# The purpose of the PhD – A South African perspective

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**Abstract**

The article sets out to explore how PhD programme leaders in South Africa view the purpose of the PhD, and how their views shape their responses to recent policies with regard to the PhD. It refers in particular to the vision of the Department of Science and Technology for a five-fold increase in the number of PhD graduates by 2018, and to the drive to achieve racial and gender equity as part of the transition to democracy. The article is based on interviews with leaders of 16 doctoral programmes in nine top PhD-awarding South African universities, representing a range of disciplines. The data indicate that there is a strong predisposition among PhD programme leaders to perceive the doctorate largely as an academic pursuit. At the same time, some tentative changes are being seen 'on the ground' in response to the needs of industry and business, to the various policies, and to a diverse student cohort. It seems that the PhD attempts to serve several purposes within the single structure provided by the Higher Education Qualification Framework, sometimes in

tense associations. Going forward, the article discusses two policy options available to South Africa.

**Key words**

Doctoral education, South Africa, Higher Education policy, professional doctorate, PhD

## Introduction

One of the key processes linked to the emergence of the knowledge economy is the shift in the purpose of the PhD from being a licence to teach in academic institutions to being an important strategic resource for a country's economic development (Kehm, 2007; Warhurst, 2008). Furthermore, a new concept of knowledge, commonly referred to as the transformation from Mode 1 to Mode 2 knowledge production (Gibbons et al., 2004), coupled with expansion and diversification of the student cohort, may offer a partial explanation for the recent developments in doctoral education worldwide.

Universities are under pressure to offer both new pathways to the PhD and innovative doctoral pedagogies (Boud and Lee, 2009; Johnston and Murray, 2004; Malfroy and Yates, 2003; Tennant, 2004). Questions are raised about the appropriateness of the traditional single-purpose qualification for a degree that is expected to fulfil different purposes (Green and Powell, 2005). Park (2007) speaks about a 'family of doctorates' that has emerged in the UK, such as 'professional doctorates', 'New Route PhDs', and 'practice doctorates'.

In South Africa, doctoral education has only recently begun to receive an explicit policy attention. In 2007, the Department of Education (DoE) issued the Higher Education Qualifications Framework (HEQF), which required qualifications, including doctoral degrees, to be registered. The HEQF envisages the PhD as a traditional research degree that prepares the graduate for an academic career. The thesis is at the centre of the programme; the graduate is required to 'make a significant and original academic contribution to the discipline,' and must also be able to supervise others (Department of Education, 2007, 29).

As a research degree, the PhD in South Africa is also a concern of the Department of Science and Technology (DST). In 2007, the DST and the National Research Foundation (NRF) identified the PhD as a key driver for economic development and global competitiveness. Subsequently, the NRF and the DST embarked on initiatives for a five-fold increase in the number of PhD graduates by 2018, especially in science, engineering and technology, in order to 'provide the bedrock for [an] innovative and entrepreneurial society' (National Research Foundation (NRF), 2007, 8).

These two different views of the PhD reflect a global shift in the understanding of knowledge and the role of universities in the knowledge economy (Barnett, 2000; Johnston and Murray, 2004). It seems that the South African PhD is 'right in the middle of a fierce contestation that pits the traditional values of the academy against the new values of the knowledge academy' (Usher, 2002, 145). Importantly, this contestation is taking place in the context of the transition from an exclusive and discriminatory past to an inclusive democracy, one in which universities have to increase the proportion of black

and female students at postgraduate level in an effort to redress racial and gender inequalities (Department of Education, 1997).

This article enters the debate by capturing the voice of those entrusted with producing doctoral graduates in South Africa in this significant transitional period. It sets out to explore the views of a number of PhD programme leaders on three critical questions, namely: 'What is the purpose of the PhD?' 'What knowledge should it produce?' and 'Can South Africa produce more PhDs?'

Much of the available literature on doctoral education in the context of the knowledge economy tends to focus on discussing the drivers for change or on exploring the development of new PhD models, either from the student perspective (Johnston and Murray, 2004) or from the academics' and policy makers' perspectives (Enders, 2004; Green and Powell, 2005; Harman, 2008; Jamieson and Naidoo, 2007; Kehm, 2007; Park, 2005, 2007). There are a few exceptions, such as an edited volume by Boud and Lee (2009), which analyses the many ways that practices in doctoral education are changing in North America, Europe and Australia in response to new policy contexts. It is not surprising that Africa was left out of this collection. In fact, there are very few studies on the PhD in Africa, including South Africa, from either in or outside the region.

The article is based on interviews with the leaders of 16 PhD programmes at nine top PhD-awarding South African universities.[1] It is based on a purposive sample representing a range of disciplines – including engineering, agriculture, medicine, biological sciences, chemistry, physics, health, business, education

[1] The study was sponsored by the Academy of Science in South Africa (ASSAf).

and law – in addition to interdisciplinary and professional fields. Since South Africa aimed to increase the number of PhD graduates, the sample was made up of experienced and reputable PhD programme leaders in order to elicit their views on the expansion goal. They were purposefully selected from among the DST-NRF Centres of Excellence, recipients of National Science and Technology Forum (NSTF) awards specifically commended for graduating doctoral students, and research Chairs with exemplary doctoral graduate track records. Given the small size of the sample, it was not the intention of the article to claim generalisability. The interviews were conducted between February and June 2009, each lasting between one and two hours. They were recorded, transcribed verbatim, and analysed using AtlasTi.

I begin by describing emerging PhD models and their purposes. The section that follows provides a short overview of the current state of the South African PhD. Drawing on data gleaned from the empirical study, I explore how PhD programme leaders in South Africa understand the purpose of the PhD and what it means to have a PhD. I then identify the different types of PhDs that have evolved in South Africa and explore their challenges. The main issue is how the PhD programme leaders, given their understanding of what a PhD is, respond to the policy imperatives to increase the quantity and quality of PhDs, as well as to redress the social and gender inequalities created by the apartheid era. I conclude with some reflections, based on the international experience, on possible pathways for the South African PhD.

***Models of doctoral education – international perspective***

The prevalent doctoral model, at least in Europe, is the traditional research degree, described as an apprenticeship following the Humboldtian model, with a close relationship between one supervisor and one student (Bitusikova, 2009; Kendall, 2002).

Scott and Brown (2004, 20), in their typology of ideal models of doctoral degrees, refer to this type of PhD as the pure model. The knowledge is produced within the disciplinary arm of the university, is governed by its criteria, and is protected by it. The purpose of the PhD is to provide graduates with an entry to academic life and to educate 'stewards of the discipline'(Golde and Walker, 2006, 5). The thesis is the main product and is expected to be an original contribution to the knowledge base of the discipline. This model is being increasingly criticized in European countries as inappropriate to meeting the challenges of training for the knowledge economy (Bitusikova, 2009; Kehm, 2007).

Scott and Brown (2004) describe a second model of a PhD which shares many features with the first but is beginning to include notions of trans-disciplinary interaction, and looser boundaries both between disciplines and between the university itself and other regulating bodies and outside agencies. There is an acknowledgment that ideas could be better understood in the context of their application.

The third model described by Scott and Brown is the servicing model, in which the 'university and the doctoral student on behalf of the university abandon notions of universalising truth, and adopt a more modest role in

relation to society as a whole' (2004, 21). The student as practitioner is required to make sense of his or her workplace and to develop a new, original and more productive way of working. The outcome of this PhD is a commodity and its value is decided in the marketplace.

According to Scott and Brown, the last two models and the hybrid versions of them form the basis for the various types of PhDs that have developed in addition to the traditional PhD. These include the professional doctorate, the practice-based doctorate, the New Route doctorate, and the doctorate by publication.

The professional doctorate is the most prevalent alternative to the traditional PhD. Professional doctorates are well established in the United States and since the 1990s in Australia, New Zealand and the UK (Boud and Tennant, 2006; Scott, et al., 2004; Servage, 2009). Professional doctorates target mature students in their mid-career. They usually offer a fast-tracking doctoral research through the introduction of coursework, as well as the development of relevant professional knowledge.

Critics of the professional doctorate question the quality and scope of the research that is carried out in such doctorates (Bitusikova, 2009). It is argued that they do not constitute a radical departure from the traditional PhD (Scott, et al., 2004; Tennant, 2004), and that the real differences lie in the target populations, in the selection criteria, and in the students' ability to pay fees (Neumann, 2005, 2009). Servage (2009) likewise suggests that the expansion in professional doctorates reflects entrepreneurial behaviour by universities, rather than a demand by the labour market for more doctorates.

***The South African PhD***

At the time of the transition to democracy in 1994, South African higher education consisted of 36 institutions, divided along the lines of ethnicity, language or geographical location (urban vs rural), in which only universities catering for white students could award a doctoral degree.

The post-apartheid higher education policy aimed to create new institutions with new identities which would transcend their racial and ethnic institutional history (Jansen et al., 2002). The new higher education landscape consisted of 23 institutions, all of which could award a PhD. However, in 2007, 83% of all PhD awards were still produced by the nine historically white institutions (HWIs) (ASSAf, 2010).

With the opening of all the country's universities to all sections of the population, the number of PhD graduates nearly doubled, from 699 in 1996 to 1,182 in 2008. Yet in comparison to the situation in other relevant countries, South Africa produces too few doctoral graduates annually relative to the size of its population (26 PhDs per million of the population in 2007) (ASSAf, 2010). This has highlighted the need for South Africa to increase the number of PhDs.

In spite of the significant increase in the number of black graduates (32% of the total) and in the number of female graduates (42% of the total), the production of doctoral awards in South Africa in 2007 remained skewed towards white men in their 30s or older (with the average age of graduation being 40 years). Furthermore, 75% of doctoral students were the first in their families to enter postgraduate education (Masters and PhD). About 50% of the

intake were part-time students, mostly with full-time employment, while another 20% were full-time students with part-time employment (Herman and Yu, 2009). International students, mostly from Africa, make up about 30% of all graduates (ASSAf, 2010), which means that racial equity is to a large extent masked by the intake of doctoral students from other parts of Africa.

There are no accurate statistics in South Africa on attrition, but it is estimated at an average of 13% across institutions (Department of Basic Education, 2010, 34). Time-to-degree on average is five years (CREST, 2009). Most doctoral degrees in South Africa are awarded in the Social Sciences (34% in 2007); together with Humanities these constitute more than half of all the PhD awards (54%). The largest share of PhDs is awarded in Education, Economic and Management Sciences and Religion. The disciplines which are considered essential for the knowledge economy have a smaller share of the total PhDs. Thus Engineering Sciences produced only 7% of all the degrees, Natural and Agricultural Sciences 28%, and Health Sciences 10% (ASSAf, 2010).

This short overview highlights the challenges that South Africa faces as it endeavours to make the PhD a driver for economic development and to increase the production of PhDs in engineering and the sciences, as well as to redress past inequalities. The next section explicates how these challenges are experienced by those academics who shape the degree 'on the ground', and how they relate to the way the PhD programme leaders understand the purpose of the PhD. Three prevalent views of the purpose of the PhD have been identified: as training for an academic career, as a training for a profession, and as a training for industry. These will be discussed in the next section.

### *The PhD as training for an academic career or for scholarship*

The data indicate that most PhD programme leaders, regardless of their discipline, tend to view an academic career as the main purpose of a PhD. The degree is perceived to be about scholarship and critical thinking. It is a part of the process of becoming a scholar:

> 'The goal of the PhD is to train lifelong scholars.' (Interview with a PhD programme leader in Law)
>
> 'Why get a PhD in the Humanities? The main reason for getting a PhD in the Humanities is to become an academic; that's the main driver.' (Interview with a PhD programme leader in the Humanities)
>
> 'To produce researchers – those who can take on independent research. To produce the next generation of academics.' (Interview with a PhD programme leader in Science and Mathematics Education).
>
> 'The PhD is an apprenticeship into academia. It is a training in how the academic game is played… The PhD is a training to go out into the world.' (Interview with a PhD programme leader in Mechanical Engineering)
>
> 'To educate a scholar!' (Interview with a PhD programme leader in Biomedical).

This finding is supported by Backhouse (2009), who explored how supervisors in four disciplines in South Africa understood the purpose of a PhD. Backhouse interviewed supervisors representing a pure hard discipline (Mathematics), a hard applied discipline (Engineering), a soft pure discipline (English), and a soft applied discipline (Development Management). She argues that supervisors across the four disciplines understand the purpose of the PhD to be about generating knowledge by undertaking research.

The doctoral programmes that fit this concept of the PhD come in all shapes and sizes. Some of the programmes have one to five PhD students (Engineering, Biomedical, Law), some have between 10 and 20 (Astrophysics, Humanities, Education Policy), while others have 25 or more PhD students

(Chemistry, Science and Mathematics Education, Education). While there is no particular programme type, there are common features; these include a preference for having full-time students on site, in order to build a culture of learning around the students and the community of scholars:

> 'If you are going to produce the next generation of scholars, you don't just want them to become narrow specialists in one tiny little area; you want to induct them into an academic citizenship: and this requires a variety of different kinds of exposures and competences. … You want to expose them to conversation at a high level.' (Interview with a PhD programme leader in the Humanities)

When students are being trained to become academics they need various skills, among them learning to supervise, to present papers at conferences, and to play the academic game, which means 'not only how to publish but also what to publish and where it is worthwhile publishing' (Interview with a PhD programme leader in Mechanical Engineering).

Furthermore, students need to possess the necessary life skills in order to compete successfully in the academic world. These include speaking and writing English, developing computer skills, travelling abroad independently, and presenting themselves confidently. There is a prevalent view among the programme leaders that acquiring these basic skills can be difficult for South African students, since many of them are first-generation entrants into academia. The following excerpt from an interview illustrates some of the challenges faced in particular by black women trying to pursue a PhD in engineering:

> 'The PhD is a training to go out into the world, so there are a bundle of things that many students don't know, including basic life skills that they need before they can go on, such as presenting papers at international conferences, which is a crucial skill. Almost all my

> students are black women. And they are not well skilled in flying off somewhere and renting a car at the airport. Indeed, most of my students come to me without driving licences. How can you possibly go out into the world without a driving licence?' (Interview with a PhD programme leader in Mechanical Engineering)

The PhD programme leaders who view the PhD as training for an academic career exhibited different approaches towards the DST/NRF expansion target. Those who dismissed the expansion initiative maintained that to increase the quantity of PhDs would negatively affect their quality. They also questioned the connection between the degree and development:

> Some people think that a PhD is an index of development …But is that necessarily so? If the purpose of the PhD is to break new ground, then those PhDs are worth waiting for. … I would rather have fewer PhDs who have greater impact. The question is whose interest would be served by turning the PhD into what the Masters used to be…' (Interview with a PhD programme leader in the Humanities)

> 'One could have a structured programme for a doctorate, where one perhaps does certain courses, then a project. I can think of lots of ways that you can call it a doctorate, but that's not what I call a PhD. But I know what my PhDs are, I am clear that we need more of them.… But it's the process. ... It can't be mechanised. The PhD is about becoming an academic, and it's about understanding knowledge production and critical thinking.' (Interview with a PhD programme leader in Mechanical Engineering)

Even those who supported the initiative emphasized the obstacles that stand in the way of achieving the desired outcomes. Undoubtedly the main challenge is to fund and sustain full-time students on campus:

> 'And I found that the national level of bursaries is, in some cases, unacceptably low. So we incentivise to try and get good students.' (Interview with a PhD programme leader in Chemistry)

> 'The biggest threat we find is that the amounts of the bursaries are extremely small. The NRF bursary for a PhD is R40,000 a year [This amount has changed since the interview and in 2011 the bursary is R60,000 per annum, which in April 2011 was the equivalent of $8500]. Students simply walk away from that; it is simply not feasible.' (Interview with a PhD programme leader in Astrophysics)

Equally concerning is the shortage of suitable students. The contested issue in most of the interviews was the extent to which South Africa can increase the number of students without compromising on the quality of the intake. The competition is intense for quality students, especially (but not exclusively) in science and engineering, and for black candidates:

> 'There is a small pool of students, with all of us in science and engineering … [fishing in] the same little pool … The pool of black South African students who have high grades in mathematics is particularly small.' (Interview with a PhD programme leader in Engineering)
>
> 'I think one of the big threats is getting enough students. After the first cohort we started to see the student number shift quite largely in favour of students from other SADC countries... I was very aware of the fact that we started with outstanding students and then as we went from one cohort to the next, we were getting the average bureaucrats who were intellectually not of the same quality as we had in the beginning. After all, we were not the only one offering a PhD in Education Policy.' (Interview with a PhD programme leader in Education Policy)

A further challenge is the attitude towards full-time study, which in South Africa is perceived as a luxury for the rich:

> 'But the difficulty we had was to change the attitude of full-time students because full-time used to be regarded as what the rich did. Even if they come here once a week, they would consider themselves full-time. But we say no, we want you here, we want to integrate you with the staff and into academia. In order to integrate them, we have to make offices and PCs available to them.' (Interview with a PhD programme leader in Education)

It is evident that, while there is a strong tendency among PhD programme leaders to replicate the HEQF view of the PhD as training for an academic career, there are a number of challenges that need to be met, mainly those related to recruiting suitable students and sustaining them. The discourse of equity and expansion brings with it a concern about quality. There is a sense

that the elitist character of the PhD, which privileges the traditional full-time student on campus, should be preserved.

### *Applied model: The PhD as training for a profession*

While there are no professional doctorates in South Africa, the PhD programme leaders in some programmes, such as Education and Business Management, described their PhD as an '*Applied PhD'*. In their understanding, the purpose of the PhD is to serve both academia and a profession:

> 'The purpose of the PhD is to produce both researchers and professional practitioners' (Interview with a PhD programme leader in Education Policy)
>
> 'Doctorate is about contributing to knowledge – both theoretical and practical.' (Interview with a PhD programme leader in Business Administration)

Most of the students in these programmes aim at improving their practices or their status at work, with only a small percentage choosing academic careers. However, all the students have to produce a full research dissertation. The vacillation between the academic world and the professional world brings tensions into these programmes. One programme leader described these tensions in terms of the difficulties students have with finding 'a meaningful theoretically significant study in the real world context, in such a way that it makes a genuine contribution to practice as well as theory.'

Another PhD programme leader reported a similar dilemma:

> 'One of the flaws in our design ... [was] that we had a research PhD, when we should in fact have had a professional doctorate, because most of the people were not graduating into research; they were going

> to work in government. … The hardest thing for all these students, or at least for most of them, was how I translate my study of professional practice to deep theory about educational change, which is not entirely a destructive tension, but it is definitely a tension, and one that I don't think we were able to resolve.*'* (Interview with a PhD programme leader in Education Policy)

Additional tension in this programme has arisen from the programme leaders' efforts to cater for a large number of professionals by supplementing the one-to-one apprenticeship model with a cohort model and providing a seminar-based programme. The seminars, however, are not accredited as part of the PhD, since the policy recognizes the dissertation as the only product of a PhD. As a result, the cohort-/seminar-based model relies on the PhD programme leaders' initiatives and on their ability to convince their institutions to allow them to proceed:

> 'The way I got it approved was to convince the university that there would be no dilution of the actual research component. And then I had this dilemma that I couldn't really give marks for the seven modules. In other words, there were no credits. Fortunately, the students understood this, and did it anyway, so one major challenge was overcome.' (Interview with a PhD programme leader in Education Policy)

It seems that 'on the ground' there was a tentative move toward a 'professional type' doctorate in South Africa. While they were able to cater for a large cohort of students, their provision was highly dependent on individual or departmental entrepreneurial initiative, sometimes with little institutional or policy support. These were expensive programmes which needed much administrative support. In both case studies, the PhD programme leaders used the word 'exhausting' when the discussion focused on expansion, which may indicate the difficulty of offering a PhD that aims to achieve two different

purposes at the same time. Furthermore, since most of the doctoral students in these programmes do not stay in academia, it is difficult to build the supervisory capacity. Indeed, one programme in the study collapsed when the programme leader took a post at another university.

> 'You need to build capacity. It takes energy and resources. It is exhausting.' (Interview with a PhD programme leader in Business Administration)
>
> 'To stretch this programme beyond what we did would have been to collapse it… It is exhausting.' (Interview with a PhD programme leader in Education Policy)

***The service model: The PhD as training for industry***

In this understanding of the PhD, the main benefit attributed to the PhD is its service to industry. PhD programmes in the sciences forge different partnerships with industry, ranging from programmes which are exclusively established around the needs of an industry to those which attempt to find a comfortable balance between applied (Mode 2) and fundamental research (Mode 1). In my small sample, only one leader of a PhD programme showed no interest in preparing scholars for academia, but instead saw the main purpose of the programme as 'producing food and plant breeders for Africa by an African institution.' (Interview with a PhD programme leader in Agriculture)

For other PhD programme leaders, the aim of the PhD was to build 'academic and intellectual enterprise in South Africa.'(Interview with a PhD programme leader in Forestry and Agricultural Biotechnology) Whether these researchers choose to work in academia or industry is irrelevant. For one interviewee, this only related to the funding source:

> ‘There is no distinction. If Element 6 [a subsidiary of De Beers, engages in the supply of industrial diamond and cubic boron nitride products for abrasive and non-abrasive industrial uses] provides the bursaries, part of the obligation for the students is that they will go and work at Element 6. If Mintek [South Africa’s national mineral research organisation] gives a student a bursary for either undergraduate or postgraduate studies, Mintek reserves the right to employ that student.’ (Interview with a PhD programme leader in Chemistry)

Other PhD programme leaders reiterated similar understandings of the aim of the PhD:

> ‘To train researchers to be independent … you have to do original work, to contribute to scientific knowledge…. to produce researchers for both academia and industry.’ (Interview with a PhD programme leader in Biotechnology)

According to another programme leader (Physics), all PhDs needed to be relevant; all his students were therefore working on applied research. This made the research exciting and enticing. However, fundamental research was always the basis of applied research:

> ‘That’s why I’ve currently excluded all projects outside the area of application. Of course, you have to deal with fundamental research to create a model, but once the model is in place you can begin to apply it. Working in the area of application stimulates the students. It requires them to go outside their comfort zones, because applications are difficult, and you need to make the students think about how to arrive at the solutions.’ (Interview with a PhD programme leader in Physical and Material Science)

The PhD programme leaders who perceived the goal of the PhD as training for industry seemed to be concerned with the needs of the country, thus aligning themselves with the DST/NRF vision:

> ‘A PhD is essential to become a player in the knowledge economy. If we are going to build a knowledge economy – i.e. an economy based on high-end technology – and this country is clearly trying to do so, then we can’t do without PhDs. We need to train the leading intellects

> in the country in any field in which they can explore their intellect best.' (Interview with a PhD programme leader in Biotechnology)

The main challenge for this type of programme is funding. The study highlighted three ways in which PhD programme leaders operated, reflecting the way they accommodated their different views of the purpose of the PhD.

Especially in economically unstable times, there were those who preferred the safe funding of the NRF or the DST, however small and bureaucratic this might be, instead of industry funding:

> '[B]ecause industry or industry-related bodies provide funding for a different type of research. They look for product, patent and processes, and they are not interested in the more fundamental aspects of research. And most academics go into academia because they are interested in some fundamental aspect. I would be unhappy to have a programme that is fully application oriented. And it's not always the best time, economically.' (Interview with a PhD programme leader in Biotechnology)

The industry-university partnership was similarly resisted by a PhD programme leader in Engineering. She argued that working too closely with industry could distract students from 'the heart of the matter, which is the academic endeavour.' To ensure a strong academic focus, she also opted for NRF and DST funding, instead of industry funding:

> 'One must be careful always with industry funding: it's great when it's there but you have to be careful around issues of publishing and intellectual property if academic research is what you do; and you have to be careful not to sell your soul. So I think we are better off [with NRF funding]. The money is probably not as magnificent, but I think the situation for me is a much more comfortable one.' (Interview with a PhD programme leader in Engineering)

Secondly, there were those, similar to the 'academic entrepreneurs' described by Slaughter and Leslie (1997), who looked to industry, donor agencies and

businesses to secure external funding or projects for their PhD programmes. One leader of a PhD programme described how he managed to fund a big cohort of postgraduate students:

> 'There is the university contribution, very substantial, for salaries and facilities. Then we run our research on what we call the third stream – external funding. Many of the academics have various NRF ratings with the opportunity to call on NRF money... We have many industrial partners, including synergies with the Thrip programme of the Department of Trade and Industry (DTI) ... Then there are EU projects... There is collaboration funding with other universities. We have collaborations and international bilateral agreements, people from Australia, and a French group that has set up funds. The DAAD [German Academic Exchange Service] people were here….they were very excited about what we are doing.' (Interview with a PhD programme leader in Biotechnology)

Since securing funds in this model is an individual pursuit, above PhD programme leader in Biotechnology maintained that he 'probably spent half [his] time chasing money; that is all [he does]. For the other half [he does] science.'

Some PhD programme leaders were not comfortable knocking at the industry gate:

> 'Getting money from industry is often about cold calling, phoning somebody that you don't know, and getting together with them and selling them on the idea of a student training as a PhD student and so on. So I think I am more comfortable currently. The grant money is there for academic research and I am an academic.' (Interview with a PhD programme leader in Mechanical Engineering)

Finally, there were those who tried to find a comfortable balance between the two:

> 'This is always a personal individual choice – one depending on the individual. A proportion of my research has always been bio-industry oriented. I am comfortable with the ratio at the moment. I wouldn't be comfortable with only industry-related research, producing patents

> rather than papers, nor would I be comfortable doing only fundamental research. I believe that it is important to have some focus on the needs of one's local community, or with the national interest.' (Interview with a PhD programme leader in Biotechnology)

A major concern for these programmers was finding suitable students. One possible route, which emphasised in particular by those PhD programme leaders situated in previously disadvantaged universities, is to start 'from the grassroots… to bring intelligent youngsters in from the bottom and to train them to the point where they are willing and able to do a PhD.' (Interview with a PhD programme leader in Physical and Material Science). What often delays the completion time of this kind of PhD and increases attrition is the process of the academic writing and the requirements of the HEQF.

A further challenge to this type of PhD is the attitude of industry towards the degree. Not all major industries in South Africa share the view that they require knowledge at PhD level.[2] Backhouse likewise maintains that industry in South Africa generally does not value academic research explicitly; instead of encouraging Masters and PhDs, they 'prefer BSc graduates that they can put on the production line' (Backhouse, 2009, 269).

It is probable that the motivation of industrial companies for entering into partnerships with universities is dependent on their investment in Research and Development (R&D), and whether this is developed locally or is imported. For example, while motor vehicles are built in South Africa, the technology to manufacture them is derived mainly from the manufacturers' offshore partners. Indeed, some major industries, such as SASOL [South African Coal

[2] Based on unpublished interviews with major industries, international and local foundations, government departments and embassies that were conducted in the 2009 ASSAf Panel on the Ph.D.

and Oil], provide PhD students with bursaries and scholarships, access to data, facilities, and mentoring. They fund Chairs, Centres of Excellence, and specific PhD programmes.

In sum, it seems that for most PhD programme leaders close ties with the industry is secondary to the main goal of making the PhD training for an academic career, and it even sometimes is seen as detracting the students from this goal. It appears that with a few exceptions there is no evidence of strong effective links between PhD programmes and industry. It is not clear whether this is a result of limited academic entrepreneurism or of industry's preference for lower skills.

**The South African PhD – the way forward**

The data clearly indicate that there is a strong predisposition among PhD programme leaders to align themselves with the HEQF and to perceive the PhD as an academic pursuit. At the same time, there are some tentative changes 'on the ground' in response to the needs of industry, business, the NRF/DST vision, funding policies, and a diverse student cohort. It seems that the PhD attempts to serve several purposes within the single structure provided by the HEQF, sometimes in tense association.

The policy dilemma for South Africa is whether to adopt and promote the changes that are taking place on the ground and offer diverse pathways to doctoral training, or to continue to impose a one-size-fits-all model of the traditional PhD on a system that is moving away from this single conception of the PhD.

The report of the Academy of Science of South Africa (ASSAf)'s Study Panel on the PhD recommended the first option. Based on a taken-for-granted assumption that South Africa needs more PhDs in order to become a meaningful player in the global economy, the panel felt that 'the insistence on a single model of a PhD will slow down the production of PhDs and frustrate practitioners responding to the real needs in business, industry and academia for more relevant and more powerful training locked up in a single model' (ASSAf, 2010,113).

As a late-comer to the policy debate on doctoral education, South Africa could benefit from the international experience. The research literature indicates two main policy responses. The first is to support the establishment of diverse pathways to the PhD, especially professional doctorates.

A binary system of professional vs traditional doctorate was adopted in Australia in the 1990s (Lee et al., 2009) but has many critics. Tennant (2004) suggests that the notion that the professional doctorate offers an alternative to the traditional doctorate is not sustainable for two reasons: First, the doctoral experience is the same for both types of doctorate, and second, there are broader transformations in doctoral education which transcend the PhD/professional doctorate distinction. For Neumann (2009) the traditional PhD no longer exists and structural variation is related to discipline and institutional contexts rather than dependent on the type of doctorate.

On the other hand, Lee et al. (2009, 280) argue that the 'discourse of demise' of the professional doctorate in Australia is premature, and call for the 're-imagining' of new forms of doctoral education to emerge from the spaces opened by the professional doctorate.

The introduction of professional doctorates to South Africa may not in itself position the degree in relation to the knowledge economy. This is mainly because the DST/NRF vision for an increased production of PhDs emphasizes increased PhD production in the sciences and technologies, whereas professional doctorates, with the exception of engineering (Park 2007), dominate the social services professions such as education, psychology, business and nursing.

The second policy response is to ensure the flexibility of the traditional PhD programme, on the assumption that the diverse nature of university knowledge production requires a flexible doctoral education system with in-built diversity, allowing the student to succeed in both academic and professional contexts (Bastalich, 2010). This signals a shift of focus from structural rearrangement (as in the shift from traditional PhDs to professional doctorates) to cultural change in the practices of academics and academic institutions (Boud and Tennant, 2006). In order to make the PhD more flexible it is important to challenge existing practices and boundaries, which may be a threat to the identity of academics, traditionally defined by their disciplinary 'belonging' (Boud and Tennant, 2006).

Should policy-makers in South Africa choose this option, the challenge would be to encourage academics to think differently about the PhD in their specific fields, and for the institutions to support innovative PhD programmes, as well as various collaborations and networks. It is important, however, that any policy decision be preceded by a debate on the role that academia and the PhD should play in the knowledge economy (Johnston and Murray, 2004; Lee, Brennan et al., 2009).

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