African Honours graduates has increased significantly since 2000. The Social Sciences are also the only field in which Black African graduates comprised the majority in 2005.
- However, the percentage of Black African Honours graduates has declined in the Humanities (from 47% in 2000 to 32% in 2005), the Health Sciences (from 26% to 20%) and in the Natural and Agricultural Sciences (marginally from 33% to 30%).
- Indian Honours graduates are best represented in the Natural and Agricultural Sciences and in the Health Sciences (11% in both). The largest increase (from 6% to 11%) for Indian Honours graduates between 2000 and 2005 was in the field of Health Sciences.
- White Honours graduates are very well represented in the Health Sciences, and there has been almost no change in their representation between 2000 and 2005 (64% and 63%). In the Humanities, White Honours graduates increased significantly between 2000 and 2005 (from 44% to 56%).

Master's

- The percentage of Black African Master's graduates increased in all fields between 2000 and 2005, with the largest increases recorded for Engineering and Applied Technologies (11% increase) and the Health Sciences (10% increase).
- There were less White Master's graduates in all fields in 2005 than in 2000, although they still comprised the majority in all fields in 2005 (ranging from 48% to 60%).
- The relative proportions of Coloured and Indian Master's graduates remained more or less constant between 2000 and 2005. Where increases are evident, these never exceed 1% or 2%.

Doctoral

- African Doctoral graduates were increasingly represented in all fields between 2000 and 2005, the greatest increase in representation being in the field of Natural and Agricultural Sciences (34% in 2005).
- Concomitantly, the share of White Doctoral graduates declined in all fields during the same period, with sharpest decline occurring in the Natural and Agricultural Sciences, and Engineering and Applied Technologies (an 18% decrease in each field).

- White Doctoral graduates nevertheless continued to dominate all fields in 2005, with relative contributions varying from 55% to 67%.
- The share of Coloured Doctoral graduates in the Social Sciences doubled in size between 2000 and 2005 (from 4% to 8%).

Table 3.4: Race distribution of graduates per qualification, by broad field, 2000 and 2005

Broad Field	Race	Honours		Master's		Doctoral	
		2000	2005	2000	2005	2000	2005
Nat & Agri Sc	Black African	33%	30%	29%	34%	17%	34%
	Coloured	5%	4%	4%	5%	5%	6%
	Indian	9%	11%	4%	6%	4%	5%
	White	54%	56%	63%	55%	73%	55%
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Eng & Appl Tech	Black African	18%	42%	15%	26%	8%	24%
	Coloured	1%	3%	3%	5%	0%	0%
	Indian	9%	7%	8%	9%	8%	9%
	White	72%	48%	74%	60%	85%	67%
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Health Science	Black African	26%	20%	20%	30%	19%	25%
	Coloured	4%	6%	3%	5%	5%	6%
	Indian	6%	11%	10%	11%	7%	10%
	White	64%	63%	68%	54%	69%	58%
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Humanities	Black African	47%	32%	29%	30%	24%	29%
	Coloured	5%	7%	6%	6%	7%	5%
	Indian	4%	5%	6%	6%	3%	5%
	White	44%	56%	60%	58%	66%	61%
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Soc Science	Black African	32%	49%	29%	37%	21%	26%
	Coloured	5%	5%	6%	6%	4%	8%
	Indian	8%	7%	8%	9%	8%	7%
	White	55%	38%	57%	48%	67%	60%
	Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Table 3.5 provides percentages only for Black African graduates. For each qualification it presents the broad field distribution of these graduates:

- In both 2000 and 2005 Black African Master's graduates were largely concentrated in the Social Sciences (63% and 81%). However, this concentration increased significantly over this period (18% increase).
- As a result of the over-concentration of Black African Honours graduates in the Social Sciences in 2005, smaller percentages of Africans were found in the Natural and Agricultural Sciences (10% in 2005 vs. 18% in 2000) and in the Humanities (5% in 2005 vs. 16% in 2000).

- There was no significant shift in the field distribution of Black African Master's graduates between the years 2000 and 2005, although the proportion of African students in the Social Sciences and Humanities declined.
- Whereas only 22% of Black African students graduated in the Natural and Agricultural Sciences in 2000, this figure increased significantly to 31% in 2005. There was also a marginal increase in the percentage of Black African graduates in Engineering and Applied Technologies (from 3% in 2000 to 6% in 2005). Concomitantly, the shares of Black African graduates decreased in both the Humanities and Social Sciences.

Table 3.5: Broad field distribution of African graduates per qualification, 2000 and 2005

Broad Field	Honours		Master's		Doctoral	
	2000	2005	2000	2005	2000	2005
Nat & Agri Science	18%	10%	13%	14%	22%	31%
Eng & Appl Technology	1%	3%	4%	6%	3%	6%
Health Science	3%	1%	9%	11%	13%	13
Humanities	16%	5%	18%	16%	27%	21%
Soc Science	63%	81%	56%	53%	35%	30%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

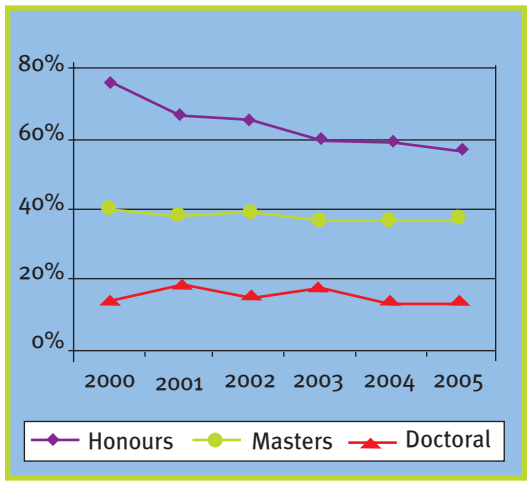
The table above shows a few shifts in the representation of African graduates by field with a significant increase at the Honours level in the social sciences, no substantial changes as far as Master's degrees are concerned and a significant increase in the proportion of African students in the Natural and Agricultural Sciences.

3.2.3 Age

Figure 3.9 shows the proportion of graduates younger than 30 years by qualification.

- The percentage of Honours graduates younger than 30 years decreased significantly between 2000 (76%) and 2005 (58%). However, between the years 2003, 2004 and 2005 only small decreases of about 1% occurred. The sharpest decrease was between the years 2000 and 2001 (a 12% decrease).
- Three possible explanations exist for the decline in the proportion of Honours graduates younger than 30 years. It could either be that (1) more students above 30 years enrolled for Honours qualifications, or that (2) there are more students taking longer to graduate, so that they were over 30 years when they graduated, or that (3) more students enrolled for part-time Honours degrees which would have taken longer to complete. Various combinations of (1)-(3) could also apply.

Figure 3.9: Percentage of graduates younger than 30 years, by qualification type, 2000 to 2005



- The fact that the proportion of Honours first-enrolments who are under 30 years (see Figure 3.3) is always smaller than those who graduate under 30 (except in 2005) implies that the average time of completion is more than one year. Thus, reasons (2) and (3) mentioned for the decline in the share of Honours graduates under 30 years seem more plausible.
- The proportion of Master's graduates younger than 30 years remained constant at just below 40%.
- The year-to-year fluctuations in the share of Doctoral graduates in the under-30 age group are not particularly variable (proportions vary between 13% and 18%), and could be accounted for by variations in degree-completion time.

Figure 3.10 presents the mean age at graduation by qualification. The ages are more or less stabilised for the different qualifications with:

- 30 years being the mean age for Honours graduates,
- 34 years for Master's graduates, and
- 40 years for Doctoral graduates.
- The mean age of Honours graduates was initially 27 years (in 2000), but increased annually by an increment of 1 until 2003.

Figure 3.10: Mean age at graduation by qualification, 2000 to 2005

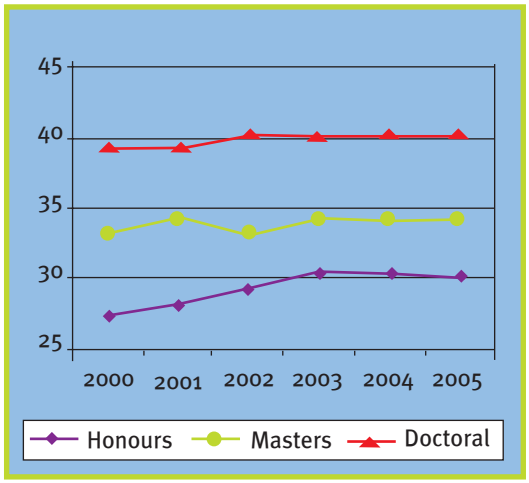


Table 3.6 below shows the mean age at graduation by gender for the total period 2000 to 2005.

- On average, female Honours graduates are one year older than their male counterparts (30 and 29 years, respectively).
- Master's female graduates are one year younger than their male counterparts (33 and 34 years, respectively).
- Doctoral male and female graduates are the same age at graduation (40 years).

Table 3.6: Mean age at graduation by gender and qualification

Gender	Honours		Master's		Doctoral	
	Mean	N	Mean	N	Mean	N
Female	30	39677	33	16372	40	2114
Male	29	28554	34	20251	40	2857
Total	**29**	**68231**	**34**	**36623**	**40**	**4971**

Table 3.7 supplements the figures provided in Figure 3.9, by providing the percentage of graduates, per qualification, in the other age groups.

- Compared to 2000 figures, the percentages of Honours graduates in 2005 in the categories 30-39 years and 40-49 years increased significantly (from 17% to 24% and from 6% to 15%).
- No significant shifts occurred in the age-group distributions of either Master's or Doctoral graduates.
- Doctoral graduates are largely concentrated in the 30-39 years category (40% in 2005), and in the 40-49 years category, to a lesser extent (29% in 2005).

Table 3.7: Age group distribution of graduates per qualification, 2000 and 2005

Age	Honours		Master's		Doctoral	
	2000	2005	2000	2005	2000	2005
Younger than 30	76%	58%	38%	37%	14%	13%
30 to 39	17%	24%	41%	39%	42%	40%
40 to 49	6%	15%	17%	18%	30%	29%
50 to 59	1%	3%	4%	5%	12%	14%
60 or older	0%	0%	1%	1%	2%	4%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Whereas Table 3.7 presents the age group distribution of graduates for all fields, Table 3.8 gives a breakdown in terms of the five broad fields.

Honours

- Honours graduates in the Natural and Agricultural Sciences are almost exclusively younger than 30 years (90% in 2005). The Health Sciences also has a large majority of graduates younger than 30 years (84%).
- The decline in young Honours graduates is limited to two fields: the Social Sciences (from 76% in 2000 to 52% in 2005) and Engineering and Applied Technologies (from 68% to 56%).
- In the Humanities the share of young Honours graduates actually increased during the two years of comparison (from 54% in 2000 to 60% in 2005).

Master's

- The majority of Master's graduates younger than 30 years of age are found primarily in two fields: the Natural and Agricultural Sciences (63% of graduates in 2005), and Engineering and Applied Technologies (55% of graduates in 2005). However, in both these fields the share of young graduates has declined since 2000 (by 5% and 9% respectively).
- In the Health Sciences the percentage of Master's graduates between 40 and 49 years of age increased from 16% in 2000 to 22% in 2005. In the Social Sciences, the share of Master's graduates in this age group also increased, although to a lesser extent (19% in 2000 vs. 22% in 2005).
- In the Humanities the share of Master's graduates in the 40-49 age category declined between 2000 and 2005 (from 20% to 16%). There is evidence that this field is becoming 'younger' in terms of Master's graduates - 41% of graduates were younger than 30 years in 2005, compared to 38% in 2000.

Doctoral

- The age profiles of Doctoral graduates in the Natural and Agricultural Sciences and Engineering and Applied Technologies are showing evidence of rapid maturation. This trend is strongest in the field of Engineering and Applied Technologies, where the percentage of graduates under 30 years of age declined by 19% between 2000 and 2005, together with a 10% increase in students in the 40-49 age group.

Table 3.8: Age group distribution of graduates per qualification, by broad field, 2000 and 2005

Broad Field	Age Field	Honours		Master's		Doctoral	
		2000	2005	2000	2005	2000	2005
Nat & Agri Sc	‹···30	93%	90%	68%	63%	30%	21%
	30 to 39	6%	8%	23%	27%	47%	54%
	40 to 49	1%	2%	7%	8%	16%	18%
	50 to 59	0%	0%	1%	2%	7%	6%
	60 or older	0%	0%	0%	0%	0%	1%
	Total	100%	100%	100%	100%	100%	100%
Eng & Appl Tech	‹···30	68%	56%	64%	55%	38%	19%
	30 to 39	24%	31%	24%	32%	40%	46%
	40 to 49	7%	11%	10%	9%	16%	26%
	50 to 59	1%	1%	2%	4%	4%	6%
	60 or older	0%	0%	0%	0%	2%	3%
	Total	100%	100%	100%	100%	100%	100%
Health Science	‹···30	84%	84%	35%	34%	13%	17%
	30 to 39	10%	10%	45%	38%	46%	37%
	40 to 49	4%	6%	16%	22%	31%	25%
	50 to 59	2%	1%	4%	6%	9%	16%
	60 or older	0%	0%	0%	0%	1%	4%
	Total	100%	100%	100%	100%	100%	100%
Humanities	‹···30	54%	60%	38%	41%	6%	8%
	30 to 39	27%	18%	34%	35%	39%	34%
	40 to 49	14%	15%	20%	16%	34%	33%
	50 to 59	4%	5%	6%	7%	16%	17%
	60 or older	1%	2%	2%	1%	6%	8%
	Total	100%	100%	100%	100%	100%	100%
Soc Sc	‹···30	76%	52%	29%	27%	4%	6%
	30 to 39	18%	27%	48%	46%	39%	34%
	40 to 49	5%	18%	19%	22%	39%	38%
	50 to 59	1%	3%	4%	5%	16%	19%
	60 or older	0%	0%	0%	0%	3%	3%
	Total	100%	100%	100%	100%	100%	100%

The analysis by subfield reveals huge inter-field differences as far as the age distribution of graduates are concerned. Younger cohorts (below the age of 30) predominate in the Natural and Agricultural Sciences especially at the Honours and Master's level with a very different profile as far as the Humanities and Social Sciences are concerned where graduates tend to be between 30 and 49 years of age.

3.2.4 Nationality

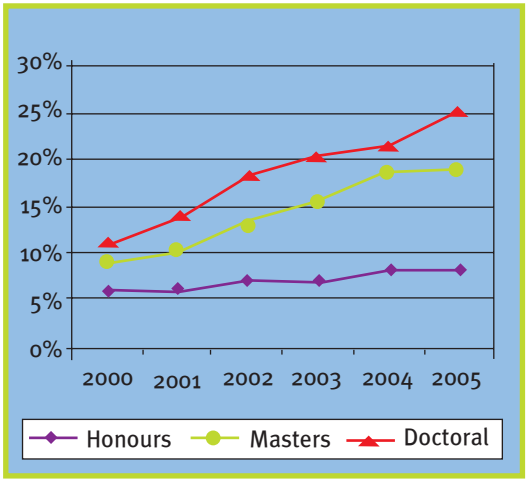
Figure 3.11 shows the percentage of non-South African graduates per qualification type, for the period 2000 to 2005.

- Between 2000 and 2005, there was a gradual increase in the proportion of non-South African Honours graduates, from 6% in 2000, to 8% in 2005.
- The share of non-South African Master's graduates increased by 10% over this 6-year period, from 9% in 2000 to 19% in 2005.
- The share of non-South African Doctoral graduates increased by 14% over this 6-year period, from 9% in 2000 to 25% in 2005.
- For both Master's and Doctoral qualifications, the percentage of non-South African graduates increased more sharply and quite significantly than that of Honours graduates over this time.

Table 3.9 shows non-South African graduates and their distribution across the five broad fields.

- For Honours qualifications, the share of non-South African graduates increased most drastically in the field of Engineering and Applied Technologies - by 8% (from 2% in 2000 to 10% in 2005). For Honours qualifications, the most foreign graduates were in the Humanities, for both 2000 (8%) and 2005 (11%).

Figure 3.11: Percentage of non-South African graduates per qualification, 2000 to 2005



- For Master's qualifications, there was an increase of foreign graduates in all fields and, in 2005, non-South African graduates were more or less evenly distributed across the five fields. The proportion of foreign graduates increased most in Engineering and Applied Technologies (as with the Honours graduates above), together with the Health Sciences. Foreign graduates in both fields increased by 11% (from 9% to 20% for both). The largest share of foreign Master's graduates were in the Natural and Agricultural Sciences (12% in 2000 and 20% in 2005) and the Humanities (12% in 2000 and 22% in 2005%).
- For Doctoral qualifications, the percentage of foreign graduates increased the sharpest in the Humanities - by 19% (from 9% in 2000 to 28% in 2005). The Natural and Agricultural Sciences and Engineering and Applied Technologies also registered relatively large increases in foreign graduates over the six-year period (an increase of 15% in both fields).

Table 3.9: Percent of non-South African graduates by field and qualification, 2000 and 2005

Broad Field	Honours		Master's		Doctoral	
	2000	2005	2000	2005	2000	2005
Nat & Agri Science Science	6%	9%	12%	20%	19%	34%
Eng & Appl Technology	2%	10%	9%	20%	9%	24%
Health Science	3%	6%	9%	20%	13%	21%
Humanities	8%	11%	12%	22%	9%	28%
Soc Science	6%	8%	9%	17%	5%	17%

Table 3.10 disaggregates non-South African graduates in terms of their country of origin. Percentages are reported below:

- Most of the non-South African Honours graduates from 2000 to 2005 came from SADC countries (64% in 2000 and 72% in 2005), but during the same period fewer students came from Europe, reflected by a decrease from 19% in 2000 to 10% in 2005.
- For Master's qualifications, non-South African graduates also largely came from SADC countries (47% in 2000 and 45% in 2005, indicating a slight decline). Once again, as with Honours, there were fewer Master's graduates from Europe (from 22% to 14%).
- The percentages for foreign Doctoral graduates reflect a similar pattern (with the largest share of graduates originating from SADC countries; namely 43% in 2000 and 32% in 2005). However, there was a significant decline (of almost 10%) in non-South African Doctoral graduates from the SADC and, conversely, a significant increase in graduates from Other African Countries (from 16% in 2000 to 37% in 2005).

Table 3.10: Percent of non-South African graduates by country and qualification, 2000 and 2005

Countries	Honours		Master's		Doctoral	
	2000	2005	2000	2005	2000	2005
SADC	64%	72%	47%	45%	43%	32%
Other African Countries	11%	11%	21%	27%	16%	37%
Europe	19%	10%	22%	14%	19%	15%
Rest of World	6%	7%	11%	14%	22%	16%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

DEMOGRAPHIC TRENDS OF GRADUATED

The graduation results for **gender** are similar to that for first enrolments with none of the degrees showing any significant increases between 2000 and 2005. It seems as if gender representation at the graduate level has stabilised at about 60% for Honours students and just below 50% for Master's and Doctoral level. The breakdown by scientific field reveals that female students at all levels are predominantly still pursuing degrees in the Humanities and Social Sciences with no discernible growth in other fields. As far as race is concerned, we witnessed a steady increase in the proportion of Black graduates between 2000 and 2005 for all three qualification types (Honours: from 47% to 57%; Master's: from 39% to 47%; Doctoral: from 30% to 41%). The breakdown by field shows a few shifts with a significant increase of Black African students at the Honours level in the social sciences, no substantial changes as far as Master's degrees are concerned and a significant increase in the Natural and Agricultural Sciences. The mean age of graduates across all qualification levels has remained fairly stable over the period 2000 to 2005: 30 for Honours graduates, 34 for Master's graduates and 40 for Doctoral graduates. The analysis by subfield reveals huge inter-field differences as far as the **age distribution** of graduates are concerned. Younger cohorts (below the age of 30) predominate in the Natural and Agricultural Sciences especially at the Honours and Master's level with a very different profile as far as the Humanities and Social Sciences are concerned where graduates tend to be between 30 and 49 years of age. Our final analysis addressed **nationality**. For both Master's and Doctoral qualifications, the percentage of non-South African graduates increased more sharply and quite significantly than that of Honours graduates over this time. Graduates from other African countries increased significantly for all qualifications and constituted between 70% and 80% of all non-South African graduates by 2005. No huge field differences were recorded but with substantial increases across most fields.

3.3 PARTICIPATION RATES FOR FIRST-ENROLMENTS AND GRADUATES

The participation rate refers to the number of Master's and Doctoral students (in terms of both first-enrolments and graduates) per 1 000 of the population, specifically those aged between 25 and 34, and 35 and 44 years.

3.3.1 First-enrolments

Table 3.11 shows the number of Master's and Doctoral first-enrolments per 1 000 people within these two age categories for 2001 and 2005. The figures are broken down by race.

Table 3.11: Number of Master's and Doctoral first-enrolments per 1 000 in the 25 to 34 age group and the 35 to 44 age group, 2001 and 2005

Master's First-Enrolments	25-34 Age Group		35-44 Age Group	
	2000	2005	2000	2005
Black African	0.40	0.54	0.46	0.77
Coloured	0.67	0.66	0.61	0.77
Indian	3.83	4.80	1.92	2.48
White	4.95	5.96	1.52	1.76
Total	**0.86**	**0.98**	**0.67**	**0.95**
Doctoral First-Enrolments				
Black African	0.02	0.06	0.04	0.11
Coloured	0.08	0.10	0.09	0.14
Indian	0.25	0.50	0.40	0.44
White	0.74	0.94	0.35	0.45
Total	**0.09**	**0.13**	**0.10**	**0.17**

Source: Calculated by using Mid-year Population Estimates (obtained from Statistics South Africa Website) - only available from 2001 onwards.
Note: For Doctoral first-time enrolments, not all cases could be used due to an error in the data. These figures represent corrected figures.

Master's

- In terms of participation, the number of White Master's first-enrolments per 1 000 of the White population (5.96 in 2005) is still substantially higher than for the other race groups in the 25-to-34 year age bracket.
- Although the participation rates increased across all races, there are very large differences between them. For instance, the number of Indian Master's first-enrolments per 1 000 of the Indian population in the relevant age category (4.80 in 2005) is much higher than that of Coloured Master's (0.66 in 2005), which, in turn, is slightly higher than that of Black Africans (0.54 in 2005).
- It is also interesting to note that between 2001 and 2005, there was an increase in Master's first-enrolments across all the race groups, except for the Coloured group, which recorded an insignificant decrease (from 0.67 to 0.66).
- Master's first-enrolments in the 35-to-44 age group are slightly different to those in the 25-to-34 year age group. Indian Master's first-enrolments have the highest participation figure in both 2001 and 2005 (1.92 and 2.48, respectively) and Black African Master's first-enrolments the lowest (0.46 and 0.77, respectively).

Doctoral

- In the 25-to-34 year age group, Doctoral first-enrolments per 1 000 of the population increased across all races between 2001 and 2005, from 0.09 to 0.13.
- However, it is striking that the participation figure for White Doctoral first-enrolments is significantly higher than that of the other races (0.74 in 2001 and 0.94 in 2005) even though the population of White people aged between 25 and 34 years declined significantly between 2001 and 2005 (see Table 3.13 below).
- In 2001, the highest participant rate in the 35-to-44 age category was in Indian Doctoral first-enrolments, which exceeded that for Whites.
- Black African Doctoral first-enrolments in the 25-to-34 age group per 1 000 of the population, remains the lowest participant rate. Black African Doctoral first-enrolments also have the lowest participation in the 35-to-44 age category.

3.3.2 GRADUATES

Table 3.12 shows the number of Doctoral graduates per 1 000 people aged between 25 and 34 years in South Africa in 2001 and 2005. Again, the breakdown is in terms of race.

Table 3.12: Number of Master's and Doctoral graduates per 1 000 in the 25-to-34 age group and the 35-to-44 age group, 2001 and 2005

Master's Graduates	25-34 Age Group		35-44 Age Group	
	2000	2005	2000	2005
Black African	0.32	0.40	0.51	0.70
Coloured	0.42	0.59	0.56	0.76
Indian	2.57	3.43	2.95	4.03
White	6.71	8.53	5.22	6.24
Total	**0.88**	**0.98**	**1.26**	**1.52**
Doctoral Graduates				
Black African	0.03	0.05	0.05	0.09
Coloured	0.04	0.09	0.05	0.11
Indian	0.28	0.41	0.32	0.49
White	1.02	1.43	0.80	1.05
Total	**0.12**	**0.15**	**0.17**	**0.23**

Source: Calculated by using Mid-year Population Estimates (obtained from Statistics South Africa Website) - only available from 2001 onwards.

Master's

The participation figure of White Master's graduates for the 25-to-34 age category is significantly higher than that of any other race, and has continued to increase over time (from 6.71 in 2001 and 8.53 in 2005).

- The difference between the participation rates of White and Indian Master's graduates is less for the 35-to-44 age group than for the 25-to-34 age group.
- All races showed an increase in participation over the five-year period, in both age groups.

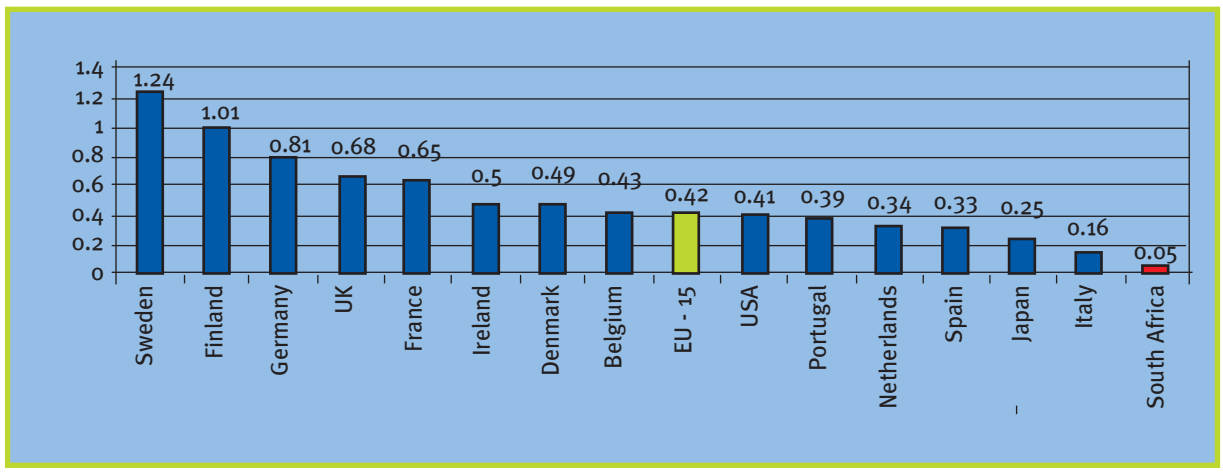
Doctoral

- In both the 25-to-34 and 35-to-44 age groups there was an increase in the participation rate of Doctoral graduates between 2001 and 2005 (from 0.12 to 0.15, and from 0.17 to 0.23).
- However, White Doctoral graduates - in both age groups - have markedly higher participant rates than the other races. (For example, in 2005, 1.43 out of every 1 000 Whites in the younger age group graduated with a Doctoral degree; the second highest participant rate was that of Indians, with only 0.41 out of every 1 000 Indians in the same age group graduating with a Doctoral degree.)
- Black African Doctoral graduates per 1 000 of the population represent the lowest participant rate in both age categories. Participation figures for Black Africans nevertheless increased between 2001 and 2005 (from 0.05 in 2001, to 0.09 in 2005 in the 35-to-44 age group).

Figure 3.12 below shows the number of Doctoral degrees awarded in Science and Engineering per 1 000 of the population in the 25-to-34 age group for 2000.

- South Africa has 0.05 Doctoral degrees in Science and Engineering per 1 000 of the population in this age group. Relative to a selected number of developed countries, South Africa's share of Doctoral degrees in Science and Engineering is much lower.

Figure 3.12: Doctoral degrees in S&E per 1 000 in the 25-34 age group (2000)



Source: Third European Report on S&T Indicators, produced by the European Commission in 2003.

Table 3.19 below shows the figures for the South African population in two age groups (the 25-to-34 year age group, and the 35-to-44 year age group) across the four race groups, by year (from 2001 to 2005), and compares these figures the number of Master's and Doctoral graduates in the same categories. The growth and growth rates are also shown in order to compare the growth in the number of graduates with that of the general population.

- In South African population aged between 25 and 34 years, there was an average annual growth rate of 3.2% in the Black African group, 1% in the Coloured group, 1.5% in the Indian group and a -3.7% growth rate in the White group.
- In the South African population aged between 35 and 44 years, there was an average annual growth rate of 0.7% in the Black African group, 2.3% in the Coloured group, 0.9% in the Indian group and a -2.2% growth rate in the White group.

- In terms of Master's graduates, all race groups except Whites (with 1.7%), grew by 9% or more between 2001 and 2005.
- In terms of Doctoral graduates, the highest growth was for Coloureds (18.6%), followed by Black Africans (15.4%), Indians (with 13.7%) and Whites (with 3.9%).

PARTICIPATION RATES

We have witnessed an increase in the participation rates of Master's and Doctoral students (in terms of first-enrolments and graduates) between 2001 and 2005. Overall the rate of participation by Master's students increased from 0.88 to 0.98 (per thousand of the age cohort 25 -34) and for Doctoral students from 0.12 to 0.15. These rates compare unfavourably with international benchmarks (at least when focusing on SET fields only). It is also important to point out that the participation rates of White Doctoral students remain the highest (1.43 in 2005) and are on a par with international levels. The extent of the challenge, however, is starkly illustrated when one looks at the gap between White and African participation rates at the Master's (8.53 compared to 0.5) and the Doctoral level (1.43 compared to 0.05). This effectively means that Whites in the age group 25 - 34 are 17 times more likely than their African counterparts to engage in and complete Master's studies and 28 times more likely than their African counterparts to engage in and complete Doctoral studies in South Africa.

Table 3.13: Growth in participation of Master's and Doctoral graduates compared to general population according to age groups

Year	SA Population 25-34 Years				SA Population 35-44 Years			
	Black African	Coloured	Indian	White	Black African	Coloured	Indian	White
2001	5776537	737558	177542	562976	3656608	547503	154819	724039
2002	6003058	748925	179991	533258	3670679	560744	156460	712090
2003	6213936	758106	182683	508497	3682123	573256	158012	698253
2004	6398565	764619	185604	491621	3709546	585881	159447	681490
2005	6553309	768231	188699	484577	3767983	599254	160744	661821
Growth rate	3.2%	1.0%	1.5%	-3.7%	0.7%	2.3%	0.9%	-2.2%
Headcount Growth	194905	7704	2793	-19844	26162	12864	1484	-15504

Year	Doctoral Graduates				Master's Graduates			
	Black African	Coloured	Indian	White	Black African	Coloured	Indian	White
2001	185	29	49	577	1875	308	456	3780
2002	227	50	70	633	2021	378	551	3915
2003	237	50	90	653	2283	410	699	4001
2004	290	50	100	646	2573	423	643	3894
2005	335	68	78	693	2627	457	648	4133
Growth rate	15.4%	18.6%	13.7%	3.9%	9.6%	9.4%	9.0%	1.7%
Headcount Growth	36	8	9	25	206	34	48	69

Source: Mid-year Population Statistics, obtained from Statistics South Africa Website.
Note: Mid-year Population Statistics only available in breakdown according to racial group and age group from 2001 onwards.

CHAPTER 4
INSTITUTIONAL SHARES OF POSTGRADUATE STUDENTS

This chapter focuses on the contribution of the different Universities and Universities of Technology in the production of Master's and Doctoral graduates. The analysis addresses overall trends as well as trends by scientific field.

4.1 INSTITUTIONAL SHARES OF MASTER'S AND DOCTORAL GRADUATES

Table 4.1 shows the national proportion of Master's and Doctoral graduates across all institutions for both 2000 and 2005, as well as the increases or decreases of graduates at institutions.

Master's

- In 2000, the institutions with the largest national proportions of Master's graduates included Stellenbosch University (SU) (13%), the University of Pretoria (UP) (12%), the University of South Africa (UNISA) (11%), North West University (NWU) (10%), the University of Cape Town (UCT), the University of Johannesburg (UJ), the University of KwaZulu-Natal (UKZN) and the University of the Witwatersrand (WITS) (all with 9% each).
- In 2005, the University of Pretoria had the largest national share (14%), followed by the University of Cape Town (13%), Stellenbosch University (11%), the University of KwaZulu-Natal, North West University and the University of the Witwatersrand (all with 9% each).
- Between 2000 and 2005, the University of Cape Town increased its national share from 9% to 13%; the University of Johannesburg decreased from 9% to 5% and the University of South Africa decreased from 11% to 7%.

Doctoral

- When looking at all Doctoral graduates in 2000, the institutions with the largest proportion of graduates across all fields were the University of Pretoria (14%), the University of Cape Town (12%), the University of Johannesburg (11%), Stellenbosch University and the University of the Witwatersrand (each with 10%) and the University of South Africa (9%).
- In 2005, the institutional landscape looked similar to that in 2000, where the largest national shares of Doctorates were still at the University of Pretoria (16%), the University of Cape Town (15%), Stellenbosch University (11%) and the University of the Witwatersrand (9%).
- Between 2000 and 2005, the University of Cape Town increased its proportion of national Doctoral graduates from 12% to 15% and the University of Johannesburg decreased from 11% to 8%.

The general picture that emerges from Table 4.1 is consistent with similar pictures for research output that shows the dominance of a small number of universities in knowledge production in the country. The top ten universities (UP, UCT, SU, WITS, UNISA, KZN, UJ, NWU, UFS, UPS and UWC) produced 88% of all Master's graduates and 90% of all Doctoral graduates in 2005.

4.2 SHARES OF MASTER'S AND DOCTORAL GRADUATES WITHIN INSTITUTIONS

Since the size of an institution has an effect on its proportion of Master's and Doctoral students, it was considered worthwhile to develop indicators through which to make comparisons across institutions of varying sizes. The indicators that were developed in order to control for the size of the institutions (and was calculated only for 2005) are shown in Table 4.2. They are referred to as relational indicators and take both undergraduate and postgraduate graduates into consideration. The share of Master's and Doctoral graduates was calculated for each institution respectively, out of the total pool of student graduates at that institution. Those institutions that produced more than the average for the system (more than 7% at the Master's level and more than 1% at the Doctoral level) have been grey shaded.

The relational indicators that illustrate the size of institutions, in terms of graduates, show the following:

- The largest proportion of Master's graduates relative to all student graduates at an institution are found at UCT (18%), SU (17%) and WITS (15%). UFS and UWC also have relatively high proportions of Master's graduates (11% and 10%).
- The four institutions with the largest proportion of Doctoral graduates of their respective pools of student graduates are also those with the largest percentage of the national pool of Doctoral graduates. These institutions are UCT (3%), WITS, SU and UP (all with about 2% each).
- Although UP is the single largest contributor to Doctoral graduates in the country (192 in 2005, or 16%) only about 2% of its student graduates are Doctoral graduates. UCT has the largest proportion of Doctoral graduates of its graduate population (3%).
- UNISA, although a significant contributor to Doctoral graduates in the country (8% in 2005), only had 3% of Doctoral graduates of its total pool of student graduates in the same year.

Nine universities produced more Master's graduates (as percentage of overall student body) than the 7% average for the system: UCT, SU, WITS, UP, UFS, UWC, NWU, Rhodes University and UKZN in descending order) while ten universities (the same as this list plus the University of Zululand(UZULU) made the biggest contribution to Doctoral output.

4.3 INSTITUTIONAL SHARES OF MASTER'S AND DOCTORAL GRADUATES BY BROAD FIELD

Table 4.3 shows the institutional shares by broad field and reports on those institutions with at least a 10% share per field in either 2000 or 2005. Table 4.4 is a summary of the key observations of Table 4.3. Table 4.4 lists those institutions with the largest contributions per broad field (in 2005), and institutions characterised by marked increases or decreases (4% or more) in any of the broad fields between 2000 and 2005.

- As expected, the five more prominent research-oriented universities (SU, UCT, UKZN, UP & WITS) tend to dominate the list of institutions with the largest national percentages of Master's and Doctoral graduates per field.
- However, relatively smaller universities such as NWU and UJ feature strongly in the Social Sciences - NWU had the largest national share of Master's graduates in this field in 2005 (13%), and UJ the largest national share of Doctoral graduates in this field (also 13%, a position that UJ shared with UP).

- These two universities (NWU and UJ) are also growing in terms of Doctoral graduates in Engineering and Applied Technologies - their national percentages of Doctoral graduates in this field increased markedly between 2000 and 2005 (by 10% for NWU and 4% for UJ).

Table 4.1: Institutions in terms of their share of graduates in all fields, 2000 and 2005 (in descending order by Doctoral shares)

Institution	Master's				Doctoral			
	2000		2005		2000		2005	
	Count	%	Count	%	Count	%	Count	%
UP	689	11.9%	1102	14.0%	114	13.9%	192	16.3%
UCT	545	9.4%	997	12.7%	101	12.3%	182	15.5%
SU	741	12.8%	895	11.4%	83	10.1%	126	10.7%
WITS	549	9.5%	728	9.2%	81	9.9%	100	8.5%
UNISA	624	10.8%	571	7.2%	77	9.4%	92	7.8%
UKZN	545	9.4%	689	8.7%	67	8.2%	90	7.7%
UJ	542	9.4%	426	5.4%	88	10.7%	88	7.5%
NWU	559	9.6%	693	8.8%	51	6.2%	82	7.0%
UFS	308	5.3%	531	6.7%	59	7.2%	65	5.5%
UWC	128	2.2%	296	3.8%	20	2.4%	35	3.0%
NMMU	171	3.0%	298	3.8%	11	1.3%	30	2.6%
RHODES	86	1.5%	167	2.1%	28	3.4%	31	2.6%
UZULU	25	0.4%	40	0.5%	17	2.1%	17	1.4%
UL	113	1.9%	130	1.6%	6	0.7%	15	1.3%
TUT	16	0.3%	85	1.1%	2	0.2%	12	1.0%
CUT	16	0.3%	10	0.1%	3	0.4%	6	0.5%
CPUT	12	0.2%	53	0.7%	0	0.0%	5	0.4%
DUT	52	0.9%	66	0.8%	0	0.0%	4	0.3%
UNIVEN	10	0.2%	32	0.4%	0	0.0%	2	0.2%
UFH	11	0.2%	53	0.7%	3	0.4%	1	0.1%
VUT	1	0.0%	10	0.1%	0	0.0%	1	0.1%
WSU	7	0.1%	9	0.1%	1	0.1%	0	0.0%
Vista University	45	0.8%	--	--	10	1.2%	--	--
Total	**5795**	**100.0%**	**7881**	**100.0%**	**822**	**100.0%**	**1176**	**100.0%**

Note: (1) Institutions with a 10% share or close to 10% share have been highlighted in grey.

(2) Individual campuses of the former Vista University are not specified in the 2000 dataset - student figures for Vista University could therefore not be assigned to the new parental institutions with which these campuses merged.

Table 4.2: Relational indicators for institutional size based on graduates

Institution	Master's Graduates		Doctoral Graduates		All student graduates (UG & PG)	Relational indicators controlling for institutional size	
	Headcount	Institutional share	Headcount	Institutional share		Master's as % of all student graduates	Doctoral as % of all student graduates
UCT	997	12.7%	182	15.5%	5675	18%	3.2%
SU	895	11.4%	126	10.7%	5389	17%	2.3%
WITS	728	9.2%	100	8.5%	4810	15%	2.1%
UP	1102	14.0%	192	16.3%	11069	10%	1.7%
RHODES	167	2.1%	31	2.6%	2019	8%	1.5%
UFS	531	6.7%	65	5.5%	4904	11%	1.3%
UZULU	40	0.5%	17	1.4%	1355	3%	1.3%
UWC	296	3.8%	35	3.0%	3010	10%	1.2%
UKZN	689	8.7%	90	7.7%	8106	8%	1.1%
NWU	693	8.8%	82	7.0%	7525	9%	1.1%
UJ	426	5.4%	88	7.5%	9528	4%	0.9%
UL	130	1.6%	15	1.3%	2268	6%	0.7%
UNISA	571	7.2%	92	7.8%	14034	4%	0.7%
NMMU	298	3.8%	30	2.6%	5328	6%	0.6%
CUT	10	0.1%	6	0.5%	2013	0%	0.3%
CPUT	53	0.7%	5	0.4%	5459	1%	0.1%
DUT	66	0.8%	4	0.3%	3881	2%	0.1%
UFH	53	0.7%	1	0.1%	1789	3%	0.1%
TUT	85	1.1%	12	1.0%	8031	1%	0.1%
UNIVEN	32	0.4%	2	0.2%	1469	2%	0.1%
VUT	10	0.1%	1	0.1%	1917	1%	0.1%
WSU	9	0.1%	0	0.0%	2627	0%	0.0%
MUT	0	0.0%	0	0.0%	1072	0%	0.0%
Total	**7881**	**100.00%**	**1176**	**100.00%**	**113278**	**7%**	**1.00%**

Note: Institutions with a 10% share or close to 10% share have been highlighted in grey.

Table 4.3: Institutions in terms of their share of graduates by broad field, 2000 and 2005

Institution	Master's		Doctoral	
	2000	2005	2000	2005
Natural & Agricultural Sciences				
UCT	11%	15%	14%	20%
UFS	15%	11%	11%	9%
UKZN	11%	10%	10%	12%
UP	16%	16%	15%	18%
SU	12%	13%	9%	13%
WITS			18%	3%
Engineering & Applied Technologies				
UCT	21%	17%	31%	23%
UJ			6%	10%
NWU			0%	10%
UP	19%	22%	14%	15%
SU	12%	14%	17%	11%
WITS	16%	21%	21%	13%
Health Sciences				
UCT	5%	10%	23%	21%
UFS	10%	7%		
UJ	10%	4%		
UKZN			11%	5%
UP	17%	15%	10%	8%
SU	11%	8%		
WITS	8%	20%	15%	26%
Humanities				
UCT	10%	14%	12%	12%
UKZN	11%	8%		
NWU			10%	8%
UP	13%	16%	14%	26%
UNISA	10%	13%	13%	14%
SU	22%	16%	15%	10%
Social Sciences				
UCT	8%	11%	4%	10%
UJ	11%	7%	16%	13%
UKZN	9%	10%		
NWU	13%	13%		
UP	9%	10%	15%	13%
UNISA	17%	9%	16%	12%
SU	10%	9%	7%	10%

Note: Only institutions with a 10% or higher share in any of the two years are reported above

Table 4.4: Institutions that feature most in terms of share of graduates by broad field

Field	Master's	Doctoral
Natural & Agricultural Sciences		
Institution(s) with largest national share in 2005	UP; UCT	UCT; UP
Institution(s) whose national share increased by at least 4% between 2000 and 2005	UCT	UCT; SU
Institution(s) whose national share decreased by at least 4% between 2000 and 2005	UFS	WITS
Engineering & Applied Technologies		
Institution(s) with largest national share in 2005	UP; WITS	UCT
Institution(s) whose national share increased by at least 4% between 2000 and 2005	WITS	NWU; UJ
Institution(s) whose national share decreased by at least 4% between 2000 and 2005	UCT	UCT; WITS; SU
Health Sciences		
Institution(s) with largest national share in 2005	WITS	WITS; UCT
Institution(s) whose national share increased by at least 4% between 2000 and 2005	WITS; UCT	WITS
Institution(s) whose national share decreased by at least 4% between 2000 and 2005	UJ	UKZN
Humanities		
Institution(s) with largest national share in 2005	UP; SU	UP
Institution(s) whose national share increased by at least 4% between 2000 and 2005	UCT	UP
Institution(s) whose national share decreased by at least 4% between 2000 and 2005	SU	SU
Social Sciences		
Institution(s) with largest national share in 2005	NWU	UJ; UP
Institution(s) whose national share increased by at least 4% between 2000 and 2005	--	UCT
Institution(s) whose national share decreased by at least 4% between 2000 and 2005	UJ; UNISA	UNISA

INSTITUTIONAL DISTRIBUTION OF MASTER S AND DOCTORAL STUDENTS

The general picture that emerges from our analysis is consistent with similar pictures for research output that shows the dominance of a small number of universities in knowledge production in the country. The top ten universities (UP, UCT, SU, WITS, UNISA, KZN, UJ, NWU, UFS and UWC) produced 88% of all Master's graduates and 90% of all Doctoral graduates in 2005. Nine universities produced more Master's graduates (as percentage of overall student body) than the 7% average for the system: UCT, SU, WITS, UP, UFS, UWC, NWU, Rhodes and UKZN in descending order) while ten universities (the same as this list plus the University of Zululand) made the biggest contribution to Doctoral output. As expected, the five more prominent research-oriented universities (SU, UCT, UKZN, UP & WITS) tend to dominate the list of institutions with the largest national percentages of Master's and Doctoral graduates per field. However, relatively smaller universities such as NWU and UJ feature strongly in the Social Sciences.

APPENDIX
AMALGAMATION OF THE HEMIS CESM CATEGORIES INTO THE CREST SCIENTIFIC FIELD FRAMEWORK

HEMIS Classification		CREST Classification	
1st-order CESM	2nd-order CESM	Main field	Sub-field
01 Agriculture and Renewable Natural Resources	01.01 Agricultural economics	Natural & agricultural sciences	Other agricultural sciences
01 Agriculture and Renewable Natural Resources	01.02 Agricultural extension	Natural & agricultural sciences	Other agricultural sciences
01 Agriculture and Renewable Natural Resources	01.03 Agricultural food technology	Natural & agricultural sciences	Other agricultural sciences
01 Agriculture and Renewable Natural Resources	01.04 Animal sciences	Natural & agricultural sciences	Other agricultural sciences
01 Agriculture and Renewable Natural Resources	01.05 Horticulture	Natural & agricultural sciences	Other agricultural sciences
01 Agriculture and Renewable Natural Resources	01.06 Plant sciences	Natural & agricultural sciences	Plant sciences
01 Agriculture and Renewable Natural Resources	01.07 Soil sciences	Natural & agricultural sciences	Other agricultural sciences
01 Agriculture and Renewable Natural Resources	01.08 Fisheries	Natural & agricultural sciences	Other agricultural sciences
01 Agriculture and Renewable Natural Resources	01.09 Forestry	Natural & agricultural sciences	Other agricultural sciences
01 Agriculture and Renewable Natural Resources	01.10 Outdoor recreation	Social sciences	Other social sciences
01 Agriculture and Renewable Natural Resources	01.11 Wildlife	Natural & agricultural sciences	Earth sciences
01 Agriculture and Renewable Natural Resources	01.12 Land reclamation	Natural & agricultural sciences	Other agricultural sciences
01 Agriculture and Renewable Natural Resources	01.13 Renewable natural resources	Natural & agricultural sciences	Other agricultural sciences
01 Agriculture and Renewable Natural Resources	01.99 Other Agriculture and Renewable Natural Resources	Natural & agricultural sciences	Other agricultural sciences
02 Architecture and Environmental Design	02.01 Environmental Design	Social sciences	Other social sciences
02 Architecture and Environmental Design	02.02 Design and Planning Technology	Engineering & applied technologies	Other engineering & applied technologies
02 Architecture and Environmental Design	02.03 History of Environments	Humanities	Other humanities & arts
02 Architecture and Environmental Design	2.04 Construction and Design Implementation	Engineering & applied technologies	Other engineering & applied technologies
02 Architecture and Environmental Design	02.05 Communication in Architecture & Environmental Design	Social sciences	Other social sciences
02 Architecture and Environmental Design	02.06 Structural Technology	Engineering & applied technologies	Other engineering & applied technologies
02 Architecture and Environmental Design	02.07 Environmental Technology	Engineering & applied technologies	Other engineering & applied technologies
02 Architecture and Environmental Design	02.08 Materials of Architecture & Environmental Design	Engineering & applied technologies	Materials sciences

HEMIS Classification		CREST Classification	
1st-order CESM	2nd-order CESM	Main field	Sub-field
02 Architecture and Environmental Design	02.09 Management in Architecture & Environmental Design	Social sciences	Economic & management sciences
02 Architecture and Environmental Design	02.10 Professional Practices of Architecture & Environmental Design	Social sciences	Other social sciences
02 Architecture and Environmental Design	02.11 Planning	Social sciences	Other social sciences
02 Architecture and Environmental Design	02.99 Other Architecture and Environmental Design	Engineering and applied technologies	Other engineering & applied technologies
03 Arts, Visual and Performing	03.01 Dance	Humanities	Other humanities & arts
03 Arts, Visual and Performing	03.02 Film as art	Humanities	Other humanities & arts
03 Arts, Visual and Performing	03.03 Music	Humanities	Other humanities & arts
03 Arts, Visual and Performing	03.04 Theatre arts	Humanities	Other humanities & arts
03 Arts, Visual and Performing	03.05 Visual arts	Humanities	Other humanities & arts
03 Arts, Visual and Performing	03.06 Related arts	Humanities	Other humanities & arts
03 Arts, Visual and Performing	03.07 Arts therapy	Social sciences	Other social sciences
03 Arts, Visual and Performing	03.99 Other arts, visual and performing	Humanities	Other humanities & arts
04 Business, Commerce and Management Sciences	04.01 Accounting	Social sciences	Economic & management sciences
04 Business, Commerce and Management Sciences	04.02 Administrative and Office Services	Social sciences	Economic & management sciences
04 Business, Commerce and Management Sciences	04.03 Banking and Finance	Social sciences	Economic & management sciences
04 Business, Commerce and Management Sciences	04.04 Business Data Systems	Social sciences	Economic & management sciences
04 Business, Commerce and Management Sciences	04.05 Entrepreneurship	Social sciences	Economic & management sciences
04 Business, Commerce and Management Sciences	04.06 Information Communications	Social sciences	Economic & management sciences
04 Business, Commerce and Management Sciences	04.07 Insurance and Risk Management	Social sciences	Economic & management sciences
04 Business, Commerce and Management Sciences	04.08 International Business	Social sciences	Economic & management sciences
04 Business, Commerce and Management Sciences	4.09 Management	Social sciences	Economic & management sciences
04 Business, Commerce and Management Sciences	04.10 Marketing	Social sciences	Economic & management sciences
04 Business, Commerce and Management Sciences	04.11 Personnel Management and Administration	Social sciences	Economic & management sciences
04 Business, Commerce and Management Sciences	04.12 Quantitative Methods	Social sciences	Economic & management sciences
04 Business, Commerce and Management Sciences	04.13 Real Estate	Social sciences	Economic & management sciences
04 Business, Commerce and Management Sciences	04.99 Other Business, Commerce and Management Sciences	Social sciences	Economic & management sciences
05 Communication	05.01 Advertising	Social sciences	Other social sciences
05 Communication	05.02 Code systems	Social sciences	Other social sciences
05 Communication	05.03 Communication methodology	Social sciences	Other social sciences
05 Communication	05.04 Communication technology	Natural & agricultural sciences	Information, computer & communication technologies

HEMIS Classification		CREST Classification	
1st-order CESM	2nd-order CESM	Main field	Sub-field
05 Communication	05.05 Cybernetics	Natural & agricultural sciences	Information, computer & communication technologies
05 Communication	05.06 Film as communication	Social sciences	Other social sciences
05 Communication	05.07 Governmental and state communication	Social sciences	Other social sciences
05 Communication	05.08 Innovative communication	Social sciences	Other social sciences
05 Communication	05.09 International communication	Social sciences	Other social sciences
05 Communication	05.10 Instructional communication	Social sciences	Other social sciences
05 Communication	05.11 Interpersonal communication	Social sciences	Other social sciences
05 Communication	05.12 Journalism	Social sciences	Other social sciences
05 Communication	05.13 Mass communication	Social sciences	Other social sciences
05 Communication	05.14 Organisational communication	Social sciences	Other social sciences
05 Communication	05.15 Print media	Social sciences	Other social sciences
05 Communication	05.16 Professional practices in communication	Social sciences	Other social sciences
05 Communication	05.17 Public relations	Social sciences	Other social sciences
05 Communication	05.18 Radio	Social sciences	Other social sciences
05 Communication	05.19 Speech communication	Social sciences	Other social sciences
05 Communication	05.20 Special communication	Social sciences	Other social sciences
05 Communication	05.21 Television	Social sciences	Other social sciences
05 Communication	05.99 Other communication	Social sciences	Other social sciences
06 Computer Science and Data Processing	06.01 Applications in Computer Science and Data Processing	Natural & agricultural sciences	Information, computer & communication technologies
06 Computer Science and Data Processing	06.02 Computer Operations and Operations Control	Natural & agricultural sciences	Information, computer & communication technologies
06 Computer Science and Data Processing	06.03 Computer Hardware Systems	Natural & agricultural sciences	Information, computer & communication technologies
06 Computer Science and Data Processing	06.04 Computer Hardware	Natural & agricultural sciences	Information, computer & communication technologies
06 Computer Science and Data Processing	06.05 Information and Data Base Systems	Natural & agricultural sciences	Information, computer & communication technologies
06 Computer Science and Data Processing	06.06 Numerical Computations	Natural & agricultural sciences	Information, computer & communication technologies
06 Computer Science and Data Processing	06.07 Programming Languages	Natural & agricultural sciences	Information, computer & communication technologies
06 Computer Science and Data Processing	06.08 Programming Systems	Natural & agricultural sciences	Information, computer & & communication technologies
06 Computer Science and Data Processing	06.09 Software Methodology	Natural & agricultural sciences	Information, computer & communication technologies
06 Computer Science and Data Processing	06.10 Theory of Computation	Natural & agricultural sciences	Information, computer & communication technologies
06 Computer Science and Data Processing	06.11 Educational, Societal, and Cultural Considerations	Social sciences	Other social sciences
06 Computer Science and Data Processing	06.99 Other Computer Science and Data Processing	Natural & agricultural sciences	Information, computer & communication technologies
07 Education	07.01 Foundations of education	Social sciences	Education
07 Education	07.02 Educational administration	Social sciences	Education
07 Education	07.03 Systems of education	Social sciences	Education
07 Education	07.04 Teaching - subject matter	Social sciences	Education
07 Education	07.05 Teaching - programmes	Social sciences	Education

HEMIS Classification		CREST Classification	
1st-order CESM	2nd-order CESM	Main field	Sub-field
07 Education	07.06 Teacher training	Social sciences	Education
07 Education	07.07 Counselling and guidance	Social sciences	Education
07 Education	07.08 Special education programmes	Social sciences	Education
07 Education	07.09 Community service	Social sciences	Education
07 Education	07.10 Educational development	Social sciences	Education
07 Education	07.11 Educational evaluation and research	Social sciences	Education
07 Education	07.12 Educational technology and media	Engineering & applied technologies	Other engineering & applied technologies
07 Education	07.99 Other education	Social sciences	Education
08 Engineering and Engineering Technology	08.01 Aerospace and Aeronautical Engineering and Technology	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.02 Agricultural Engineering and Technology	Natural & agricultural sciences	Other agricultural sciences
08 Engineering and Engineering Technology	08.03 Automotive Engineering and Technology	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.04 Bio-Engineering and Technology	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.05 Chemical Engineering and Technology	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.06 Civil Engineering and Technology	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.07 Computer Engineering and Technology	Natural & agricultural sciences	Information, computer & communication technologies
08 Engineering and Engineering Technology	08.08 Electrical Engineering and Technology	Engineering & applied technologies	Electrical & electronic engineering
08 Engineering and Engineering Technology	08.09 Graphics and Drafting for Engineering and Technology	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.10 Engineering Mechanics	Engineering & applied technologies	Mechanical engineering
08 Engineering and Engineering Technology	08.11 Engineering Science	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.12 Environmental Engineering and Technology	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.13 Geological Engineering	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.14 Industrial Engineering and Technology	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.15 Instrumentation Engineering and Technology	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.16 Manufacturing Engineering and Technology	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.17 Marine Engineering and Naval Architecture	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.18 Materials Engineering and Technology	Engineering & applied technologies	Materials sciences
08 Engineering and Engineering Technology	8.19 Mechanical Engineering and Technology	Engineering & applied technologies	Mechanical engineering
08 Engineering and Engineering Technology	08.20 Metallurgical Engineering and Technology	Engineering & applied technologies	Mining engineering

HEMIS Classification		CREST Classification	
1st-order CESM	2nd-order CESM	Main field	Sub-field
08 Engineering and Engineering Technology	08.21 Mining Engineering and Technology	Engineering &	Mining engineering applied technologies
08 Engineering and Engineering Technology	08.22 Nuclear Engineering and Technology	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.23 Ocean Engineering	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.24 Petroleum Engineering	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.25 Surveying and Mapping	Engineering & applied technologies	Other engineering & applied technologies
08 Engineering and Engineering Technology	08.99 Other Engineering and Engineering Technology	Engineering & applied technologies	Other engineering & applied technologies
09 Health Care and Health Sciences	09.01 Basic health care sciences	Health sciences	Basic health sciences
09 Health Care and Health Sciences	09.02 Clinical health sciences	Health sciences	Clinical & public health
09 Health Care and Health Sciences	09.03 Rehabilitation and therapy	Health sciences	Clinical & public health
09 Health Care and Health Sciences	09.04 Pharmaceutical science	Health sciences	Clinical & public health
09 Health Care and Health Sciences	09.05 Emergency services	Health sciences	Clinical & public health
09 Health Care and Health Sciences	09.06 Hospital and health care administration	Health sciences	Clinical & public health
09 Health Care and Health Sciences	09.07 Public health	Health sciences	Clinical & public health
09 Health Care and Health Sciences	09.08 Veterinary health sciences	Natural & agricultural sciences	Veterinary sciences
09 Health Care and Health Sciences	09.09 General perspectives on health care and health sciences	Health sciences	Clinical & public health
09 Health Care and Health Sciences	09.99 Other health care and health sciences	Health sciences	Clinical & public health
10 Home Economics	10.01 Clothing and Textiles	Social sciences	Other social sciences
10 Home Economics	10.02 Consumer Education	Social sciences	Other social sciences
10 Home Economics	10.03 Food and Nutrition	Health sciences	Clinical & public health
10 Home Economics	10.04 Home Management	Social sciences	Other social sciences
10 Home Economics	10.05 Housing	Social sciences	Other social sciences
10 Home Economics	10.06 Human Development and Family Studies	Social sciences	Sociology & related studies
10 Home Economics	10.07 Institutional Housekeeping and Food Service Management	Social sciences	Economic & management sciences
10 Home Economics	10.99 Other Home Economics	Social sciences	Other social sciences
11 Industrial Arts, Trades, and Technology	11.01 Construction	Engineering & applied technologies	Other engineering & applied technologies
11 Industrial Arts, Trades, and Technology	11.02 Manufacturing	Engineering & applied technologies	Other engineering & applied technologies
11 Industrial Arts, Trades, and Technology	11.03 Power systems	Engineering & applied technologies	Other engineering & applied technologies
11 Industrial Arts, Trades, and Technology	11.04 Product service	Engineering & applied technologies	Other engineering & applied technologies
11 Industrial Arts, Trades, and Technology	11.05 Graphic arts	Humanities	Other humanities & arts
11 Industrial Arts, Trades, and Technology	11.06 Transportation	Social sciences	Economic & management sciences
11 Industrial Arts, Trades, and Technology	11.07 Personal services	Social sciences	Other social sciences

HEMIS Classification		CREST Classification	
1st-order CESM	2nd-order CESM	Main field	Sub-field
11 Industrial Arts, arts, trades and technology	11.99 Other industrial	Engineering & applied technologies	Other engineering & applied technologies
12 Language, Linguistics, and Literature	12.01 Linguistics	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.02 Literary Studies	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.03 Study and uses of the Afrikaans Language	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.04 Study and uses of the English Language	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.05 Arabic	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.06 Artificial Languages	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.07 Chinese	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.08 Dutch	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.09 Finnish	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.10 French	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.11 German	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.12 Greek	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.13 Hebrew	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.14 Italian	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.15 Japanese	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.16 Latin	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.17 Native American	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.18 Norwegian	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.19 Persian	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.20 Portuguese	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.21 Russian	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.22 Sanskrit	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.23 Slavic Languages	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.24 South-east Asian Languages	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.25 Spanish	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.26 Swedish	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.27 Yiddish	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.28 Herero	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.29 Kwangali	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.30 Kwanyama	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.31 Lozi	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.32 Mbukushu	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.33 Nama	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.34 IsiNdebele	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.35 Ndonga	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.36 San (Bushman)	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.37 Shona	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.38 SeSotho	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.39 SeSotho Sa Leboa	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.40 SiSwati	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.41 XiTsonga	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.42 SeTswana	Humanities	Language & linguistics

HEMIS Classification		CREST Classification	
1st-order CESM	2nd-order CESM	Main field	Sub-field
12 Language, Linguistics, and Literature	12.43 TshiVenda	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.44 IsiXhosa	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.45 IsiZulu	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.49 Other African Languages	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.50 Gujerati	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.51 Hindi	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.52 Tamil	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.53 Telugu	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.54 Urdu	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.59 Other South Asian Languages	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.60 The Study and uses of Languages	Humanities	Language & linguistics
12 Language, Linguistics, and Literature	12.99 Other Language, Linguistics, and Literature	Humanities	Language & linguistics
13 Law	13.01 International aspects of law	Humanities	Law
13 Law	13.02 Perspectives on law	Humanities	Law
13 Law	13.03 Mercantile law	Humanities	Law
13 Law	13.04 Private Law	Humanities	Law
13 Law	13.05 Public Law	Humanities	Law
13 Law	13.06 Formal Law	Humanities	Law
13 Law	13.07 Law for black persons in South Africa	Humanities	Law
13 Law	13.08 Legal profession	Humanities	Law
13 Law	13.99 Other law	Humanities	Law
14 Libraries and Museums	14.01 Libraries and Museums in Perspective	Social sciences	Other social sciences
14 Libraries and Museums	14.02 Physical Records	Social sciences	Other social sciences
14 Libraries and Museums	14.03 Information	Social sciences	Other social sciences
14 Libraries and Museums	14.04 Library and Museum users	Social sciences	Other social sciences
14 Libraries and Museums	14.05 Library and Museum Services and Functions	Social sciences	Other social sciences
14 Libraries and Museums	14.06 Administration of Libraries and Museums	Social sciences	Other social sciences
14 Libraries and Museums	14.07 Facilities for Libraries and Museums	Social sciences	Other social sciences
14 Libraries and Museums	14.08 Equipment for Libraries and Museums	Social sciences	Other social sciences
14 Libraries and Museums	14.99 Other Libraries and Museums	Social sciences	Other social sciences
15 Life Sciences and Physical Sciences	15.01 Astronomy	Natural & agricultural sciences	Physical sciences
15 Life Sciences and Physical Sciences	15.02 Atmospheric sciences	Natural & agricultural sciences	Earth sciences
15 Life Sciences and Physical Sciences	15.03 Biological sciences	Natural & agricultural sciences	Biological sciences
15 Life Sciences and Physical Sciences	15.04 Chemistry	Natural & agricultural sciences	Chemical sciences

HEMIS Classification		CREST Classification	
1st-order CESM	2nd-order CESM	Main field	Sub-field
15 Life Sciences and Physical Sciences	15.05 Geology	Natural & agricultural sciences	Earth sciences
15 Life Sciences and Physical Sciences	15.06 Oceanology	Natural & agricultural sciences	Earth sciences
15 Life Sciences and Physical Sciences	15.07 Physics	Natural & agricultural sciences	Physical sciences
15 Life Sciences and Physical Sciences	15.08 General earth-space science	Natural & agricultural sciences	Earth sciences
15 Life Sciences and Physical Sciences	15.99 Other life sciences and physical sciences	Natural & agricultural sciences	Physical sciences
16 Mathematical Sciences	16.01 Mathematical Sciences, General Perspective	Natural & agricultural sciences	Mathematical sciences
16 Mathematical Sciences	16.02 Logic, sets, and Foundations	Natural & agricultural sciences	Mathematical sciences
16 Mathematical Sciences	16.03 Arithmetic and Algebra	Natural & agricultural sciences	Mathematical sciences
16 Mathematical Sciences	16.04 Classical Analysis	Natural & agricultural sciences	Mathematical sciences
16 Mathematical Sciences	16.05 Functional Analysis	Natural & agricultural sciences	Mathematical sciences
16 Mathematical Sciences	16.06 Geometry and Topology	Natural & agricultural sciences	Mathematical sciences
16 Mathematical Sciences	16.07 Probability	Natural & agricultural sciences	Mathematical sciences
16 Mathematical Sciences	16.08 Statistics	Natural & agricultural sciences	Mathematical sciences
16 Mathematical Sciences	16.09 Numerical Analysis and Approximation Theory	Natural & agricultural sciences	Mathematical sciences
16 Mathematical Sciences	16.10 Classical Applied Mathematics	Natural & agricultural sciences	Mathematical sciences
16 Mathematical Sciences	16.11 Applications of Mathematics	Natural & agricultural sciences	Mathematical sciences
16 Mathematical Sciences	16.12 User-oriented Mathematics	Natural & agricultural sciences	Mathematical sciences
16 Mathematical Sciences	16.99 Other Mathematical Sciences	Natural & agricultural sciences	Mathematical sciences
17 Military Sciences	17.01Military history	Humanities	Other humanities & arts
17 Military Sciences	17.02 Military organisation	Social sciences	Other social sciences
17 Military Sciences	17.03 Military management and leadership	Social sciences	Economic & management sciences
17 Military Sciences	17.04 National security and defence	Social sciences	Other social sciences
17 Military Sciences	17.05 Military law	Humanities	Law
17 Military Sciences	17.06 International military systems	Social sciences	Other social sciences
17 Military Sciences	17.07 Military communications	Social sciences	Other social sciences
17 Military Sciences	17.08 Field training, camps and cruises	Social sciences	Other social sciences
17 Military Sciences	17.09 Drill, Commands and Ceremonies	Social sciences	Other social sciences
17 Military Sciences	17.10 Weaponry and marksmanship	Engineering & applied technologies	Other engineering & applied technologies
17 Military Sciences	17.11 Military first aid and health education	Social sciences	Other social sciences
17 Military Sciences	17.99 Other military sciences	Social sciences	Other social sciences
18 Philosophy, Religion & Theology	18.01 Systematic Philosophy	Humanities	Other humanities & arts
18 Philosophy, Religion & Theology	18.02 History of Philosophy	Humanities	Other humanities & arts
18 Philosophy, Religion & Theology	18.03 Main Philosophical Currents and Trends	Humanities	Other humanities & arts
18 Philosophy, Religion & Theology	18.04 Science of Religion	Humanities	Religion
18 Philosophy, Religion & Theology	18.05 Buddhism	Humanities	Religion
18 Philosophy, Religion & Theology	18.06 Christianity	Humanities	Religion
18 Philosophy, Religion & Theology	18.07 Hinduism	Humanities	Religion
18 Philosophy, Religion & Theology	18.08 Islam	Humanities	Religion
18 Philosophy, Religion & Theology	18.09 Judaism	Humanities	Religion
18 Philosophy, Religion & Theology	18.10 Primal Religions	Humanities	Religion

HEMIS Classification		CREST Classification	
1st-order CESM	2nd-order CESM	Main field	Sub-field
18 Philosophy, Religion & Theology	18.99 Other Philosophy, Religion and Theology	Humanities	Religion
19 Physical Education, Health Education and Leisure	19.01 Physical education	Social sciences	Other social sciences
19 Physical Education, Health Education and Leisure	19.02 Kinesiology	Health sciences	Clinical & public health
19 Physical Education, Health Education and Leisure	19.03 Sport	Social sciences	Other social sciences
19 Physical Education, Health Education and Leisure	19.04 Dance	Humanities	Other humanities & arts
19 Physical Education, Health Education and Leisure	19.05 Health education	Social sciences	Other social sciences
19 Physical Education, Health Education and Leisure	19.06 Driver and safety education	Social sciences	Other social sciences
19 Physical Education, Health Education and Leisure	19.07 Leisure studies	Social sciences	Other social sciences
19 Physical Education, Health Education and Leisure	19.99 Other physical education, health education and leisure	Social sciences	Other social sciences
20 Psychology	20.01 Foundations of Psychology	Social sciences	Psychology
20 Psychology	20.02 Biopsychology	Social sciences	Psychology
20 Psychology	20.03 Environmental Psychology	Social sciences	Psychology
20 Psychology	20.04 Experimental Psychology	Social sciences	Psychology
20 Psychology	20.05 Psychology Applied to Health	Social sciences	Psychology
20 Psychology	20.06 Psychology Applied to Education	Social sciences	Psychology
20 Psychology	20.07 Psychology applied to Industry, Government and Other Organisations	Social sciences	Psychology
20 Psychology	20.08 Psychometrics	Social sciences	Psychology
20 Psychology	20.09 Social Psychology	Social sciences	Psychology
20 Psychology	20.10 Developmental Psychology	Social sciences	Psychology
20 Psychology	20.11 Cognitive Psychology	Social sciences	Psychology
20 Psychology	20.99 Other Psychology	Social sciences	Psychology
21 Public Administration and Social Services	21.01 Public administration	Social sciences	Economic & management sciences
21 Public Administration and Social Services	21.02 Public works	Social sciences	Economic & management sciences
21 Public Administration and Social Services	21.03 Safety and correctional services	Social sciences	Sociology & related studies
21 Public Administration and Social Services	21.04 Social work	Social sciences	Other social sciences
21 Public Administration and Social Services	21.05 Public recreation	Social sciences	Other social sciences
21 Public Administration and Social Services	21.99 Other public administration	Social sciences	Economic & management sciences
22 Social Sciences and Social Studies	22.01 Anthropology	Social sciences	Sociology & related studies
22 Social Sciences and Social Studies	22.02 Economics	Social sciences	Economic & management sciences
22 Social Sciences and Social Studies	22.03 Geography	Social sciences	Other social sciences
22 Social Sciences and Social Studies	22.04 History	Humanities	Other humanities & arts
22 Social Sciences and Social Studies	22.05 Political Science	Social sciences	Other social sciences
22 Social Sciences and Social Studies	22.06 Sociology	Social sciences	Sociology & related studies
22 Social Sciences and Social Studies	22.99 Other Social Sciences & Social Studies	Social sciences	Sociology & related studies

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