

# **The Career Choices and Impact of PhD Graduates in the UK: A Synthesis Review**

**Report prepared for the Economic and Social  
Research Council (ESRC) “Science in Society” Team  
and the Research Councils UK (RCUK) Research  
Careers and Diversity Unit**

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# The Career Choices and Impact of PhD Graduates in the UK: A Synthesis Review

## Summary:

This report provides a synthesis review of what is known about career choices and impact of UK PhD graduates. It was commissioned by the Economic and Social Research Council (ESRC) as part of its Science in Society strategy and the Research Councils UK (RCUK) Research Careers and Diversity Unit. The review responds to a growing interest in researcher career paths and the skills which doctoral graduates bring in cultural, social and economic terms.

### *Nature and Profile of the PhD*

The report starts by examining the nature of the PhD, identifying the different types of doctoral studies undertaken and providing a profile of PhD graduates. It is clear that there has been a growth in the number of people studying for doctorates, but also changes in the student body, with increasing numbers of experienced professionals returning to study. This will have some influence on the nature of career choice and impact among PhD graduates.

### *Career Choices*

The career choices of PhD graduates are reviewed. The picture we can form is fairly limited. We examine first destinations and longer-term career pathways as evident through a number of studies. However, a much more limited amount of information is available on the contextual factors which shaped these career 'choices'. As such, a clear gap is identified in terms of the underpinning factors which impact on choice, opportunity and outcome. Equally, the current literature does not enable us to explore the differences between graduates who gained their doctorate via different approaches.

### *Impact of PhD Graduates*

The majority of relevant literature focuses on the economic impact of PhD graduates. Thus, we examine two key dimensions of this impact. First, economic studies of the value of a PhD in terms of wage premium and return on investment are considered. This leads to a consideration of the wider value and role of PhD graduates and the PhD to the academic sector and the non-academic sector. It is clear that doctoral graduates have a major impact across a wide range of sectors, with low levels of unemployment, high employability over time, and a major contribution in terms of high level skills and knowledge. Overall, graduates have been able to make use of their skills in gaining employment and within their work, and employers generally recognise the value these graduates bring to the company. More in-depth analyses of the

direct impact of the PhD graduate in the workplace were not evident and a particular gap seems to exist in terms of our understanding of the social and cultural impact of these graduates.

### *Conclusions*

This report brings together evidence on the career choices and impact of PhD graduates. Our extensive searches were able to gather a range of relevant information, although this tended to be very dispersed. Many of the larger studies are carried out on specific groups and are not comparable, but do provide useful information for this review. In particular, we did not uncover information on the social and cultural dimensions of this impact, and thus this report focused on the employment and economic dimensions of impact.

Overall, whilst we can to some extent form a picture of the career choices, destinations and related impact of the PhD graduate, we still lack in-depth examinations of the some complex areas including:

- Contextual, shaping factors which influence ‘choice’ and opportunity for PhD graduates;
- The extent to which longer term career pathways meet the expectations of PhD graduates;
- The differences between Ph.D and Professional or Taught Doctorate graduates’ motivations, background, choices and outcomes;
- Longitudinal studies which track this group from decision to study through to retirement;
- Studies of wage premium and return on investment for doctoral graduates by type of doctorate and by sector;
- The social and cultural impact of PhD graduates;
- In-depth examination of the direct impact of PhD graduates in the workplace and the ‘value added’ of employing these individuals;
- Close study of the personal impact and value of the PhD, particularly over the long run.

## Introduction

This report provides a research synthesis of the existing literature on PhD graduates' career choices and impact. This study was commissioned by the Research Councils UK (RCUK) Research Careers and Diversity Unit and the Economic and Social Research Council (ESRC) as part of its Science in Society strategy in response to growing interest in researcher career paths and the skills which doctoral graduates bring in cultural, social and economic terms. The synthesis seeks to gain a better understanding of what is known about the career choice of PhD graduates and the impact they are having in their workplace, sector and more widely. The synthesis aims to provide a better understanding of career choice and impact of PhD graduates to act as a resource to inform the RCUK and ESRC stakeholders, such as academic researchers, industry and business, government departments, careers advisors, supervisors and others supporting the career development of researchers. As well as providing an overview of what is known, some of the gaps in our knowledge are highlighted in order to inform future research directions.

Among the G8 member countries, the UK is second only to Germany for the number of PhDs per capita (Funders' Forum, 2006). Nevertheless, the information we have about these individuals is rather limited and, moreover, very dispersed. In 2004, Leonard *et al* noted that:

We know surprisingly little about what motivates people to undertake a doctorate in the UK nor how they experience it. ... We know least of all what use individuals make of a Ph.D or professional doctorate while they are studying or once they have one.

(Leonard *et al*, 2004: 369)

Similarly, in 2007 Park reflects that:

Concerns have also been voiced (Leonard and Metcalfe 2006) about the lack of research on most aspects of the doctoral student experience which could be used to inform evidence-based decision-making. Compared with the undergraduate sector, postgraduate students in general, and research students in particular, remain a relatively unresearched group.

(Park, 2007: 7)

In preparing this synthesis, we have been able to gather a range of data and discussions on PhD graduates. However, like the above cited authors, we have found the literature to be rather limited in terms of forming a really clear and systematic picture of the hopes, expectations, choices, opportunities, outcomes, and impact of doctoral graduates. Notably, elements of evidence can be found in many different publications and from research focusing on many different relevant groups. This makes the data dispersed, rather than there being a clear and coherent location to which we can turn for answers to these questions. If we were to focus very specifically on what is known directly about career choices and the impact of PhDs, there would be a more

limited range of relevant published literature and documentation. Thus, we have tried to draw on a range of publications which can bring relevant issues to this review and help us to piece together information to form a wider picture of what is known about the career choices and impact of PhD graduates at this time. Equally, we seek to identify where some of the research gaps are and how these might be filled.

The research team comprised Dr Arwen Raddon and Dr Johnny Sung of the Centre for Labour Market Studies, University of Leicester. Dr Arwen Raddon led the review and in particular prepared materials on the nature of the PhD, career choices and longer term employment paths and employers and graduates' views on the role and value of PhDs in academic and non-academic sectors. Dr Johnny Sung prepared the sections on the demography of PhDs, first destinations, the labour market and demand for PhDs, rate of return and wage premiums.

## **1. What is the PhD?**

First, it is important to clarify who we are talking about when we focus on the career choices and impact of PhD graduates.

The Ph.D is the traditional form of doctoral study, to which have now been added a wide range of different approaches to gaining a doctoral level qualification. The remit of this current study was to examine the career choices and impact of 'PhD graduates', which was taken to mean the full range of doctoral graduates. Thus, we will generally refer to doctoral graduates and, where the term 'PhD' is used, this is intended to include doctoral graduates of all types. Where differentiation is required for the purposes of the discussion, the more specific titles such as Ph.D or Ed.D will be used to identify graduates of the Doctor of Philosophy or Doctorate in Education and so on. In following sections we briefly outline these different modes of study since they are likely to have an important influence on the issue of career choice and impact for doctoral graduates.

As a number of writers have commented, postgraduate education, training, experience and employment have traditionally been relatively under-researched areas when compared with the research on undergraduates (e.g. Burgess, 1997; Noble, 1994; Park, 2007; Salmon, 1992). More recently, despite the rapid expansion in numbers of postgraduates and subsequent wider range of research (e.g. doctoral experience, the viva examination, impact of class, impact of gender, quality of training, traditional versus new or professional doctorates etc.), there are still aspects of postgraduate experience and impact about which relatively limited information is available. In particular, information on, and studies of, the career choices, opportunities, challenges and longer term impact of postgraduates – and doctorates in particular – is still relatively limited. Some of what is written about PhD graduates is based on general knowledge or a limited range of empirical data, with many gaps being noted. For example, Green and Powell (2007) comment that little is known about employer demand for doctoral graduates and that, in terms of the wider labour market, there appears to be relatively little

information in the UK on the impact that employers believe PhDs can make, or the demand for this qualification.

Whilst the length of this current project (2 months) placed limitations on what we could achieve, we have nevertheless managed to locate a fair range of information on PhD graduates and, in some cases, postgraduates in general (due to grouping of Masters and Doctorates in some documents). However, much of the literature is not *directly* focused on the issues we are reviewing here, for example, relevant aspects may simply be touched upon in the course of examining other dimensions of PhD graduate outcomes or experience. As such, the literature tends to be rather dispersed. We can gain elements of understanding from different sources, rather than there being a small number of core documents or literature from which we can gain a full and clear picture of the choices and impact of PhD graduates, or to which we can point researchers. This helps us nonetheless to build a sense of the wider picture and to identify areas for further consideration.

## 1.1 *The Variety of Doctoral Level Studies*

Given the range of means to achieve a Doctorate, we will now outline two of the key doctoral programmes. Others such as the PhD by Publication have not been considered in this review, since there is relatively limited information on these in relation to impact or career choice.

### 1.1.1 *The Traditional PhD*

As will be highlighted in this section, the Ph.D has a long and distinguished history, but more recently this qualification has come under question. The first PhD awarded has been traced back to Paris in 1150 (Noble 1994). PhDs were well recognised in Germany from the 17<sup>th</sup> century and the USA from the 19<sup>th</sup> century and were increasingly perceived as helping to expand the “economic power and national prestige” of these countries (Simpson, 1983: 27). However, it was not until 1920 that the Ph.D was adopted in the UK at Oxford university and later taken up in other UK universities (Noble, 1994). A number of higher doctorates followed.

...DD (Divinity), MD (Medicine), LLD (Law), DMus (Music), DSc (Science), DLitt (Letters, i.e. Arts).

(Phillips and Pugh, 2005: 21)

The Doctor of Philosophy (Ph.D) qualification continues to draw on the Humboldtian model of the seemingly isolated “doctoral candidate, hoping for a career, thinking original thoughts, but living in a structured situation of professional dependence [on their supervisor]” (Cowen, 1997: 185). The PhD is thus seen as producing a significant piece of work over some time:

“The image that comes into our heads might well be a detailed study of a particular topic, supervised by an established academic with experience of the area; a sustained piece of original research that will hopefully make a difference to our understanding of the field.

(Wellington *et al*, 2005: 3)

The books will tell you that the PhD is several things, including a professional qualification, a training in how to do research and an initiation rite...

(Rugg and Petre, 2004: 2)

The National Postgraduate Committee (NPC) define the PhD “primarily as a training in research” and argue that those doctoral programmes which are not should be clearly differentiated (NPC, 1993: 1). Interestingly, whilst research training and production of an original piece of research are common to descriptions of the PhD, many writers comment that the nature of the PhD is far from clear, and disagreements continue as to its purpose and differences across disciplines and institutions (e.g. Delamont *et al*, 2000; Rugg and Petre, 2004). For a more in-depth exploration of individual supervisors’ and supervisees’ views of the PhD process and purpose, see: (Delamont *et al*, 2000).

Indeed, the traditional Ph.D model has come under criticism in the UK and elsewhere (Burgess, 1997; Cowen, 1997; Park, 2007; Scott *et al*, 2004; UKCGE, 2002). Noble’s (1994) research on the doctorate in a number of countries identified problems with quality, completion rates, employment and discrimination; although he is overall supportive of the doctorate. Scott *et al* (2004) point to five issues raised by Usher (2002), including the overly-specialised nature of the PhD, disciplinary narrowness, a need for broader skills development, the focus on individual rather than collaborative work and a lack of linkage with industry. Other criticisms they go on to highlight are lack of relevance, being too geared to producing future academics, not helping professionals in other areas to tackle important questions in their field and privileging academic over practice/craft knowledge (Scott *et al*, 2004). Similarly, UKCGE (2002: 11) comment that the increasing intellectual demands of many areas of work have led to “extensive recruitment of PhD holders into industrial and commercial employment”, but that it has equally been rejected in other areas where it is perceived as “too academic and having insufficient focus on the ability to apply knowledge and skills outside the field of academic research”. Scott *et al* (2004) reflect that, while these criticisms often overlook the reality and diversity of doctoral studies, it is in light of challenges such as these that the PhD has come under increased scrutiny from the government, national Research Councils, universities, HEFCE and QAA, and led to the introduction of professional doctorates in the UK. Indeed, we will see these views raised again later in this report when reviewing impact of PhD graduates in relation to employment and the workplace. However, questions around the traditional Ph.D are not only related to its relevance and how it meets wider demands, but to the very purpose of the Ph.D as an educational process and experience (for a fuller discussion see: Park, 2005, 2007).

Since the 1980s a number of reviews and subsequent measures have been initiated in order to raise completion rates, increase the employability of

graduates and improve the quality of research training programmes within postgraduate studies (Burgess, 1997; Cowen, 1997; Park, 2007; UKCGE, 1996). In the late 1980s, there was particular concern among Research Councils over the low completion rates for PhDs and a call from many different directions for improved research skills training and a better return on the investment in PhDs (e.g. Wilson, 1987; Winfield, 1987). This concern continued into the 1990s, with establishment of bodies such as the UK Council for Graduate Education and UK GRAD Programme and an increasing emphasis on the development of more transferable, employment-related skills.

In another recent development, the Higher Education Funding Council for England (HEFCE) backed a 'New Route PhD' which includes two possible routes:

- the 'one + three model': one year of training (and deciding on title and focus) plus three years of researching and;
- the four-year doctoral programme, integrating academic supervision with group work, lectures, tutorials and perhaps an annual Graduate Research Conference.

(Wellington et al, 2005: 8)

The aim of this new form of PhD was to address some of the criticisms of the Ph.D whilst also responding to the:

... knowledge-based economy of today [which] puts far greater demands upon Doctoral graduates. There will always be a need for the subject specialist, but the competition for jobs in all sectors...is increasingly and many find that having specialist knowledge...is not sufficient. Increasingly, the traditional PhD is seen as too 'narrow' and students wishing to study for a PhD must carefully consider how employable they will be on graduation.

([www.newroutephd.ac.uk/Pages/why.html](http://www.newroutephd.ac.uk/Pages/why.html) cited in Murray 2002: 31)

Interestingly, although this description appears to refer to wider employability, a UKCGE report on doctorates refers to this as an enhanced training for the "aspirant academic" (UKCGE, 2002: 15).

With under half of all doctoral graduates moving on to careers in academia (UK GRAD, 2004), it would seem important that students are able to develop a broad range of skills which will ultimately help them gain employment or further opportunities in a range of different sectors. Gillon (1998 cited in Leonard, 2001), however, argues that too much is now asked of the traditional PhD student who has not only to produce a thesis, but to teach, publish and develop a range of transferable skills. Wellington *et al* (2005) also note criticisms of the integration of HE teacher training within the PhD, such as the Postgraduate Certificate in Higher Education (PGCHE). Furthermore, Scott *et al* (2004) emphasise that there is an important role for creation and exploration

of 'pure' knowledge which is not necessarily directly marketable or immediately applied, but which nevertheless enhances society's knowledge and understanding. As noted above, however, it would also be wrong to assume that the Ph.D does not enable development of applied knowledge. Indeed, case studies of different PhD student's experience attest to the link that many students make between their fields of practice and their Ph.D research (e.g. Salmon, 1992). On the other hand, many of the skills questioned by Gillon are already important and integral skills within the doctoral process (Murray, 2002).

Nevertheless, questions still remain as to the suitability of a Ph.D for those who do not aspire to become academics or researchers, whilst others argue that the Ph.D does have much wider relevance and value. Certainly, the Ph.D continues to gain recognition well beyond the HE sector, and this will be seen when we consider impact, in particular, further on.

### 1.1.2 *The Introduction of Professional Doctorates*

Against the background of criticisms of the PhD, new modes of doctoral study have been developed since the late 1980s/ early 1990s. However, these programmes were not solely a response to perceived shortcomings in the PhD. Other key drivers include:

- Higher education expansion and competition for students;
- Changing intellectual demands in all areas of work;
- Demand from professionals and employers for higher level qualifications;
- Government and international emphasis on knowledge workers and the 'knowledge economy';
- Pressure on higher education to demonstrate its value to society, relevance and links with industry;
- Growing trend for continuing professional development, reflective practice and evidence/research-based approaches;
- Increased levels of accountability and quality measures required in the professions;
- Increased recognition of work-based learning;
- Qualification inflation, with growing numbers of graduates and postgraduates;
- Demand from UK and international students for more structured programmes.

(e.g. Green and Powell, 2007; Scott *et al*, 2004; UKCGE, 2002; Wellington *et al*, 2005)

Thus, as well as a growth in numbers of people studying at postgraduate level, the last two decades have seen a growth in the range and format of doctoral programmes on offer. Green and Powell (2005: 11) maintain that many of the changes taking place in doctoral education have not been sufficiently mapped

out in the research, leading to a “lack of UK research evidence for many of the changes” whilst there is “richer research evidence coming from North America and Australia”.

Although professional doctorates have been available in the USA since the 1920s, they were only taken up in the UK in the last two decades. There are now more than 30 different types of doctoral study available in the UK (Green and Powell, 2007) and over 200 doctoral programmes (Farrow, 2007). The Doctorate in Clinical Psychology appeared in 1989 and unlike most doctorates is now a standard licence to practice, accredited by the British Psychological Society (UKCGE, 2002). The Doctorate in Education (EdD) and the Doctorate in Engineering (EngD) followed in 1992 (Noble, 1994). More recently, doctorates have been developed in a wide range of practice-related areas such as Business Administration (DBA), Educational Psychology (DEdPsy), Pharmacy (DPharm), Nursing (DNursSci), Veterinary Medicine (VetMD), Fine Arts (DFA), Psychotherapy by Professional Studies (DPsych Prof) and so on. For a fuller listing and discussion, see (Powell and Long, 2005).

The professional doctorate is perceived to fulfil a different role to that of the Ph.D. Above all, it is distinguished by the emphasis on practice, the professional context and a shift away from academic scholarship as the primary focus of knowledge production. As Bareham *et al* note (2000: 402), for example, the Doctorate of Business Administration (DBA) has the capacity not only to produce original knowledge – as with the Ph.D – but to “make a significant contribution to management practice”. In some cases, there is no longer a requirement to submit a thesis, although such courses require submission of a number of extended assignments and most often completion of a research project. These programmes are aimed at what is perceived as a different group of individuals to the Ph.D, namely the new ‘knowledge workers’ in a range of industries and sectors (Boud and Tennant, 2006).

One way in which the doctorate is intended to be differentiated from the Ph.D is in the collaboration of HEIs, employers and professional bodies in the design, delivery and outcomes of these programmes. In some cases, there has been a strong role for employers or professional associations in the development of professional doctorate programmes. However, this is not necessarily the case (Powell and Long, 2005; Scott *et al*, 2004). Equally, whatever role employers and professional bodies may play, as Scott *et al* (2004) note, the programmes are ultimately educational programmes and must meet the requirements and quality standards of the higher education institution.

The traditional Ph.D is also relevant to non-academic sectors, as will be highlighted in this review. For example, UKCGE note that the chemistry industry have similar requirements to those of the academic sector, meaning that the PhD is felt to meet industry demands. The engineering industry, on the other hand, have very different needs, as highlighted by the Parnaby Report (SERC 1991); although this does differ depending on the branch of engineering, with some valuing the Ph.D more highly. In particular, areas such as communication, finance, leadership and management skills were identified

as vital skills that were not clearly being developed through existing PhD programmes. Following the SERC (1991) report, the Engineering and Physical Sciences Research Council (EPSRC) moved to develop the Doctorate in Engineering. The aim of this professional programme was to provide:

... a high status route for young engineers to enter industrial careers, with a combination of a high level of technical expertise and well developed skills in problem solving and team working. It was intended to operate in full-time mode, and be aimed at recent graduates.

(UKCGE, 2002: 19)

Furthermore, close links with industry, placements and cooperation with industrial sponsors are central to the DEng in a way that it was felt did not occur with the traditional Ph.D. It is interesting to note, however, that the majority of professional doctorates are related to public sector employment fields, rather than industry and commerce. Findings in 2002 showed that the Doctorate in Education and different doctorates in psychology formed the largest proportion of professional doctorates (UKCGE, 2002: 39). Equally, the appearance of the professional doctorate seems to have led to an increase in people studying at this level in fields such as healthcare (UKCGE, 2003).

There is some debate over what distinguishes academic and professional knowledge and why, and the extent to which this is being assessed in ways which fully recognise the difference between the PhD and the professional doctorate (Scott *et al*, 2004; UKCGE, 2001; Wellington *et al*, 2005). With the professional doctorate's "orientation towards *praxis*" (Wellington *et al*, 2005: 17), many see engaging in such a programme as a way of getting formal recognition for their experience and knowledge whilst simultaneously dealing with issues in their daily practice and gaining a doctoral qualification. This is perhaps more pronounced within the professional doctorate, although it is also seen with the Ph.D. Nevertheless, professional doctorates are perceived as a means for universities to build better links with industry (Scott *et al*, 2004).

There has been some suspicion of professional doctorates among academics who perceive them as a challenge to the values of the Ph.D, as well as a feeling that they are not a real equivalent to the Ph.D (Powell and Long, 2005; UKCGE, 2002; Wellington *et al*, 2005). Nevertheless, the UK Council for Graduate Education (UKCGE, 1998: 8) emphasise that the professional doctorate holds parity with the PhD and that it is simply the way in which "doctorateness" is achieved which differs. Indeed, changing requirements from Research Councils for the completion of a Ph.D now mean that Ph.D programmes are shifting towards the taught or professional doctorate format, with more time spent on taught courses, research training and a greater need for identifiable transferable skills (Green and Powell, 2007). Furthermore, distinguishing the professional doctorate by emphasising the application to and reflection on practice overlooks the fact that this often occurs within Ph.D research (Wellington *et al*, 2005). As such, it is not easy to draw a clear line between the Ph.D and the Doctorate.

The Professional Doctorate is often seen to provide a more structured, supported and potentially less isolated experience (Becker, 2004; Murray, 2002; UKCGE, 2003; Wellington *et al*, 2005) and is regarded in reviews as particularly useful for part-time practitioners wanting to study whilst working in their field (UKCGE, 2003). Nevertheless, the image of isolation and lack of structure perhaps draws on a stereotype of the PhD experience, particularly given recent changes.

Fuller discussion of the development and nature of professional doctorates, including in-depth case studies, can be found in: (Scott *et al*, 2004). For a forecast on the future shape of doctorates in the UK see: (Park, In Print 2007).

## 1.2 *Who Studies for a PhD/Doctorate?*

The stereotypical picture of the PhD candidate follows the ‘science model’ of a young postgraduate undertaking full time studies with funding, perhaps having come straight from their undergraduate degree, and studying for around 3 years (Salmon, 1992). This is not entirely a stereotype, since many doctoral students do fit this model (Noble, 1994). In the 2004/5 cohort, 57% of new full-time doctoral students were in the 21-24 age bracket, 20% aged 25-29, and 21% aged 30 plus (HESA data cited in Green and Powell, 2007: 97). Nevertheless, a fair proportion of doctoral candidates are part-time, self-funded, mature students who may take much more than three years to complete their studies (Salmon, 1992). In the same 2004/5 cohort, 74% of new part-time doctorate students were aged 30 plus (HESA data cited in Green and Powell, 2007: 97). This is now increasing given the expansion of professional doctorates aimed at experienced individuals wanting to research their field, gain a licence to practice, or enter a new field (Scott *et al*, 2004). As Leonard *et al* found in their study of doctoral graduates at the Institute of Education:

... many ‘students’ were not ‘wannabe’ academics. They had a parallel and, within its own sphere, equally prestigious and better paid career as educational practitioners or consultants.

(Leonard *et al*, 2004: 374)

Indeed, there are not only more people studying at this level, but these are increasingly “mid-career professionals, often already senior people in their own right, working on their degrees part-time” (Wellington *et al*, 2005: 4). Given the increasing diversity of the PhD student body, Green and Powell (2005: 21) ask, “have universities and funders fully recognized this fact and responded appropriately?”. Whilst an answer to this question is outside the remit of our review, it is worth noting the differences between the different groups studying for doctorates. In particular, those undertaking a Professional Doctorate are highly likely, by nature of the programme, to be further on in their careers, potentially in senior positions. Given the linkage between Professional Doctorates and the workplace, it is likely that these graduates will have made their career choices some years beforehand and consider the doctorate as part of progressing with that career. As such, they are overall likely to have fairly different motivations to those studying for a Ph.D and

perhaps considering an academic career, particularly compared to those PhD students who are newer entrants to the labour market and are more likely to be considering a range of early career options.

It is important to emphasise these differences and we try where possible to highlight this within the rest of the report. However, the wider studies of doctoral graduates have tended to focus on more traditional PhD students, particularly those funded by Research Councils. Relatively little is known about the growing body of professional or taught doctorates and, as Green and Powell (2005) note, these are not identified separately in HESA data.

As such, this is a clear gap in the literature on doctoral graduates and their career choices and impact. We might suggest that their impact will be qualitatively quite different to that of new graduates moving into the labour market after completing a Ph.D, since they are often researching their everyday practice in a more direct manner and shaping that practice through their research. Equally, the skills training which is increasingly emphasised for doctoral students may not be as relevant for all groups (Green and Powell, 2005). We have cited here some of the growing body of literature on professional doctorates and the nature of these programmes, which can tell us something about the links students are making with practice and the workplace. However, our searches did not locate data on the wider picture of this group of graduates in the UK, where they work, if they change jobs, what their career expectations are and so on.

### 1.2.1 *Profile of UK Doctorates*

Alongside general massification of higher education in the last few decades (Becher and Trowler, 2001), there has been a significant growth in PhD and doctorate level studies in the UK. In the 1998/9 cohort, over 10,000 students embarked on PhDs compared to around 3000 in 1992 (Gillon, 1998 cited in Leonard, 2001).

A relatively uncommon phenomenon before the 1950s, the doctorate today remains a substantial achievement but is no longer so unusual.

(Wellington et al, 2005: 4)

Indeed, between 1996 and 2000, the number of doctorates being awarded in the UK period increased by 27%, although these are heavily concentrated in a fairly small range of institutions (Metcalf *et al*, 2002). However, as Jackson notes, despite growth, real numbers of doctoral graduates entering the labour market are still relatively small:

the number of people graduating with a doctorate increased from 14,120 in 2001 to 15,780 in 2005– an increase of 12% in total numbers. This still means, however, that in any one year perhaps only about 5,000 UK domiciled PhD researchers gain work outside academia, less than the number of students with first degrees graduating from Oxford and Cambridge.

(Jackson, Charles, 2007: 9)

We now turn to look at what subjects these students are studying as this helps to tell us something about the likely destinations and impact of PhD graduates.

### 1.2.2 *PhDs by Discipline*

As the *What Do PhDs Do* (UK GRAD, 2004) report highlights, UK-domiciled PhD students graduated within the following broad disciplinary areas. We have integrated the data on subject groupings and gender breakdown, showing which disciplines women and men tend to be graduating from. This will have some impact on the area of work in which we are likely to find men and women PhD graduates.

Table 1: Subject Grouping and Gender Breakdown of UK-Domiciled PhD Graduates

Subject	Total	% in Subject Grouping	Female %	Male %
Biosciences	2845	39.1	57.0	43.0
Physical Sciences	2330	32.1	25.8	74.2
Arts & Humanities	1000	13.8	45.5	54.5
Social Sciences	810	11.1	49.4	50.6
Other	285	3.9	56.9	43.1
Total	7270	100	44.6	55.4

Source: adapted from (UK GRAD, 2004: 5 Table 2 and Figure 2)

### 1.2.3 *PhDs for the Professions*

The Langlands Report (Langlands, 2005b) examined various education routes into the professions. It also took the opportunity to assess the population of PhDs who were likely to enter the professions. This is useful since it breaks down the disciplines further in relation to likely areas of employment. Table 2 shows the numbers of students obtaining PhDs in various professional subjects in 2002/3 and 2003/4.

Table 2: PhDs in 2003/4 and 2003/4 and Related Professions

Subject	2002/03			2003/04		
	UK domiciles	Non-UK domiciles	All	UK domiciles	Non-UK domiciles	All
<b>Architecture</b>	<b>23</b>	<b>42</b>	<b>65</b>	<b>22</b>	<b>40</b>	<b>62</b>
<b>Chemistry</b>	<b>685</b>	<b>315</b>	<b>999</b>	<b>747</b>	<b>291</b>	<b>1038</b>
Clinical Dentistry	38	21	59	35	18	53
Pre-clinical Dentistry	8	0	8	5	3	8
<b>Total Dentistry</b>	<b>46</b>	<b>21</b>	<b>67</b>	<b>40</b>	<b>21</b>	<b>61</b>
Research and Study Skills in Education	13	15	28	11	5	16
Academic studies in Education	262	185	447	315	179	494
Others in Education	48	83	131	36	41	77
<b>Total Education</b>	<b>323</b>	<b>283</b>	<b>605</b>	<b>362</b>	<b>225</b>	<b>587</b>
General Engineering	159	178	337	190	219	409
Civil Engineering	106	123	228	94	114	208
Mechanical Engineering	168	194	362	139	151	289
Aerospace Engineering	16	19	35	23	16	38
Naval Architecture	2	4	6	1	3	4
Electronic and Electrical Engineering	204	313	517	188	319	507
Production and Manufacturing Engineering	41	29	70	43	44	87
Chemical, Process and Energy Engineering	75	114	189	89	122	211
Others in Engineering	1	2	3	14	38	52
<b>Total Engineering</b>	<b>771</b>	<b>974</b>	<b>1745</b>	<b>779</b>	<b>1025</b>	<b>1804</b>
<b>Law</b>	<b>109</b>	<b>149</b>	<b>257</b>	<b>84</b>	<b>110</b>	<b>193</b>
Pre-clinical Medicine	77	31	108	65	13	78
Clinical Medicine	923	215	1137	1126	221	1347
<b>Total Medicine</b>	<b>999</b>	<b>246</b>	<b>1245</b>	<b>1191</b>	<b>234</b>	<b>1425</b>
<b>Social Work</b>	<b>39</b>	<b>12</b>	<b>51</b>	<b>32</b>	<b>10</b>	<b>42</b>
Pre-clinical Veterinary Medicine	8	4	12	10	6	16
Clinical Veterinary Medicine and Dentistry	41	18	59	35	8	43
<b>Total Veterinary science</b>	<b>49</b>	<b>22</b>	<b>71</b>	<b>45</b>	<b>14</b>	<b>59</b>

Source: (Langlands, 2005b: 23)

Table 2 shows that PhDs in engineering and medicine formed the majority of the professional groups that the report focused on. The report also noted that there had been a continuous growth of 31% of PhDs awarded between 1999 and 2004. A big proportion of this growth came from overseas students (+65%) and part-time UK researchers (+72%). The growth of UK full-time PhDs was by comparison much smaller (+11%) (Langlands, 2005b: 22).

#### 1.2.4 Demographics for Social Science PhDs

It is possible to take the examination of growth in PhDs down one level further by looking at each discipline. We will not examine this for all of the disciplines here, but instead provide some indicative information by examining growth within one field.

Whilst social sciences are one of the smaller groupings of PhDs, a particularly useful study was commissioned by the ESRC in 2005 which provides a detailed demographic review of PhDs in social sciences (Mills *et al*, 2006). This report gives a more in-depth assessment on the demographics of social sciences PhDs. This analysis makes use of HESA data, and contains wide

ranging demographic information about all social science academics. In addition, some data also contain specific labour market information about PhDs. However, many of the figures and discussions in this report refer to the ‘total social science’ population of PhDs which also include overseas students. In the following discussion we will therefore recalculate the figures and focus on UK PhDs only.

The most striking feature of doctoral training in the last decade is the rapid growth of PhDs in social science subjects. Between 1994 and 2001, Table Y1 shows that total PhD awards (including overseas students) grew by 144.5% in the social sciences with some subjects such as sociology, social work, psychology, education, social policy and administration growing by two to three times their previous totals.

Table 3: Percentage Growth of PhDs in Britain, 1994-2001

	1994/5	2000/1	% UK only	% UK, EU & O/S
<i>Social economic &amp; political studies</i>				
Economics	62	79	27.4	70.1
Sociology	42	131	211.9	217.7
Social policy & administration	15	48	220.0	245.5
Social work	4	28	600.0	540.0
Anthropology	16	35	118.8	92.9
Psychology (without significant element of biological science)	12	57	375.0	353.3
Geography (unless solely as a physical science)	40	57	42.5	77.2
Balanced combinations within social, economic & political studies (excl. law)	9	12	33.3	8.3
Politics	34	104	205.9	173.6
Other social studies	14	38	171.4	187.0
<i>Social economic &amp; political studies total</i>	248	589	137.5	132.3
<i>Law</i>	27	77	185.2	152.6
<i>Business &amp; management studies</i>	107	215	100.9	150.0
<i>Humanities</i>				
History	94	211	124.5	92.2
Economic & social history	6	17	183.3	140.0
Education	106	366	245.3	232.4
<i>Grand total of social science subjects</i>	587	1473	150.9	144.5

Source: Adapted from (Mills et al, 2006: 23, Table 2.5)

Table 3 also shows that some of the growth – e.g. social work, social studies, law, economic and social history – is due to a very low student base in 1994/5 while others have experienced substantial increases from early high bases. For example, social, economic and political studies have grown by more than double from 248 in 1994/5 to 589 in 2000/1. Likewise, history, education, business and management studies have grown substantially.

Within this picture of general expansion in PhD recruitment, a few disciplines have experienced slow growth during this period - e.g. economics, geography and balanced combined subjects. However, it is in economics that PhD

recruitment has been viewed as a 'crisis'. Indeed, the overall increase of 70.1% between 1994/5 and 2000/1 has been mostly made up of EU and overseas candidates. In 1998, neither London School of Economics nor Nuffield College (Oxford) had any UK PhD recruitment. Oswald and Machin (2000) investigated the causes of this problem. They concluded that the relative pay of economics PhDs had deteriorated significantly vis-à-vis the private sector. This is aggravated by unfavourable university working conditions to attract UK PhD candidates. Their study also showed that only 6% of the relevant Masters students would consider working as academics in economics. Freeman (2000) similarly confirmed that relative pay was also a factor in causing a decline in economics PhDs in the USA, although in the USA, the magnitude of decline in popularity was smaller than that in the UK. A similar PhD recruitment crisis in the USA happened to take place in mathematical and biological sciences.

Following the introduction of the ESRC 1+3 studentship, the UK PhD recruitment in economics after 2002 appeared to have reverted, though Mills *et al* (2006) do not have sufficient data to investigate the whole picture.

## **2. Skills and Attributes Developed Through Doctoral Studies**

Having considered the nature of the PhD, and a general demographic snapshot of the PhD graduate body, we now briefly examine the skills and attributes commonly attached to doctoral studies. Whilst this does not tell us about career choices or impact it signals, in part, what is expected of an individual who has completed doctoral studies and what they might bring to society.

Postgraduate education, in general, is widely recognised to make a major contribution to knowledge and national wealth creation (Harris, 1996). However, concern has long been expressed about the potentially narrow range of skills developed through the Ph.D in particular. Burgess (1997) points to a number of reports identifying concerns about postgraduate and PhD studies over the last few decades. For example, there is concern about the potential lack of connection to skills for employment outside academia, the seemingly heavy emphasis on the production of a thesis on a narrow topic at the expense of wider knowledge and activities, the need for a broader range of communication and technical skills to be developed as part of such programmes, and for these degrees to have relevance to all careers (OST, 1993; Robbins, 1963; RSC, 1995). Similarly, the NPC (1993: 1) note that since employers tend to employ new recruits based on their broad range of skills, and will train for specific skills, it is important that PhDs should "not be too specialised". Indeed, a 1993 White Paper (OST, 1993: parag. 7.16) claimed that the traditional PhD was "not well matched to the needs of a career outside research in academia or an industrial research laboratory". However, the NPC (1994) refute this claim, noting the comparatively low (3%) unemployment rate of PhDs and the fact that most PhD graduates in science and engineering work beyond these two settings. Furthermore, it is noted in the NPC document and elsewhere that, as the undergraduate degree becomes more commonplace, the PhD will gain greater market value over the coming years. Nevertheless, the debate continues as to whether the PhD is

intended as education or training and the form this should take (Burgess, 1997; Leonard *et al*, 2004; Salmon, 1992; Scott *et al*, 2004; Wellington *et al*, 2005).

As Burgess (1997) notes, inquiries in the 1980s and 90s such as the Dearing and Harris Reports, highlighted the need for different forms of doctoral study as well as raising concern about the need for development of a broader skills set. Despite these concerns, it is clear that a range of skills are developed through study at doctoral level. Any postgraduate course provides a focused “time for reflection and self-development” (Becker, 2004: 1). Murray (2002) comments that most doctoral students are unlikely to have prior experience of writing a document like the thesis, either in terms of the length of writing or the processes involved in completing such a demanding project. Thus, some of the core skills that are identified as being developed through the doctorate include:

- the ability to work independently as well as working under supervision;
- self-motivation and -discipline;
- specialist and generalist knowledge within the given field;
- time, project and document management, ability to prioritise tasks;
- critical thinking, analytical and writing skills;
- the ability to read and synthesise a range of documentation;
- research skills;
- developing initiative;
- communication, presentation and interpersonal skills;
- problem-solving, flexibility in the face of change and creative thinking;
- networking;
- professionalism and ethical practice;
- team work (e.g. in scientific team-based studies, or as part of seminar groups, conference organising);
- computing and information searching skills;
- teaching skills;
- taking responsibility for one’s own learning and learning how to learn, seen to support lifelong learning for the future.

(e.g. Becker, 2004; Burgess, 1997; Cryer, 2001; Delamont *et al*, 2000; DTZ Consulting & Research, 2006; Murray, 2002; Phillips and Pugh, 2005; Rugg and Petre, 2004; Wisker, 2005).

In addition to these, a UKCGE working group identified a desired outcome of doctoral study in the humanities, which can probably be broadly translated across all fields of doctoral study, as the development of:

Generally highly-qualified and talented people, who will use a wide range of knowledge, understanding and skills that they have gained through doctoral research in a wide variety of contexts, in employment and beyond, enriching their own lives and the lives of others.

(UKCGE, 2000: 19)

### **3. Doctoral Graduates and Career Choice**

We now turn to consider the literature on PhD graduate career choices. Firstly, we reflect on the concepts of careers and choice. Next, we examine a number of studies which highlight aspects of the choices and expectations of doctoral graduates. This brings us to consider other means of gauging career choice, such as job satisfaction and future plans. Areas which are less evident in the existing literature are highlighted.

#### *3.1 The Concepts of Careers and Choice*

The concepts of careers and choice have been discussed in detail in a number of different disciplines, being informed by sociological, psychological and economic theories among others. We have not been able to explore these wider issues in any depth within the confines of this short project, however, it is worth noting some of the key issues raised by the notions of careers and choice (see Langlands, 2005a for further useful discussion of career theories).

As Langlands, reflecting on the reasons that individuals might pursue a particular profession, comments:

The decision to follow a particular profession will hinge on a number of critical social, psychological and economic influences. How important are personal and family/social influences? How does the education process influence decisions? How important are financial considerations? When are preferences formulated? And so on.

(Langlands, 2005a: 5, parag. 1.12)

Indeed, the concept of 'choice' is a contentious one (Hughes, 2002). If we take a human capital approach, we might assume that choices are made by individuals in a rational manner, based on the benefits (often financial) that will be accrued. Thus, a PhD, like any other qualification, will be considered in terms of the current costs and the likely future pay offs – will I gain access to a higher paid job, can it help me get a promotion, will the longer-term gains outweigh the short term costs and impacts on my life? However, if we take a more sociological perspective, we might ask about the ways in which the individual interacts with wider society and how, for example, class, gender, ethnicity, age and so on have shaped not only what choice is made, but what choices are possible for an individual or group. A more psychological approach might lead us to consider individual dispositions towards types of work or how individuals see themselves in terms of identity.

Similarly, the concept of careers has been explored from a range of perspectives and a number of theories have been developed. It is not clear from the literature reviewed in this synthesis whether these theories have or have not been considered when designing methodologies. This is perhaps not surprising since many of the documents, articles and books referred to are not directly focused on the career choices of PhD graduates but have been drawn upon here in order to piece together a wider picture. Those studies which did specifically research PhD graduates' employment do not appear to explore these theories, although they may have been informed by them.

Numerous studies consider employment status and position but there is relatively little exploration of the factors behind career transitions – or a broader reading of the impact of these PhD graduates in the workplace. A similar situation is noted for studies of graduates:

Studies on graduate employment and work often give a limited description of graduates' professional success. The analysis of their income (or related measures such as salary or wages) in the context of applications of the human capital theory (Psacharopoulos & Patrinos, 2004) prevails. Education is viewed as an investment and the later income is used to calculate the private or social rates of return to this investment. Sometimes, only the employment status (employed/not employed) at a certain time after graduation is considered as an indicator of professional success. Such approaches often ignore that graduates have complex work orientations and career plans in which other factors such as the autonomy at the work place and the content of work play a much more prominent role than income.

(Schomburg, 2007: 35)

### 3.2 *Career Choices and Expectations*

The growing variety of 'how to' PhD guides provide some necessarily limited information for potential PhD candidates on career options. These guides tend to be aimed at doctoral or postgraduate candidates in general. Since career options can be quite specific according to the discipline or institution, the information provided is of a necessarily general nature. Interestingly, within such texts, students are widely perceived as only coming to consider their career options rather late on in the process, many only after their viva examination:

There are various things which are not elaborated ... One thing which is seldom mentioned is what happens to you after you finish the PhD. The classic story is as follows. A student focuses clearly, submits the thesis and starts looking for a lecturing job, only to discover that they need two years of lecturing experience and preferably a journal publication as well if they (p. 3 ends here) are to be appointable for a job in a good department in their field. If they had known this two years previously, they could have started doing some part-time lecturing and submitted a paper or two to a journal.

(Rugg and Petre, 2004: 3-4)

So there you are, through your viva, corrections finished to everyone's satisfaction and waiting for graduation day, without the thesis filling your life. At this point many students realize with growing unease that they haven't given much thought to the topic of what to do next with their lives."

(Rugg and Petre, 2004: 191)

In some ways this is a difficult time to consider your future [having just finished], in that you will feel relief that your course is over, perhaps tinged with sadness that a satisfying phase of your life is finishing, whilst being elated that you have finally achieved your desired result. Thinking about the career may be the last thing on your mind at the moment. On the other hand, your recent experience, your desirability from an employer's point of view and your will to succeed will all be fresh in your mind. ... most postgraduates get a new job (or return to their existing career, often at a higher level) once they have completed their courses ..."

(Becker, 2004: 170-171)

Nevertheless, this more 'traditional' picture of the PhD candidate is perhaps rather different when we come to those studying for a professional or taught doctorate. The latter student population often come to the doctorate later on in their career, having already embarked upon their chosen career and now following a course of higher studies in order to go further or to enhance their professional practice (Wisker, 2005). Therefore, we can assume that the experience and process of career 'choice' for this group is likely to be rather different.

The traditional picture of employment for the PhD graduate was to move fairly swiftly from the PhD to the research assistant post (perhaps already being employed in this capacity whilst undertaking the PhD), moving on to a lectureship "and on and upwards depending on their age, merits and chances" (Blaxter *et al*, 1998: 1). However, even if this model was evident in the past, it no longer reflects the reality of academic work. Blaxter *et al* (1998: 1) observe that the nature of academic work has changed considerably in the UK, now representing a "major industry employing hundreds of thousands of people in an increasing diversity of positions". Nevertheless, whilst the higher education 'industry' has expanded, there has been a simultaneous decline in full-time and tenured/permanent roles in the UK (Blaxter *et al*, 1998; Bryson, 2004).

For those who do achieve an academic post, the experience of 'transition' into an academic career can be a particularly difficult, challenging and even fearful one (Blaxter *et al*, 1998; Delamont *et al*, 1997, 2000). One particular source of problems for PhD students thinking about an academic career is a lack of knowledge and information about "how the academic system works" (Rugg and Petre, 2004: x). This includes both academic career structures and expectations:

For instance, what are some classic career paths in academia? Why is academic writing so dry? Why do some people get lectureships in good departments before they finished their PhD, whereas others are still struggling to find any job ten years after their doctorate? What counts as a 'good' department anyway, and why? Many students are too embarrassed to show their ignorance by asking questions like these; more students are too focused on the immediate problems of the PhD to think of asking them until it's too late.

(Rugg and Petre, 2004: x-xi)

There are a limited number of guides for researchers and academics on academic career planning, opportunities and challenges in the UK. Indeed, in their guide to academic careers, Blaxter *et al* (1998: 1) note that at the time of writing their handbook, there was no existing publication which outlined "career strategies, opportunities and practicalities" for potential or existing academics. A number of authors point interested readers towards the more established American literature in this area (e.g. Delamont *et al*, 1997).

Equally, structural barriers to academic careers have been identified in the wider literature and these can limit the choices of doctoral graduates. Cryer (2001), for example, draws on a list intended for women but maintains that these have wider relevance:

- Old-school tie network
- People staying in positions a long time
- Barriers in larger traditional, male-dominated organizations
- Less mentoring (formal and informal) for women
- Lack of confidence
- Dislike of playing office politics
- False assumptions that competence and ability are enough

(Cryer, 2001: 249 citing Bogan, 1999)

Nevertheless, these kinds of barriers and obstacles have been particularly noted for women, who make up a significantly smaller proportion of the higher posts in this field and form the majority of those on fixed and shorter-term contracts (e.g. Blaxter *et al*, 1998; Evidence Ltd, 2005; Leonard, 2001; Raddon, 2006a). Indeed, whilst women make up a good proportion of the UK PhD graduates, this does not translate into academic posts:

... the shifting numerical balance from PhD awards (58% men, and 42% women) to academic posts (where women make up 38% of overall staff and only 15% among professorial grades). Consequently, whereas almost 60% of men in HE are in permanent posts, this is true of only 48% of women (see Table 6 in Ackers and Gill, 2005). This is not a UK phenomenon but is reflected generally across Europe. This in turn affects

pay differentials, because women are more frequently employed in fixed-term posts and are less likely to have progressed to higher salary points.

(Evidence Ltd, 2005: 25, parag. 77)

Many of the 'how to' doctorate guides focus on academia as the main career option, with surprisingly little discussion of other choices. For example, writers such as Rugg and Petre (2004) focus their chapter titled "What next?" on academic careers (albeit having briefly mentioned that graduates may go into other careers in the introduction). Wellington *et al's* (2005) "Whatever Next" chapter focuses on getting work published following the doctorate but does not mention career options. Given their aims, these books provide general indications for publishing and networking strategies and information on the kind of positions available in academia, rather than providing any data on the academic career choices being made by doctoral graduates.

However, UKCGE emphasise the role of the HEI in supporting graduates' development of employability for areas outside academia:

However, a good proportion of humanities research students do not intend to seek academic careers, and an even larger proportion do not obtain them. The role of institutions is to help students develop the language with which to articulate the skills they have, those which they develop through doing research, and their applicability in different employment situations. Researching and writing a humanities doctoral thesis produces a skilled and employable individual, and HESA statistics show that those who emerge with a PhD have little difficulty in finding employment.

(UKCGE, 2000: 30 parag. 4.26)

Similarly, in a small survey of staff at Leeds University, it was generally felt that the HEI had a strong responsibility to develop the employability of their research students since many would go to work in a non-HE setting (Souter, 2005). On the other hand, one respondent emphasised that with the time and effort put into training student researchers, and developing their academic skills, it was desirable to keep them within HE.

Let us turn to studies of doctoral graduate employment with specific reference to the data related to choices. A number of studies highlight certain aspects of career choice, although these do not necessarily go into the kind of depth required to examine the "critical social, psychological and economic" factors emphasised by Langlands (2005a). For example, Elias *et al's* (2005) study for the ESRC draws on 31 telephone interviews with social science PhD graduates including two students who were just completing. There was a particular emphasis on those working in non-academic areas. Interviews spanned between 45-60 minutes. Within the interviews, a number of areas including employment since graduation were covered and they aimed to:

... establish the relationship between the research and related skills developed on PhD programmes, access to employment and the skills required in the employment that highly qualified social scientists had

obtained. ... The priority was to investigate the choices they had made, the options they perceived to have been available to them and the reasons they believed that they had been recruited by their current employers.

(Elias *et al*, 2005: 42)

In this study, the reasons for doing a PhD are considered by the 31 interviewees. Elias *et al* (2005: 43) comment that they show a clear “instrumental orientation”, with over half of the respondents identifying career-related reasons. For 10 of the 31 interviewees, having a PhD was “essential for their career plans” (2005: 43), including clinical psychologist or university lecturer. Others felt it would enhance their employment opportunities, one was unemployed and another bored in their job. Nevertheless, as with other studies, a third of the interviewees also indicated personal interest and wanting to carry out in-depth research as key motivations. As such, whilst we can see that career choices shaped the decision for a good number, personal and intellectual choices also lead learners to take up their studies.

When asked to think back to the kinds of job opportunities which might be open to them when they first started their PhD, just over half of the interviewees felt they were clear about the options which would be open to them. For most this is to be expected, since they had identified the PhD as essential to the careers they wanted to enter. However, 11 interviewees did not have any idea of the kinds of opportunities which might be open to them. As Elias *et al* note, this seems to suggest that they did not have any firm career expectations or ambitions when they started their studies. Indeed, the UK GRAD survey (UK GRAD, 2006a) found that only 26% of PhD students knew at the beginning of their studies what they wanted to do and, at the time of the survey, only 20% had a clear idea both of what they would do and what opportunities would be available to them. Thus, many were still unsure or exploring what opportunities were out there.

By the time of completion, most of Elias *et al*'s (2005) sample had formed a clearer idea of their career plans. Quotations from respondents show that these ideas are partly shaped by the kinds of activities undertaken in the PhD process. For example, one respondent realised that consultancy was a possible career route through their interactions with the case study organisations from their research. Another respondent was lecturing in HE, as a good number of PhD students do during their studies, and realised that they preferred research, eventually gaining employment in local government. Indeed, a number of responses to surveys of PhD graduates indicate that the PhD experience is seen as a way of testing out your own suitability for academic work. For example, in the interview section of Elias *et al*'s (2005) study those social scientists who worked in non-academic careers either decided not to continue to pursue an academic career, or found it was not for them.

Jackson (2007) carried out a study of PhD recruitment for UK GRAD. This also considers the career choices of 10 recent PhD graduates working in non-academic organisations. Interviewees were mainly in science and engineering

and included 3 non-UK nationals working in the UK. Most of the respondents had planned to work in non-academic positions from the start, or realised during the course of their PhD that they did not want to work in academia, or that opportunities were limited to do so. A small number thought that they might move into higher education in the future. Some had decided to go into non-academic jobs in order to change their field, whilst others decided to go into consulting as it provided a level of flexibility.

Some of the cases presented in these studies illustrate that career choice is shaped not only by individual desires, but by the labour market (real and perceived) at the time of transition from studying to employment. Perceived limited opportunities in academic positions had a significant shaping influence on some individuals' choices. For example:

One physics PhD graduate, now working for an investment bank, observed that his supervisor was taking on six PhD researchers every year and it was therefore pretty obvious that few of them would ever get a permanent post in academia.

(Jackson, Charles, 2007)

Like the move into academic work, the transition into employment outside HE can be equally difficult. Having taken up a new post, PhD graduates – like any new recruit – can experience another level of transition in terms of shifting from the kind of research work they did for their PhD and more everyday functions of employment. In Jackson's (2007: 38) study, for example, it is noted that some PhD graduates may find "the routine work dull" and experience this as "taking a step backwards". However, one of the interviewees who found themselves in this position realised that they needed to demonstrate their ability to cope with this kind of work before being able to move on to "more interesting work" (2007: 38). Furthermore, others felt a good deal of confidence when starting their new post due to their familiarity with the technical and scientific aspects of the work.

In the absence of data on PhD graduates and employment, Delamont *et al* (1997) refer to a study of undergraduates when considering the transition into work. They note that Brown and Scase (1994 cited in Delamont *et al*, 1997) found that graduates were generally not prepared for the labour market, although class was found to be a differentiating factor. Those from middle-class backgrounds and elite institutions found themselves in a better position to cope with the uncertainties of the labour market of the 1990s. Delamont *et al* conclude that PhD graduates are probably in a very similar situation.

Interestingly, Souter's (2005) 'Employers' Perceptions of Recruiting Research Staff and Students survey', found that employment outside HE was not necessarily attractive to the PhD graduates surveyed. Moreover, their primary motivations to consider a career route outside HE were based on negative perceptions of HE, rather than positive perceptions of other sectors. This was partly due to assumptions and stereotypes on the part of the graduates themselves. Some of the downsides identified in moving to work in other

sectors included work hours and location (away from home), lack of possibilities for intellectual freedom and creativity, inability to return to HE, and the need to do further training. Nevertheless, once actually working in non-academic posts it is likely that these perceptions will change. For example, Elias *et al* (2005) found that social sciences PhD graduates working in non-academic posts were very positive about the nature of their work and the environment, and did not necessarily see their move outside HE as a negative or second choice. Indeed, a range of benefits were attached to non-academic employment by these respondents. These include higher wages, improved job security, the opportunity to broaden their skills base beyond those skills developed within the academic research setting and a higher level of job satisfaction than those in academic work. As such, Elias *et al* concluded that:

None of these findings is consistent with the view that those in non-academic jobs are 'frustrated academics'. On the contrary, they appear to be making good use of their skills and training in these jobs and deriving significant benefits from so doing.

(Elias *et al*, 2005: 11)

Similarly, a study of Arts & Humanities Research Council (AHRC) PhD graduates found that respondents who had positions outside HE (26%) were on the whole positive about this (DTZ Consulting & Research, 2006). They noted aspects such as the ability to do research without the teaching commitments that came with a position in HE, and their interest in the area of work. Nevertheless, a small number of respondents were motivated by disenchantment with higher education careers and salaries.

Indeed, data about the mobility of PhD graduates and researchers more generally across different sectors is limited (Funders' Forum, 2006) and is probably higher than traditionally perceived:

Many holders of doctoral degrees switch sectors within the labour market, sometimes repeatedly through their career, and have a highly mobile career trajectory. It is increasingly recognised, in the UK as elsewhere, that a career beyond the academy is not second-best, the fate of those who were not good enough to secure an academic post, and neither should it be regarded as a loss in the sense that industry poaches good researchers (Defries 2006).

(Park, 2007: 21)

From the PhD graduate or postgraduates' perspective, there are a number of problems trying to move into careers outside HE. Contacts with organisations was one particular problem, with "no visible point of entry" through which to do this (Souter, 2005: 22) and an "all too often hidden job market for PhD graduates" (Jackson, Charles, 2007: 7). The role of the doctoral supervisor is highlighted by a number of authors (Delamont *et al*, 1997; Souter, 2005).

There appears to be scope to make people more aware of the kind of opportunities for employer contact that may already be available or develop new points of contact. There was no direct mention of developing relationships with supervisors, which has been identified as a useful contact and possible “gatekeeper” of connections to industry. Job fairs were not mentioned – it was perhaps felt that this fell into the ‘for undergraduates only’ category, even though it is clear some employers do recruit PhD researchers from their yearly graduate intake.

(Souter, 2005: 22)

However, Jackson (2007) found that supervisors were not always regarded as having information on careers outside academia, with friends in the labour market being identified as a useful source of help. Surprisingly, some PhD students in this study found they were viewed negatively by supervisors and others in HE if they expressed an interest in taking up a non-academic career, being seen as lacking commitment or wasting people’s time.

Like many of these studies, Park (2007) comments that the transition from HE to employment could be facilitated by making PhD graduates:

... more aware of the transition and better prepared for it, for example by having more realistic expectations, a better understanding of their strengths and weaknesses, and a keener awareness of what employers are looking for and expect to find in them.

(Park, 2007: 20)

It might be suggested that those graduating from CASE studentships, which involve cooperation with a diverse range of employers, could have an easier transition due to the experience and connections they develop as part of the PhD programme. CASE studentships are taken up by a considerable number of students:

We are spending £83 million this year on collaborative training. This includes awards for some 3,000 PhD (CASE) students who are being trained collaboratively. The scheme involves over 500 companies and users range from Reebok UK to BP to County Councils.

(RCUK, 2006: 3)

In an in-depth examination of 30 Science and Engineering Research Council (SERC) postgraduates, those on CASE studentships saw the collaborative element of their programmes as particularly important, although it also brought some negative experiences depending on the level of interest among the collaborating employers (Snape *et al*, 2001). Whilst based on a small sample (11), a good number of Particle Physics and Astronomy Research Council (PPARC) CASE PhD graduates were found to have maintained connections with the organisations they were attached to (DTZ Piedad Consulting, 2003b). Whereas, an Engineering and Physical Sciences Research

Council (EPSRC) study found that only 15% of CASE studentship graduates went on to be employed by the company (Dunn and Hemmings, 2000).

A number of authors emphasise that PhD graduates do not fully appreciate the range of skills and abilities they have developed and have trouble putting these across to employers (e.g. Jackson, Charles, 2007; McCarthy and Simm, 2006; Souter, 2005). UKCGE comment that the wide spectrum of skills developed through the doctorate provides many opportunities, and that HEIs have a responsibility to enable their graduates to put this across effectively:

It is a good story, and institutions should make it explicit and provide students with the language with which to tell it.

(UKCGE, 2000: 31)

Souter (2005: 20) similarly notes that postgraduates may not always be able to “present their skills and talents in a more ‘commercial’ language”, echoed by McCarthy and Simm (2006) who emphasise the same issues as areas for development with PhD students and post-docs.

PhD graduates equally identified these as the kinds of areas in which they felt extra support was required within the doctoral programme. Thus in Jackson’s (2007) study, the 11 PhD graduates working in non-academic areas felt that they would have benefited from more support in job search strategies and ability to put across their skill sets and abilities. One of the respondents emphasised that part of the problem for PhD graduates is identifying what they want to do after finishing their studies. Events such as those provided by UK GRAD were seen to be helpful in identifying the kinds of skills they have, as well as what they actually like doing, and using this to identify possible career choices.

One important aspect that is less clear from these studies is the extent to which doctoral graduates are happy with the direction their overall career pathway has taken and how this has developed over time – did it fulfil their expectations? It appears that this would particularly benefit from more in-depth research exploring some of the more personal journeys individuals take over time. More in-depth research over a period of time might also help us to distinguish between the extent to which individuals feel they have actively chosen their career, the options individuals felt they had, as well as barriers they may have experienced or perceived limited their career options. Although, there are issues with retrospective accounts which need to be taken into account.

It is worth noting, for example, that there can be resistance to the very notion of a career. For example, Raddon (2006) found that academics tended to resist the idea of actively choosing or planning a career. Many referred to ideas of ‘being lucky’ or being in the ‘right place at the right time’ when talking about the development over time of their career. Rather than seeing this as a weakness in the data, however, this is important in highlighting how individuals perceive their opportunities, choices, barriers and experiences and

how they form narratives around these. Similar issues are raised in a study of social anthropologists (Spencer *et al*, 2005). This was the one study we found which reflected on the issue of “moments of ‘choice’ and individual agency in decisions to pursue academic or non-academic employment” (Spencer *et al*, 2005: 8); although they do not discuss this in depth. Interestingly, however, having conducted this study of career paths among social anthropologists, the authors reassessed their approach to the issue of ‘choice’. As they reflected:

Our interviewees sometimes challenged this language [around the idea of careers], and the voluntaristic assumptions it contains. We would now argue that ‘career paths’ are more often retrospective narratives, constructed post-hoc to make sense of what at the time appeared much more contingent changes of direction. Some people do actively choose not to pursue an academic career at some point in their PhD, but for others this option is reached reluctantly as a result of failing to obtain academic employment, or of a recognition that the route to academic employment might prove incompatible with a more financially successful partner’s priorities. (It is a matter of regret that we failed to ask about partners and children in our standard questionnaire.) Other employment possibilities develop out of the geographical and institutional context in which the PhD itself is carried out.

Equally, this changed the authors’ view of the role of employment-related training for PhD students, and potentially counters some of the demands currently being made of the PhD:

This suggests that early separation of academic and non-academic strands within PhD training would be a mistake, but reinforces the case for more attention to training for employment at later rather than earlier stages in the PhD process.

(Spencer *et al*, 2005: 8)

Thus, an issue worth noting with any examination of career choice and expectations is that these studies ask individuals to comment on this in retrospect. Responses will depend on people’s memory, on their self-perception and on how they wish to portray themselves to others. It is one of the realities of research that it may be necessary to ask respondents in retrospect what their career choices were, particularly given the difficulties of locating suitable samples and capturing respondent views at the ‘right’ time in relation to the subject of enquiry. Nevertheless, narrative and biographical forms of research, in particular, have highlighted that individuals reshape and rewrite their personal histories over time – the stories people tell about themselves now have been filtered through subsequent experience, memories and so on. Indeed, for researchers who employ narrative methods, this self-portrayal may be as interesting a part of the research as the responses themselves. It is worth bearing this in mind when considering responses to studies exploring career pathways and asking individuals about issues such as how far they knew what they wanted to do. Rather than indicating a problem, this indicates the importance of having a range of different research on career

choices, enabling us to examine views from different points in PhD graduate experience and to track trajectories, experiences, expectations and choices right through the process from thinking about doing a PhD through to progress after graduation and actual trajectories and outcomes over time.

### 3.3 *Job Satisfaction and Future Plans*

Other ways in which we might further gauge, to some degree, the career choices being made by PhD graduates are through levels of job satisfaction, views of their area of employment and whether they plan to stay in that career.

If we consider job satisfaction as one way to examine how PhD graduates perceive their employment experiences, the majority across different studies appear to be satisfied in their current posts.

For the larger social science PhD survey element of Elias *et al's* study (2005), job satisfaction was measured across a number of indicators. This included aspects such as ability to contribute ideas and learn new skills, relations with others at work and job security. Interestingly, those in non-academic jobs showed higher levels of satisfaction than those in academic jobs on most indicators, particularly in job security and promotion. Similarly, when asked to give an overall rating, those in non-academic work were twice as likely to rate this as 'completely satisfied'. However, when asked to rate whether they felt they were in an appropriate job for a PhD holder, academic job holders were more likely to say they were in an appropriate job. With the 31 interviewees in this study, respondents were also generally happy with their current area of employment, although in some cases they had worked in other areas or posts after graduation about which they were less positive. As such, we can see that this is likely to change over time and with different transitions. This highlights the importance of longitudinal data in building a fuller understanding of the longer term career choices, experiences and transitions. Indeed, there appears to be a significant gap in more in-depth research following doctoral graduates over time, rather than asking respondents to reflect on this in retrospect.

Jackson (2007) also found that science and engineering PhD graduates did not regret taking their jobs. They tended to emphasise how much they enjoyed their work and were pleased to find that their knowledge and skills were highly relevant, meaning they could "make a real and valuable contribution to projects even at an early stage in their career" (Jackson, Charles, 2007: 38). Like other studies, some of the benefits identified in working outside HE were the job flexibility, shorter project times, variety and the opportunity to apply their skills.

A study of arts and humanities PhD graduates (DTZ Consulting & Research, 2006) found that 58% were 'very happy' and 38% 'quite happy' about their current job. Equally, this study found that 87% planned to stay within the same kind of career. Indeed, when looked at by sector, this rose to 92% planning to stay within HE.

Two studies of PPARC PhD graduates found that most are happy with their current jobs (DTZ Piedad Consulting, 2003a, 2003b). As will be examined further on when we consider the impact of doctoral graduates, two cohorts were involved in these two studies – an ‘old’ cohort in 1995, and a ‘new’ cohort in 2003. Among those of the new cohort who were working in HE, those with permanent contracts showed higher job satisfaction than those with fixed-term contracts, with the majority being happy overall. Within the public sector (which includes government and agencies such as national Observatories and societies), the majority were again happy, with the highest level of respondents being ‘very happy’ (68%) across all sectors. However, the number who were ‘very happy’ was lower within the private sector (25%) than those in HE (52%) or the public sector (68%). It is thus suggested that, whilst those in the private sector are “not unhappy (for the most part) with the career path they have followed”, job satisfaction is overall higher within the other sectors (DTZ Piedad Consulting, 2003b: 31). Job satisfaction was markedly lower amongst those working in computer systems and as data analysts due to boredom, however, these were a fairly small proportion of the overall number within the private sector. Therefore, it is not fully clear what the reasons are behind this response, and more in-depth research would be required to examine this interesting difference, which is not necessarily seen among graduates from the other Research Councils.

When we look at the old cohort, job satisfaction for those working in HE is fairly high, although it is lower than the new cohort with 36% ‘very happy’ and 52% ‘quite happy’, compared to 52% and 40% respectively for the new cohort. This is interesting given that many of the old cohort have been working in HE for some years (being 12-14 years on from the end of their studentships) and are twice as likely to have permanent contracts. Indeed, when examining the career journeys of academics, Raddon notes the importance of considering the differences between “generations” of academics:

Placing an individual’s story within a wider social and historical context enables us to explore changes over time and the impact of the past on the present. Perceptions of higher education practice and policy can be quite different between those new to HE and those with established careers (Deem and Lucas 2004).

(Raddon, 2006b)

Turning to the private sector, in which 28% of the old cohort are employed, there is generally high job satisfaction, with 38% ‘very happy’ and 56% ‘quite happy’. Overall job satisfaction is similar to the new 2003 cohort, although fewer of the new cohort are ‘very happy’, 25% and 65% respectively. As such, it appears that the job satisfaction of those in the private sector is likely to rise over time, whilst it is likely to decline for those in HE. Nevertheless, DTZ Piedad Consulting (2003a) do note that the sample for those in the private sector is relatively small (n=19), so this perhaps needs to be examined further.

Since only 16% of respondents (n=11) were working in the public sector and this sample was felt to be too small to produce sound data, we are not given details of their job satisfaction.

Interestingly, when PPARC graduates were asked to indicate the reasons for undertaking the PhD, these were overall similar for both the new and old cohorts. Love of the subject or of research was by far the highest reason for both groups. However, the number of respondents citing improvement of career prospects as one of the reasons almost doubled, going from 21% (old) to 41% (new). This appears to indicate that future career plans are, whilst not the highest motivation for studying, increasingly important factors for those considering a PhD. Equally, with the new cohort, women were more likely than men to do the PhD as a means of entering an academic career, although 4-6 years after graduation a higher percentage of men (36%) than women (29%) were actually working in HE. It is not clear from this report whether this was because the women and men changed their plans, or the women were unable to gain the academic posts they sought. A more in-depth approach would be needed to uncover some of these more complex differences.

Looking to future career plans and choices for this PPARC group, those working in the private sector primarily intended to stay within the sector, despite the lower level of job satisfaction. However, 15% were seriously considering self-employment, which may be seen as a means of raising job satisfaction (Noorderhaven *et al*, 2004), and none wanted to move into HE. The majority of those in HE were planning to stay in HE, although 6% stated that they would move to the private sector. However, DTZ Pleda Consulting (2006b: 35) questioned whether, given the nature of the HE sector, the 86% who wish to stay in the longer term would find be able to “appropriate jobs” or whether they might actually need to change sectors in the future.

From the 31 interview responses in Elias *et al's* (2005) study, it was also concluded that the majority of interviewees were employed in jobs considered suitable for a PhD graduate. They identified only one respondent as potentially under-employed and on a lower salary than average. This respondent had taken up a library post which did not require a PhD and actually required further more specific training to progress. However, job satisfaction for this interviewee, and most of the sample, tended to be fairly high: 17 were ‘very satisfied’ and 12 were ‘happy’.

Overall, studies such as these provide us with a useful insight into different career choices and outcomes for PhD graduates. There are a number of Research Council studies cited here and in the next section. Whilst useful, these generally do not cover doctoral graduates more widely and there seems to be a significant gap in what we know about the career choices of professional doctoral graduates, for example. As noted, the kinds of factors underpinning career choices for graduates of a professional doctorate are likely to be quite different when compared to those of traditional Ph.D route graduates. The Professional Doctorate student may have made that ‘choice’ many years before and regard the Doctorate as part of that career pathway, whilst we have seen that a good number of Ph.D students are not clear on their

pathway when they start out. This is just one of the areas of complexity which is not highlighted in the existing data.

Equally, we do not gain a sense of the wider picture within which choices and expectations occurred or were shaped. Our searches were not able to uncover more complex, in-depth examinations of career choice among doctoral graduates. Studies of employment outcomes, for example, will not necessarily highlight the underpinning factors and individual motivations or experiences which have shaped these choices. Indeed, Langlands (2005a) notes the relative paucity of wider research examining the factors which shape students' career choices in general. Thus, it is perhaps not surprising that these background factors do not appear to be addressed in any great depth within the literature on doctoral graduates. Again, this appears to signal a significant gap in our knowledge of doctoral graduates. Some of the questions that remain may be partly answered by data from the FutureTracks project (Purcell *et al*, 2007), which is one of the first major tracking studies following cohorts of learners through their studies. It includes questions in order to consider changing career choices and socio-economic data. However, this project does not focus on PhDs in particular, and only includes full-time learners.

#### **4. The Impact of Doctoral Graduates**

Like the issue of choice and careers, the impact of PhD graduates could be defined and examined in potentially different ways. The second key aim of this synthesis review is to identify what is known about the social, cultural and economic impact of doctoral graduates.

We have found that no one study, or even group of studies, can tell us succinctly what the impact of PhD graduates is, be this in social, cultural or economic terms. Like the issue of career choice, the notion of the 'impact' is highly complex. How do we measure the impact of the growing body of students graduating from doctoral studies? Which dimensions of that impact do we value and thus aim to include within research? We have not been able to identify any study which set out to do this in a comprehensive manner. What we can consider here, however, is a range literature which in some cases specifically sets out to examine the value of the PhD, or which happens to highlight this in a less intentional way. We can piece together a picture of this impact via a range of different sources. A number of studies indicate where graduates are and aim to evaluate the value of the PhD within a particular sector, or more generally, through consideration of pay, employers' views and learners'/graduates' views. Alongside this, we can draw on the wider literature about higher education, in particular, to consider the role of PhD graduates in, and their value to, higher education.

However, there were a number of areas in which we had difficulties identifying information. One of these, for example, was the impact of PhDs in the voluntary and unpaid sector. Where the role of PhD graduates is discussed in the wider literature, this focuses very heavily on the economic impact and on paid employment. Moreover, as we have already highlighted, the majority of research focuses on the economic dimensions of the PhD, leaving many

questions unanswered. Thus, another considerable gap in the literature appears to exist on the wider social impact such as political engagement, community development and support, or the cultural value that doctoral graduates bring to the UK.

With the recent focus on national competitiveness in the era of the knowledge economy, it is perhaps not surprising that the economic value of the PhD or Doctorate has been particularly emphasised, reflecting national and international policy discussions. The Leitch Review, for example, links Level 5 (now 8) qualifications to strong productivity and economic returns:

One of the most powerful levers for improving productivity will be higher level skills. Postgraduate, or Level 5 skills, such as MBAs and PhDs, can provide significant returns to organisations, individuals and to the economy as a whole. These higher level skills are key drivers of innovation, entrepreneurship, management, leadership and research and development. All of these are critical to a high skills, high performance economy and increasingly in demand from high performance, global employers. Level 5 skills should also be an important feature of greater employer collaboration with HE, as recommended in Richard Lambert's Review of Business – University Collaboration Skills ...

(Leitch, 2006: 68, parag. 3.64)

The Warray report, which reviewed the impact of Research Councils, equally emphasises the role of PhDs in sustaining the UK skills and knowledge base:

Intellectual capability and creativity is a fundamental part of this. It is created by having Universities that are at the cutting edge of international research and by having a strong stream of graduate and PhD students flowing from these Universities into industry and commerce. Indeed, the output of highly educated people rather than research results is widely regarded as the most effective knowledge transfer mechanism.

(Research Council Economic Impact Group,  
2006: 6)

Similarly, Park writes that doctoral graduates bring a range of benefits:

for employers, doctoral graduates can offer skilled and creative human capital, and access to innovative thinking and knowledge transfer.

for the nation, the obvious benefits of an active community of scholars engaged in doctoral level research include enhanced creativity and innovation, and the development of a skilled workforce and of intellectual capital and knowledge transfer, which drive the knowledge economy and are engines of the growth of cultural capital.

(Park, 2007: 8)

Indeed, higher level education is perceived as central to the EU's economic strategies and, in particular, reaching the goals of the Lisbon Agreement. As Kehm writes:

Doctoral education and training are the major link between the two goals to create a European Higher Education Area and a European Research and Innovation Area in order to make European higher education more attractive and more competitive in a globalising world.

(Kehm, 2007: 307)

In this section, we start by considering outcomes for graduates, examining what we know about where doctoral graduates go after graduation and their longer term career pathways. Next, we look at the market value of PhDs, including the evidence on salary premiums attached to PhDs. As will be highlighted, the results provide us with a complex picture, which is strongly influenced by factors such as the sector or type of employment graduates go into, as well as by factors such as gender. The data are fairly dispersed and in some cases PhDs are not disaggregated. Therefore, the findings so far are indicative rather than conclusive. Studies of the returns on the PhD aim to highlight the value of the doctoral qualification, however, many wider dimensions are not covered in such studies. Therefore, we move on to a wider discussion of the perceived value of the doctoral graduate, considering studies which have explored employer and graduate perspectives. We examine this firstly in relation to academic employment and secondly in relation to non-academic employment. Finally, we reflect on the personal impact and value of the PhD.

#### 4.1. *Doctoral Graduates in the Labour Market*

Higher education, research and development are seen as crucial to the competitiveness of national economies and are a major concern for international organisations such as the Organisation for Economic Cooperation and Development (OECD). Within the UK economy, there is a similar recognition of the value of higher-level skills and education (e.g. Leitch, 2006). Indeed, the RCUK regard the funding of Doctorates (and Masters) by Research Councils as key contributions to the UK's competitiveness and the development and flow of knowledge within this (RCUK, 2006). In recent decades the seeming move towards a knowledge-based economy has increased interest in research and higher education. However, as Green and Powell note:

The importance of research and the PhD to the sustainability of the national economy is of great significance to Governments that fund universities and students to undertake doctoral study. Discussion of the role of doctoral study and its value to society is not new.

(Green and Powell, 2005: 22)

Nevertheless, as previously indicated, employment was one of the problematic areas identified by Noble (1994) in the 1990s in relation to doctorates in the

UK and other countries. Countries such as the USA and Canada experienced over-supply of PhDs in the 1970s, followed in the 1990s by a shortage. In the UK, on the other hand, Noble (1994 citing Fisher, 1987) reports that cuts in funding for higher education led to a shortage of opportunities for PhD graduates during this same period and fears of a “brain drain” to fill shortages overseas. Moreover, there are various claims at this time that the PhD was of limited interest to employers (Noble, 1994 citing Gold, 1988; OST, 1993).

Numerous studies on the value of the PhD and careers of PhD graduates have been commissioned by the Research Councils, and will be reviewed below. However, the Worry Report (2006) continues to stress the need for the Research Councils to demonstrate the impact of their investments in both research and researcher training, particularly to be able to quantify the economic, social and cultural impact of their funded postgraduate researchers. To some extent previous studies have added to this picture, however, there are some significant gaps in terms, in particular, of highlighting the social and cultural impact of PhD graduates.

Nevertheless, the doctorate clearly does enable individuals to progress into or advance their path within a range of careers. Two primary pathways are identified for doctoral graduates: the academic and the non-academic. This perhaps oversimplifies real career trajectories, however, this is a useful classification for this discussion. In particular, the role of PhDs/Doctorates and the skills demanded can to some extent be differentiated between the field of higher education and other areas of employment. So we will now examine the impact of doctoral graduates along these two lines.

## 4.2 *Employment Outcomes for Doctoral Graduates*

The next section looks in more detail at the employment outcomes of doctoral graduates. This provides, to some extent, an indication of the value of the PhD, where the demand for PhD graduates is, and what kind of impact they might be having in the labour market.

There is relatively limited systematic data on doctoral graduates and the labour market (Green and Powell, 2005), with surprisingly little data on the PhD graduate body as a whole. Whilst HESA has compiled data on a range of relevant topics, the data is often inconsistent (Langlands, 2005b). However, there are a range of sources on which we can draw in this review. Notably, whilst we have emphasised the need to distinguish between those who study for doctorates before entering a field of practice and those who return to study after some time in a profession, and between the different types of doctorate, the data does not allow us to explore these differences.

### 4.2.1 *Where Do PhD Graduates Go? The First Ever Graduate Survey*

In terms of employment outcomes, the data shows a low unemployment level among PhD graduates across the disciplines and that they are able to gain employment – if they are not already in a position – fairly shortly after graduation (e.g. Connor and Jagger, 2001; DTZ Consulting & Research, 2006;

DTZ Pidea Consulting, 2003a, 2003b; Jackson, Charles, 2007; Jagger and Connor, 2001; Leonard *et al*, 2004; Souter, 2005; Spencer *et al*, 2005). This is a quite different picture to concerns about high unemployment levels among postgraduates in the early 1980s (Connor and Varlaarn, 1986).

Equally, despite evidence from early studies that PhDs tend to go into research and education (e.g. Rudd, 1990 who examined 1970s and 80s graduates), PhD graduates are increasingly now geographically and sectorally mobile and have greater employability than first degree graduates. Two recent reports by UK Grad Programme (UK GRAD, 2004, 2006b) provide a wealth of information about such mobility and employability.

The two 'What Do PhDs Do?' (WDPD) reports (UK GRAD, 2004, 2006b) utilise data from the first ever Destinations of Leavers from Higher Education (DLHE) survey in 2003. These reports therefore provide some revealing key facts about PhD graduates and what they do.

#### 4.2.2 *The DLHE Survey, 2003*

As outlined in the WDPD report (UK GRAD, 2004), 12,520 people were awarded PhDs in 2003, of whom 7,270 (58%) were UK citizens, 1,525 (12.2%) EU citizens and 3,725 (29.8%) from other countries. From the 7,270 UK citizens, 65% responded to the survey.

Two important features of the DLHE survey need mentioning. The first concerns high employability of the sample - 3.2% of UK PhD graduates were unemployed at the time of the survey and, of these unemployed graduates, 14.8% were to start jobs within a month of the survey.

The second feature of this survey is that the sample contains various kinds of doctorate awards and these are not disaggregated. In the 2003 survey, as well as the traditional PhDs, there were fast-growing numbers of professional doctorates - e.g. Ed.D., D.Clin.Psych., D.Med.Eth., D.Eng and DBA - some of which contained significant 'taught' elements, combined with specific industry content. Other non-traditional doctorates included the 'New Route PhD' (offered by a consortium of 34 universities), 'PhD by practice' (mostly in art and related subjects) and 'PhD by publications' (taken up mostly by existing HE academic staff).

#### 4.2.3 *Destinations of PhD Graduates*

Table 4 shows that PhD graduates have the highest rate of employment among all the degree holders. Almost 73% of PhD graduates had jobs during the time of survey compared with 69% of Masters degree and 61.1% of First Degree holders. Likewise, the unemployment rate was low for PhD graduates - just 3.2%. First Degree graduates were two times more likely to be unemployed (6.6%). It is interesting to note that of all the graduates, PhD graduates are more likely to take up employment or further study overseas. In 2003, 8.1% of all PhDs went overseas for these purposes, compared with just 2.1% to 2.7% of First and Masters degree holders.

Table 4: Employment Status of the DLHE Survey

	Entered work in the UK	Working and studying	Studying or training in the UK	Working or studying overseas	Not available for work or study	Believed unemployed	Other
PhD	72.7	8.0	2.7	8.1	3.2	3.2	2.2
Masters	69.0	10.6	8.0	2.7	3.5	3.7	2.6
First degree	61.1	8.7	13.7	2.1	5.4	6.6	2.3
PhD sub-groups:							
Arts & humanities	66.6	8.6	4.8	6.2	5.8	4.5	3.4
Social sciences	77.8	10.4	1.5	2.8	2.6	2.1	2.9
Biological and biomedical	72.8	8.6	3.1	9.1	3.0	2.0	1.3
Physical sciences and engineering	73.0	6.0	1.8	10.2	2.3	4.7	2.0

Source: Adapted from (UK GRAD, 2004; various tables)

However, if we break these figures down by broad subject grouping, we can see great variations among PhD graduates. For example, in terms of entering employment, social sciences had the highest percentage of graduates taking up employment at the time of survey. Arts and humanities graduates had the lowest. The difference is 11.2%. In terms of leaving the UK, biological/ biomedical sciences, physical sciences and engineering were more likely to go on to further studies and jobs overseas – around 9-10% of these graduates were likely to do so. In social sciences, only 2.8% PhD graduates were likely to leave the UK. Interestingly, while physical sciences and engineering graduates had the highest percentage leaving the UK for jobs/studying elsewhere, they also had the highest percentage ‘believed to be unemployed’ (4.7%).

Table 5 examines the industrial sectors which PhD graduates were in during the DLHE Survey. The data show tremendous variations across sectors of employment as to where we might find PhD graduates.

Table 5: PhD Graduate Employment by Broad Discipline and Sector (%)

	All	A & H	SS	BB	PE
Other professional, associate professional & technical occupations	29.8	28.6	28.1	39.6	21.2
Teaching professionals	22.2	45.2	46.1	11.5	10.7
Scientific research, analysis & development occupations	18.1	-	1.7	25.1	24.1
Commercial, industrial & public sector managers	6.6	6.1	12.0	3.0	7.8
Engineering professionals	5.3	-	-	1.4	15.3
Health professionals and associate professionals	5.0	0.6	2.1	11.3	0.7
Business & finance professionals and associate professionals	3.5	1.2	5.6	2.2	5.3
Marketing, sales, media advertising occupations	3.2	8.2	1.7	0.1	2.5
Information technology professionals	2.9	4.5	0.9	-	7.5
Numerical clerks and cashiers, clerical, retail, waiting staff	1.7	3.1	1.3	0.7	2.7
Other occupations	1.0	2.5	0.2	0.8	1.3
Armed forces & public protection service occupations	0.4	-	-	-	0.7
Unknown occupations	0.1	-	0.2	0.3	0.1

Notes: A & H - Arts & Humanities; SS - Social Sciences; BB - Biological/ biomedical sciences; PE - Physical Sciences and Engineering.

Source: (UK GRAD, 2004 various figures).

#### 4.2.4 Destinations of PhD Graduates - the Regional Dimension

We expect that PhD graduates are most likely to enter into teaching and research. Yet we observe in Table 6 that significant differences are present across the broad disciplines. Many of these differences reflect the nature of the subject and how this relates to the world of work. For example, in terms of teaching, A & H and SS graduates had by far the greater proportions of their PhD graduates going into teaching – 45.2% for A & H and 46.1% for SS, compared to 11.5% and 10.7% for BB and PE, respectively. For research, analysis and development, BB (25.1%) and PE (24.1) had the greatest percentages of PhDs engaging in these activities.

SS Graduates had the highest percentage of PhDs going into the commercial, industrial & public sector (12%), double the next two disciplines, A & H and PE. Likewise, there were more BB PhD graduates going into health and associated activities than other PhDs. The most interesting case is the business & finance sector. Two contrasting disciplines – SS (5.6%) and PE (5.3%) – had more PhDs entering these fields than other disciplines.

The DLHE 2003 data was further analysed in a subsequent report (UK GRAD, 2006b). This later report contains huge amounts of employment information by region of origin. For example, Table 7 shows that employment rates varied from Scotland (76.4%) to North East and Northern Ireland (both 85.5%) while unemployment rates among PhDs were the highest in Wales (5.1%). Table 7 also shows that PhDs originated in the East region were more likely to work abroad (12.2%).

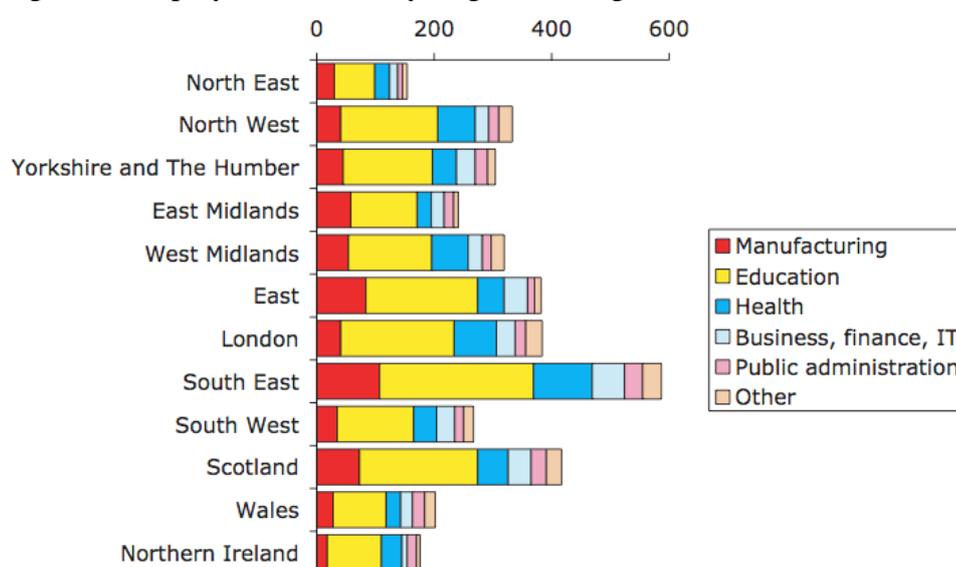
Table 7: Employment Status by Region of Origin

Region of Origin	No. of respondents	Employed in UK (%)	Unemployed (%)	Employed outside UK (%)
North East	180	85.5	2.2	5.6
North West	415	81.6	4.1	5.1
Yorkshire and Humber	375	81.5	3.8	6.2
East Midlands	290	83.7	2.4	6.2
West Midlands	390	81.6	4.1	6.4
East	485	80.0	2.9	12.2
London	495	78.3	3.2	8.7
South East	730	80.5	3.3	9.2
South West	325	82.5	2.1	8.9
Scotland	550	76.4	2.4	11.5
Wales	255	79.4	5.1	4.7
Northern Ireland	205	85.5	1.4	4.8
UK Total	4695	80.7	3.2	8.1

Source: (UK GRAD, 2006b: 8)

Figure 1 examines the numbers of PhD graduates going into various employment sectors. It is clear that the South East region provided the largest number of PhD graduates to just about every sector. This is closely followed by Scotland, London and the East regions.

Figure 1: Employment Sector by Region of Origin



Source: (UK GRAD, 2006: 10)

In general, the pictures projected by Table 7 and Figure 1 reflect the influences of the location of various HE institutions, national economic activities and the general migration pattern.

The WDPD report (UK GRAD, 2006) contains very detailed analysis on the patterns of PhD retention and migration among the UK regions. Rather than repeating all of the details here, we would refer interested readers to the original reports.

#### 4.2.5 What Do UK PhDs Do Abroad?

WDPD (UK GRAD, 2006b) also provides further employment information about PhDs who went abroad for work. Table 8 contrasts the differences between those who worked in the UK and those who went abroad. This shows that the proportions of PhDs working in manufacturing and education outside the UK (25.7% and 59.1%) were much greater than their counterparts in the UK (16.3% and 47.8%). These two types of jobs accounted for almost 86% of all PhDs who went abroad for work.

Table 8: Employment Sector of PhDs Working Abroad (%)

	UK	Abroad
Manufacturing	16.3	25.7
Education	47.8	59.1
Health	15.5	6.7
Business, finance and IT	9.1	3.3
Public administration	5.7	2.6
Other	5.6	2.6

Source: Adapted from (UK GRAD, 2006b: 10)

#### 4.3 Longer-term Career Pathways

Unlike first destinations, a longitudinal approach to career tracking gives a picture of post-doctoral career developments over time. There are a number of studies which give us a slightly longer-term picture. These tend to focus on specific groups, particularly as many are commissioned by Research Councils. As such, those not in receipt of studentships and those taking alternative routes to the Doctorate are usually not covered in such studies. We can nevertheless obtain some useful information on the longer-term career trajectories from the PhD.

Cohort and tracking studies tend to be carried out on behalf of specific bodies with a certain focus. For example, the Economic and Social Research Council (ESRC) commissioned studies of the employment of Social Science PhDs (Elias *et al*, 1997; Elias *et al*, 2005; Pearson *et al*, 1991), the Arts & Humanities Research Council (AHRC) commissioned a tracking study of arts and humanities PhDs (DTZ Consulting & Research, 2006), and the Particle Physics and Astronomy Research Council (PPARC) commissioned tracking studies of their funded PhD graduates (DTZ Piedad Consulting, 2003a, 2003b). Other studies reviewed here include one commissioned by the Institute of Physics (DTZ Piedad Consulting, 1999) and an ESRC award-funded project on social anthropologists (Spencer *et al*, 2005). These studies allow us to piece together different elements of the doctoral graduate body. One of the shortcomings is that these studies are not integrated to allow for more systematic comparison across the Research Councils or disciplines and using the same indicators. Equally, experiences of non-research council students are likely to be rather different, given that they may not have funding or may be following a different path to achieve the doctorate. All of these studies reported significant difficulties in accessing the appropriate sample due to lack

of up-to-date contact information for graduates from HEIs or Research Council information on those who received studentships in the past. This seems to signal the importance of the different stakeholders working together (e.g. HEIs, Research Councils, government agencies, researchers, graduates) for more integrated studies to be successful and to facilitate longer-term data collection. Since it is noted that there have been funding cuts for this aspect of HEIs' systems (DTZ Piedad Consulting, 2003b), this may also require increased funding.

Let us start by considering some of the findings of the AHRC study (DTZ Consulting & Research, 2006), which provides a useful longitudinal picture of one group of funded PhD graduates who graduated between 6-9 years beforehand from 28 different universities. The response rate was felt to be acceptable at 29% of those who were eligible for inclusion in the research sample. As with many longitudinal studies, a particular problem encountered was the lack of up-to-date address details for AHRC-funded PhD graduates. A survey, available by post and online, was conducted in order to examine the nature of their research, employment paths and individual perceptions of the value of the PhD. Equally, case studies were carried out to look in more detail at the career paths of 13 PhD graduates. The survey sample included people who had not completed their PhD, representing 6% of the sample. 54% are women and 46% men, with 80% being below the age of 30 when they started their PhD, and 20% being aged 30+. 85% of the sample were from the UK, and 15% from overseas. As with a number of studies, the data we discuss here will cover non-UK nationals since this is not necessarily disaggregated.

Importantly, a quarter of the respondents already had a career prior to undertaking the PhD, these tended to be aged from their late 20s+ when starting their studies and were coming to a PhD after some years of employment experience. As previously noted, contextual factors such as this can have a major bearing on issues such as career choice.

At the time of the survey, 94% were in employment and 1.5% unemployed. The majority of respondents were working "in professional occupations commensurate with their skills/ experience" (DTZ Consulting & Research, 2006: 31). Three quarters were working in HEIs (74%), with the remaining quarter working in the public sector (11%), 'independent organisations' such as charities (8%) and only 7% in the private sector. Within the total, 6% were self-employed as sole-traders without employees.

Those moving into the public and independent sectors worked in a range of organisations, including museums and galleries, local and national government, further education and schools, charities and independent agencies such as academic and professional bodies; examples include the National Trust and The Royal Academy of Engineering. Of those who went into HEIs – which we have seen made up the majority at about three quarters of responses – 48% had gained a permanent lecturing position, 20% were on fixed-term academic contracts and 7% had a Post-Doctoral position within 6-9 years after graduating from their PhD (DTZ Consulting & Research, 2006: Figure 3.5). Notably, these figures are relatively different to some of the other disciplines

we examine below, with much higher numbers going into HE and with a higher level gaining permanent posts. Whilst we cannot make direct comparisons due to the different nature of samples and research tools, this seems to highlight a potentially interesting difference and raises questions about the expectations, intentions, plans and actual outcomes of these different groups.

In 2003, DTZ Pidea Consulting published two studies tracking the careers of PhD graduates funded by the Particle Physics and Astronomy Research Council (PPARC). The first study (DTZ Pidea Consulting, 2003a) examines the careers of PPARC PhD students whose studentships ended in the period between 1986-1988 and 1990-1991. Unlike some of the other PhD fields examined, this is a strongly male-dominated field. Among the respondents, 13% were women and 87% men, which reflected the student body in these fields at the time. Importantly, this study follows on from research conducted with the same cohort in 1995, thus it is able to span 15 years in total with one cohort. The second study (DTZ Pidea Consulting, 2003b) examines a 'new' cohort of 186 respondents whose studentships ended in the period between 1995-1996 and 1998-1999. 80% of respondents were men and 20% women, described as reflecting the gender make-up of studentships awarded by PPARC during that period. The new cohort were selected with the aim of making comparisons between the 1995 'old' cohort and the 2003 'new' cohort studying in the same kinds of areas. Both studies employed a postal survey.

This multi-cohort, longitudinal approach is particularly useful. Such an approach enables us to examine similarities and changes in the careers of PhD graduates in the same field. Nevertheless, this excludes many doctoral students who did not gain Research Council funding or studied for their doctorate in different ways to the traditional PhD. Equally, many underpinning contextual factors and influences remain to be explored through these studies and are unlikely to be highlighted through such large-scale surveys. Again, there appears to be a major gap in terms of in-depth, exploratory studies of doctoral graduates' experiences over time and the factors which shape career choice and, moreover, information on their wider social and cultural impact in society. We can only really gain an insight into these people's employment, which was of course the remit of such studies. Whilst we can surmise their economic and, to some degree, social impact, wider social value and cultural impact are not visible through this kind of study. Nevertheless, let us return to the useful findings of these longitudinal and comparative PPARC studies.

Among the PPARC PhDs, both the 'new' 2003 and 'old' 1995 cohorts had low levels of unemployment, being around 4% for both cohorts during the same period (e.g. 4-6 years after end of studentship). When revisiting the employment situation of the old cohort, the vast majority are in employment, with only one classed as unemployed, one studying and two are caregivers. The employment patterns noted for this 1995 cohort since the end of their studentships, some 12-14 years earlier, demonstrate that these PhD graduates are very employable and, moreover, that they have made some considerable (although not directly identifiable) impact in their fields of employment.

These studies did not look at job positions, but instead at the broad sectors within which individuals were employed. When looking at the new cohort, it is evident that the career paths of this group have changed significantly from those in the old cohort. In particular, 48% are working in the private sector compared to 24% of the old cohort. Interestingly, the increase in private sector workers tends to highlight a simple shift away from the public sector (12% new as compared to 24% old) rather than a move away from academic work as we might expect given changes in HE (35% new, 47% old). Equally, reflecting the growth of the UK service sector, there has been a significant growth in PhD graduates in the private sector going into business and finance, whereas the old cohort were more likely to go into computer software. Again, this highlights the importance of contextual factors such as labour market trends at the time in shaping the possible choices and trajectories of PhD graduates. Among the new cohort in the private sector, 4% were self-employed, including some with employees and an additional 40% thought that they might consider this route in the future.

For the old cohort, the areas of employment 4-6 years after the studentship and 12-14 years after, had remained largely stable. One marked shift was that half of those who had been working in the public sector in 1995 (including government agencies, research institutes, Observatories and so on) had moved to take up posts in HE by 2003. We are not able to see the reasons for this here, it may have been that respondents originally hoped to stay in HE, we cannot say.

From observing patterns among the new cohort, it was suggested that around 20% of PhD graduates in this field will work overseas after gaining their PhD. More opportunities were felt to exist overseas than in the UK, particularly in North America (DTZ Piedad Consulting, 2003b). Nevertheless, with the old cohort, although similar numbers worked overseas 6-8 years after the end of their studentship, many had returned to the UK in the longer-term, particularly those who had moved to work in the EU. As such, it was concluded that the mobility of these PhD graduates is fairly high, but they are likely to return to the UK in the longer-term. To some extent, would could argue that this counters the effect of any initial 'brain drain' overseas, since researchers/practitioners are returning to the UK after gaining valuable experience overseas in competitor countries. Equally, some of these respondents will be non-UK nationals.

Among the new cohort of PPARC PhD graduates working in HE (who were 4-6 years on from the end of their studentship), only 17% had a permanent position, with two thirds being post-docs or having research fellowships (DTZ Piedad Consulting, 2003b). When compared with the old cohort, who were between 12-14 years on from their studentship, the picture suggests that a good number will move on to permanent positions in the future. Data from the old cohort suggests that PhD graduates who are employed in HE 6-8 years after their PhD are likely to stay in HE. Equally, 67% had gained permanent positions by 2003, compared to 29% in 1995. However, 30% still had fixed term research contracts, including two respondents who were still in post-doc positions many years after. This appears to reflect the growth of fixed term

contracts and the longer-term use of post-doc positions in the HE sector over the last decade and some concern was expressed about the duration of such post-doc positions.

Indeed, the Institute of Physics commissioned a tracking study of post-doctoral researchers in the field, referred to as PDRs (DTZ Piedad Consulting, 1999). This focuses on physicists who took up their first post-doc position in the period between 1988-1990, with some comparative data from PDRs taking up their position in 1994-1995. A postal survey was conducted and found that 61% of PDRs had taken up their post as part of a transition towards a permanent academic job. By the time of the survey, some 9-11 years after first taking a PDR position, 47% were still working in HE, and 19% had gained permanent positions. The report concludes that PDR expectations will need to be managed given the low number who will actually obtain a permanent position. For the majority in HE who were on fixed-term contracts, one half felt that, despite the insecurity, they enjoyed their job and planned to stay in the same area of work. The other half were either hoping to gain a permanent post in the future or were worried about their longer-term career plans.

It is interesting to note that 35% of former PDRs had moved on to positions in the private sector. The authors maintain that this demonstrates the value attached to PDRs beyond HE, although this might equally be due to a lack of longer-term posts in HE. 17% had moved to the public sector, primarily to research bodies, with another 1% in local government, and 2% in schools and colleges. Overall, respondents across all of these sectors felt that the skills developed through their post-doc work had been useful to them in their careers. Interestingly, however, when asked if they would have repeated their time as PDRs, those who moved on to the private sector were far less likely to say they would. The authors note that this indicates that the skills of the PDR do not necessarily transfer directly to non-HE posts (DTZ Piedad Consulting, 1999).

Spencer *et al* (2005) examine the career paths and training needs of social anthropology graduates through an ESRC award-funded project. The research set out to examine whether there was, as seemed to be the case, a growing demand for social anthropology graduates beyond HE, whether PhD graduates in the field were choosing to move into non-academic positions and the impact this might have on the kinds of skills they needed. One of the concerns was that there was a lack of information on this group of graduates:

Apart from a recent survey by UK GRAD (2004) on the first destinations of those holding UK nationality, we know relatively little about the longer term career paths of this cohort as a whole, and how they use the training and intellectual perspectives they receive. How many eventually obtain permanent jobs in academia, whether in the UK or internationally? What sorts of skills are needed by those employed beyond their 'home' discipline, or outside universities altogether? These are important questions, which have a profound impact on the research and professional skills that universities are now expected to provide to their students.

(Spencer *et al*, 2005: 1)

One of the initial aims of the project was to develop more reliable methodologies for tracking social science PhDs. Notably, this study employed a rather different methodology to many of those we review here, gathering data in order to create a database of 700 PhDs awarded in the discipline. This was relevant given their interest in the changing nature of the discipline, as well as individual career paths. Initial focus groups and a questionnaire were used to gather PhD graduates' views of the training provided within their studies and training needs highlighted after completing their studies, eliciting 309 responses. This was followed up with 40 opened-ended interviews and gathering audience responses during dissemination activities. Whilst a good number of the studies of PhD graduates rely on quantitative methods with the aim of gathering representative data, collecting more qualitative data (via research or discussions with interested parties) can have a significant impact on the kinds of data collected and the conclusions drawn. As the authors note:

We have also carried out a number of interviews to follow up issues raised by the responses to the questionnaires, and have adjusted our conclusions as the result of a number of lively discussions with current and former PhD students and employers in our various dissemination events.

(Spencer *et al*, 2005: 2)

The sample for the study included both UK and overseas nationals, with UK nationals constituting 43% of the group, and a gender make-up of 57% women, 43% men. Interestingly, the age profile of this group spanned from 23 years old to 66 years old on completion of the PhD. As this highlights:

Only a minority follow a 'classic' academic career path direct from school to undergraduate degree, then to postgraduate work and thence into a lectureship.

(Spencer *et al*, 2005: 5)

In terms of career paths, it was found that PhD graduates in this discipline were largely employed in positions which matched their qualifications level, with low levels of unemployment. Taking into account the potential respondents who did not participate in the survey, it is estimated that around 60-65% of these PhD graduates are working in HE. Within the survey data, however, 44% were working in academic positions in the UK with just below half having permanent contracts, and the remainder on fixed-term contracts including researchers (23%), lecturers (13%) and post-docs (12%). The follow-up interviews illustrated that many of those on fixed-term contracts were concerned about their longer-term career. Women were found to be disproportionately represented among those on fixed-term contracts and a number of issues were raised about the difficulties of combining caring roles with academic roles, as they note:

Building a successful mainstream academic career often depends on a willingness to be mobile and to take a succession of insecure short-term appointments, a path that is made more difficult by domestic and caring responsibilities. At the same time a number of female staff in our cohort have left 'permanent' academic posts in the UK. We have evidence that caring responsibilities and dissatisfaction with heavy teaching and administrative demands have led to these decisions.

(Spencer *et al*, 2005: 6)

This reflects the wider literature on fixed term contracts (Bryson, 2004) and on the tensions for women between academic careers and mothering (Raddon, 2002).

A third of the respondents had taken up employment in the non-academic sector. Interestingly, there is a high propensity to self-employment (32%) among this group when compared with other studies. Half of these were working as consultants for international agencies and half were engaged in 'portfolio careers', piecing together different kinds of work and potentially with less job security.

21% of the PhD graduates in this study were working in the public sector, with a further 17% in NGOs or charities and 13% in private sector research institutions. Overall, a third of respondents work in development-related areas and this is one of the few studies where the number going into NGOs and charities is specifically highlighted – giving us some, albeit limited, indication of the wider social and cultural impact of PhD graduates. However, we do not know whether they are working in the voluntary sector.

There are a number of tracking studies of postgraduate students who were funded by the Science and Engineering Research Council (SERC) and the later Engineering and Physical Sciences Research Council (EPSRC) (e.g. Connor and Varlaarn, 1986; Dunn, 1998; Dunn and Hemmings, 2000; Jones, 1986; Whitfield, 2000), including a more in-depth qualitative study of this group of postgraduates (Snape *et al*, 2001). It is on this latter study that we now focus, since this employs a different approach to some of the larger-scale studies and provides some different kinds of information for our review. The study focused on postgraduates whose SERC funding ended in the period between 1992-1994, meaning that their funded studies had ended between 7-9 years earlier. The main focus, like many of these studies, was on the training received during the PhD and any gaps in this provision. In-depth interviews were conducted with 30 respondents, lasting around 1.5 hours each. The sample drew on that of a previous quantitative study of SERC postgraduates (Whitfield, 2000). Career trajectories and the value of postgraduate studies are considered within this. 17 of the total sample had received PhD funding. It is not clear how many of the sample had received their PhD. Nevertheless, some of the findings are useful for this review.

Snape *et al* (2001) consider career trajectories against aspirations, in order to see how they relate to one another. However, it is worth noting that, given the

retrospective nature of responses on aspirations, some of the preferences or plans discussed by respondents may have been re-shaped over time by subsequent experience. We would argue that this highlights the importance of studies which track individuals before they complete their studies and beyond. Nevertheless, even with responses given in retrospect, we can gain some kind of picture of the degree to which expectations and aspirations were met for this group.

It was noted that aspirations were formed at different points for each individual, with the level of work experience having a significant impact. Thus, some formed their career plans prior to studying due to their previous work experience, others during their studies and some only after completing their studies. For example, some had experience in a field and had identified the qualifications they might need in order to progress, whilst others were ‘testing out’ the idea of a research or academic career by engaging in postgraduate studies.

The career trajectories identified by Snape *et al* can be summarised as follows:

- Academic – working in HE only, primarily fixed-term contracts in research and/or teaching;
- Private sector – working only in industry, mainly permanent contracts, some made redundant over time, some self-employed;
- Public sector and non-industrial sectors (e.g. scientific publishing) – stable career paths, moved into senior roles over time;
- Multi-sector employment, moving between academic and private sector positions – shifts often due to fixed-term HE contracts and lack of stability and promotion;
- Retraining, working in non-graduate positions or unemployed whilst finding a new direction - those who did not complete the PhD qualification, tended to have a more stable career path further on, but some time after the other categories.

Three factors were identified as shaping the career paths taken by individuals “career orientation, personal circumstances, and labour market circumstances” (Snape *et al*, 2001: 26). These factors are broken down by the authors as follows:

- Career orientation
  - Degree of clarity regarding career direction
  - Flexibility (i.e., willing to deviate from career path; willingness to keep re-evaluating plans)
  - Preferred sector of work (i.e., public/ private/ not for profit sectors)
  - Preferred type of work (i.e., nature of the work; managerial or direct practitioner)
  - Personal values regarding employment (relative priorities regarding freedom, flexibility, speed of advancement, job security, remuneration,

- intellectual stimulation, new challenges, training opportunities, working with specific individuals, etc.)
  - Employment versus self-employment (desire to work for oneself, choose one's own work, structure one's own time versus desire for stability, predictable income, etc.)
  - Willingness/ desire/ ability to go on to further postgraduate training (i.e., PGCE, PhD, MBA)
- Personal circumstances
  - Starting a family/ family to support
  - Extent to which desire/ willing to travel
  - Extent to which partner's career is also a consideration
  - Desired location of work
  - Maternity/ timing of and priorities for return to work
  - Need for income (i.e., funding coming to an end)
  - Motivation to pursue non-work interests
- Labour market considerations
  - Perceived competitiveness for jobs in desired field
  - Perceived relevance of age, gender, etc in securing work in desired field/ advancing in desired field or with a particular employer, etc.
  - Ability to secure job in desired field when seeking work
  - Perceived relevance of timing of career moves.

(Snape *et al*, 2001: 26-27)

It is particularly useful to see some of the decisions identified as underpinning each of these factors. Indeed, these kinds of issues are rarely touched upon in any depth within the larger-scale studies. We can see here some of the contextual factors which might shape 'choice' of employment or other directions.

Differences were noted in the deciding factors for those who moved into different sectors. For example, those working in HE emphasised intellectual stimulation and ability to self-manage, whilst those working in the private sector emphasised job-security, pay and the ability to apply their skills. Notably, the labour market conditions at the time of looking for work were identified as a key factor, with a "tight labour market" putting some limitations on what they wanted and actually could do (2001: 29). The following quote illustrates this situation for one PhD graduate:

"...I don't want to denigrate the PhD, but it worked out very badly, because '89 was a superb year to graduate. The economy was in a boom, everything was going places, but [by] '92, the bottom had dropped out of the job market and I don't think I've ever really recovered from that...Everybody just down-skilled everything." (male, PhD, chemistry)

(Snape *et al*, 2001: 29)

Equally, gender and age were found to be significant shaping factors in the decisions these postgraduates made. For example, women found that they experienced difficulties in the male-dominated academic discipline or decided to leave jobs due to lack of career progress in areas where the senior positions were male-dominated. As previously noted, these structural factors have a significant influence on the extent to which career paths are about 'choice' and the extent to which individuals perceive and/or experience some kind of barrier or limitation.

## **5 The Market Value of the Doctorate**

We now turn to consider studies on the value of the PhD, starting with those which examined the labour market pay-offs of the PhD and considering whether a wage premium is attached to doctoral studies.

### *5.1 PhD Wage Premium Compared to First Degree and Masters*

One of the earliest studies on the value of a PhD was carried out by Ernest Rudd in the late 1980s. Although this study is dated, it provides some useful information, highlighting some of the changes over time, and is one of the few studies on this issue. Rudd's (1990) sample – 2929 traceable respondents – graduated between 1972 and 1977 from 21 universities in England, Scotland and Wales. The context of this study is a very different period from the present time, as higher education was still confined to less than 5% of the population. Having a PhD was, by comparison, a rare occurrence. In Rudd's study, the methodology was one of contrasting 'comparable groups' – i.e. between those with a PhD and those who could have gone on to do a PhD but did not. Hence, for those without PhDs, only those with Masters, first or upper second class Degrees were included. Rudd (1990) focused particularly on social science graduates and compared career patterns between comparable graduates with and without a PhD. Graduates from economics, sociology, social administration, social anthropology, social psychology, political science, human geography and business and management studies were included. The specific objectives of the study include how PhD training may have impacted upon job patterns, whether PhD training has been relevant to subsequent jobs and whether a PhD qualification may have attracted a higher salary.

Table 9 reveals some interesting job patterns between social science graduates with a PhD qualification and those with other degrees. Two destinations represented the majority of the first jobs that PhDs would obtain, namely teaching (45%) and research (25%). Social science PhDs had a very low profile in other jobs, representing around 5% in 3 cases (administration, management, economic, statistics and social, welfare and religious) and very negligible % in all other jobs. By 1987, the general pattern of jobs for PhDs had not changed much, though there was a noticeable shift from research into teaching jobs, which reflected the one of the major academic career routes for social science PhDs. Rudd argued that PhD training, research and teaching are

all mutually supportive activities which would encourage the above career pattern (Rudd, 1990).

Table 9: Graduate First Jobs and Jobs in 1987, by Degree (%)

	PhD		M.Phil, Masters etc		1st Degree	
	1st Job	1987	1st Job	1987	1st Job	1987
Admin., op. management	5	6	7	9	17	19
Personnel	1	<.5	1.5	3	4	5
Buying, marketing, selling	1	1	3.5	5	9	12
Management services	3	4	5.5	7.5	5	7
Economic, statistics, etc.	5	5	7	7.5	4	3
Financial	2	2	5	7	29	28
Legal	0	<.5	1	1	1	1
Scientific & technical	3	3	1.5	1	1	1
Environmental planning	1	1	11	9	2	1
Teaching, lecturing	45	54	24.5	23	5	7
Social, welfare, religious	5	6	13	12	8	5
Medical & paramedical	<.5	<.5	0.5	1	2	1
Security, protection	<.5	1	<.5	<.5	2	1
Information, librarianship etc	1	1	2.5	2	1	1
Research	25	13	13.5	8.5	4	2
Media & leisure	1	1	1.5	2.5	3	5
Other	1	1	1.5	1.5	3	2
Total %	100	100	100	100	100	100
N	304	296	391.5	361	1075	951

Source: Adapted from: (Rudd 1990: 211)

In contrast, Masters degree holders were more ‘spread around’, though the highest proportion of Masters graduates would take up teaching as their first job. Like PhDs, Masters degree holders experienced a drop in the research occupation by 1987. However, teaching did not pick up those job movers. Most of the job movers appeared to have joined jobs in commerce and industry, e.g. administration, management, marketing and finance.

First Degree holders had a completely different first job pattern compared with PhDs. The majority of the First Degree holders went into commerce and industry, e.g. administration (17%), buying, marketing (9%) and finance (29%). By 1987, the pattern remained very similar to that of the first jobs. Rudd’s evidence would suggest that much of the job impact of the PhD qualification was in teaching and research. PhDs who ventured into industry and other sectors (e.g. manufacturing) were relatively rare at this time. We have already seen from first destinations data that the picture is very different in the 2000s. However, this indicates some of the changing values attached to the doctorate.

On analysing income in 1987, the PhD/non-PhD pay differential is surprising. Table 10 shows that in almost every industry, PhD holders - male or female - had a mean income less than those with either a taught Masters or no university postgraduate qualification. In some cases, PhD (median) income appeared to be higher (e.g. research), but the difference tended to be small. The same survey also shows that where PhDs were working in industry – e.g.

in manufacturing and management – PhD holders’ mean income was less than those commanded by Masters degree holders.

Rudd (1990) provided some tentative explanations behind the relatively low income profile of PhD holders. He suggested that the above pattern was very much due to the concentration of PhD holders in certain sectors, e.g. university education and research, and that the pay level in these sectors was generally lower than industry. Thus, the majority of PhDs worked in universities where the median salary was well below that of industry. To some extent, however, these disparities appeared to be tentative, as there were not enough PhD respondents in some occupation groups to draw a firm conclusion.

Table 10: Median and Quartile Salaries of Various Qualifications, 1987

Job group	Level†	Salary (£thousands) for respondents with the following qualifications:								All‡
		Men				Women				
		PhD	ABD, MPhil, failed MPhil	Taught Masters	No university post-graduate qualification	PhD	ABD, MPhil, failed MPhil	Taught Masters	No university post-graduate qualification	
Administration, management, personnel etc.	Q1	11.5	12.0	14.4	14.5	10.8	—	12.2	10.5	13.0
	M	13.1	13.4	17.0	18.1	12.1	—	14.5	14.6	16.0
	Q3	17.1	16.6	23.5	25.0	14.0	—	16.7	17.1	21.1
	n	10	15	42	149	7	2	20	56	358
Buying and selling	Q1	—	—	18.8	16.5	—	15.3	14.8	14.2	16.2
	M	—	—	21.0	22.0	—	19.0	20.0	22.5	21.9
	Q3	—	—	24.5	30.9	—	20.5	24.3	28.0	28.6
	n	2	4	17	71	1	5	5	27	145
Operations research, computing and consultancy	Q1	13.6	13.0	17.0	13.9	—	—	15.6	13.6	14.3
	M	18.0	15.8	18.7	18.0	—	—	17.8	15.9	17.5
	Q3	24.0	23.0	23.0	26.0	—	—	29.5	17.9	23.0
	n	7	10	30	46	3	2	7	12	131
Economics and statistics	Q1	13.2	11.9	18.2	17.0	—	—	—	—	17.0
	M	17.3	16.0	20.7	20.2	—	—	—	—	20.0
	Q3	24.5	25.0	25.2	25.0	—	—	—	—	25.0
	n	9	7	44	23	1	1	4	1	91
Finance	Q1	15.3	17.4	21.0	17.9	—	—	—	14.1	17.6
	M	53.0	20.0	27.0	23.0	—	—	—	20.0	22.5
	Q3	144.9	31.3	50.0	30.8	—	—	—	25.0	31.9
	n	5	9	39	206	1	0	4	31	324
Environmental planning	Q1	—	12.5	11.9	11.9	—	—	11.6	—	12.0
	M	—	15.0	13.3	13.4	—	—	12.2	—	13.0
	Q3	—	16.3	14.8	15.2	—	—	12.8	—	15.0
	n	1	9	47	6	1	2	12	1	129
Social, welfare and religious work	Q1	11.5	11.7	11.1	10.6	10.8	—	10.9	9.3	10.9
	M	17.7	14.3	12.3	12.0	12.0	—	12.5	10.7	12.0
	Q3	21.3	16.0	14.6	13.0	16.9	—	14.3	13.4	13.8
	n	8	8	38	11	8	3	27	16	186
Research	Q1	11.0	11.4	12.3	11.7	11.8	10.6	12.0	11.0	11.7
	M	12.3	13.7	13.7	17.0	12.7	13.0	13.0	12.2	13.0
	Q3	13.6	16.9	16.7	17.8	14.0	13.4	15.9	15.0	15.0
	n	18	8	12	5	11	12	8	7	86
Information and media	Q1	—	14.8	12.2	13.7	—	9.8	—	9.9	11.0
	M	—	20.5	16.3	17.0	—	11.5	—	14.1	15.6
	Q3	—	22.3	22.3	21.8	—	18.5	—	18.7	20.0
	n	3	6	12	28	0	5	2	14	84
University lecturing	Q1	12.7	—	11.9	12.3	12.7	—	14.1	—	12.7
	M	13.6	—	13.4	14.0	13.9	—	15.0	—	13.9
	Q3	15.0	—	16.5	16.0	15.3	—	16.4	—	15.0
	n	71	3	18	6	16	3	5	4	129
Teaching and lecturing in other higher and further education	Q1	12.6	12.6	12.3	13.6	9.9	—	13.4	—	12.5
	M	13.5	13.0	14.7	14.9	13.5	—	15.0	—	13.5
	Q3	14.6	15.0	16.4	16.6	16.3	—	16.8	—	15.0
	n	22	11	26	8	5	3	10	3	126
School-teaching	Q1	11.4	10.7	12.0	11.6	—	11.1	10.4	8.6	11.0
	M	12.1	12.0	12.6	13.3	—	12.2	12.1	10.7	12.2
	Q3	15.1	14.4	15.3	15.0	—	13.8	13.4	11.4	13.6
	n	6	10	16	12	2	5	8	6	211
Central government	Q1	15.6	12.4	15.2	14.4	—	—	12.0	10.4	13.1
	M	17.7	13.5	18.2	18.0	—	—	13.0	12.5	16.5
	Q3	21.0	19.4	20.2	21.0	—	—	16.2	16.2	19.0
	n	6	5	25	46	1	3	7	18	125
Local government (excluding school- teaching)	Q1	14.3	11.8	12.0	13.8	—	—	11.4	10.0	11.9
	M	15.6	13.3	13.2	14.9	—	—	12.6	12.9	13.0
	Q3	17.5	15.6	15.4	17.0	—	—	15.1	15.8	15.3
	n	7	14	84	44	3	4	30	23	302
Manufacturing industry	Q1	2.8	12.2	16.0	17.0	—	—	14.5	12.1	15.0
	M	10.4	17.7	18.5	21.8	—	—	16.5	20.1	19.2
	Q3	14.6	20.8	24.0	27.7	—	—	26.6	27.2	25.0
	n	14	12	51	133	4	4	5	22	291
Banking	Q1	—	—	23.5	17.7	—	—	—	—	19.3
	M	—	—	30.0	24.5	—	—	—	—	26.5
	Q3	—	—	87.5	43.0	—	—	—	—	50.0
	n	4	4	25	41	0	0	0	4	87
Insurance, stock-market etc.	Q1	—	—	17.3	17.2	—	—	—	11.2	16.9
	M	—	—	25.0	22.0	—	—	—	15.0	23.1
	Q3	—	—	44.1	29.0	—	—	—	30.0	31.5
	n	2	4	18	49	0	0	2	5	86

†M, median; Q1, lower quartile; Q3, upper quartile; n, number of cases.

‡Including respondents holding post-graduate certificates and diplomas (e.g. Post-graduate Certificate of Education).

Source: (Rudd, 1990: 228-9)

## 5.2 Rate of Return on PhDs - A General Picture

Rudd's (1990) study provided a huge amount of information about PhDs and their careers vis-à-vis others. However, it suffered from three problems, namely traceability of respondents, low return rates and not having a representative sample. Instead of examining career patterns, labour economists

concentrate on earning studies - generally known as ‘rate of return’ (RoR) or ‘return on investment’ (RoI) studies.

Through RoR studies, economists examine pay differentials as a proxy for the relative demand for and supply of a particular type of worker. Where the wage differential (or wage premium) is significant, market demand is said to be high relative to supply of the type of worker concerned, other things being equal. The ‘excess demand’ is pushing wages higher than other comparable occupations. However, some economists prefer to interpret the wage premium also as a reflection of higher market demand for higher skills. It is in this respect that, in many of the earnings analyses, workers with greater qualifications tend to accrue greater earnings. For example, large sample data show that graduates with a degree tend to command a greater lifetime earning than those with lower qualifications. Walker and Zhu (2003), for example, reported the following wage premium between degree and A-level holders:

Table 11: Wage Effect of Degree Over Two or More A-level by Age Cohort, England and Wales, 1993-2001 (%)

	1933-46	1947-57	1958-68	1969-77
Women	22	23	19	24
Men	11	12	10	16

Source: (Walker and Zhu, 2003: 149)

Table 11 therefore suggests that people with a degree (on average) can expect to earn a wage premium between 16-24%, compared with those who have 2 or more A-levels.

However, within this set of literature and empirical studies, wage premium information as well as market demand for doctoral graduates, remain largely unclear. The reason is that the majority of these studies do not differentiate graduates among the different levels of degree qualification. Most studies tend to focus on First Degree graduates. Higher qualifications tend to be put together to form a separate postgraduate category.

A further problem, which also applies to first-degree holders to some extent, is the tendency for research not to distinguish graduates who are working in different industrial sectors. It is well known to researchers that even among workers with the same qualification, there exist marked wage differences across different industrial sectors. As a result, even if a wage premium is identified, it is not always clear how this varies across industrial sectors.

### 5.3 *Rate of Return Studies - Some Sectoral Results*

A recent study by Dickerson and Vignoles (2006) adopts an unusual approach to estimate the return to education for various levels of education qualifications by sector (as defined by the Sector Skill Councils). In general, Dickerson and Vignoles’ results show marked disparities paid to different levels of qualifications across sectors and also disparities between men and women within the same sector with comparable qualifications.

Using the Labour Force Surveys between 2000 and 2004, Dickerson and Vignoles' study estimates returns to education by five levels of the National Qualifications Framework (NQF). The study finds the following rates of return:

Table 12: Rate of Return to NQF Qualifications, 2000-2004

NQF	Rate of Return (%)
Level 1	Negligible
Level 2-3	13-16
Level 4-5	23-31

Source: (Dickerson and Vignoles, 2007: 23)

Table 12 shows that compared with those without any qualification, having Level 1 qualifications do not make much difference in terms of earning power in the labour market. Levels 2 and 3 command 13-16% wage premium while levels 4 and 5 have the greatest return at 23-31%.

Much of the study focuses on below postgraduate levels, the same study also identifies that returns are “very high for both academic and vocational level 5 qualifications” (Dickerson and Vignoles, 2007: 8). Further analysis of their results also shows that the return to level 5 vocational qualifications is generally higher than to level 5 academic qualifications. Indeed, in some sectors such as accountancy, legal and finance the difference was significantly higher.

This very high level of wage premium accrued to level 5 vocational qualifications varies substantially across the different SSC sectors. For example, the wage premium for male level 5 qualification holders reaches 100% in Skillfast-UK (fashion and textile); 82% in Skills for Health and 56% in Energy & Utility Skills and Asset Skills (property, facility, housing and cleaning management). For female level 5 qualification holders, the wage premium is 114% in Skills for Logistics; 64% in Skillsmart Retail; 50% in Skillfast-UK, Skills for Justice and SkillsActive (leisure and learning).

Dickerson and Vignoles' study provides the first sectoral analysis on return to qualifications and in particular level 5 qualifications. Unfortunately, they have not provided a more specific picture for PhD graduates. Their results cannot separate the wage effect between that of PhD training and those from Masters degree and postgraduate professional qualifications.

#### 5.4 *What do PhDs Earn - Some Specific Results*

The most specific attempt to estimate the market premium of PhD education comes from a study carried out by O'Leary and Sloane (2005). This study differs from other similar studies in that it examines the return to PhD degrees separately from other postgraduate qualifications. The study also achieves a huge amount of earning data by pooling eight years' worth of Labour Force Survey data to form a sample of 17,500 men and 15,200 women who have

hourly earning data available. Table 2 summarises O’Leary and Sloane’s findings:

Table 13: Rate of Return to Degrees by Gender, 1994-2002

	Men	Women
First degree	20.2*	35.5*
Masters degree	29.2*	54.0*
PhD degree	31.4*	60.0*

\* statistically significant at 95% confidence level; baseline – 2 or more A levels.

Source: O’Leary and Sloane (2005: 79)

O’Leary and Sloane’s results are interesting. In Table 13, the results show that women’s wage premium is greater than that of men at all levels of university education. At the PhD level, the wage premium is at its greatest between men and women PhDs. Compared with workers with 2 or more A levels, women PhDs can command a wage premium of 60% while men PhDs have a premium of 31.4%.

What distinguishes O’Leary and Sloane’s study is the focus on wage premium by subject. This study enables us to examine for which subject PhD holders tend to get the more effective economic return. Alternatively, this may provide some indication of employers’ relative demand for employees with doctoral training.

Table 14: Rate of Return to PhD by Subject and by Gender, 1994-2002

	Men	Women
Medicine and related	17.8*	14.6*
Sciences	7.9*	14.2*
Maths and computing	4.8	12.4*
Engineering and technology	5.0	3.5
Architecture and related	-6.6	-
Social sciences	7.5**	14.3**
Business and financial studies	20.2*	10.8*
Arts	4.5	8.5**
Languages	1.2	6.6
Education	-1.0	12.4*
Combined	11.2*	15.1*

\* (\*\*) statistically significant at 95% (90%) confidence level; baseline - first degree in that subject.

Source: (O’Leary and Sloane, 2005: 84)

Despite the authors’ caution that the sample for some subjects suffers from small numbers (hence less precision in those estimates), PhDs in some subjects appear to command huge amounts of wage premium. For example, among male PhDs, those in medicine and related business and financial studies stand out. Other subjects such as combined, sciences, social sciences and arts command a reasonable level of return. However, in two subjects - architecture & technology and education - having a PhD may not provide any wage premium, though these estimates are not statistically significant. Indeed,

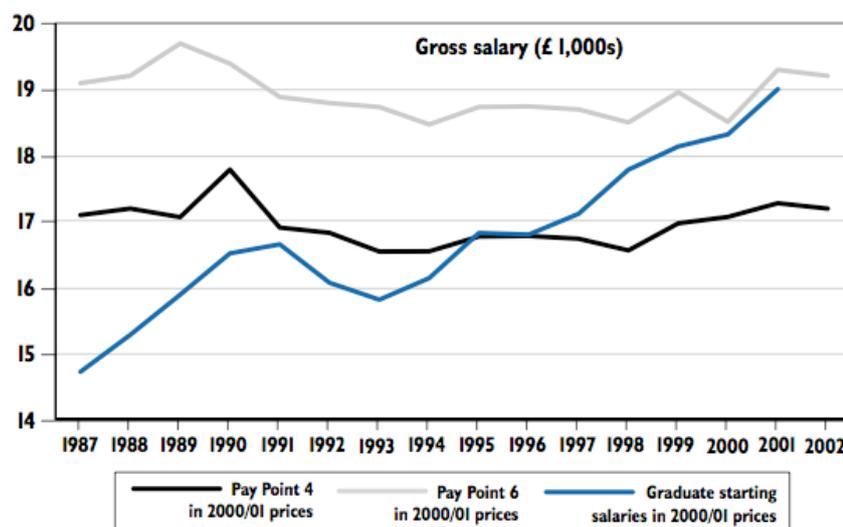
O’Leary and Sloane point out that the returns to arts, engineering and technology are less than the returns to Masters holders in the same subjects. As is highlighted in later sections, in more technical and practical sectors such as these, three years experience are often recognised more highly than three years (or more) studying for a PhD.

For women PhDs, most graduates command impressive levels of wage premium over first degree holders. Table 3 shows that many subjects have a double digit wage premium, ranging from 10.8% (business & financial studies) to 15.1% (combined). Notably, O’Leary and Sloane go on to conclude that these returns to qualifications results demonstrate that women have more to gain than men in PhD education (2005: 85). Of course, this is women with PhDs compared to women without PhDs. If women and men were compared on wage premium this picture might look quite different as generally men with PhDs earn more than women.

### 5.5 Pay Review of PhDs in Higher Education

Using the Labour Force Survey to examine PhD earning differential in relation to those without any qualification is one way to examine the earning profile of PhDs. Another way to look at pay conditions is to carry out a specific review of PhDs in higher education. For example, a recent salary review by Sir Gareth Roberts (Roberts, 2002) included PhDs’ pay as part of its remit. Its findings point to a deterioration of PhD pay in higher education over time in comparison to graduate starting salaries. Indeed, the Roberts’ Review identifies low relative pay to research staff in general. However, PhD pay has been caught up in this general decline of pay for academics/researchers in the last 20 years. Figure 2 shows the two spinal points for PhDs – point 4 (black line) for minimum appointment level and point 6 (grey line) for minimum 27 year-old appointment – gradually lost ground against starting salaries offered by graduate recruiters to new graduates with 2:1 degrees (blue line).

Figure 2: Starting Salaries for Spinal Points 4 and 6 with Graduate Starting Salaries, 1987-2002



Source: (Roberts, 2002: 155)

Figure 2 shows that in 1987, the starting salary of spinal point 6 was £2,000 more than spinal point 4 which in turn was £2,000 more than a first degree graduate. By 1997, graduate starting salary caught up with spinal point 4, and by 2001, graduate starting salary (21-22 years old) was almost the same as spinal point 6 (27 years old).

The Roberts Review argues that the fall in real pay for those working in higher education against alternative jobs was the main reason for declining attractiveness for doing PhD studies and the increasing difficulties in attracting applicants for postdoctoral research posts.

The Roberts Review findings on low starting pay for PhDs are not inconsistent with the evidence produced by various rate of return studies (which all show varying degrees of wage premium for PhD holders). Rate of return studies tend to use large sample workforce surveys which include PhDs who are working outside the higher education sector, whereas the Roberts Review focuses on PhDs who are working in higher education only. As will now be considered, PhDs who are working in industry are likely to earn the much higher 'market rates'.

#### 5.6 *Pay Differentials Between the University Sector and the Private Sector*

The above HE/private sector pay differential was equally highlighted in the recent 15-year longitudinal study on PPARC PhD graduates who earned their doctorates in the late 1980s (DTZ Pineda Consulting, 2003a). Among the 67 respondents, around 79% of those who made a career in the university sector earned less than £40,000 p.a. while only 42% of their counterparts in the private sector earned less than £40,000 p.a.. Indeed, 6% of the university sample earned the top salaries of £60,000 p.a.. This contrasted with 26% of the private sector sample earning more than £80,000 p.a. (2003: 24-26).

Reviewing various previous surveys and analyses, Elias *et al* (2005: 31, 50) found very similar HE/private sector pay differentials, though it was evident from their interviews with PhD holders that the real 'value of a PhD' should take into consideration a wide range of non-monetary benefits, e.g. independent work, time to think and learn and a challenging research environment .

### **6. The Wider Value and Role of the PhD for Graduates and Employers**

This brings us to consider studies which highlight the perceived value of the PhD through examination of graduate and employer perceptions. A number of studies consider the value of the PhD, although this is primarily in employment terms. As already indicated, one of the shortcomings is that the literature emphasises the employment-related value above any wider impact and, as such, this forms the majority of this review discussion. Whilst this discussion focuses on the value of the PhD and the role of the doctoral graduate, this helps us to some degree to assess the impact of this group of individuals, at least in terms of employment- and economic-related impact.

For example, Rudd's (1990: 203) survey research on the value of the PhD used the following indicators:

The survey started from the assumptions that, in a particular occupation, if a PhD is of value

- (a) a high proportion there will have the PhD,
- (b) they will regard what they learnt while studying for it as especially relevant to their jobs and
- (c) employers will pay the people with PhDs more than others.

Nevertheless, as Rudd notes of his study of social sciences graduates, only employment factors were taken into account:

It should be noted, firstly, that in this study no account was taken of any value of the PhD not relevant to jobs and careers; other possible benefits, such as the candidate's contribution to knowledge, enjoyment of research, or opportunity to enter a chosen career, were outside its scope.

(Rudd, 1990: 203)

It is particularly interesting to note some of the differences between this group of graduates from the 1970s and the situation for current PhD graduates. There are not only many more people studying for a PhD now, but there appears to be a greater demand for, and recognition of, the doctorate across different areas of work.

Looking at Rudd's respondents between 9.5-16 years after graduation, 17.1% had tried to gain a PhD, of which 60.9% had succeeded. The employment of those with and without PhDs is examined. University teaching was the only area in which significant numbers of PhD graduates were found, with 68% of those in this field having a PhD. Rudd goes on to note, however, that approximately half of the respondents had not completed or were not planning on studying for a PhD when they were offered their first teaching post. It is therefore concluded that a PhD is not essential for a teaching career in HE – a rather different situation to that highlighted now. Equally, whilst research skills were rated as important to teaching posts, such skills were overall rated lower in terms of relevance to their jobs than other intellectual and personal skills which were often developed through work experience as opposed to studying. However, it is later emphasised that:

It is not that employers do not regard a PhD in the social sciences as useful; it is just that they regard three years' experience in employment as more useful, and most reward it more highly.

(Rudd, 1990: 231)

Looking at the employment patterns of all respondents, Rudd concluded that having a PhD did not have a significant impact overall on employment or, as

we have seen, on salaries at the time. Twice as many graduates needed a Masters level qualification rather than a PhD for their first post. Equally, the class of First Degree appeared to have a stronger influence on later employment options. For example, those with a first class Degree and a PhD were more likely to have teaching posts in a university than those with a second class Degree, who were more likely to be teaching in polytechnics and colleges or working in non-academic posts. Notably, this seems to position polytechnics (now universities) and non-academic work in a somewhat negative position, reflecting the traditional view that the PhD was a preparation for work in universities. More up to date studies paint a much more positive picture of work outside higher education, and do not tend to differentiate between pre- and post-92 universities in this way.

Another interesting difference between Rudd's study and later studies is that most graduates working in research posts did not hold a PhD. Many of those who had worked in research for their first job had moved into other areas or were unemployed by 1987 and a high level of movement in and out of research was noted. As such, Rudd (1990: 213) suggested that there was a limited demand for PhDs in research posts and that arguments for sustaining research manpower via PhD funding seemed "rather weak". As will be explored in subsequent sections, a rather different picture emerges here when looking at current studies of researcher careers. As such, where the value of the PhD is questioned in a number of employment areas for these 1970s graduates, this appears to have changed considerably over the last three decades. Whilst this increased demand for doctoral graduates is likely to be shaped by a number of factors, this partly reflects wider participation in higher education and the growing number of individuals with Degrees and Masters (Jackson, Charles, 2007).

Interestingly, Green and Powell (2007) comment that workforce planning does not seem to have shaped current changes in the doctorate. This is particularly within the academic workforce where the demand for PhDs is perhaps most evident. For example, how many doctorates will the HE sector require to fulfil its workforce needs over the next decade? What role will PhD graduates play in the higher education sector of the future? What abilities will those graduates need to cope in the changing academic and wider labour market?

To what extent do we simply respond to changing patterns of demand? Should we be setting targets for the numbers of Doctorates awarded? Do institutions plan research student numbers within a context of research need, lifelong learning or knowledge transfer?

(Green and Powell, 2005: 21)

We will now investigate the perceived value of the doctoral graduate within the academic sector and then within non-academic sectors as there are some interesting differences. Whilst this section often deals with perceptions rather than actual outcomes – which we have already considered – it is important to note that these can nevertheless shape potential opportunities for PhD graduates, as well as their own understanding of the value of their

qualification in the labour market and beyond. As UK GRAD (2004: 11) note, there can be barriers between “the most highly educated and skilled group in the UK” and potential employers. Perceptions among employers, for example, may be shaped by societal and personal views of higher education, which are not always positive. Raddon and Quinn (2007) found that negative views of higher education among employers could lead them to overlook the benefits they might gain from supporting employees to complete a Foundation Degree, or recruiting someone with an FD, simply due to the title ‘degree’. This same resistance is likely to be seen – perhaps even more so – for the doctoral level if employers do not have experience of targeting or recruiting people at this level. Given the privileged nature of higher education in the past, and to some extent the present, and the stereotypes which we have noted around the PhD, perceptions of those graduating with PhDs and Doctorates are fairly mixed.

### 6.1. *Perceived Value and Role of Doctoral Graduates in the Academic Sector*

There is little direct research on the exact impact of doctoral graduates within academic work and higher education more widely. Nevertheless, it is clear from the literature – and the continued demand for a PhD/Doctorate in order to progress within an academic career – that there are a number of areas of significant impact beyond maintenance of the higher education workforce:

But the supply chain issue runs much deeper than this, because a throughput of productive doctoral students is vital to the health of academic disciplines. Because they are custodians of the disciplines, it is essential that we have a sustained supply of doctoral students, not just to grow the next generation of academics but to maintain vitality and research momentum in disciplines.

(Park, 2007: 13)

#### 6.1.1 *Demand for Doctoral Graduates in HE*

There are mixed messages about the opportunities and demand for PhD graduates in the academic workforce. Forecast studies carried out by the Institute for Employment Studies in the early 1990s projected a considerable growth in the demand for academics in order to cope with retirements and higher education expansion (UKCGE, 1996). Indeed, HESA data shows a continued growth in academic posts, with 21% of HEI staff in England being classed as early career researchers (Ackers and Gill, 2005 citing Court, 2004). However, the academic labour market of the last decade has also been shaped by funding cuts and redundancies, leading to a tighter academic labour market and a decline in permanent posts. Moreover, as student debt increases, the value of PhD studentships and academic pay has become less attractive when compared to graduate salaries outside HE and may lead to a shortage of PhD graduates in the future, although this may not be fully apparent for some time (Ackers and Gill, 2005; Evidence Ltd, 2005; HEFCE, 2006; Park, 2007). Indeed, the attractiveness of the academic profession is in question across a number of European countries due to similar issues (Huisman *et al*, 2002).

Within the UK, potential shortages of new academics have been predicted for the coming decade across a number of disciplines. For example, there is concern in the social sciences, where a 35% retirement rate is expected in the next 7 years (Ackers and Gill, 2005 citing Johnston, 2004). Similarly, skills supply is raising concerns in fields such as physics, mathematics, medicine, pharmacy, law, economics and IT (Ackers and Gill, 2005). Langlands (2005b) suggests that engineering is likely to be the profession most affected in the longer term by this shortage. A number of studies have expressed grave concern at the current shortage of economics PhDs and what this means for the academy and the discipline in the UK (Machin and Oswald, 1999, 2000).

38.1% of HEIs indicate low turnover of staff nearing retirement age as a concern, whilst nearly 30% report problems with recruitment of newer academics and around 25% experience difficulty retaining younger academics (Ackers and Gill, 2005 citing Thewlis, 2003). At present, however, HESA data does not provide information on how many of those entering higher education posts were PhD graduates, so it is not possible to say how many new recruits to HE came through the PhD route (HEFCE, 2006). Equally, the data does not indicate the “size and scope of the recruitment pool for lectureships” (Evidence Ltd, 2005: 22, parag. 63).

The Engineering and Physical Sciences Research Council (EPSRC) commissioned a study to examine the ‘health’ of the ICT disciplines and, in particular, to identify whether perceived difficulties in recruiting researchers in these areas were correct and why. EPSRC-funded PhD students and permanent staff in receipt of research awards were surveyed. Subsequent interviews were also conducted with these two groups and with industry figures. 127 PhD students responded to the survey. The report notes that HESA data shows that between 30-40% of PhDs in the discipline continue on into research posts within HE or research and development functions in industry. They found that the majority of academic staff (81%) perceive problems retaining PhD graduates as post-doctoral researchers. Above all, staff and students alike identified the problem to be a lack of clear career paths for PhD graduates within research and the general lack of attractiveness of the sector due to “*the absence of attractive ‘remuneration’ packages*” (EPSRC, 1999: 7 emphasis in the original). Indeed, this was felt to impact on the ability to attract potential PhD students onto programmes. This reflects Roberts’ (2002: 143) conclusion that the lack of attractiveness of the academic career in terms of career structure, training and salary, has led to difficulties recruiting and retaining the “brightest PhD graduates” in science and engineering.

Indeed, the report goes on to paint a rather dismal picture for PhD graduates. Whilst this study was conducted some years ago, the following image of the difficult ‘post-doc’ time is reflected in the wider literature on researcher careers:

When a PhD finishes, (if no permanent lecturer vacancy is available - and there are very few), can become a Post Doc Research Assistant. Typically this is for 3 years, after which they may be lucky and get another 3 years, after which they hope for another 3. By the time they are 30 with family

responsibilities these short term contracts wear a bit thin and they want out. So the problem is no “career” as a researcher.

Even the permanent staff with their heavy teaching and administrative commitments are short of time to devote to research and so dedicated researchers cannot be assured of the opportunity to pursue their interests and continue a career in research.

(EPSRC, 1999: 8)

### 6.1.2 *The Role of the PhD in the Academic Sector*

Traditionally the PhD was viewed as a “licence to teach ... in a university as a member of a faculty” (Phillips and Pugh, 2005: 20) and a form of apprenticeship in which the apprentice passes into the profession once they produce their own significant body of work (Hoddell *et al*, 2002). This view has persisted and the doctorate is increasingly seen as an initial entry requirement for new academic staff. Nevertheless, many PhD graduates now move on to work outside academia. Moreover, the idea of the Ph.D as an automatic licence to teach has been challenged more recently with the introduction of academic development programmes and requirements in HEIs for new staff to complete these programmes as part of their probation (e.g. Postgraduate Certificate in Higher Education, Postgraduate Certificate in Academic Practice in Higher Education).

However, the PhD or Doctorate serves a number of purposes in relation to the academic profession. For example:

- Socialisation;
- Maintenance of the academic skills base and knowledge;
- Recruitment into HE;
- Status and professionalisation of the academy and the individual;
- Accepted form of entry into the academy;
- Professional qualification recognised nationally and internationally.

(e.g. Delamont *et al*, 2000; Rugg and Petre, 2004; UKCGE, 1999, 2002; Wellington *et al*, 2005)

The outcomes, and the list of skills attributed to the doctorate earlier in this report, ultimately transfer to the wider world of work and the full range of professions. For example, we could argue that the experience of working in a particular environment with others, becoming to whatever extent part of a ‘community of practice’ (Lave and Wenger, 1991) and observing how a professional culture operates, are experiences and learning that can be transferred to any workplace. Such tacit knowledge and “social learning” are a vital element of the doctoral experience (Delamont *et al*, 2000: 52).

Nevertheless, it is clear that the PhD or doctorate is widely seen as having a particular ‘gatekeeping’ role within the academy in a way which is not as

evident in other fields of practice. As might be expected given the origins of the PhD, the activities required of academic work map fairly neatly on to the skills identified as being developed via doctorate studies:

- networking;
- teaching;
- researching;
- writing;
- managing.

(Blaxter *et al*, 1998: 22)

Furthermore, “the ideas behind ‘lifelong learning’ and ‘multi-skilling’” (Blaxter *et al*, 1998: 194) are likely to be very helpful in developing an academic career – again these are attributes linked to doctoral graduates.

It is perhaps not surprising that among social sciences PhDs, 90% of those in academic posts felt that the skills developed through the PhD were used in their work, compared to 75% of those in non-academic jobs (Elias *et al*, 2005). Equally, reflecting some the debates explored earlier when considering the nature of the PhD, 71.1% of those in academic and 49% of those in non-academic posts felt that the PhD research training was very useful for their job. Similarly, turning to the AHRC study, while 66% of the overall sample saw the PhD as essential for their career or job, this rose to 90% for those working in HEIs (DTZ Consulting & Research, 2006). Although it is not broken down by sector (75% are in HE), the same study found that there was a close match between the skills which individuals felt they developed through their PhD studies, and the skills they required in their everyday work setting. One area where there was less match was in terms of “people skills” such as teamwork (DTZ Consulting & Research, 2006: 42). However, the report concluded that these were the kinds of skills which were harder to build via the PhD process.

Thus, although it does not guarantee employment, those aiming for an academic career are strongly advised to undertake a PhD:

At a sordidly practical level, the PhD is a qualification which shows that you are good enough at research to be appointable in a university post. If you're thinking of work as an academic in a university, a PhD is highly advisable. It is also helpful if you want a career as a researcher in industry. ... Still at the practical level, if you have a PhD, you usually go onto a higher pay scale.

(Rugg and Petre, 2004: 2)

This paints a very different picture to that found by Rudd (1990) when examining the careers of those graduating in the 1980s, a time when many in academia did not have PhDs.

A study by Jagger and Connor (2001) of the demand for postgraduates in the engineering field, including interviews with academic staff, found that the Research Assessment Exercise (RAE) brought about changes in recruitment of both researchers and lecturers. In particular, there was an increase in the demand for PhDs, since this was viewed as “proven research experience” and thus ability to contribute to the RAE (Jagger and Connor, 2001: 28). At the same time, however, problems were identified with recruitment and retention of post-docs and research assistants. The same problems were identified in a parallel study of materials science postgraduates (Connor and Jagger, 2001). Key factors identified in both of these areas were the lack of attractiveness of HE employment when compared to industry in terms of salary and other conditions of employment such as work contracts and clearer career paths. Equally, in the materials science area, academics were particularly worried about the attractiveness of the subject to chemists. Interestingly, it was also highlighted that the increased demand for PhD graduates to have developed ‘soft’ skills was not only evident in industry but in HE too, particularly in relation to teaching posts (Jagger and Connor, 2001).

However, while the Ph.D is often perceived as the ‘gold standard’ (Wellington *et al*, 2005), writers such as Wellington *et al* (2005) and Murray (2002) maintain that this is also somewhat of a stereotype which is changing.

Compared to 30, or even 10 years ago, the doctorate is developing in new and interesting ways. There is still a great deal of mystique about it, but also pressure of different kinds that is making it more accountable, to the institution, to the society, to the government, and also to the student. Cutting-edge research is still the key rationale for the study, but there are growing expectations about making use of the study for other social purposes, and about what is often style ‘transfer of skills’.

(Wellington *et al*, 2005: 4)

Even within academic careers, the PhD is viewed as more or less important depending on discipline and institution.

Only a minority of employers value a PhD in information technology and engineering, while a PhD is virtually a prerequisite for careers in biotechnology and biology. It is a requirement for most lectureships in sociology, but less important for a lectureship in law. It is also rather too soon to say, and certainly too soon to comment in detail, on how professional doctorates are going to be valued by employers.

(Leonard, 2001: 54-55)

On the other hand, Cowen (1997: 198) remarks that the PhD is no longer a direct entry to academic work, but part of an increasingly longer “admission process”.

The importance of a doctoral degree also depends to some extent on other factors such as the institution and changing HEI systems. For example, doctorates are less common among staff who are classed as ‘teaching only’,

but are more common among those involved in research and/or teaching in the science disciplines when compared with other disciplines (Blaxter *et al*, 1998, drawing on Ramsden, 1996). Equally, those who entered higher education some time ago (before the introduction of new systems and career structures), or who have gained a reputation within another professional field may not require a doctorate in order to reach the highest levels in academia (Blaxter *et al*, 1998). Here the experience and perhaps wider recognition they have gained in their field will, to a large extent, “substitute for a doctoral degree”, although “ambitious” individuals or those looking for promotion are likely to embark on a doctorate after entering academic work (Becher and Trowler, 2001: 134).

The Ph.D, in particular, is internationally recognised, although it is less clear to what extent the other forms of doctorate are recognised under reciprocity agreements with other countries (Noble, 1994). The Ph.D thus also provides a form of “valid academic passport” for those graduates who gain employment overseas (Noble, 1994: 69). Noble (1994) was particularly concerned that this shared recognition not be lost due to changes in the form of the doctorate, since the new professional and taught doctorates were beginning to appear at the time.

### 6.1.3 *Contribution of Doctoral Graduates to the Work and Culture of the Academy*

If we look more generally at the value and role of the PhD graduate in HE, a number of important areas of impact can be identified.

Within the work culture of higher education, senior academics are often supported in their research work and projects by junior academic staff and doctoral students. This may mean freeing the senior staff up to do research by having a junior member of staff or doctorate student take on their teaching duties. Equally, the junior academic or postgraduate may carry out considerable amounts of work on established academics’ research projects (Blaxter *et al*, 1998). For some postgraduates, this provides a means to fund their studies (Cryer, 2001; Noble, 1994), while for others it will be their first job after the PhD. This can be a positive experience for newly graduated doctoral students and help them to develop a longer term career. This is particularly seen in the sciences. Some newer researchers are even found to continue working unpaid after the end of a contract in the hope that the senior academic/ principal investigator gets further funding (Ackers *et al*, 2006; Evidence Ltd, 2005 citing Hockey, 2004). Unfortunately, it can in some cases also involve exploitation where the junior staff member carries out a major part of the research but is not given credit in publications, has limited rights over, or access to, the data they have collected and lacks a clear career pathway (Becher and Trowler, 2001; Blaxter *et al*, 1998; Evidence Ltd, 2005; Phillips and Pugh, 2005). Equally, continued fixed-term contracts and a long term post-doctoral research post can potentially damage doctoral graduates’ career progression. A report for HEFCE provides the following quote from a concerned post-doc researcher:

“It’s not so much the temporary contract in itself, it’s the career progression as a post-doc. You have the feeling that yes, it’s fine to do a

post-doc for two years, yes it's fine to do a post-doc for four years but 6 years that's a bit off. The older you become you become a. more experienced, b. more expensive and it's difficult for an employer to employ you and it's difficult for yourself to develop if you want to develop as a scientist so this is the biggest problem."

(Evidence Ltd, 2005: 23, parag. 70)

Some of these issues may be addressed via the recently introduced Fixed-term Employees (Prevention of Less Favourable Treatment) Regulations 2002, the Concordant on Contract Research Staff Career Management and more recent pay agreements. Nevertheless, this continues to be a concern for PhD graduates aiming to develop a longer-term research career or find their first lectureship and for contract researchers more widely.

Successful supervision of doctoral candidates is one of the indicators against which departments, academics and programmes are measured (Green and Powell, 2005; UKCGE, 1996). Furthermore, the ability to grow a group of doctoral researchers is not only a positive experience for many academics, but is a means of gaining recognition, disseminating the senior academic's ideas and producing new research in an effective manner (Delamont *et al*, 1997, 2000).

Doctoral graduates also make a significant impact in terms of adding to the body of knowledge within their field and nationally through their thesis and related publications. Leonard *et al* (2004: 383) note that "the relationship between academics and their research students provides substantial knowledge transfer ... into Higher Education Institutions" from the fields and sectors within which they work or have worked. Equally, as Wisker comments:

The PhD is a major academic, professional and personal achievement. Upon undertaking and then completing a PhD, a student will have made an original and valuable contribution to knowledge. Their work will be read by, built on and used by others – to build theory, to fuel change and encourage good practice.

(Wisker, 2005: 8)

Whilst more common in the USA, bibliometric studies have been made of the impact of graduates from specific programmes and departments in the UK. For example, a study of one department at the University of Sheffield (Santos *et al*, 1998) found that 393 publications could be tracked to postgraduates who graduated between 1968-1996 (including MA, MSc, MPhil and PhD). Following a citation analysis, the authors concluded that postgraduates' publications had a comparable impact to that of academic faculty's work.

More systematic studies of the impact of doctoral graduates in the academy could provide very useful information not only on their role within the academic profession and in knowledge creation more widely, but also by highlighting areas where more support and development might be offered. Notably, newer academics can feel that taking up their first post is a rather 'in

at the deep end' experience (Raddon, 2006b). This is another significant gap in the research, and more in-depth research in this field could help to inform future policy and practice developments.

## 6.2 *Perceived Value and Role of Doctoral Graduates in Non-academic Sectors*

In relation to the perceived value of doctoral graduates to fields outside higher education, the picture is fairly mixed. In order to explore this, we start by examining some of the documents from a small number of Sector Skills Councils in order to consider where PhD graduates might fit into the picture; although there is limited research which we can review to inform this picture. We then move on to examine the views of employers and graduates as we have already done for the academic sector.

### 6.2.1 *Industrial and Commercial Sectors and Demand for Higher Level Skills*

The Funders' Forum (2006) reports that there is limited data available on the demand for doctoral graduates and higher level skills, particularly from outside HE, such as within the R&D functions of companies and non-academic bodies. It is argued that there is a role here for the government but equally the sectors themselves to identify the demand for higher level skills, but that many studies have focused on lower level skills (Funders' Forum, 2006).

Sector Skills Councils (SSCs) are required to produce Sector Skills Agreements (SSAs) as part of their role. It is useful to examine where PhDs come within this and what this tells us about the perceived impact of PhDs. This next section is not synthesising published literature, but we have made use of publicly available documentation from a number of Sector Skills Councils. Within the confines of this report, we have not examined this for every sector, aiming instead to give a 'flavour' from a selection of SSCs.

The SSA maps out the skills held within the sector and forecasts the likely skills gaps, shortages and demands. Equally, a number of SSCs have developed skills strategies, plans or maps to identify more specifically how skills contribute to the sector and the different ways in which individuals might enter and progress within them. Some of these are mapped against the qualifications framework (e.g. the Skills for Logistics 'Stairway' to be discussed below), whilst others identify areas of work and levels of responsibility (e.g. Skills for the Information Age, <http://www.sfia.org.uk>, developed through cooperation between E-Skills UK (IT and Telecoms), the British Computer Society, the Institution of Engineering and Technology and the Institute for the Management of Information Systems). A number of these strategies are being updated following the Leitch Skills Review (Leitch, 2006). Although Leitch's report focused more on the lower levels of skills, it did emphasise the role of higher skills and the PhD in the UK's economic competitiveness and this might have some influence on how higher skills are viewed in some sectors.

As noted by the Funders' Forum, however, a good number of sectors are focusing primarily on the demand for lower level skills due to the nature of the employment (Funders' Forum, 2006). We could argue that this is equally due to the fact that the UK government has targeted funding in recent years with the aim that all individuals gain equivalent of at least Level 2 qualifications, now raised to Level 3 (e.g. DfES, 2006). Nevertheless, the SSCs are working to raise awareness of the role and impact of higher level skills; although in many cases this is more likely to be at undergraduate level.

For example, Skills for Logistics has worked with the industry and skills providers to develop a very useful 'Stairway'. This is a careers pathway or "roadmap" for the industry (<http://www.thestairway.org/> at the time of writing this was being updated and we were given access to a draft version, but this should be available again shortly). This maps out the types of jobs available in the sector and the different skills, attributes and qualifications required to carry out these jobs. It aims to map against the new National Qualifications Framework up to Level 8 (e.g. doctorates). Nevertheless, there are particular issues within a sector like logistics which mean opportunities for doctoral graduates will be perceived as limited.

One area in which skills gaps have been identified in this sector is at the management level. This is particularly in relation to 'soft' skills (e.g. people management). This sector experiences difficulties attracting graduates to the industry but is working to raise investment in skills development for people already in the industry and likely to move up to higher levels (Skills for Logistics, 2006b). This investment in skills could potentially include higher education, and the SSC has certainly worked to raise the profile of HE within the sector. Nevertheless, even at Foundation Degree level, limited interest or understanding among employers could make this a difficult task (Raddon and Quinn, 2007). Moreover, whilst further and higher education institutions are developing postgraduate level courses in logistics, these are primarily studied by overseas residents who often do not stay in the UK industry (Skills for Logistics, 2006a). Within this kind of industry, where the majority of employees are educated to NVQ Level 2 or below (Grey, 2004), the demand and openings for doctoral graduates are likely to be more limited; although this may in part be due to misperceptions on the part of graduates and the industry about one another. So some of the challenges of recognising the impact of PhDs in this kind of sector will be based on changing external perceptions of the industry and internal perceptions within the industry, both in terms of recognising the kinds of skills graduates more widely can bring to the industry and employ within it.

Other industries and sectors have a clearer role for PhDs and Doctorates and a potentially better understanding of their impact in the sector. Let us look, for example, at the industries which fall under the remit of SEMTA – the UK Sector Skills Council for science, engineering and manufacturing technologies. The SEMTA 'Progression Map for Engineering' shows a number of career structures mapped against qualifications up to Level 8 and different forms of training (e.g. work-based learning, short courses). A recent labour market survey on engineering unfortunately does not provide details of

PhD recruitment (Wiseman and Harrington, 2007). Information on graduate recruitment (under which PhDs may fall) ranged from between 3% of companies within Metals Wholesale through to 19% in Electronics. Different elements of the industry show quite different levels of demand for doctorates, as also noted in the Parnaby Report (SERC, 1991).

Within other industries which fall under the remit of SEMTA, such as the fields of pharmaceuticals and biotechnology, highly skilled researchers are vital to current and future development. Indeed, a recent survey of companies found that 60% recruited PhD graduates (SEMTA, 2006). UKCGE (1998) note that the PhD is now a prerequisite for research positions in these industries, to the point where many more PhDs are now going into careers in industry rather than academic careers. A report by the Association of the British Pharmaceutical Industry (ABPI, 2005) identified a number of priority areas in the future development of these two fields. These are examined in terms of recruitment to the fields and include graduate, PhD and Post-Doc level recruits. PhDs and post-docs are important across all of the disciplines listed within this industry, and are clearly regarded as both in demand and as making a major impact on the disciplines. Indeed, concerns are expressed about shortages of PhDs and post-docs which could have a major impact on a number of disciplines within the industry. For example, the area of Clinical Pharmacology/ Experimental Medicine is signalled as a high priority for action. One aspect of PhD graduate recruitment which was identified as particularly problematic was in the lack of industrial experience. Long-term shortages of PhDs and post-docs are linked to a shortage of academic clinical pharmacologists. Thus, we can see that whilst the academic and non-academic employment sectors are often differentiated, they can have a major impact upon each other.

#### 6.2.2. *Contribution of Doctoral Graduates in Non-academic Sectors*

The Careers Service of the University of Sheffield (McCarthy and Simm, 2006) surveyed employers on their view of postgraduate researchers, including PhDs, receiving 104 responses (5.7% response rate). Reasons for recruiting postgraduates more generally were similar to those identified elsewhere for recruiting doctoral graduates (e.g. Park, 2007), including maturity, future prospects, specialist knowledge and research skills. 69% of companies stated that they either accepted or encouraged job applications from PhDs. This was the case across all positions but particularly for research and development or consultancy roles. Indeed, 80% of companies said they would welcome more applications from PhDs. A growth was noted in PhDs being recruited to small- and medium-sized enterprises (SMEs), with these companies particularly valuing the skills they brought and their ability to “move quickly within the organizations” (McCarthy and Simm, 2006: 3). However, meeting the required skills and attributes for a post were more important than having a PhD. Equally, many companies regarded doctoral graduates as part of the same pool of applicants as First and Masters Degree graduates, rather than differentiating them as a specific recruitment group. Furthermore, individuals themselves are likely to value the general and

technical skills they have developed through the process of a doctorate over the ability to claim an 'expert' status on the subject of their PhD (Pole, 2000).

Nevertheless, Park argues that employers do have certain expectations of doctoral graduates and perceptions about how they will contribute:

According to Vandrup (2006), industrial employers are usually looking for people with multidisciplinary and ideally international experience, a flexible approach, and an understanding of business models. Sotillo (2006) puts it more bluntly in arguing that managers are really looking for "someone who will add value to the business today and in the future, and do it quickly". She adds that, as well as specific subject knowledge (though employers can often teach them what they need to know), managers are looking for brain-power, appropriate behaviour (such as a collegial approach to work, and taking ownership of and responsibility for tasks and processes), relevant work experience, and a short transition from the academy to the workplace. It is a double-edged sword, because while doctoral graduates usually do bring added value to an enterprise ... realising this potential is often constrained by a series of potential barriers which employers must confront and find effective ways of dealing with. Doctoral students usually lack commercial awareness, are generally over-specialised, face difficulties in adapting to non-academic work cultures, and often have unrealistic expectations (McCarthy and Souter 2006).

(Park, 2007: 19)

As we can see, although PhD graduates are generally seen to have valuable skills, there are equally other concerns around their perceived ability to fit into a non-academic workplace.

The growth of a wide range of professional doctorates would seem to provide testament to the changing recognition of the doctorate in a more extensive number of professions and the growing demand for qualifications at this level. For clinical psychologists, for example, the doctorate is now the pre-service qualification required in order to practice (Green and Powell, 2007; Scott *et al*, 2004). This was developed in response to demand from practitioners and the National Health Service in the UK (Scott *et al*, 2004). Indeed, Degrees, Postgraduate Diplomas and Masters qualifications are now required or preferred in many fields, either as standard qualifications or in order to practice (e.g. further education teaching, school teaching, nursing practice, law, medicine, dentistry). However, apart from clinical psychology (and academic work), it is not clear which fields require the PhD/doctorate as standard. Furthermore, data is not currently available in the UK on the number of people holding a doctorate and working in professions outside academic work (Green and Powell, 2007). As such, Green and Powell (2007) lament that it is not fully possible to assess the value that is placed on the doctorate by employers.

Professional Doctorates have a potentially more immediate connection with the non-academic workplace, often involving a project that relates to the

student's daily practice or their wider field of practice; although this can also occur with Ph.D studies (e.g. Salmon, 1992). Nevertheless, the transfer of academic knowledge to the workplace is not necessarily a straightforward process and cannot be taken for granted. Writers such as Scott *et al* (2004) provide a useful discussion of the challenges involved in this knowledge transfer.

Doctoral level studies not only provide learners with a range of skills that are relevant and transferable to the workplace, but can bring new dimensions to the practice of those already in their chosen careers. Here, it is not simply a case of saying "You are in command of your subject, you have experience in the field and all you have to do now is gain the qualification" (Becker, 2004: 2). Becker comments that those pursuing postgraduate studies as part of their professional development may overlook and miss out on one of the most important dimensions of studying at this level:

... that of moving away from your everyday work life to immerse yourself in a new way of working and a more considered way of seeing things, leaving you with a new view of both your work life and your personal and professional development.

(Becker, 2004: 3)

EdD graduates, for example, are likely to have developed their research thesis or project on an issue in their work context. The resulting research will not only inform and shape their own practice, but may have wider impact in their workplace or nationally. Wellington *et al* (2005) provide 'cameos' of EdD students who describe how their research focused on issues embedded in their field of practice. One student is researching student teacher retention and another examining pedagogies for non-traditional learners. As the latter student reflected "undertaking the doctorate has given me another view on how I can perform my own job function differently and be better informed, wiser and, with a great deal more determination, make a difference in my corner of the field" (Wellington *et al*, 2005: 29). Later in the same text, another student cameo notes how a student was asked to become a project manager in her institution due to the research experience on the doctorate programme.

The doctorate is thus becoming recognised as a useful means for practitioners to engage in reflective practice, a concept which has grown in popularity alongside greater "requirements for greater accountability and a rapidly changing environment" within many professions (Scott *et al*, 2004: 2). As Phillips and Pugh write:

Successful candidates [of the professional doctorate] will be skilled and experienced professionals who have not only practiced but pondered on and analysed the use of their academic and practical knowledge.

(Phillips and Pugh, 2005: 197)

Indeed, a survey of employers with staff undertaking professional doctorates found that employers were very positive about the benefits of this level of study for their staff. Benefits identified included:

- the development of individual skills, particularly in the area of research;
- the development of organisational skills, by dissemination from the individual student together with involvement in the programme;
- retention and motivation of staff;
- improved skills in management and leadership;
- improved quality of output/product of the organisation.

(UKCGE, 2002: 40)

Moreover, in some non-academic fields a professional doctorate may be regarded as having a greater linkage with the work than a traditional Ph.D:

For the health service and other healthcare employers, the outputs (in terms of skills as well as findings) from professional doctorate training programmes may well have more immediate benefits for day-to-day practice than those from traditional PhD programmes.

(UKCGE, 2003: 34, parag. 4.4)

A number of fields of practice where the PhD is not traditionally required have made calls for this to become a standard qualification for practitioners. For example, there are strong arguments within the field of librarianship for the value of the PhD to this field of practice (Freeman, 1995). Similarly, in the field of nursing, where the PhD has not been widely perceived as a required or relevant qualification, there are various arguments for the benefits this can bring to nurses' practice (Jolley, 2007). Indeed, Christine Jackson and Butterworth (2007) comment that, whilst the data suggests that nurses tend to undertake the PhD later on in their careers, the nurses and the profession would benefit from supporting them earlier in their careers. This is due to resource and time implications which may be a heavier burden for senior professionals. Baum (1998) discusses the growing recognition of doctoral studies for educators in hospitality studies, but also questions whether the format of this education could be better designed to fit the needs of experienced educators.

Nevertheless, in such fields, doctorates are starting to be seen as a form of professionalisation and as bringing a range of new skills to the role. For example, the Society and College of Radiographers recently suggested that individuals seeking to gain the new position of Consultant Radiographer should obtain a professional doctorate as part of gaining that status (Manning and Bentley, 2003). Here, the aim of the doctorate is to develop high level research skills which can be applied within the clinical practice setting and develop reflective practice. The doctoral graduate is perceived to be able not only to make use of existing research in a more critical way, but generate their own knowledge as required within the field of practice and with a full

understanding of the patient and practice setting (Manning and Bentley, 2003). Moreover, the doctorate is felt to add to the professionalism and standing of the field. Notably, Manning and Bentley (2003: 5) draw comparisons with the “heavyweight” field of medicine in which they note that the Doctor of Medicine is awarded (although this is not technically the same as a Ph.D or Doctorate).

### 6.2.3 *Transfer of Doctoral Graduate Skills to the Workplace*

Studies of PhD graduate employment generally highlight that the skills graduates have developed are useful to them in getting their job and in carrying out their work; although this does tend to be lower in relation to the private sector and industry. For example, the majority of the new 2003 PPARC cohort (DTZ Pinda Consulting, 2003b) felt that the PhD was very useful in helping to develop their career, including aspects such as gaining promotion, but this was highest among those working in HE (87%), followed by public sector (73%) and private sector (58%). When asked more specifically about the connection between the PhD and their work, overall 45% saw this as ‘essential’ and 47% as ‘of some importance’. It was most important to those in HE, 91% of whom saw this as ‘essential’ (91%). Again, this illustrates the increasing demand for PhDs within academic jobs. For the public sector, 55% saw it as ‘essential’ and 45% as ‘of some importance’. For those in the private sector, however, 12% saw it as having ‘no importance’ and only 10% saw it as ‘essential’, but 78% saw it as having ‘some importance’. Nevertheless, whilst the PhD in itself might not be essential for the private sector roles, the skills developed are felt to be highly relevant and valuable. Equally, a good number of those who saw the PhD as having no relevance had not completed their PhDs.

Snape *et al*'s (2001) study of SERC graduates indicates that all respondents felt that their postgraduate studies had been of some value. Employment-related factors were particularly emphasised. Thus, for some it was a prerequisite for their intended career (e.g. HE), whilst for others the qualification brought a certain level of recognition and status and would be valued by employers when looking to gain a first post from which to move on. Equally, as with other studies, the qualification was felt to bring prestige to the employing organisation, particularly where graduates were dealing with clients. Indeed, women and younger PhD graduates saw the title ‘Dr’ as giving them a level of recognition in their field which they might otherwise not gain, particularly among senior people. The skills developed through the programme were valued by both the graduates and their employers, as were the contacts made in HE during their studies. Interestingly, one disadvantage identified in relation to PhD graduates was that in some work environments they were perceived to be too independent and perhaps not able to fit within the work culture.

Equally, however, there were personal gains – and disadvantages – too. In particular, some of the more personal gains, which overlap with employment-related benefits in many cases, and the disadvantages included:

- Benefits:
  - “personal development” – e.g. independent thinking, self-motivation, maturity;
  - “professional development” – e.g. critical thinking, basis for research career;
  - “enjoyment of learning and the student lifestyle”; and
  - “opportunities to pursue a subject in a way that is not possible in their working lives” – e.g. pure scientific research, combined pure and applied research;
- Disadvantages:
  - “opportunity costs” – e.g. time spent on studies, lower earnings compared to contemporaries due to later entry in labour market, lack of work experience, impact on family life;
  - areas where training was lacking – e.g. business and management skills, support in transition from HE to other sectors.

(Adapted from: Snape *et al*, 2001: 38)

The ‘Employers’ Perceptions of Recruiting Research Staff and Students survey’, funded by the Roberts’ Skills Training programme, particularly explores employers’ views outside HE in order to better understand the “reality of the current employment market for researchers” (Souter, 2005: 4). The researchers found some difficulties in accessing information on whether and how postgraduate researchers and PhD graduates were employed within the organisations contacted. Indeed, the ‘entry point’ into the labour market for doctoral students and PhD graduates is found to be less clear than that for undergraduates who were a clearly targeted group in recruitment policy (Jackson, Charles, 2007; Souter, 2005). Importantly, the survey highlighted that employers found it difficult to maintain a relationship with universities through which they might be able to locate suitable recruits, particularly in specialist and technical areas. Nevertheless, the perceived qualifications inflation meant that generally employers neither felt a need to target PhD graduates as a specific recruitment group, nor to pay a premium for their skills (Souter, 2005). One sector which appeared to use a more targeted approach to recruiting postgraduates was the engineering sector, whilst law was found to focus on training contracts aimed at those with Bachelors degrees.

Focusing on the engineering sector, Jagger and Connor (2001) examined the census and HESA first destinations data in order to identify where engineers work, and found that they are employed across most sectors in the UK. Moreover, the data showed that engineering postgraduates were less likely to be unemployed than any other postgraduates (at this time PhDs and Masters were grouped in HESA data). What is of interest here is that, in subsequent interviews with employers, PhDs were regarded as particularly useful in areas such as consultancy and for manufacturing companies that wished to form better links with HE. Equally, PhDs were viewed generally more highly and recruited in more numbers than those with Masters qualifications. PhDs were valued for two aspects in particular and the kind of company was seen to

influence which of these aspects were recognised. Some companies highlighted the value of the highly-developed academic and problem-solving skills and creative thinking the individual had developed through their studies. Other companies sought the highly-developed technical skills, business awareness and ‘soft’ skills of PhD graduates, which they felt could give their company an edge over the competition. The authors (Jagger and Connor, 2001) note that the latter appeared to be a new area of demand from employers and questioned whether it was possible for the PhD to produce the different kinds of skills being sought by these two groups of companies. We have already seen that questions were raised in the 1990s about the relevance of the PhD for engineering, leading to the development of the more industry-linked DEng recommended by the Parnaby Report (SERC, 1991). We could argue that the fact that the DEng was developed, and that the PhD is still recognised in the industry, provides some level of indication as to the impact that people qualified at this level can have in the industry and the demand that continues to exist for them, albeit companies may have different views of the kinds of skills a doctoral graduate will bring.

Thus, we can see that companies which do employ PhD graduates are generally very positive about the skills and attributes they bring to their work (Elias *et al*, 2005; Souter, 2005). Souter notes that this includes the developed research skills, project management, autonomy, the maturity of such individuals and the way in which they could also add kudos to the external image of the company. On the other hand, shortcomings perceived in PhD graduates include over-specialisation, questions around the potential for application of their specialist knowledge, the inability to shape mature individuals in the same way as undergraduates, interpersonal skills and raised salary and progression expectations (McCarthy and Simm, 2006; Park, 2007; Souter, 2005). Notably, Souter found that those companies that did not employ PhDs were unable to identify the kinds of skills these individuals might bring to the organisation. In addition, a number of assumptions and stereotypes shaped views of the PhD graduate, potentially leading employers to overlook their value and impact in the workplace and more widely. For example, employers saw PhD graduates’ salary expectations as too high. However, post-doctoral researchers were asked “A company is currently paying £27,000 as a starting salary for graduates. What salary would you expect to receive?”. Interestingly, the average estimated by this group was in fact similar to that offered, coming out at between £25-30k (Souter, 2005: 22). Similarly, Elias *et al* (2005) found that job satisfaction and doing work that has a social impact were more important to social scientists (with and without PhDs) than salary. Although, those in non-academic posts were much more likely than those in academic posts to have taken their present post due to the attractiveness of the salary – 51% compared to 17.4% (Elias *et al*, 2005: Table 3.3).

Equally, Souter (2005) found that employers perceived that researchers were not used to dealing with the levels of competition that occur within business and thus might not be able to cope. Similar concerns were also noted by employers in other studies (Elias *et al*, 2005; McCarthy and Simm, 2006). However, PhD graduates may have dealt with very strong competition for studentships, research grants, research posts, submitting conference abstracts

or getting published and thus have experience that will prepare them for this in any career (Souter, 2005). Nevertheless, a number of the managers interviewed by Elias *et al* (2005) viewed 3 or more years of employment experience as more important than having a PhD and this view is generally reflected in other research (e.g. McCarthy and Simm, 2006; Rudd, 1990). Notably, McCarthy and Simm found that experience outside HE was valued by non-academic employers, but that several years post-doc experience within academia was seen negatively as having spent too much time in an academic environment. On the other hand, having worked as a researcher within an HEI was felt to provide useful connections for companies.

There tends to be a high demand for the best postgraduates and doctoral graduates in the sciences in particular, with national and international competition for the top PhD graduates, both inside and outside higher education (Ackers and Gill, 2005). Chou and Cheng (2004) comment that scientists have some of the most marketable and transferable skills on the international market when compared with other sectors, with leading scientists likely to work collaboratively and be known outside their own country. In the rapidly expanding biotechnology industry, for example, there is strong international competition for PhD graduates with highly developed research skills. A study of 5 of the leading biotech companies in the UK found that they experienced significant difficulties in recruiting talented PhD graduates, emphasising that core skills such as communication were lacking and that there was a perceived shortage of potential recruits (Chou and Cheng, 2004). However, the authors argue that there is no evidence of a shortage of graduates with PhDs and experience in the industry. This seems to be supported by Ackers and Gill who note similar issues for HEIs:

... the Wellcome Trust ... identified 'hard to recruit disciplines' including maths, biology, physiology and genomics. In these areas, it is not so much that supply has dried up, but that the volume and attraction of alternative routes out of the academic sector into industry are very strong.

(Ackers and Gill, 2005: 5)

Indeed, a number of studies indicate a growth rather than decline in postgraduate and PhD graduates; although there has been a decline in the physical sciences whilst there has been growth in other areas such as education or creative arts (Elias *et al*, 2005; Funders' Forum, 2006). Therefore, Chou and Cheng (2004) argue that these leading biotech companies focused on recruiting from what they considered to be the *very best* graduates and senior rather than junior scientists. Moreover, they sought not only academic research skills but more broad skills in communication, management and leadership and it was felt that these were lacking in newer graduates. This left companies with a smaller pool of potential recruits. According to Chou and Cheng (2004), this leads to a clear need for companies to not only increase the attractiveness of their own company to potential recruits but also to build a better understanding of the longer-term relationship and commitment that can be developed by training newer graduates earlier on in their careers.

Thus, employers in such fields are having to work harder to recruit and retain highly talented PhD graduates, again demonstrating their value and impact within the labour market and society more widely. Charles Jackson (2007) similarly maintains that an increase in companies recruiting doctoral graduates has led to greater competition between organisations and a move to develop more targeted recruitment practices for this specific group and activities to raise awareness of opportunities available in their sectors.

A number of studies cited here highlight that one of the value-added factors in recruiting a PhD graduate is that they bring a certain level of status or prestige to the company. By inference this is the case for higher education, which is promoted on the basis of providing access to the best education, educators and researchers. However, this was particularly noted for private research institutes, R&D functions and SMEs within the areas of science and engineering (e.g. Jagger and Connor, 2001; Jones, 1986; Snape *et al*, 2001). In these cases, the PhD graduate was seen to bring something extra to negotiations with clients in terms of both technical and research communication skills, and they might also bring links with HE which companies can find difficult to develop. Indeed, social anthropology graduates felt that they were generally able to make use of their skills at work and a small number had specifically marketed their anthropological skills in order to work for research institutes and agencies (Spencer *et al*, 2005). Although, for most, it was not their specific anthropological training but the more general skills on which they could draw and which were recognised in the workplace:

The PhD is valued as an individual, self-led, and creative research project, and the ability (or willingness) to recognise it as a set of particular skills comes only with the demands of employment.

(Spencer *et al*, 2005: 8)

For some fields, on the other hand, the doctorate is a fairly new concept and recognition of its impact is slowly beginning to grow among both employers and individuals. For example, given the often practical and performance-based nature of the field, the value of more academic PhD research has been questioned in the arts and cultural professions (Newbury, 1997). In 1991, a survey of first degree graduates' views of studying at postgraduate level found that 18% of graduates felt that studying for a PhD, compared to 28% for a Masters, would enhance their future career (Policy Studies Institute, 1991). The PhD was particularly felt to be an advantage among teachers (81%) and those working in scientific R&D (64%), but those working in arts and entertainment saw no reason for undertaking a PhD. Thus, we can see that, at this time, there was no recognised demand for, or value attached to, the PhD in this field (Policy Studies Institute, 1991). Nevertheless, doctoral programmes in the arts and related to the cultural sector are being developed. As such programmes grow, greater links are being made with practice and alternative means of developing knowledge (Phillips and Pugh, 2005).

In general, we can see that these graduates and employers do value – and see the impact of – the skills and abilities developed through doctoral studies.

Interestingly, the kinds of skills developed through the PhD remained largely the same for the new and old cohorts of PPARC students (DTZ Piedad Consulting, 2003b). However, we might suggest that there could be some changes in the kinds of skills PhD graduates across all disciplines develop in the future given the increased emphasis on transferable skills in the doctorate. Nevertheless, a number of general skills in which more support could have been provided – and in which employer surveys raise issues – are identified across the disciplines, in particular:

- Project and time management
- Leadership
- Communication and people skills

(e.g. DTZ Consulting & Research, 2006; DTZ Piedad Consulting, 2003b; Elias *et al*, 2005; Jackson, Charles, 2007)

### 6.3. *Personal Impact of the Doctorate*

We now turn to briefly examine some of the evidence on the personal impact of doctoral studies. As we have already noted, evidence on wider social and cultural impact of doctoral studies is difficult to find. Some have argued that the increased emphasis from government policy towards employability and the economic outcomes of education has detracted from the importance given to the social and cultural impact of studying at this higher level and the general enrichment of society and creativity (Leonard, 2001; Newman, 2001; NPC, 2005; Wisker, 2005). This is seen to have shifted the emphasis towards marketable, economic-driven skills development and away from the impact that higher education has on society more generally.

PhDs are seen by government as a mixture of training for generic researchers and a form of national ‘R&D’; and professional doctorates have been introduced to ‘upskill’ professionals for managerial level employment. Neither form of doctorate is now seen officially as pre-eminently a means to a more personally rewarding and satisfying life, nor as about making a significant contribution to communal knowledge.

(Leonard, 2001: 30).

Furthermore, it is argued that role of education in reducing disadvantage and inequity is being overlooked (Leonard, 2001).

When we look at the individual impact, postgraduate education is often considered to be more closely linked to current or intended employment opportunities than undergraduate education, but it is equally important in “fulfilling personal as well as public purposes” (Burgess, 1997: 11). Individuals may themselves have many personal and intellectual reasons for undertaking a doctorate, particularly as the number of learners over 30 increases (Leonard *et al*, 2004). When we discussed career choices, we saw that a number of studies highlighted individual motivations for studying. For

example, in the study of Arts & Humanities Research Council-funded PhD graduates, 46% felt that their personal interest in the topic was the most important reason for studying on the PhD (DTZ Consulting & Research, 2006).

When examining the personal value of the doctorate for individuals, it seems that relatively little has been written on this issue in the UK. Indeed, a number of writers have commented on the very personal and private nature of the doctoral process (e.g. Salmon, 1992). Salmon (1992) outlines the experiences of 10 different PhD students, three of whom had completed their PhD at the time of publication. These PhD candidates came from different backgrounds, most had considerable work experience (e.g. clinical psychologist, school teacher, civil servant), some were working full-time whilst studying, some had gained recognition in their field of practice before embarking on the PhD. Again, these cases highlight that a good number of doctoral graduates made their career choices before taking up the PhD or doctorate, although they may go on to take up more senior positions following graduation. Whilst these cases give a useful insight into the individually “transformative” nature of the PhD experience (Salmon, 1992: 10), the majority had not completed their studies and thus did not cover career choices or the graduates’ subsequent impact in wider society. Nevertheless, these 10 cases highlight vividly the deeply personal nature of PhD research but also the social and political impact that such research can have. Most of these students were researching their own area of practice and aimed to bring about some level of change, be it in terms of developing better understanding as practitioners, influencing policy or shaping social and political relations around issues such as racism, sexism, learning difficulties or school education.

Similarly, a chapter written by three PhD students (Dickinson *et al*, 1997) reflects usefully on their lives before and during the PhD, but does not provide reflection on the post-graduation experiences or expectations.

Delamont *et al* (2000) explore students’ experiences of the doctoral process in the sciences, including successes and failures. A strong message within these students’ experiences and hopes, was that the PhD was a means for them to explore a topic or field and to embed themselves within a discipline for a number of years to conduct research that they really ‘loved’ and were passionate about. Nevertheless, whilst this was the strongest motivation, Delmont *et al* equally remind us that a number of respondents also had more vocational or financial motivations:

...they wanted to be university lecturers and career researchers. Many also wanted to avoid a routine job, or to escape back to university from a routine job. A few wanted to be in a particular city, and were offered a PhD place before they had found any other source of income.

(Delamont *et al*, 2000: 49)

Patterson (2001), who considers the ‘overproduction’ of postgraduates, refers for information on doctoral graduates’ future plans to Nerad and Cerny (1999)

who surveyed PhD graduates in the USA studying English. These US graduates valued the fact that they learned a range of skills and new capabilities which gave them a sense of professionalisation, including research, analysis, writing and publishing skills, management, collaboration, teamwork and teaching. Thus, we again see that doctoral graduates learn not only about their topic, but build their academic and/or technical knowledge and wider work and life skills.

Examples from personal comments or interviews with doctoral graduates are often used in 'how to' guides, but there does appear to be a shortage of larger scale research on PhD graduate experience and particularly their ambitions, expectations and plans for the future and whether these were fulfilled. Examples from 'how to' guides highlight aspects such as developing confidence, seeing the PhD as a "stepping stone" to further research or development (Wisker, 2005: 358). The AHRC PhD graduate study examined the value that respondents felt they gained from completing the PhD. This briefly identified similar themes in relation to the personal impact and value of the process. Again, the process was seen as a life-changing experience that opened up new employment opportunities as well as opportunities for thinking in different ways (DTZ Consulting & Research, 2006). As Rugg and Petre note:

The main point is that doing a PhD does change you.

(Rugg and Petre, 2004: 3)

Although we can to some extent gather a picture of work-related impact, there seems to be a gap in the literature when it comes to in-depth studies of the personal, as well as the social and cultural impact of studying at this level and, indeed, of having a higher level qualification. For example, aspects such as 'kudos' and 'status' were highlighted by employers in the previous section – inevitably these will also shape aspects such as individual self-perception, motivation and the overall experience of work. More in-depth studies could help to highlight some of these additional dimensions of the impact of PhD graduates and start to explore some of the different ways in which this might be shaped. At present, it appears that this picture is somewhat limited.

## Conclusions

This synthesis review set out to consider the existing literature on PhD graduates' career choices and their social, cultural and economic impact. The aim being to provide a clearer picture of what we know about the kinds of choices these graduates are making in relation to employment and the impacts they are having more widely.

We have drawn on a wide range of literature and documentation in order to piece together a useful snapshot of the kinds of work PhD graduates do and perceptions of the value of the PhD. Whilst the project was limited in terms of time, extensive searches were conducted in order to trace relevant discussions. This proved challenging, since there are a relatively limited number of studies directly focusing on the issues explored here but a range of literature which touches on relevant areas and can be drawn together to form a larger picture. In reviewing the literature we have highlighted many gaps in the existing knowledge on this area. Whilst there are gaps, this general picture will hopefully prove helpful to those wanting to explore the existing literature and those wanting to identify areas where future research might be targeted. The following summarise some of the key gaps identified in this review:

- Studies with disaggregated data on different types of PhD graduate – even in the national data this is not clearly identified;
- Career planning for PhD graduates and the role of supervisors;
- Full examination of the contextual and background factors shaping career 'choice', opportunity and outcomes, including type of doctorate undertaken;
- Studies comparing PhD graduate expectations and outcomes;
- Longitudinal and in-depth research tracking learners from decision to study for a doctorate, through employment to retirement and research over time which maps activity and decisions as they happen, as well as using retrospective accounts;
- Integrated Research Council studies, using the same indicators and mapping across the disciplines over time in order to facilitate comparison;
- Studies mapping careers and impact of the whole doctoral graduate body beyond Research Council-funded students and disaggregated by type of doctorate;
- In-depth research exploring social, cultural and wider economic and employment-related impact of doctoral graduates;
- Wage premium and rate of return studies which examine differences across sectors and by types of doctorate;
- Research on experiences of transition from studies to employment in both the academic and non-academic sectors and the wider personal impact of having studied at this level.

A key question for stakeholders now will be to ask which of these areas are the priority for future research and review.

For example, the social and cultural impact of PhD graduates appear to be significantly under-researched areas. Given the current emphasis on economic outcomes, this is perhaps not surprising. What might a study of the social and cultural impact of the PhD tell us? Above all, we would argue that PhD graduates make a clear contribution to society and that, at present, much of that contribution is not being captured in the research literature. In relation to impact in the workplace or sector, for example, questions remain among employers as to the relevance of the PhD – particularly the traditional Ph.D. By forming a more in-depth knowledge of the ways in which doctoral graduates contribute in the workplace, a clearer case can be made not only to employers but to government and funding agencies, for example, about the role that these highly-skilled and talented individuals play in knowledge creation, creativity, innovation and so on. The social and cultural impact are perhaps more complex and more difficult to gauge. Nevertheless, there is clearly room for studies of the impact of the PhD graduate in terms of political and social engagement, community development, knowledge and wealth creation, poverty reduction and social mobility and general enrichment of society. Thus, whilst government, HEIs, Research Councils, employers and other stakeholders are keen to ensure that the return on investment in PhDs/doctorates is viable, to appreciate the full impact of doctoral graduates – and doctoral studies – it is important to take into account the far wider-reaching impact that the process of studying at this level and the consequent skills and knowledge have at the individual, community, organisational and national levels.

## References:

- ABPI (2005) *Sustaining the Skills Pipeline in the Pharmaceutical and Biopharmaceutical Industries*, London: Association of the British Pharmaceutical Industry.
- Ackers, L. and Gill, B. (2005) *Attracting and Retaining 'Early Career' Researchers in English HEIs: Is There a Problem?*, CSLPE Working Paper, 2005-2, Leeds: University of Leeds.
- Ackers, L., Gill, B., Groves, K. and Oliver, L. (2006) *Assessing the Impact of the Roberts' Review: Enhanced Stipends and Salaries on Postgraduate and Postdoctoral Positions*, Leeds: Centre for the Study of Law and Policy in Europe.
- Bareham, J., Bourner, T. and Ruggeri Stevens, G. (2000) 'The DBA: what is it for?' *Career Development International*, 5 (7): 394-403.
- Baum, T. (1998) 'Mature doctoral candidates: the case in hospitality education', *Tourism Management*, 19 (5): 463-74.
- Becher, T. and Trowler, P. R. (2001) *Academic Tribes and Territories: Intellectual enquiry and the culture of disciplines, 2nd Edition*, Buckingham: SRHE and Open University Press.
- Becker, L. (2004) *How to Manage your Postgraduate Course*, Basingstoke: Palgrave Macmillan.
- Blaxter, L., Hughes, C. and Tight, M. (1998) *The Academic Career Handbook*, Buckingham: Open University Press.
- Blaxter, L., Hughes, C. and Tight, M. (1998) *The Academic Career Handbook*, Buckingham: Open University Press.
- Boud, D. and Tennant, M. (2006) 'Putting doctoral education to work: challenges to academic practice', *Higher Education Research & Development*, 25 (3): 293 - 306.
- Bryson, C. (2004) 'The consequences for women in the academic profession of the widespread use of fixed term contracts', *Gender, Work and Organization*, 11 (2): 187-206.
- Burgess, R. G. (1997) 'The Changing Context of Postgraduate Education in the United Kingdom', in Burgess, R. G. (Ed.) *Beyond the First Degree: Graduate Education, Lifelong Learning and Careers*, Buckingham: Society for Research into Higher Education and Open University Press, pp. 3-17.

Chou, C.-Y. and Cheng, G.-H. (2004) *How To Win The War For Talent? Case Study In Biotech Related Industries of UK*, accessed online July 2007, Taiwan: Institute of Human Resource Management, National Sun Yat-sen University.

<http://www.kyu.edu.tw/93/epaperv6/93-198.pdf>

Connor, H. and Jagger, N. (2001) *Employers' Views on the Provision of Postgraduate Materials Scientists Final Report for the Engineering Programme of the EPSRC*, Brighton: Institute for Employment Studies.

Connor, H. and Varlaarn, C. (1986) *Employment and Careers of Science Postgraduates*, Swindon: Science and Engineering Research Council.

Cowen, R. (1997) 'Comparative Perspectives on the British PhD', in Graves, N. & Varma, V. (Eds.) *Working for a Doctorate: A Guide for the Humanities and Social Sciences*, London: Routledge, pp. 184-99.

Cryer, P. (2001) *The Research Student's Guide to Success, 2nd Edition*, Buckingham: Open University Press.

Delamont, S., Atkinson, P. and Parry, O. (1997) *Supervising the PhD: A guide to success*, Buckingham: Society for Research into Higher Education and Open University Press.

Delamont, S., Atkinson, P. and Parry, O. (2000) *The Doctoral Experience: Success and Failure in Graduate School*, London: Falmer Press.

DfES (2006) *Further Education: Raising Skills, Improving Life Chances*, Norwich: HMSO, Department for Education and Skills.

Dickinson, H. W., Connell, H. and Savage, J. (1997) 'Student Experiences', in Graves, N. & Varma, V. (Eds.) *Working for a Doctorate: A Guided for the Humanities and Social Sciences*, London: Routledge, pp. 113-30.

DTZ Consulting & Research (2006) *Career Path Study of PhD Students, Final Report*, Swindon: Arts & Humanities Research Council.

DTZ Piedad Consulting (1999) *Career Paths of Physics Post Doctoral Research Staff, A report for the Institute of Physics, Policy Paper 992*, London: Institute of Physics.

DTZ Piedad Consulting (2003a) *A Fifteen Year Longitudinal Career Path Study of PPARC PhD Students*, Reading: DTZ Piedad Consulting.

DTZ Piedad Consulting (2003b) *A Study of the Career Paths of PPARC PhD Students*, Reading: DTZ Piedad Consulting.

Dunn, M. (1998) *Analysis of Career Paths of EPSRC-supported Postgraduate Students, Planning and Communication*, Swindon: Engineering and Physical Sciences Research Council.

Dunn, M. and Hemmings, P. (2000) *Where do EPSRC Students Go? A Study of Career Paths, Planning & Communication Division*, Swindon: Engineering and Physical Sciences Research Council.

Elias, P., McKnight, A., Purcell, K. and Wilson, R. (1997) *A study of the labour market for social science postgraduates*, Coventry: Institute for Employment Research, University of Warwick.

Elias, P., Purcell, K., Durbin, S., Davies, R. and Warren, S. (2005) *The employment of social science PhDs in academic and non-academic jobs: research skills and postgraduate training*, Swindon: Economic and Social Research Council.

EPSRC (1999) *Attraction & Retention of Staff & Students in Research in IT & Computer Science, May 1999*, Swindon: Engineering and Physical Sciences Research Council.

Evidence Ltd (2005) *Researchers in higher education institutions: Scoping study of career development and human resource management, A Report to HEFCE*, Bristol: Higher Education Funding Council for England.

Farrow, T. (2007) 'Professional Doctorates: Is there a risk to going vocational?' *The Independent*, 23rd July 2007: Accessed online July 2007.

Freeman, M. (1995) 'The doctorate: a possible continuing professional development route for library and information service practitioners', *Librarian Career Development*, 3 (1): 26-7.

Funders' Forum (2006) *Researchers: What is the Situation? April 2006* Swindon: Research Councils UK.  
<http://www.rcuk.ac.uk/cmsweb/downloads/rcuk/publications/rwitsar06.pdf>

Green, H. and Powell, S. (2005) *Doctoral Study in Contemporary Higher Education*, Buckingham: Society for Research into Higher Education and Open University Press.

Green, H. and Powell, S. (2007) 'Doctoral education in the UK', in Powell, S. & Green, H. (Eds.) *The Doctorate Worldwide*, Maidenhead: Society for Research into Higher Education and Open University Press pp. 88-102.

Grey, S. (2004) *East Midlands Logistics Sector Regional Profile*, London: Skills for Logistics.

Harris, M. (1996) *Review of Postgraduate Education*, London: HEFCE.

HEFCE (2006) *The higher education workforce in England: A framework for the future*, Bristol: Higher Education Funding Council for England.

Hoddell, S., Street, D. and Wildblood, H. (2002) 'Doctorates – converging or diverging patterns of provision', *Quality Assurance in Education*, 10 (2): 61-70.

Hughes, C. (2002) *Key Concepts in Feminist Theory and Research*, London: Sage Publications.

Huisman, J., de Weert, E. and Bartelse, J. (2002) 'Academic careers from a European perspective: the declining desirability of the faculty position', *Journal of Higher Education*, 73 (1): 141-60.

Jackson, C. (2007) *Recruiting PhDs: What works?*, Cambridge: CRAC Ltd.

Jackson, C. and Butterworth, T. (2007) 'Every-one's business, no-one's responsibility; reporting clinical academic research activity by nurses in the United Kingdom', *Journal of Research in Nursing*, 12 (3): 213-23.

Jagger, N. and Connor, H. (2001) *Employers' Views on the Provision of Postgraduate Engineers, Final Report for the Engineering Programme of the EPSRC*, Brighton: Institute for Employment Studies.

Jolley, J. (2007) 'Choose your doctorate', *Journal of Clinical Nursing*, 16: 225–33.

Jones, A. (1986) *Careers of Post Graduate Scientists and Engineers, Report for SERC*, London: Technical Change Centre.

Kehm, B. M. (2007) 'Quo Vadis Doctoral Education? New European Approaches in the Context of Global Changes', *European Journal of Education*, 42 (3): 307-19.

Langlands, A. (2005a) *Gateways to the Professions Literature Review, June 2005*, London: Department for Education and Skills.

Langlands, A. (2005b) *The Gateways to the Professions Report*, London: Department for Education and Skills.

Lave, J. and Wenger, E. (1991) *Situated Learning: Legitimate Peripheral Participation*, Cambridge: Cambridge University Press.

Leitch, S. (2006) *Prosperity for all in the global economy - world class skills, Final Report*, London: HMSO.

Leonard, D. (2001) *A Woman's Guide to Doctoral Studies*, Buckingham: Open University Press.

Leonard, D., Becker, R. and Coate, K. (2004) 'Continuing professional and career development: the doctoral experience of education alumni at a UK university', *Studies in Continuing Education*, 26 (3): 369 - 85.

Machin, S. and Oswald, A. (1999) *Signs of Disintegration: A Report on UK Economics PhDs and ESRC Studentship Demand, Final Report written for the ESRC*.  
<http://www2.warwick.ac.uk/fac/soc/economics/staff/faculty/oswald/escrep.pdf>

Machin, S. and Oswald, A. (2000) 'UK Economics and the Future Supply of Academic Economists', *The Economic Journal*, 110: 334-49.

Manning, D. and Bentley, H. B. (2003) 'Guest Editorial, The consultant radiographer and a Doctorate degree', *Radiography*, 9: 3-5.

McCarthy, M. and Simm, J. (2006) *Survey of employer attitudes to postgraduate researchers*, Sheffield: University of Sheffield, The Careers Service.

Metcalfe, J., Thompson, Q. and Green, H. (2002) *Improving standards in postgraduate research programmes: a report to the Higher Education Funding Councils of England, Scotland and Wales*.  
[http://www.grad.ac.uk/downloads/rdp\\_report/rdp\\_framework\\_report.pdf](http://www.grad.ac.uk/downloads/rdp_report/rdp_framework_report.pdf)

Mills, D., Jepson, A., Coxon, T., Eaterby-Smith, M., Hawkins, P. and Spencer, J. (2006) *Demographic Review of the Social Sciences*, Swindon: Economic and Social Research Council.

Murray, R. (2002) *How to write a thesis*, Buckingham: Open University Press.

Nerad, M. and Cerny, J. (1999) 'From rumors to facts: career outcomes of English PhDs, results from the PhDs - ten years later study', *Communicator*, XXXII (7): 1-11.

Newbury, D. (1997) *Research and Practice in the PhD: issues for training and supervision*, Accessed online July 2007, Birmingham: The Research Training Initiative, University of Central England.  
<http://www.biad.uce.ac.uk/research/rtrtrc/pdfArchive/da5.PDF>

Newman, J. (2001) 'The shape of graduate studies in English', *Issues in English: Doctor! Doctor! Doctoral Studies in English in Twenty-First Century Britain*, 1: 15-24.

Noble, K. A. (1994) *Changing Doctoral Degrees: An International Perspective*, Buckingham: Society for Research into Higher Education and Open University Press.

Noorderhaven, N., Thurik, R., Wennekers, S. and van Stel, A. (2004) 'The Role of Dissatisfaction and per Capita Income in Explaining Self-Employment across 15 European Countries', *Entrepreneurship Theory and Practice*, 28 (5): 447-66.

NPC (1993) *ABRC Nature of the PhD, Comments by the National Postgraduate Committee (1993)*, Accessed online August 2007.

<http://www.npc.org.uk/page/1100030426>

NPC (1994) *Report by the National Postgraduate Committee to the Office of Science and Technology Consultation Paper: A New Structure for Postgraduate Research Training Supported by the Research Councils (1994)*, Accessed online August 2007.

<http://www.npc.org.uk/postgraduatefactsandissues/oldpolicyresponsesarchive/nationalpostgraduatecommitteeeresponsetothehefceconsultationfurtherdevelopmentofthethodfortheassessmentofthequalityofeducation1994>

NPC (2005) *Policy Response to hefce/cvcp/scop review of postgraduate education*, Accessed online August 2007.

<http://www.npc.org.uk/postgraduatefactsandissues/oldpolicyresponsesarchive/hefcecvcp scopreviewofpostgraduateeducation1995>

OST (1993) *Realising Our Potential*, London: HMSO.

Park, C. (2005) 'New Variant PhD: The changing nature of the doctorate in the UK', *Journal of Higher Education Policy and Management*, 27 (2): 189-207.

Park, C. (2007) *Redefining the Doctorate*, York: Higher Education Academy.

Park, C. (In Print 2007) 'PhD, quo vadis? Envisioning futures for the UK doctorate', in Hinchcliffe, R., Bromley, T. and Hutchinson, S. (Ed.) *Skills training in research degree programmes: politics and practice*, London: Open University Press, pp.

Patterson, A. (2001) 'Overproduction', *Issues in English: Doctor! Doctor! Doctoral Studies in English in Twenty-First Century Britain*, 1: 5-13.

Pearson, R., Seccombe, I., Pike, G., Holly, S. and Connor, H. (1991) *Doctoral Social Scientists and the Labour Market, IMS Report No. 217, Report for the Economic and Social Research Council*, Brighton: Institute of Manpower Studies.

Phillips, E. M. and Pugh, D. S. (2005) *How to get a PhD: A handbook for students and their supervisors*, Maidenhead: Open University Press.

Pole, C. (2000) 'Technicians and scholars in pursuit of the PhD: some reflections on doctoral study', *Research Papers in Education*, 15 (1): 95-111.

Policy Studies Institute (1991) *Postgraduate Study Following A First Degree: A survey of Graduates' Choices, Prepared for the Heads of Research Councils' Working Party on Postgraduate Education*, London: Policy Studies Institute.

Powell, S. and Long, E. (2005) *Professional Doctorate Awards in the UK*, Lichfield: UK Council for Graduate Education.

Purcell, K., Elias, P., Adam, D., Behle, H., Ellison, R. and Wilton, N. (2007) *Applying for Higher Education – Career Choices and Plans, Preliminary Findings from the Wave 1 investigation of the 'class of 2006' applicants for Higher Education who applied through the Universities and Colleges Admissions Service to study on full-time courses, Research undertaken for HECSU and UCAS*, Coventry: Institute for Employment Research, University of Warwick.

[http://www.prospects.ac.uk/downloads/documents/HECSU/Futuretrack2006/June07%20FuturetrackReport\\_KP.pdf](http://www.prospects.ac.uk/downloads/documents/HECSU/Futuretrack2006/June07%20FuturetrackReport_KP.pdf)

Raddon, A. (2002) 'Mothers in the Academy: positioned and positioning within discourses of the 'successful academic' and the 'good mother"', *Studies in Higher Education*, 27 (4): 387-403.

Raddon, A. (2006a) 'Academic Journeys and Gendered Stories: Careers in UK Higher Education', in Research Institute for Higher Education, H. U. (Ed.) *Gender Inequity in Academic Profession and Higher Education Access*, Hiroshima: Research Institute for Higher Education, Hiroshima University, pp. 27-46.

Raddon, A. (2006b) 'Drawing the Boundaries in Academic Work: Individual Views and Experiences of Teaching, Research and Administration'. *Beyond Boundaries: New Horizons for Research into Higher Education*, SRHE Annual Conference. Brighton: Society for Research into Higher Education.

Raddon, A. and Quinn, M. (2007) *In Real Demand? An investigation into the less successful uptake of Foundation Degrees in some sectors in the East Midlands, Conducted for the Higher Education Funding Council for England (HEFCE)*, Bristol: HEFCE.

RCUK (2006) 'RCUK Address: The changing role of knowledge transfer in the Research Councils'. *The changing role of knowledge transfer in the Research Councils*, UNICO conference. Manchester.

Research Council Economic Impact Group (2006) *Increasing the economic impact of Research Councils Advice to the Director General of Science and Innovation, DTI from the Research Council Economic Impact Group, 06/1678*, London: Department of Trade and Industry. <http://www.berr.gov.uk/files/file32802.pdf>

Robbins, L. (1963) *Higher Education*, London: HMSO.

Roberts, G. (2002) *SET for Success: Final Report of Sir Gareth Roberts' Review*, London: HM Treasury.

- RSC (1995) *The Chemistry PhD: The Enhancement of Quality*, London: Royal Society of Chemistry.
- Rudd, E. (1990) 'The Early Careers of Social Science Graduates and the Value of a PhD', *Journal of the Royal Statistical Society, Series A (Statistics in Society)*, 153 (2): 203-32
- Rugg, G. and Petre, M. (2004) *The Unwritten Rules of PhD Research*, Maidenhead: Open University Press.
- Salmon, P. (1992) *Achieving a PhD: ten students' experiences*, Stoke-on-Trent: Trentham Books Limited.
- Santos, M., Willett, P. and Wood, F. E. (1998) 'Research degrees in librarianship and information science: a survey of master's and doctoral students from the Department of Information Studies, University of Sheffield', *Journal of Librarianship and Information Science*, 30 (1): 49-56.
- Schomburg, H. (2007) 'The Professional Success of Higher Education Graduates', *European Journal of Education*, 42 (1): 35-57.
- Scott, D., Brown, A., Lunt, I. and Thorne, L. (2004) *Professional Doctorates: Integrating Professional and Academic Knowledge*, Maidenhead: Society for Research into Higher Education and Open University Press.
- SEMTA (2006) *Labour Market Survey of the Pharmaceutical and Bioscience Sectors*, Watford: Science, Engineering and Manufacturing Technologies Association (SEMTA).
- SERC (1991) *The Engineering Doctorate: An SERC Working Party Report*, Swindon: Science and Engineering Research Council (SERC).
- Simpson, R. (1983) *How the PhD Came to Britain: A century of struggle for postgraduate education*, Guilford: Society for Research into Higher Education, Guildford University.
- Skills for Logistics (2006a) *Right Skills, Right Place, Right Time! The Logistics sector skills agreement: Analysis of Gaps and Weaknesses in Workforce Development Activity (Stage 3), Final Report for Publication, January 2006*, Milton Keynes: Skills for Logistics.
- Skills for Logistics (2006b) *The Logistics Skills Agreement for Scotland*, Milton Keynes: Skills for Logistics.
- Snape, D., Rix, V., White, C. and Lewis, J. (2001) *Postgraduate Career Progression: Qualitative findings Prepared for the Engineering and Physical Sciences Research Council (EPSRC)*, London: National Centre for Social Research Formerly SCPR.

Souter, C. (2005) *EMPRESS: employers' perceptions of recruiting research staff and students, accessed online July 2007*, Leeds: University of Leeds.  
[http://careerweb.leeds.ac.uk/downloads/empress\\_LR\\_000.pdf](http://careerweb.leeds.ac.uk/downloads/empress_LR_000.pdf)

Spencer, J., Jepson, A. and Mills, D. (2005) *Career Paths and Training Needs of Social Anthropology Research Students, ESRC Research Grant RES-000-23-0220, End of Award Report October 2005*, Swindon: Economic and Social Research Council.

UK GRAD (2004) *What do PhDs do?: 2004 analysis of first destinations for PhD graduates*, Cambridge: UK GRAD Programme. [www.grad.ac.uk/wdprd](http://www.grad.ac.uk/wdprd)

UK GRAD (2006a) *A survey into the career motivations and expectations of doctoral researchers*, Cambridge: UK Grad Programme.

UK GRAD (2006b) *What Do PhDs Do? A Regional Analysis of First Destinations for PhD Graduates*, Cambridge: UK GRAD/CRAC Publications.

UKCGE (1996) *Quality and Standards of Postgraduate Research Degrees*, Lichfield: UK Council for Graduate Education.

UKCGE (1998) *The Status of Published Work in Submissions for Doctoral Degrees in European Universities*, Lichfield: UK Council for Graduate Education.

UKCGE (1999) *Preparing Postgraduates to Teach in Higher Education*, Lichfield: UK Council for Graduate Education.

UKCGE (2000) *Research Training For Humanities Postgraduate Students*, Lichfield: UK Council for Graduate Education.

UKCGE (2001) *Research Training in the Creative & Performing Arts & Design*, Lichfield: UK Council for Graduate Education

UKCGE (2002) *Professional Doctorates*, Lichfield: UK Council for Graduate Education. [http://www.ukcge.ac.uk/report\\_downloads.html](http://www.ukcge.ac.uk/report_downloads.html)

UKCGE (2003) *Research Training in the Healthcare Professions*, Lichfield: UK Council for Graduate Education.

Wellington, J., Bathmaker, A.-M., Hunt, C., McCulloch, G. and Sikes, P. (2005) *Succeeding with your Doctorate*, London: Sage Publications Ltd.

Whitfield, G. (2000) *Postgraduate Career Progression: A Survey of Former SERC Funded Postgraduates, Prepared for the Engineering and Physical Sciences Research Council (EPSRC)*, London: National Centre for Social Research, Formerly SCPR.

Wilson, A. (1987) *Research Progress and Submission Rates: the Social Science PhD*, London: ESRC.

Winfield, G. (1987) *The Social Science PhD: the ESRC Enquiry on Submission Rates*, Swindon: ESRC.

Wiseman, J. and Harrington, J. (2007) *Topline Report 2006 Labour Market Survey of the GB Engineering Sectors, BMG Research Report Prepared for SEMTA, April 2007*, Watford: Science, Engineering and Manufacturing Technologies Association (SEMTA).

Wisker, G. (2005) *The Good Supervisor: Supervising Postgraduate and Undergraduate Research for Doctoral Theses and Dissertations*, Basingstoke: Palgrave Macmillan.