

## CHAPTER 5

# SOUTH AFRICA AS A PHD HUB IN AFRICA?

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### **International debates about doctoral education**

Internationally, the importance of the doctorate has increased disproportionately in relation to its contribution to the overall graduate output. This heightened attention has not been predominantly concerned with the traditional role of the PhD, namely the provision of a future supply of academics. Rather, it has focused on the increasingly important role that higher education is perceived to play in the knowledge economy, specifically with regard to high-level skills. If knowledge and information are the new electricity of the economy (Castells 1993), then it is a reasonable assumption that the university – as the main knowledge institution in society – will become increasingly important, and that its apex training product, the PhD, will appear on the skills radar (Gorman 2013). As such, current debate about the doctorate is mainly concerned with the contribution to and place of the PhD graduate in the knowledge economy. One strand of the debate is about strengthening the university as knowledge producer. Another relates to the doctorate as a contributor to ‘talentism’: in other words, the global search for talent. In this sense, the debate is concerned with high-level skills – both research and analytical – outside of the university, be it within industry or the public sector (Cloete & Mouton forthcoming).

Another feature of the international debates is the uneven distribution of doctoral students (in terms of both enrolment and graduation) across the globe. This can be seen as reflecting the different histories of doctoral production in different parts of the world and is associated with variations across higher education systems. Thus, with regard to doctoral production internationally, two groups emerge. The first includes South Korea, Singapore, Taiwan and Mexico – all acknowledged members (if not leaders) in the knowledge economy, and all countries where doctoral output is already high. The second group includes the BRICS countries (Brazil, Russia, India, China and South Africa). Of particular interest is that the governments of China and Brazil are formulating targeted policies and making significant investments in order to increase doctoral and research output, as part of their effort to improve their positions in the

global rankings by catching up within the knowledge economy. Regarding China, Cyranoski et al. (2011) reported that the number of PhD-holders has gone through the roof, with more than 50 000 graduates in 2009, and that by 2011, China was producing more PhDs than any other country. Brazil initiated the 'Science Without Frontiers' programme to provide publicly funded grants to 75 000 students, with the Secretariat of Strategic Affairs aiming to raise financing from the private sector for a further 25 000 grants (Hennigan 2011). Of the 100 000 fellowships in the four-year programme, around 10% are earmarked for doctoral studies. Another 10% allocated to post-doctoral fellowships will benefit young Brazilian professors spending a year on sabbatical at a university abroad (Schwartzman 2013).

More comparable to South Africa is Malaysia. After a long debate about differentiation, five of Malaysia's 65 universities and colleges have been granted 'research university' status and these institutions receive additional government funding. The five research universities have undertaken to raise their output of research papers in Web of Science journals. The research output increase is linked to a reform in PhD programmes: in addition to increasing the numbers of students, the conventional dissertation has been replaced by the requirement for Web of Science-accredited paper publications. The number of PhD students in Malaysia has increased from about 4 000 in 2002 to almost 40 000 in 2012, and about half of these students are attached to the research universities. For example, the Universiti Teknolgi Malaysia has seen an increase in PhD students from 300 in 2002 to 4 500 in 2012. The University now has more postgraduate than undergraduate students – a trend that is expected to continue up to 70% postgraduates by 2020, and by that time, 30% of all enrolments will be PhD candidates. Not only has the number of PhD students increased, the proportion of international PhD students has increased from 25% in 2002 to almost 50% in 2012 (Hansen 2013).

### *Africa is part of the debate*

Africa has certainly not been left out of the debate about the importance of the doctorate. During 2012 alone, discussions on doctoral education took place via a number of initiatives including: an International Association of Universities (IAU) and Catalan Association of Public Universities (ACUP) international seminar entitled 'Innovative Approaches to Doctoral Education and Research Training in Sub-Saharan Africa' (IAU-ACUP 2012); the Southern African Regional Universities Association leadership's 2012 dialogue, 'Doctoral Education: Renewing the Academy'; and the IAU's report *Changing Nature of Doctoral Studies in Sub-Saharan Africa* (IAU 2012). In 2013, the National Research Foundation in South Africa together with the Carnegie Corporation of New York convened a workshop entitled 'Expanding and Sustaining Excellence in Doctoral Programmes in Sub-Saharan Africa: What needs to be done?'

Prof Is-haq Oloyede, speaking as Chair of the IAU Task Force at the IAU-ACUP seminar, highlighted the direct link between doctoral studies and research for the development of Africa. He stressed the importance of supervision and career development for university and national advancement, and called for more synergy and collaboration to broaden the development of

doctoral education in African universities (IAU-ACUP 2012). The importance of doctoral education was echoed by the Chairperson of the African Union Commission, Dr Nkosazana Dlamini-Zuma, when she stated at an NRF/Carnegie Corporation meeting in 2013: 'You must look at ways to train thousands more PhD students on the continent' (Namuddu 2014). At the IAU-ACUP seminar, the importance of doctoral education and its relevance for African higher education institutions was not questioned. Interestingly, however, the seminar report concluded that 'while the status of the PhD is recognised in Africa, African society does not know how to evaluate the competencies of PhD holders nor the relevance of what they can contribute to society' (IAU-ACUP 2012: 20).

The IAU-ACUP report, in part, was informed by an IAU study that provided a broad overview and comparisons of six African universities<sup>1</sup> in terms of programmes, enrolments, graduation and funding. The main conclusion of the study was the following (IAU 2012: 43):

*The project was found to be a valuable experience and an 'eye opener' to participating institutional teams and university leadership as well. Indeed if most leaders and main doctoral programme actors thought they knew what was at stake, many reported to have been surprised by what the self-assessment exercise and interim report brought to the fore. Many reported that they thought that their doctoral programmes were doing well and realize that there is considerable space for improvement.*

Africa is littered with hasty studies such as the one referred to above, which are usually followed by high-profile conferences with grand declarations and recommendations. Considering the general development aid funding context, the challenge is to undertake more systematic, research-informed studies to diagnose problems in a way that avoids hasty prescriptions. The lack of implemented reform in Africa is often lamented as a problem of 'good policy but poor implementation', which is then attributed to a lack of capacity or funds. However, the difficulty actually originates with superficial understandings of the problem, followed by declarations rather than policy, as well as a lack of consensus on what to do. All of this gives rise to inevitable implementation disappointment.

## **Debates and developments in doctoral education in South Africa**

### *More PhDs to produce knowledge and address the quality problem in South Africa*

Over the past two decades, the dominant debate in higher education in South Africa (as in many other parts of the world) has been about access and equity. In particular, the emphasis

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<sup>1</sup> The six universities included Kenyatta in Kenya, Doula in Cameroon, Ilorin in Nigeria, Science and Technology of Benin, Gaston Berger in Senegal, and the National University of Rwanda.

has been on how to increase the number of high school graduates entering universities and how to address racial and gender imbalances in the higher education system. Access, in this context, was not seen as massification or as part of a development model, but rather as a mechanism for redressing the imbalances of the past by using a model of planned growth. This approach succeeded in increasing the percentage of head count black<sup>2</sup> students in universities (from 53% in 1996 to 70% in 2012) but it hardly affected the overall gross participation rates of African students, which only increased from 10% to 16% over the same period (Cloete 2014).

A shift in discourse from equity to development became apparent in the South African Ministry of Planning's national development planning process and subsequent proposals. Central to a highly productive, globally connected economy are high-level skills and extensive participation in higher education. The first draft of the new *National Development Plan (NDP): Vision for 2030* embraced the knowledge economy argument; in fact, it was so enthusiastic about knowledge production that it declared that 'knowledge production is the rationale of higher education' (NPC 2011: 271). This is indeed a radical departure from the traditional role of higher education in Africa, namely the dissemination, through teaching, of knowledge from elsewhere. It is also a significant departure from the post-1994 focus on higher education as an equity instrument to provide mobility for the historically disadvantaged (Cloete et al. 2011).

An important reason provided in the NDP for the focus on the doctorate is the perception of poor quality in the higher education system as a whole as well as the importance of staff qualifications for ensuring quality (NPC 2012: 318). As such, the basic argument underlying the *NDP 2030* runs as follows: raise the qualifications of staff – in other words, increase the number of academics with PhDs – and the quality of the student outcomes will improve. It is also assumed that this will significantly improve throughput, the capacity to supervise higher degrees and, ultimately, the research productivity of the sector. In short, as Muller (2013: 2) observes, 'quality defined as having a PhD is seen by the *NDP 2030* as being the key that will unlock a virtuous cycle of effects.'

In a more targeted planning approach than that of the national education ministry, the National Planning Commission, in Chapter 9: Improving Education, Training and Innovation in the *NDP 2030*, started with an empirical, rather than an ideological, statement: 'South Africa has a differentiated system of university education, but the system does not have the capacity to meet the needs of the learners' (NPC 2012: 318). It then presented a somewhat muddled mixture of system features. However, unlike any previous policy document, it made a number of bold proposals for universities and for the doctorate in particular (ibid.: 318–320):

- Improve the qualifications of higher education academic staff from the current 39% to 75% (this is the number one recommendation).
- Produce more than 100 doctoral graduates per million by the year 2030. South Africa

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2 Following South African convention, the term 'black' is used in this chapter to refer to African, Coloured and Indian race groupings.

- currently produces 28 per million, which is low by international standards.
- To achieve the target of 100 per million, the country needs more than 5 000 doctoral graduates per annum, as against the current figure of 1 878.
  - If South Africa is to be a leading innovator, the majority of these doctorates should be in science, engineering, technology and mathematics.
  - Increase the number of masters and PhD students: by 2030 over 25% of university enrolments should be at the postgraduate level.
  - Strengthen universities that have an embedded culture of research and development.
  - Provide performance-based grants to develop centres or networks of excellence within and across institutions. International exchange partnerships should be encouraged.

The *NDP 2030* went further by stating the aim of producing more than 100 doctoral graduates per one million of the population by 2030. Roughly speaking, this means that the annual production of doctoral graduates will have to increase from 1 420 per annum (in 2010) to 5 000 per annum in 2030 (NPC 2012: 319). The *NDP 2030* acknowledged that there was ‘a shortage of academics’ and that just over a third possessed a PhD – qualifying them to supervise a PhD (ibid.: 317). Where will this extra supervisory capacity come from, let alone the increased number of PhD students? The *NDP 2030* identified three new sources (ibid.: 319):

- Local institutions with ‘embedded research capacity’ that should, in return for recognition of this niche, assist with supervision at other universities that only focus on teaching and learning;
- Partnerships with industry and commerce; and
- Partnerships and exchanges with international universities.

Following the *NDP 2030* report, the Minister of Science and Technology, Naledi Pandor, in her 2014 budget speech, announced that the government would need to set aside an additional USD 580 million a year to meet the NDP target of producing 5 000 PhD students annually (Kahn 2014). The Minister also argued that South Africa lacks research supervision capacity and that the doctoral student pipeline is too narrow. As such, additional measures would include providing support to researchers who are capable of supervising postgraduate students, and creating appropriate incentives for students to remain in the system up to doctoral level. She also announced that the Department of Science and Technology (DST) had begun investing in emerging researchers through postdoctoral and research career-advancement fellowships. The Minister further reported that the DST would invest USD 50 million in a coordinated approach to science education, science awareness and science communication, and that the DST/Treasury-supported internship programme had, during 2012/2013, supported 1 341 unemployed graduates in work experience in science, engineering and technology institutions. Of these, 58% had been absorbed into permanent employment in the same institutions while the others had found employment

elsewhere (ibid.). Another ambition of the DST was to increase the proportion of black researchers from 28% in 2014 to 40% in 2016/2017 and to raise the proportion of women from 36% to 50% (Wild 2014).

### *The drive towards the internationalisation of PhDs in South Africa*

At the national level in South Africa, the internationalisation of postgraduate enrolments is advocated by various policy documents. The *National Plan for Higher Education* (MoE 2001: 2.8.1.2), for instance, recommended that institutions increase recruitment of students from the Southern African Development Community (SADC), especially at the postgraduate level. Similarly, the *NDP 2030* envisaged South Africa establishing itself as a hub for higher education and training in the region that is capable of attracting a significant share of the international student population (NPC 2012). The *White Paper for Post-School Education and Training* (DHET 2013a: 40) noted that hosting large numbers of international students, especially SADC students, represents a major contribution by South Africa to the development of the subcontinent. It also highlights the fact that all the countries in the SADC region are interdependent and that the strengthening of Southern African economies will inevitably result in the improvement of South Africa's own economy.

The simple reality is that if the South African higher education system wants even remotely to achieve the target of 5 000 or more PhD graduates per annum, then the system will have to enrol and graduate more students – from South Africa, the rest of Africa and the rest of the world!

There are a number of approaches to or 'models' for attracting international students.<sup>3</sup> The first model, the 'internationalisation drive', is based on information and/or contacts from international offices at universities with strong internationalisation programmes. In South Africa, the Nelson Mandela Metropolitan University (NMMU) is probably the prime example. In their internationalisation strategy, they propose that each university programme and faculty must have internationalisation targets, with enrolment plans and an agreed-upon target indicator (for 2014 it is 9% overall) (NMMU 2014: 6).<sup>4</sup>

Almost diametrically opposed to the 'internationalisation drive' approach is the 'traditional academic' model in which an ambitious student approaches a high-status academic for supervision. This model is probably much less common primarily because students from the rest of Africa who have not studied in South Africa would not have the tacit knowledge about or the necessary connections within the system. Another version of this is where institutions (or even governments) in other African countries identify a South African academic department and negotiate a relationship, often with funding and support from both sides.

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3 Currently, there are no statistics about which model attracts what number of students.

4 It could be argued that the NMMU model is based on the Australian approach to recruiting East Asian students. In this, the two components include aggressive advertising, and having an office for the director of the international office that is only marginally smaller than that of the vice-chancellor (ostensibly to show foreigners how important internationalisation is).

A third internationalisation model could be called ‘capacity-building doctoral education’. There are two types of such capacity-building approaches at the University of Stellenbosch. The first is the Partnership for Africa’s Next Generation of Academics (PANGeA), a collaborative network of leading African universities that is developing research capacity and confidence in order to bring African expertise to bear on Africa’s challenges.<sup>5</sup> The network aims to develop research capacity on site; offer supervision for and participate in collaborative doctoral programmes, research programmes focused on Africa and joint doctoral degree programmes; and offer three-year full-time residential scholarships. The funding for this programme comes from Stellenbosch University and partner institutions (which provide sabbatical and salaries during absence), as well as foreign donors.<sup>6</sup> Students register for this programme at Stellenbosch University, or jointly with a partnership institution, with the requirement that students return to the partnership institution once they have completed their degrees. From the three cohorts that completed in 2012–2014, all 26 PANGeA graduates have resumed their academic posts at the partner universities. This suggests that the PANGeA initiative could be a ‘safeguard against the brain drain to the south of the continent’.<sup>7</sup> However, this initiative has not been without challenges: thus far no joint degrees have been issued and there has been limited research cooperation between senior professors.

The second doctoral capacity-building programme at Stellenbosch University, the African Doctoral Academy, focuses on skills and training. Strategically, the Academy aims to support, strengthen and advance doctoral training and scholarship on the continent across disciplines, through scholarship workshops, two-month summer schools, accredited supervision courses, research methodology and proposal-writing workshops, and mentorship. This programme is largely funded by foreign donors and the January 2015 summer school will have about 250 participants from all over Africa. In contrast to the PANGeA programme, these students are registered at their home institutions and not at Stellenbosch University.

The above is just a brief summary of some of the programmes and approaches adopted by institutions to attract international students. A more comprehensive survey/study of these types of programmes across South African universities would indeed be very informative.

## **Data on doctoral production in South Africa: 2000–2012**

The most reliable data on doctoral education in South Africa is available from 1996, while that for international students is from 2000 – the earliest date for which there is audited data on the

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5 PANGeA website: [www.pangeaonline.org](http://www.pangeaonline.org). The founding partners are the universities of Stellenbosch, Botswana, Dar es Salaam, Makerere, Malawi and Nairobi.

6 Personal communication, Cindy Steenekamp, Centre for International and Comparative Politics, Stellenbosch University (4 December 2014).

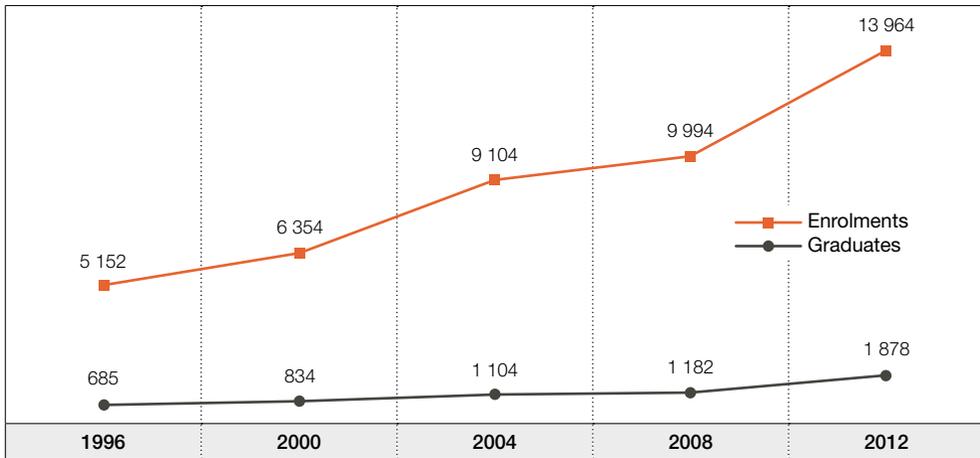
7 Personal communication, Cindy Steenekamp, Centre for International and Comparative Politics, Stellenbosch University (4 December 2014).

nationality of students in the South African Higher Education Management and Information System (HEMIS). Thus, the analysis of doctoral enrolments in South Africa presented here covers the period 1996–2012, while most of the international trend analyses will cover the period 2000–2012.

The four-year time periods from 2002–2012 roughly correspond with important policy moments in the South African system. A benchmark year was 2000, when the Council on Higher Education launched the *Towards a New Higher Education Landscape* report (CHE 2000). This report prompted the Ministry of Education’s *National Plan for Higher Education* (MoE 2001) which, amongst others, led to mergers that reduced the South African system from 36 to 23 universities. During 2004, a new funding framework was introduced that included an important principle of using funding as a steering lever, which also affected the newly merged institutions.<sup>8</sup> This framework was fully implemented by 2008, which makes it a key year for looking at possible steering effects.

Figure 5.1 below shows that doctoral enrolments increased from 5 152 in 1996 to 13 964 in 2012. This was a 6.4% average growth per annum, which was slightly faster than the growth in masters enrolments (5%), and considerably faster than the average undergraduate growth (3%). There was a surge in doctoral enrolments between 2000 and 2004, from 6 354 in 2000 to 9 104 in 2004, an increase of 2 750 (or 43%).

**Figure 5.1** PhD enrolments and graduates (1996–2012)



Compiled by Charles Sheppard  
Sources: DoE (1999) and DHET (2013b)

<sup>8</sup> While the funding framework was introduced during 2003/2004, it only became fully functional during the 2007/2008 financial year.

Doctoral graduates increased from 685 in 1996 to 1 878 in 2012. Overall, therefore, graduates increased by 6.5% on average per annum, compared to the 6.4% average annual growth rate of enrolments. The possible effects of the full introduction of government funding incentives, which were designed to encourage postgraduate studies,<sup>9</sup> can be seen in the enrolment increases that occurred between 2008 and 2012. During this period, PhD enrolments and graduates grew at an average annual growth rate of 8.7% and 12.3% respectively.

### *Doctoral enrolments and graduations by nationality*

Prior to 1994, South Africa had a very small number of international students. The fact that in 2000 the DHET started recording nationality in HEMIS signals that a change was occurring. The data in this analysis are classified as follows:

- South African students (those with a South African identification number); and
- International students, who are further divided into
  - Students from the rest of Africa (i.e. those who are from Africa, but not from South Africa); and
  - Other international students (i.e. those who are neither from South Africa nor from other African countries). As will be seen, on the whole this group constitutes a very small proportion of the total group of international students.

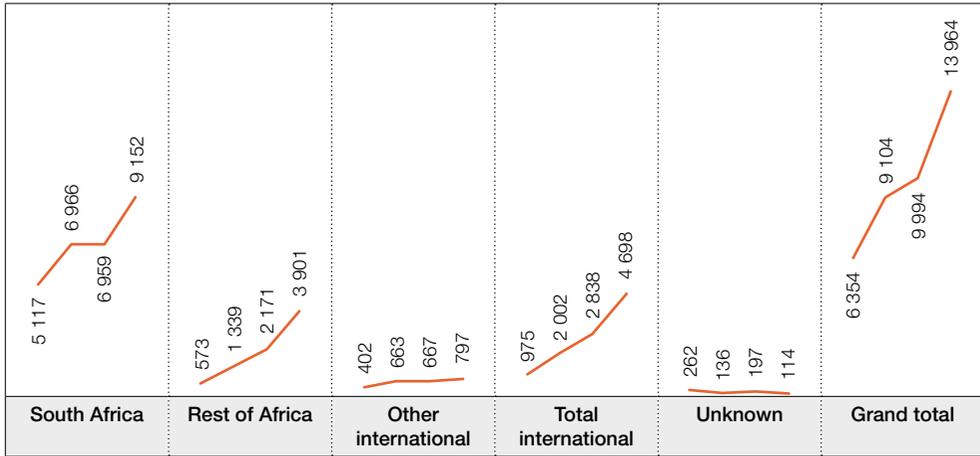
Overall, for the period 2000–2012, doctoral enrolments increased from 6 354 to 13 964, a growth of 7 610 (120%) (see Figure 5.2). South African enrolments increased from 5 117 to 9 152 (a growth of 79%). This compared to an increase from 975 to 4 698 (382%) among all international students and, within this, enrolments among students from the rest of Africa increased from 573 to 3 901 (581%).

For South Africans, the annual growth rate of 5% for enrolments was slightly below the overall annual growth of 6.8% for the cohort. By comparison, the annual growth rate of 14% for all international students was almost two-and-a-half times that for South Africans and, within this, the growth rate of 17.3% for students from the rest of Africa was three-and-a-half times more than for South Africans (see Figure 5.3). Thus, while by 2012 the South African students still comprised more than half the total enrolments (9 152 out of 13 964), enrolments among all international students were growing at almost three times (14% versus 5%) the rate of the South Africans.

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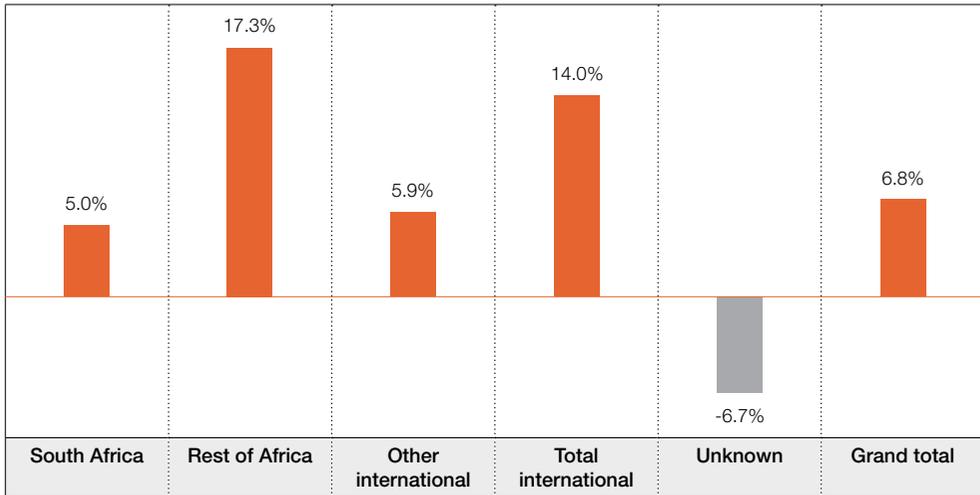
<sup>9</sup> For enrolment funding purposes, fields of study are divided into four groupings, with education, law, psychology and public management in Group 1, and agriculture, health sciences and performing arts in Group 4. Upon graduation, the total funding per graduate ranges from around USD 45 000 for Group 1 graduates to USD 65 000 for Group 4 graduates. Universities receive the highest funding for PhD graduates, which is a substantial incentive to produce more PhDs.

**Figure 5.2** PhD enrolments by nationality (2000, 2004, 2008, 2012)



Compiled by Charles Sheppard  
Source: DHET (2013b)

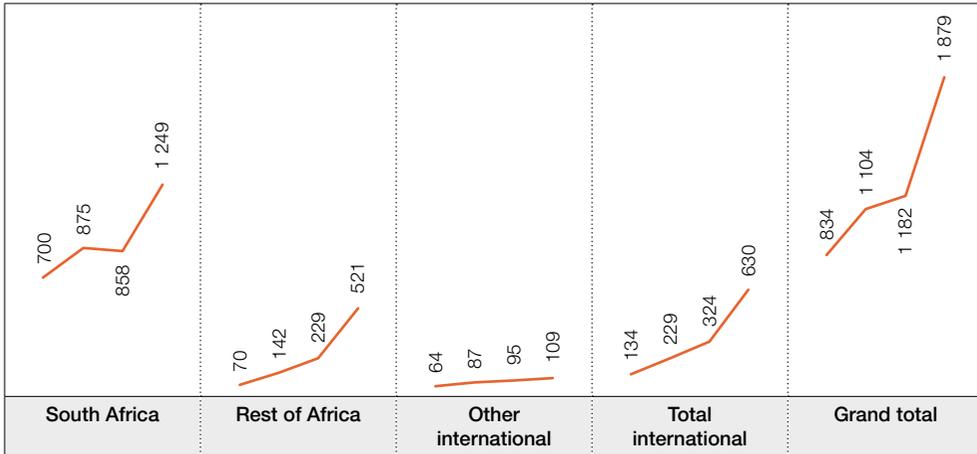
**Figure 5.3** Average annual growth rate of PhD enrolments by nationality (2000–2012)



Compiled by Charles Sheppard  
Source: DHET (2013b)

Overall, for the period 2000–2012, doctoral graduates increased from 834 to 1 879, a total growth of 125% (see Figure 5.4). The number of South African graduates increased from 700 to 1 249 (78%). International graduates increased from 134 to 630 (370%) and, within this, graduates from the rest of Africa increased from 70 to 521 (644%).

**Figure 5.4** PhD graduates by nationality (2000, 2004, 2008, 2012)



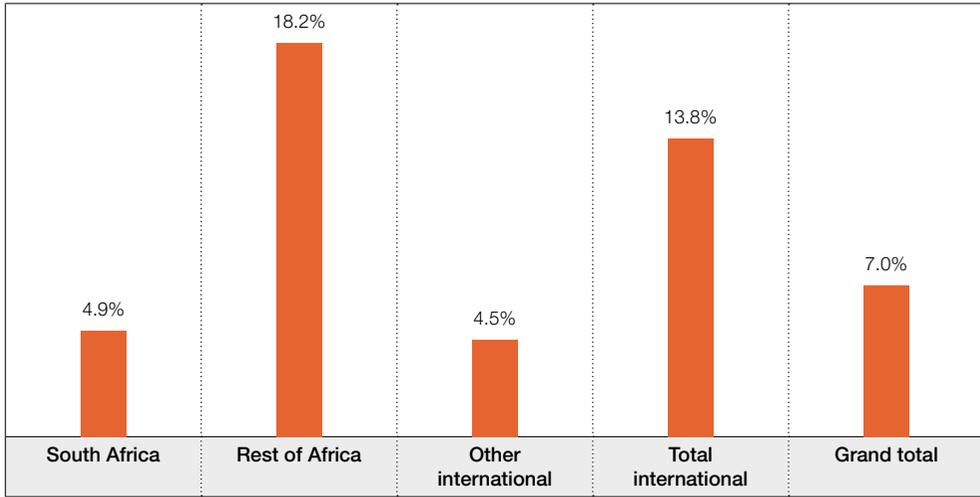
Compiled by Charles Sheppard  
Source: DHET (2013b)

An analysis of doctoral graduates by nationality for 2012 illustrates that, similar to enrolments (65.5%), South Africans of all races constituted 66.5% (1 249) of all doctoral graduates, while international students constituted a 33.5% (630) share.

For graduates, the overall growth rate of 7% (see Figure 5.5) was very similar to that of enrolments (6.8%), implying that the same efficiency ratio had been maintained. For South Africans, the annual growth rate of 4.9% for graduations was slightly below the overall annual growth of 7% for the cohort (see Figure 5.5). The annual growth rate of 13.8% for all international students was more than double that of South Africans, while the growth rate of 18.2% for students from the rest of Africa was three-and-half times more than for South Africans. Similar to the trends in enrolments, while by 2012 the South Africans still comprised around two thirds (1 249 out of 1 879) of the total graduates, the number of international graduates was growing at almost three times the rate (13.8% versus 4.9%) on average per annum.

In terms of efficiency, a cohort analysis was performed in which individual students were tracked based on records extracted from the HEMIS database. Enrolments and graduates were linked through cohort-tracking, starting with 2006. This allows for accurate measures and comparisons of the proportion of doctoral students who do not complete their studies, as well as the share of students who eventually graduate. For the 2006 cohort, the results show that after seven years, the completion rate for all international students was 47%, as compared to 45% for South African students. The tendency for international doctoral students to complete more quickly than national students has also been observed in the United States and Norway (Cloete & Mouton forthcoming).

**Figure 5.5** Average annual growth rate of PhD graduates by nationality (2000–2012)



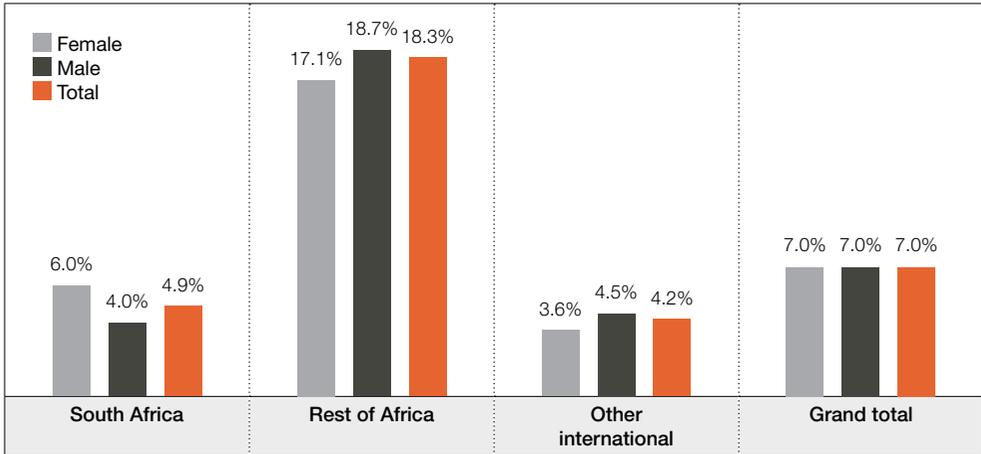
Compiled by Charles Sheppard  
Source: DHET (2013b)

### *Gender*

In total, over the period 2000–2012, the gender distribution remained the same with an average annual growth rate of 7% for males and females (see Figure 5.6). In both 2000 and 2012, 42% of the PhD graduates were female. The biggest change was amongst South Africans where the number of female PhD graduates increased at an average annual rate of 6% compared to 4% among male graduates. This translated into female PhD graduates increasing their share from 45% to 50% over the period 2000–2012. Among the students from the rest of Africa, the number of male PhD graduates increased at a higher rate over this period (18.7%) compared to female graduates (17.1%). The percentage of female graduates from the rest of Africa declined from 30% in 2000 to 27% in 2012. Similarly, the share of females from the international group of PhD graduates declined from 30% to 28% over the same period.

### *PhD graduates by nationality and field of study*

As indicated in Figure 5.1 above, the total number of PhD graduates increased from 834 to 1 878 over the 2000–2012 period, which represented a total increase of 125% and an average annual growth rate of 7%. Disaggregating the data by nationality for this period reveals that graduates from the rest of Africa and other countries combined increased at a much higher rate (total increase of 320%, average annual growth rate of 13%) than the South African PhD graduates (total increase of 80%, average annual growth rate of 5%).

**Figure 5.6** Average annual growth rates by nationality and gender (2000–2012)

Compiled by Charles Sheppard  
Source: DHET (2013b)

In 2000, the majority of graduates in both the South African (39.6%) and international (43%) groups were in the humanities. This was followed by the natural sciences with 20.9% South African and 27.8% international graduate groups in the same year. By 2012 these percentages had switched around: of the South African graduates, 31.7% were in the natural sciences compared to 28.8% in the humanities and social sciences, and for the international graduates, 39.9% were in the natural sciences and 27.7% in the humanities and social sciences. Both groups showed a decline in the percentage of graduates in the health sciences (South Africans from 12.3% to 11.1%, international from 13.9% to 8%) and in education (South Africans from 16.3% to 12.2%, international from 8.2% to 7.7%).

The percentage of graduates in business, economic and management sciences increased for both groups: from 4% to 8.4% for South Africans, and from 0.6% to 9.2% for international graduates. Engineering graduates also increased as a percentage of the total graduates for both groups (South African from 7% to 7.8%; international from 6.3% to 8%). It is thus evident that both the South African and international graduates have increased in the natural sciences, engineering and technology, business, economic and management sciences at the expense of graduates produced in the humanities and social sciences.

### *University differentiation in internationalisation*

South Africa has a university system that is differentiated in terms of type of institution, performance in terms of knowledge production and, as was suggested in the section on foreign student policy above, differences in approach to internationalisation. Table 5.1 shows that the University of Cape Town produced the most doctorates during the post-2000 period,

**Table 5.1** International PhD graduates per university (2000–2012)

Institution	2000	2004	2008	2012	Total for all years from 2000–2012	Accumulative percentage
Cape Town	25	33	51	80	676	14.9%
Stellenbosch	12	17	34	75	559	27.2%
KwaZulu-Natal	13	25	39	70	554	39.4%
Pretoria	8	38	45	68	497	50.3%
South Africa	31	27	28	62	467	60.6%
Witwatersrand	17	29	40	48	414	69.7%
Western Cape	4	9	16	33	224	74.6%
Nelson Mandela	1	4	10	30	215	79.3%
North West	2	7	10	30	207	83.9%
Fort Hare	–	2	7	25	166	87.5%
Rhodes	7	14	10	24	142	90.7%
Johannesburg	3	4	11	23	121	93.3%
Tshwane	–	–	4	22	97	95.4%
Free State	10	12	12	14	70	97.0%
Cape Peninsula	–	–	3	11	40	97.9%
Zululand	–	1	3	5	36	98.7%
Central	1	2	–	3	28	99.3%
Limpopo	–	3	1	3	10	99.5%
Vaal	–	–	–	2	7	99.6%
Durban	–	–	–	1	6	99.8%
Venda	–	1	–	1	6	99.9%
Walter Sisulu	–	1	–	–	4	100.0%
<b>TOTAL</b>	<b>134</b>	<b>229</b>	<b>324</b>	<b>630</b>	<b>4 546</b>	

Compiled by Charles Sheppard  
Source: DHET (2013b)

followed closely by Pretoria, KwaZulu-Natal, Witwatersrand, South Africa and Stellenbosch. These six universities produced 70% of the international PhD graduates. However, these are total numbers in institutions that vary considerably in size. If adjusted for overall number of students, Cape Town, Stellenbosch and Rhodes University do the best.

Table 5.1 also shows different patterns in growth. Of the high ‘internationalisers’, Pretoria started rather slowly (with eight) in 2000, but then accelerated by growing by 700%, while the University of South Africa remained stagnant during 2004 and 2008, before doubling their 2000 numbers in 2012. Of the historically disadvantaged institutions, Western Cape (four in 2000 to 33 in 2012) and Fort Hare (two in 2004 to 30 in 2012) have also become part of the internationalisation process.

**Table 5.2** Top 20 countries of origin of the 2012 international PhD graduates

No.	Country	2012	Accumulative percentage
1	Zimbabwe	142	22.5%
2	Nigeria	76	34.6%
3	Kenya	43	41.4%
4	Uganda	29	46.0%
5	Ethiopia	23	49.7%
6	United States	23	53.3%
7	Cameroon	19	56.3%
8	Ghana	19	59.4%
9	Tanzania	18	62.2%
10	Zambia	17	64.9%
11	Democratic Republic of Congo	15	67.3%
12	Lesotho	15	69.7%
13	Malawi	15	72.1%
14	Sudan	15	74.4%
15	India	13	76.5%
16	Mozambique	13	78.6%
17	Namibia	13	80.6%
18	Germany	11	82.4%
19	Botswana	10	84.0%
20	Rwanda	10	85.6%

Compiled by Charles Sheppard  
Source: DHET (2013b)

### *Country of origin*

In 2012, from a total of 1 878 graduates, 630 (33.6%) were international students from 59 countries. Table 5.2 lists the top 20 countries and shows that ten countries contributed 64% of the total. Zimbabwe with 142 (22.5%) topped the list, followed by Nigeria (76), Kenya (43), Uganda (29) and Ethiopia (23). The only country in the top ten that is not from the African continent was the United States with 23 (3.7%). Twenty-one countries only contributed one graduate per country. In terms of the BRICS countries, India (15), China (7) Russia (3) and Brazil (1) do not yet feature as prominently as much of the cooperation hype would suggest. For a full list see Appendix Table A5.1.

Notably, in 2012, the total number of international graduates was 630, of which 521 (82.7%) were from the rest of Africa and only 109 (17.3%) were from countries outside of Africa.

### *Data on African PhDs in South Africa*

In post-apartheid South Africa, transformation in higher education was framed by the Nelson Mandela-appointed National Commission on Higher Education (NCHE 1996). The three main pillars of reform focused on increasing participation in higher education and in governance, and on greater relevance. However, equity, gender and particularly race constituted the dominant discourse. Although equity was dominant in the NCHE report, there was no unanimity on how to redress it (Cloete 2014).

In terms of formal policy, the *Education White Paper 3: A programme for the transformation of higher education* (DoE 1997: 2.91, 2.94) emphasised the importance of increased access of black (i.e. African, Coloured and Indian) and female students to masters, doctoral and postdoctoral programmes, as a means of increasing the pool of researchers and improving the demographic representation of staff in higher education. Furthermore, recommendations of the *NDP 2030* included increasing the number of African and female postgraduates, especially at the doctoral level, to improve research and innovation capacity and to normalise staff demographics (NPC 2012: 327). The *NDP 2030* also envisaged South Africa establishing itself as a regional hub for higher education and training, capable of attracting a significant share of the international student population (ibid.: 319).

Figure 5.7 shows South African doctoral graduates for 1996–2012 according to race groupings. The major change was in African graduates whose numbers increased from only 58 in 1996 to 821 in 2012, compared to 816 white graduates, 142 Indian graduates and 100 Coloured graduates. The proportion of African doctoral graduates increased from 8% to 44% while the proportion of white graduates declined from 86% to 43%. The demographic profile of graduates has changed drastically in line with the demographics for enrolments. In 2010, African enrolments (5 065) first exceeded white doctoral enrolments (4 853) and, in 2012, African graduates (821) exceeded white graduates (816) for the first time in South Africa's history.

There were also changes in the gender balance over this period where the proportion of female graduates increased from 35% in 1996 to 42% in 2012, although this change was not as dramatic as the race reversal between African and white doctoral graduates highlighted above.

#### *South African-Africans and the rest of Africa*

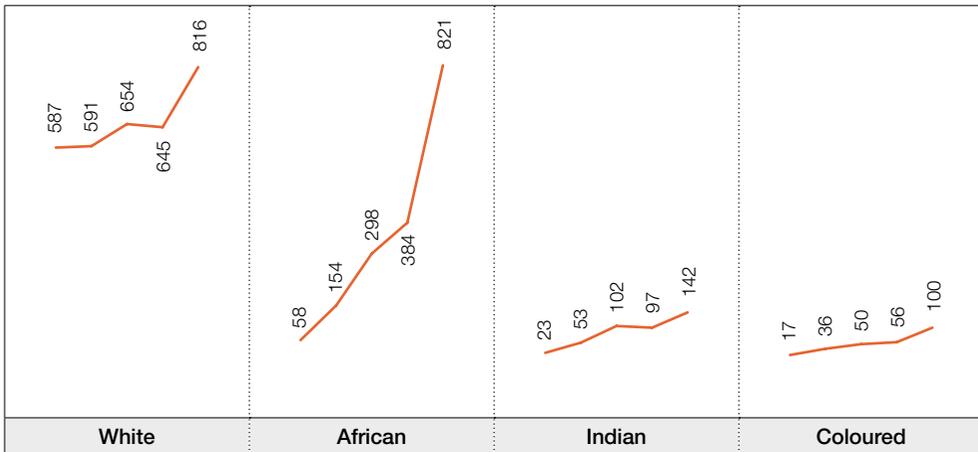
Despite all the policy attention on equity, in 2013 there was once again a heated debate, referred to as 'passionate commentaries' by Govinder et al. (2014), in the *South African Journal of Science* and the national press, about a lack of transformation. The Equity Index attempted to assess the racial and gender demographics of each university against national demographics, using a mathematical formula to attribute numerical distances between pairs of points in a multidimensional space (ibid.).<sup>10</sup> Part of the debate was that Govinder et al.

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<sup>10</sup> For a more detailed discussion, see Cloete (2014) and Govinder et al. (2014).

had not included ‘foreigners’ (code word for Africans from the rest of Africa) in their equity index for students, but had included their publications under staff. Govinder et al. (ibid.: 2) concluded in their response that they ‘acknowledge that there is no agreement on if and how Non-South African (blacks) should be included in the equity index (or indeed in any discussion incorporating demographics in South Africa).’

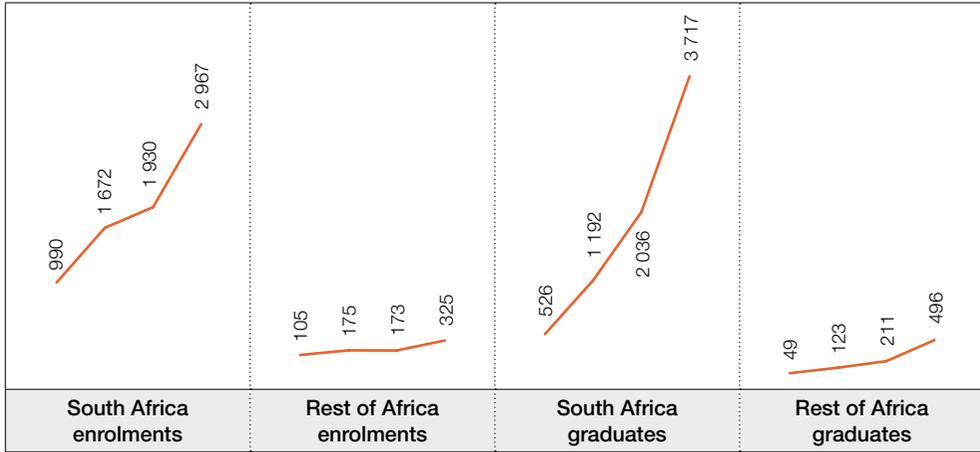
**Figure 5.7** South African doctoral graduates by race (1996, 2000, 2004, 2008, 2012)



Compiled by Charles Sheppard  
Sources: DoE (1999) and DHET (2013b)

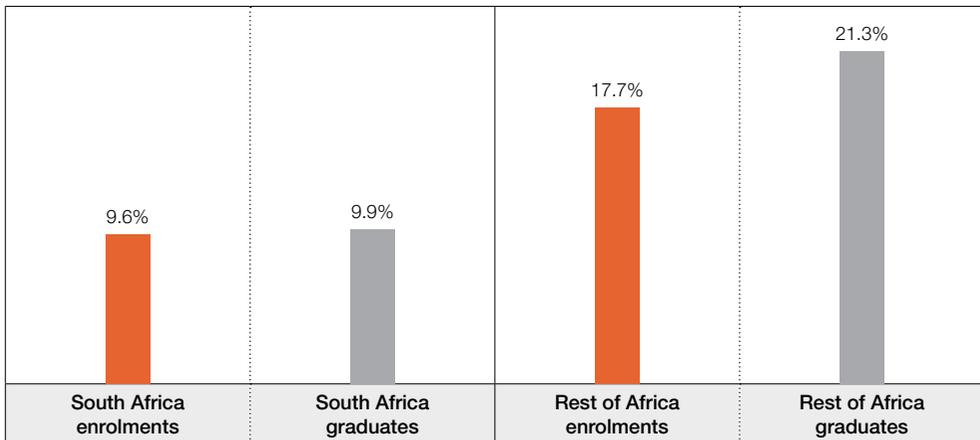
Nevertheless, the Africans in South African doctoral education come from the continent as a whole and not just South Africa. Figure 5.8 below shows that in 2000 the number of South African-African enrolments (990) were almost ten times those of the rest of Africa (105). By 2012, there were 750 more enrolments and 171 more graduates from the rest of Africa than there were among SA-Africans. A notable change happened in the period 2004–2008 when the SA-African enrolments increased by 258 (15%) and the rest of Africa by 844 (71%). The annual growth rate, which is a much stronger indicator than overall growth percentage, shows that on an annual basis among students from the rest of Africa doctoral enrolments grew at 17.7% and graduates at 21.3%. This was more than double the rate for SA-Africans for which the average annual growth rates were 9.6% for enrolments and 9.9% for graduates.

**Figure 5.8** South African-African and rest of Africa enrolments and graduates (2000, 2004, 2008, 2012)



Compiled by Charles Sheppard  
Source: DHET (2013b)

**Figure 5.9** South African-African and rest of Africa enrolments and graduates: Average annual growth rate (2000–2010)



Compiled by Charles Sheppard  
Source: DHET (2013b)

### *Female African doctorates*

It is beyond the scope of this chapter to explore the profile of female African PhD enrolments and graduations in any great detail; this will be dealt with more extensively in the forthcoming book by Cloete and Mouton. It is, however, worth noting some key trends over the 2000–2012 period.

With regard to enrolments, there were significant increases among African females from South Africa and females from the rest of Africa: the SA-African enrolments increased from 336 in 2000 to 1 306 in 2012 (a total increase of 288%), while the female enrolments from the rest of Africa increased from 114 to 1 034 (a total increase of 807%). The annual growth rate for females from the rest of Africa was 20.2%, almost twice as fast as for SA-Africans (12%). In terms of graduations, the number of SA-African female graduates increased from 26 in 2000 to 104 in 2012 (a 300% increase); by contrast, graduations amongst females from the rest of Africa increased from 14 to 136, which is a total increase of 871%. The annual growth rate differences were very similar to those for enrolments: 12.2% for SA-African females and 20.9% for females from the rest of Africa.

The enrolments of African female PhDs in South Africa and the rest of Africa have increased at higher rates than for males: 12% on average for SA-African females compared to 8.1% for SA-African males; and 20.2% for females from the rest of Africa compared to 16.9% for their male counterparts. Whilst the growth in enrolments was the highest among females from the rest of Africa, males from the rest of Africa improved their graduation efficiency the most, with an average annual growth rate of 21.5%.

Finally, with regard to field of study, the majority of SA-African female students obtained their PhD degrees in the humanities and social sciences (28.8%) and the natural sciences (22.1%), while the majority of female graduates from the rest of Africa obtained their PhD degrees in the natural sciences (38.2%) and the humanities and social sciences (32.4%).

### *Summary of data*

#### *Trends among PhD students from South Africa, the rest of Africa and other countries*

- Enrolments:
  - In the post-apartheid period in South Africa, doctoral enrolments overall increased by 171% from 5 152 in 1996 to 13 964 in 2012 (the 6.4% average growth per annum was considerably faster than the average undergraduate growth of 3%).
  - In terms of the trends in the internationalisation of PhDs in South Africa, overall for the period 2000–2012,<sup>11</sup> doctoral enrolments increased from 6 354 to 13 964, a growth of 7 610 (120%). South African enrolments increased from 5 117 to 9 152

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<sup>11</sup> Owing to the availability of data, the trends in the internationalisation of PhDs in South Africa can only be analysed from the year 2000 onwards.

- (a growth rate of 79%). This compared to an increase from 975 to 4 698 (382%) among international students and, within this, enrolments among students from the rest of Africa increased from 573 to 3 901 (581%).
- In 2012, the enrolments among South African students were still contributing to almost half the total enrolments (9 152 out of 13 964), although enrolments among all international students were growing at almost three times (14% versus 5%) the rate of the South Africans.
  - Graduates:
    - An analysis of doctoral graduates by nationality for 2012 illustrates that, similar to enrolments (65.5%), South Africans of all races constituted 66.5% (1 249) of all doctoral graduates, while international students constituted a 33.5% (630) share.
    - Overall for the period 2000–2012, doctoral graduates increased from 834 to 1 879, a total growth of 125%. The number of South African graduates increased from 700 to 1 249 (78%). International graduates increased from 134 to 630 (370%) and, within this, graduates from the rest of Africa increased from 70 to 521 (644%).
    - The fastest growing group of graduates was students from the rest of Africa, with an average annual growth rate of 18.3%, which was three-and-a-half times faster than the South African group.
    - In 2012, the South Africans were still contributing around two thirds (1 249 out of 1 879) of the total graduates, but the number of international graduates was growing almost three times faster (13.8% versus 4.9%) on average per annum.
    - Seven years after registration, the completion rate for all international students was 47%, as compared to 45% for South African students.
  - Graduations by field of study:
    - Over the period 2000–2012, there was an interesting switch in terms of field of study between the South African and international PhD graduates: in 2000, the majority of South Africans (39.6%) were in the humanities but by 2012, the majority (31.7%) was in the natural sciences. Among the international students, in 2000, 43% of the PhD graduates were in the humanities, but by 2012, this had shifted to 39.9 % in the natural sciences compared to 27.7% in the humanities and social sciences.
    - Overall, the number of both the South African and international graduates increased in the natural sciences, engineering and technology, business, economic and management sciences at the expense of graduates produced in the humanities and social sciences.
  - Institutional, country of origin and race differentiation:
    - The university system in South Africa is notably differentiated in terms of producing doctoral graduates. The University of Cape Town (676) produced the most international doctorates during the post-2000 period, followed by Stellenbosch (559), KwaZulu-Natal (554), Pretoria (497), South Africa (467) and Witwatersrand

(414). Together, these six universities produced 70% of the international PhDs for the 2000–2012 period.

- In 2012, students from 59 countries around the globe obtained a PhD in South Africa. Zimbabwe (142), Nigeria (76), Kenya (43), Uganda (29) and Ethiopia (23) produced 50% of the international PhD graduates, with the United States (23) in sixth place.
- In 2010, among the South African students, African enrolments (5 065) first exceeded white doctoral enrolments (4 853) and, in 2012, African graduates (821) for the first time in the history of South Africa exceeded white graduates (816).

*Trends amongst African PhD students from South Africa and the rest of Africa*

- Enrolments:
  - In 2000, the number of SA-African enrolments (990) was almost double those of the rest of Africa (526), but by 2012 there were (750) more enrolments from the rest of Africa (3 717) than the SA-African (2 967) enrolments. The annual growth rate was almost twice as fast for students from the rest of Africa (17.7% versus 9.6%).
  - With regard to gender, the female SA-African enrolments increased from 336 in 2000 to 1 306 in 2012, a total increase of 288%, while the enrolments among females from the rest of Africa increased from 114 to 1 034, a total increase of 807%. The annual growth rate for female PhD enrolments for the rest of Africa was 20.2%, almost twice as fast as for South Africans (12%).
  - The enrolments of African female PhDs in South Africa and the rest of Africa have increased at higher rates than for their male counterparts: 12% on average for African females in South Africa compared to 8.1% for African males; and 20.2% for females from the rest of Africa, compared to 16.9% for males.
- Graduates:
  - In 2000, there were 105 SA-African graduates, compared to 49 from the rest of Africa. By 2012, graduates from the rest of Africa totalled 496, against the 325 among the SA-Africans. The average annual growth rate was 9.9% for SA-Africans compared to the 21.3% for the rest of Africa.
  - The number of SA-African female graduates increased from 26 in 2000 to 104 in 2012 (a 300% increase); by contrast, female graduates from the rest of Africa increased from 14 to 136 (a total increase of 871%). The annual growth rate differences were very similar to those for enrolments: 12.2% for SA-African females and 20.9% for females from the rest of Africa.
  - Whilst the growth in graduations was the highest for females from the rest of Africa, males from the rest of Africa improved their graduation efficiency the most, with an average annual growth rate of 21.5%.
- Graduations by field of study:
  - The majority of SA-African female students obtained their PhD degrees in the

humanities and social sciences (28.8%) and the natural sciences (22.1%), while the majority of females from the rest of Africa obtained their PhD degrees in the fields of natural sciences (38.2%) and the humanities and social sciences (32.4%).

## South Africa as a PhD hub?

There are three key factors that contribute positively to the possibility of South Africa becoming a PhD hub for the continent. The first, highlighted earlier in this chapter, is the considerable investments the South African government intends to make towards increasing doctoral production; improving supervisory capacity among academics; providing incentives for students to remain in the system up to doctoral level; and supporting unemployed graduates in work experience in science, engineering and technology institutions. The second, as highlighted by the data presented in the preceding sections, is related to significant increases in doctoral enrolments and graduations – within the higher education system as a whole and, specifically with regard to internationalisation, in the enrolments and graduations among international students, and in particular among students from the rest of Africa.

A third factor is that, relatively speaking, South Africa is an inexpensive destination for PhD candidates from other African countries.<sup>12</sup> In the United Kingdom, the average tuition fees for a full-time research PhD in education or the social sciences at Bath University are USD 6 600 for UK and European Union residents and USD 21 450 for students from other countries. With living costs at around USD 18 000 per annum, the total comes to around USD 46 050. In the United States, at the University of California, Berkeley, the fee for non-residential students in the humanities and social sciences is USD 31 397, and in law and engineering USD 57 000. With living costs around USD 23 000, the total comes to USD 54 388. The first year of a PhD in education at New York University starts with tuition at USD 41 303, USD 3 500 for health costs and a USD 25 687 cost-of-living stipend, bringing the total to USD 70 490.

By contrast, from the perspective of PhD students from the rest of Africa, South Africa is a bargain. In the five universities (three of which are in the Shanghai top 500) that produce 61% of the graduates from the rest of Africa, the cost in terms of tuition (full-time in the social sciences) is on average USD 2 000, plus another USD 1 000 for foreign student fees, medical aid, etc. The cost of living is estimated to be around USD 10 000 per annum, bringing the total to around USD 13 000. The total cost at a top South African university for the first year of a PhD in the social sciences or education is (at USD 13 000) four times cheaper than at the prestigious, high-competition University of California, Berkeley; three-and-a-half

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12 Thanks to Professors Rajani Naidoo (University of Bath), John Douglass (University of California, Berkeley) and Teboho Moja (New York University) for information on costs for doctoral study.

times cheaper than at Bath University; and five-and-a-half times cheaper than at a top private institution such as New York University.

Despite these positive contributing factors, arguably there is also a range of systemic, capacity, financial and attitudinal factors that (potentially) stand in the way of South Africa realising the aspiration of becoming a PhD hub for the continent.

### *South African immigration policy relating to foreign PhD students and academics*

Despite the policy, planning and investment intentions of the South African government, highlighted in the introduction to this chapter, when it comes to the Department of Home Affairs and study and employment visas, the picture is much more complicated and ambiguous. For a study permit, the basic information is straightforward; the key requirement is an official letter from the educational institution where the student intends to study, confirming provisional acceptance and the duration of the course. According to the Department of Home Affairs website,<sup>13</sup> the overriding considerations in processing applications for study permits are that: no foreigner must displace a South African citizen/resident at a local educational institution; the student must have proof of sufficient funds to pay for day-to-day living expenses, accommodation and tuition fees during his/her stay in South Africa; and the student must have adequate medical cover with a registered South African medical scheme.

In response to a question about how difficult it is for candidates from Africa to obtain visas, a senior university administrator<sup>14</sup> reported that 'it is highly variable' but that there is no firm evidence that African applicants have a harder time than others. She reported that a key factor which influences a successful outcome is the completeness of an application but that there are other mission-specific factors that can play a role. For example, the embassies in Nigeria, Ghana and Cameroon are very careful to make sure that the applicant is legitimate; they often request additional supporting documentation and will often verify information before issuing study visas. It thus seems that with regards to students, the variability is more individual embassy-based than a systemic ambiguity.

The ambiguity arises with regard to academics and to allowing graduates to remain in South Africa. The reality is that the imperative to produce 5 000 doctorates every year does not only depend on demand from students but also on the institutional capacity to supervise. If the growth in graduates in South Africa between 2008 and 2012 (12.3% on average per annum) is maintained, the target is reachable – but that assumes a similar growth in supervision capacity. For example, at current enrolment-graduation ratios, 5 000 graduates will require about 37 160 enrolments. With only 35% of South African academics (6 744 in

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13 Department of Home Affairs website: <http://www.home-affairs.gov.za/index.php/immigration-services/types-of-temporary-permits> [accessed December 2014].

14 Personal communication, Dorothy Stevens, Deputy Director of the Postgraduate and International Office, University of Stellenbosch (2014).

2012) with a doctoral degree, this confronts the ‘conundrum that in order to produce more doctoral graduates, more PhD supervisors are needed: but in order to have more supervisors, more PhDs are needed’ (MacGregor 2013). This was echoed by the international office official, who commented from the perspective of academia:<sup>15</sup>

*As we are all acutely aware, we do not have the supervisory capacity in South Africa to produce the number of PhDs the government has set as a target. I suspect that we also don't actually have the local candidature either. It thus seems logical that given our skills shortages and capacity challenges that where skilled workers wish to remain, they ought to be welcomed.*

One way to increase supervisory capacity is to employ suitably qualified academics from other African countries in South African universities. At a number of universities, such as Fort Hare and North West (Mafikeng campus), where substantial numbers of foreign academics have been employed, an unanticipated outcome has been a huge increase in publication output. At Fort Hare, the publication output trebled between 2008 and 2012. At Mafikeng (the previously historically disadvantaged campus), the publication output grew from 6% of North West University's output to 22% by 2012, and the ratio of publications per academic exceeded that of the historically white advantaged Potchefstroom (DHET 2013b). This ‘transformation’ has finally punctured the myth that conditions at the historically black universities are so detrimental that academics cannot do research and publish. A second unanticipated outcome is that the academics from the rest of Africa also attract doctoral students from the rest of Africa, so at Fort Hare for example, the output of PhDs quadrupled from 11 in 2008 to 43 in 2012 (ibid.).

The South African immigration policy relating to foreign academics and foreign skills has become ambiguous and uncoordinated. In June 2014, new guidelines for work permits were promulgated. The central change is that while previously a candidate could be accepted with what was described as ‘exceptional skills’, this has been replaced with a more focused and defined category of ‘critical skills’, which are deemed critical to the needs of the country's economy (Republic of South Africa 2014). For academic positions, academics and researchers are listed as a critical skill. However, at a workshop (May 2014) between the universities and the Department of Home Affairs, officials who had drafted the regulations disagreed with each other about whether academics and researchers should be read as ‘and’ or as ‘or’, the implication being that if it is academics *and* researchers, then academics would be required to fulfil the critical skills list. The published list contains 40 areas, of which more than 30 are in South Africa's new global research niche area of astronomy. The list starts with areas such as galaxy formation and deep observations of earlier galaxies, and ends with earth observation

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15 Personal communication, Dorothy Stevens, Deputy Director of the Postgraduate and International Office, University of Stellenbosch (2014).

and natural and applied sciences (ibid.). One immediate implication would be an end to international appointments within the humanities, law or social sciences. At the time of writing this chapter, this issue remains unresolved.

A senior university official dealing with international students and staff observed that the list of bodies/authorities, from which confirmation and/or evidence of one's critical skills is required, is lengthy, and that officials are reluctant to help and are seemingly uncertain about what is expected of them. The consequence is that critical skills visas are often issued effortlessly outside of South Africa, whereas within South Africa there is uncertainty: 'The risk here is clear: the processes, (mis)interpretation and insufficient coordination between government departments is/will prevent us from retaining these critical skills.'<sup>16</sup>

### *Resistance to internationalisation (or the rest of Africa?)*

In practice, it is the institutions and individual academics that drive the recruitment and training of students and, at the institutional level, the demand for more doctorates produces different and often conflicting discourses.<sup>17</sup>

For academics, students from the rest of Africa could be described as a 'golden triangle'. Firstly, by admitting these students, academics are responding to government and institutional leadership pressures to enrol more Africans (transformation). Secondly, more students from the rest of Africa apply and, according to completion rates (47% versus 45%), they complete their degrees slightly more quickly, and they appear to have more access to financial resources (efficiency). Thirdly, and based entirely on anecdotal reports (academic rumour), students from the rest of the continent have on average better writing skills (quality). What more can an institution and an academic want than substantial government funding plus the kudos for responding to transformation, efficiency and quality – the three discourses that are often regarded as being in tension, if not incompatible (Badat 2004).

However, what about the SA-Africans and the post-1994 policy emphasis on 'transformation' via demographic change? When it is pointed out, for example, that black female PhD enrolments have increased by 140% over the period 1996 to 2012, some observers raise the point that this does not amount to transformation since a significant proportion of these students are not SA-Africans. Implicit in this position are two seldom-expressed opinions. The first is that there is a reservoir of South Africans who are not selected because better-prepared candidates from other African countries are preferred.<sup>18</sup> A second view is that while academics are doing good work, they must do better to build a bigger pool of candidates; that is, recruit

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16 Personal communication, Dorothy Stevens, Deputy Director of the Postgraduate and International Office, University of Stellenbosch (2014).

17 In a forthcoming book on the doctorate in South Africa (Cloete & Mouton), this problem is investigated through a qualitative study of 25 'PhD-productive' departments in the social sciences and humanities.

18 Those holding this opinion do not answer the question as to why South Africans, in the most advanced economy on the continent, are not as well prepared.

and train more SA-Africans. The question that those who hold this view seldom ask is why there are so few SA-Africans applying for doctoral studies. A somewhat obvious answer, without systematic empirical evidence, is 'financial barriers'. However, if producing more doctorates is a national policy priority, why are there not more resources allocated to SA-Africans who qualify to register for PhD degrees? It is perhaps not surprising that the country with one of the highest PhD success rates is Norway where doctoral candidates are employed as junior staff at a university for three years at a competitive salary (Cloete & Mouton forthcoming).

Another unintended consequence of the transformation imperative relates to black economic empowerment and talent. Globally, the PhD is seen as an indicator of talent. However, in South Africa, a bachelors degree (not to mention a masters degree) from a top-500 university in the world puts an SA-African on the talent radar of companies and the civil service, which are under considerable affirmative action labour legislation pressure to recruit 'black talent'. So, while South Africa could be seen as a very market-competitive destination for aspiring PhD candidates from other African countries, for the prospective SA-African doctoral candidate, it is by far not as lucrative.<sup>19</sup>

Finally, reference can be made to what could be termed 'middle-class xenophobia' where the new African middle class, with access to policy influence, is trying to reduce competition for lucrative professional positions and lifestyles. While the method is much more genteel, the impulse is no different from the township attacks and looting of foreigners' businesses. Could this be interpreted as government being willing to contemplate providing protection for middle-class positions but not for lower-skilled jobs and small businesses?

### *Brain drain or brain circulation?*

In both South Africa and the rest of Africa, there might be a broad agreement emerging that there is a need for more PhDs, as was expressed by the Chairperson of the African Union Commission, Dr Nkosazana Dlamini-Zuma at the NRF/Carnegie Corporation meeting in 2013. However, at the same meeting, a vice-chancellor from a university in Nairobi complained bitterly that some of their brightest candidates were going to South Africa but then not returning – implying an intra-continental brain drain. Dr Zuma's response was that her main concern was that talent must not leave Africa and that the circulation of high-level skills in Africa was very important for strengthening the African Union.<sup>20</sup>

This interchange reflects a major global debate around the brain drain and so-called 'brain circulation' as encapsulated by Anna Lee Saxenian (2002: 1) as follows:

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19 Objectively, the cards are stacked against a talented African woman choosing an arduous seven-year programme (only 45% complete in seven years) in which she will, in all likelihood, have to submit to the authority of an elder white male supervisor and will hardly have spare money for her mobile phone and other accessories.

20 A recent study by the Swedish International Development Cooperation Agency found that many of those who returned from doing their PhDs in Sweden did not find a welcoming climate or jobs back home (Felleson & Mählick 2013).

*Understandably, the rapid growth of the foreign-born workforce has evoked intense debates over U.S. immigration policy, both here and in the developing world. In the United States, discussions of the immigration of scientists and engineers have focused primarily on the extent to which foreign-born professionals displace native workers. The view from sending countries, by contrast, has been that the emigration of highly skilled personnel to the United States represents a big economic loss, a 'brain drain'. Neither view is adequate in today's global economy. Far from simply replacing native workers, foreign-born engineers are starting new businesses and generating jobs and wealth at least as fast as their U.S. counterparts. And the dynamism of emerging regions in Asia and elsewhere now draws skilled immigrants homeward. Even when they choose not to return home, they are serving as middlemen linking businesses in the United States with those in distant regions ... the old dynamic of 'brain drain' is giving way to one I call 'brain circulation'.*

Saxenian's studies were based mostly on Silicon Valley and its interaction with East Asia, and later with Latin America. For her, the Silicon Valley experience is but an example of far-reaching transformation of the relationship between immigration, trade, education and economic development in the 21st century. The new high-skill immigrant entrepreneurs foster economic development directly by creating new jobs and wealth, both in their new country and back home, and indirectly by coordinating information flows and providing linguistic and cultural know-how that promote trade and investment both ways (ibid.: 6). While Silicon Valley might be the innovation centre of brain circulation, and has brought immense wealth to California, issues have been raised about immigration policy in the United States and its impact on retaining high-skill immigrants in the country. As recently as 2010, New York Mayor Michael Bloomberg, joining influential chief executive officers from the Partnership for a New American Economy, said: 'I can't think of any ways to destroy this country quite as direct and impactful as our immigration policy ... we educate the best and the brightest, and then we don't give them a green card' (Packer 2010).

Silicon Valley can be characterised as a space with a high concentration of postgraduate intellectual talent from across the globe (Saxenian 2002), together with a culture of innovation (Dormehl 2012) that is fed by significant government spending on basic research and enormous amounts of venture capital. Furthermore, in Silicon Valley there is a separation, but also a proximity link, between the role of the university in the production of knowledge and the role of industry (Mazzucato 2013). The dynamic that led to brain circulation, as opposed to brain drain, might be an extremely attractive narrative for Africa – a model that would 'save' Africa from poverty and catapult the continent into an innovative, entrepreneurial member of the global community.

But, Saxenian (2014: 29) also tells a different story where failure to invest in local infrastructure and public education, amongst others, leads to an unequal society:

*The region (Silicon Valley) continues to attract world-class talent and incubate successful start-ups—with a handful in each generation growing into corporate giants like Apple and Google—at the same time as new centres of technology entrepreneurship have emerged around the US and in other parts of the world, from Finland and Israel to China and India. For some observers these economies pose a challenge to Silicon Valley’s leadership. This chapter argues that the region’s problems are closer to home: Silicon Valley is threatened less by foreign competition than by decades of neglect of the collective social and human development that underpins its economic success. As the region emerges from the current economic crisis, the failure to invest in the local infrastructure, aggressive cuts to funding of public education and other government services, and the rising cost of living contribute to an increasingly unequal society.*

It could be argued that Silicon Valley is not a model for Africa for a number of reasons, including that there is no significant public investment in basic research and little in the way of venture capital; that innovation is survival- rather than corporate giant-orientated; and that Africa is not an ecosystem that is a magnet for talent and, alas, Silicon Valley not a model for reducing inequality.

### ***South Africa as a PhD hub with brain circulation***

For the foreseeable future, South Africa and Africa should at least postpone the idea of Silicon Valleys, and rather focus on a more modest discourse, namely to develop ‘EdHubs’ (see Douglass et al. 2011, 2014). The EdHubs model enables the enrolment of more high-paying ‘out-of-state’ students, and creates a space where universities can imagine themselves as knowledge hubs that respond to both regional and national economic needs, as well as to the thirst of a growing world (African) population for high-quality tertiary education (ibid.). Such a discourse could sit quite comfortably with the *White Paper for Post-school Education and Training*, which states that hosting large numbers of international students could represent a major contribution by South Africa to the development of the sub-continent (DHET 2013a: 40). The *White Paper* also states that all the countries in the SADC region are interdependent and that the strengthening of Southern African economies will inevitably result in the improvement of South Africa’s own economy. And the *NDP 2030* actually suggests that South Africa could establish itself as a hub for higher education and training in the region.

But this raises the differentiation question: All levels of students for all universities? From the data and arguments presented in this chapter, a case emerges for the South African DST Ten-Year Innovation Plan which proposed that: ‘to build a knowledge-based economy positioned between developed and developing countries, South Africa will need to increase its PhD production rate by a factor of about five over the next 10–20 years’ (DST 2008: 29). This dovetails quite well with the *NDP 2030* argument that South Africa needs to increase the

number of academics with PhDs, which would improve the quality of student outcomes, as well as significantly contribute to the capacity to supervise higher degrees and, ultimately, to the research productivity of the sector.

If South Africa is to focus its internationalisation efforts on postgraduate (and specifically doctoral) education, rather than on undergraduate education, postgraduate education should become more closely linked to an innovation, brain circulation economy/migration model. As the University of Stellenbosch experience with the PANGeA project (described earlier in this chapter) shows, it is very challenging to fully develop research and academic circulation between the participating universities. Stellenbosch is one of the few so-called ‘innovation districts’<sup>21</sup> in South Africa, but stimulating interaction between doctoral education and the innovation district seems, for now, to remain on the level of intention rather than practice.

In a study on Swedish development support for research capacity-building in Mozambique (Fellesson & Mählck 2013), the main results indicate a remarkably low mobility among the PhD graduates, geographically and sectorally. Furthermore, the attainment of a PhD degree was highly valued among many of the graduates, particularly in terms of boosting status and self-confidence, and fast-tracking their careers in either academic departments or the university administration. This indicates that support for PhD training has resulted in the building of a foundation for research at the Eduardo Mondlane University in terms of qualified individuals. However, the survey also highlighted considerable dissatisfaction amongst the participants – especially with regard to a lack of resources, working conditions and the degree of independence they were afforded. Many reported performing the same duties after graduation as they had before entering the programme, and while the majority of the graduates continued to do research, this was on a very small scale. Supplementary income from consultancies seems to be widespread among graduates, and is an accepted part of academic life at the University (ibid.: 5–6). A finding on the experience of training that should be worrisome for South Africa is (ibid. 6):

*the significantly higher level of dissatisfaction among graduates and candidates that have done or were doing their training at South African universities, compared to their Swedish equivalents. Access to supervisors and quality of supervision is the dominant practical problem facing PhD students, and this is constant over more than decade.*

Brain circulation could only be achieved if conditions at the rest of Africa’s flagship institutions provide environments – and particularly research environments – that stimulate continental collaboration.

The emergence of Silicon Valley was not the result of a government policy, hatched in a smoky Washington office with lobbyists. Rather, it was the outcome of a confluence of factors,

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21 See <http://www.wdcapepetown2014.com/projects/project/487>.

such as the United States Department of Defence switching significant amounts of research money to electronics within, arguably, the 'best' higher education system in the world (i.e. the California differentiated system); the availability of large amounts of floating venture capital; and a counter-culture of openness ('anything goes').

From the data presented above, it could be argued that there is also a confluence of factors that make South Africa a possible PhD hub for Africa (although, as the statistics show, not for the rest of the world); in particular, national policies that stimulate doctoral education, the 'golden triangle' for certain universities, and market forces (competitive pricing). However, this is not government policy. Currently, with the exception of a few politically correct references to the rest of Africa, the official policies are nationalistic in that they focus on how to improve South African higher education and how to make South Africa a knowledge economy. The South African government thus faces an interesting conundrum. Do they try to stimulate a hub, knowing that it cannot be done without students and staff from the rest of Africa, or do they restrict the intake of foreign doctoral candidates and academics in South African universities and provide additional stimulus for South African candidates? Or do they not intervene and simply monitor how this develops over the next few years? Either way, there will need to be an agreed-upon and coordinated approach by the relevant government departments (i.e. DHET, DST and Home Affairs) rather than the counterproductive pursuance of contradictory policies.

In addition to coordinated political will, more monitoring would need to include the tracking of student mobility: in other words, who goes back to where, who stays, and where (in which sectors and positions) do they get employed? All in all this points to a more rational, research-informed and consultative approach amongst all collaborators if South Africa is to be a PhD hub with brain circulation, and not just another version of internal continental brain drain with inevitable xenophobia and accusatory transformation discourses.

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## Appendix tables

**Table A5.1** The 59 countries of origin of the 2012 international PhD graduates

Country	2012	Accumulative %
Zimbabwe	142	22.5%
Nigeria	76	34.6%
Kenya	43	41.4%
Uganda	29	46.0%
Ethiopia	23	49.7%
United States	23	53.3%
Cameroon	19	56.3%
Ghana	19	59.4%
Tanzania	18	62.2%
Zambia	17	64.9%
Democratic Republic of Congo	15	67.3%
Lesotho	15	69.7%
Malawi	15	72.1%
Sudan	15	74.4%
India	13	76.5%
Mozambique	13	78.6%
Namibia	13	80.6%
Germany	11	82.4%
Botswana	10	84.0%
Rwanda	10	85.6%
United Kingdom	9	87.0%
Swaziland	7	88.1%
China	6	89.0%
Iran	6	90.0%
Canada	5	90.8%
Eritrea	5	91.6%
Mauritius	5	92.4%
Gabon	4	93.0%
France	3	93.5%
Netherlands	3	94.0%
Russian Federation	3	94.4%
Switzerland	3	94.9%
Belgium	2	95.2%
Italy	2	95.6%
Libyan Arab Jamahiriya	2	95.9%
Madagascar	2	96.2%
Sierra Leone	2	96.5%
Angola	1	96.7%
Benin	1	96.8%
Bosnia and Herzegovina	1	97.0%
Brazil	1	97.0%
Burundi	1	97.3%
Chile	1	97.5%
Egypt	1	97.6%
Greece	1	97.8%
Ireland	1	97.9%
Israel	1	97.9%
Liberia	1	98.3%
Malaysia	1	98.4%
Morocco	1	98.6%
New Zealand	1	98.7%
Norway	1	98.9%
Palestine	1	99.0%
Republic of Korea	1	99.2%
Senegal	1	99.4%
Singapore	1	99.5%
Spain	1	99.7%
Sweden	1	99.8%
Taiwan	1	100.0%
Total international	630	

Compiled by Charles Sheppard  
Source: DHET (2013b)

**Table A5.2** PhD graduates of 2012 according to nationality and gender as a percentage of the total (1 879) graduates

<b>Race</b>	<b>Nationality</b>	<b>Females</b>	<b>Males</b>	<b>Total</b>
African	International	7.2%	20.7%	27.9%
	National	5.5%	10.2%	15.8%
	Total	12.8%	30.9%	43.7%
Coloured	International	0.2%	0.7%	0.9%
	National	1.8%	2.7%	4.4%
	Total	1.9%	3.4%	5.3%
Indian	International	0.3%	1.5%	1.9%
	National	3.4%	2.3%	5.7%
	Total	3.7%	3.8%	7.6%
White	International	1.5%	3.2%	4.7%
	National	22.4%	16.3%	38.7%
	Total	23.9%	19.5%	43.4%
<b>GRAND TOTAL</b>		<b>42.3%</b>	<b>57.7%</b>	<b>100.0%</b>

Compiled by Charles Sheppard