

what do



PhDs do?

A regional analysis of first destinations for PhD graduates

This guide has been produced to:

Supplement the UK overview provided in 'What Do PhDs Do? – 2004 analysis of first destinations for PhD graduates'

Highlight regional variations in the gender, mode of study and subject areas of PhD graduates

Examine regional variations in the sectors and types of work employing PhD graduates

Explore migration patterns between the regions

**North East England • North West England
Yorkshire and the Humber • East Midlands
West Midlands • East of England • London
South East England • South West England
Scotland • Wales • Northern Ireland**

Foreword



I am delighted to introduce the latest production of "What Do PhDs Do?" This excellent study provides valuable intelligence which will interest all those involved in helping to develop doctoral researchers. It will also be of great value to those of us supporting the many businesses, universities and research organisations that benefit from employing these intensively trained and highly skilled PhDs.

Leading edge research skills are essential to drive forward UK economic success and international competitiveness. Evidence-based ideas and knowledge stimulate business innovation, realising economic value from the government's investment in basic research and driving global success. The government's response to Sir Gareth Roberts' review, "SET for Success", provides the framework to support the future development of such skills but more needs to be done.

Even the smallest business can "go global" today. To develop and attract high value, knowledge intensive businesses and jobs, we need more people with the skills to carry out not just the basic research, in which the UK is acknowledged to be world-class, but also the development of innovative products, processes and services to high levels of technology-readiness. We need many more people skilled in research and development if we are to deliver the ambitious targets of the UK's 10-year Investment Framework for Science and Innovation and the European Union's Lisbon Agenda. We must create and retain doctoral graduates of the highest quality to compete successfully with the rapidly increasing numbers of PhDs from newly emerging economic powers such as China, India and South Korea.

All regions and devolved administrations recognise the economic importance of an internationally attractive and competitive knowledge base to a thriving 21st century economy. The 9 Regional Development Agencies, each advised by a Science & Industry Council, have put their commitment to innovation at the centre of their Regional Economic Strategies, and have a core role in increasing the number of businesses engaged with the knowledge base. We are encouraging the employment of highly skilled doctoral graduates to drive forward high growth businesses and stimulating greater collaboration across disciplines and sectors on research and development. Several regions have specific programmes targeted at the effective use of these highly skilled people (e.g. Postgrad Talent NW www.postgradtalentnw.co.uk)

We need the best intelligence on what doctoral graduates do and what employers need so that we are to meet all these challenges effectively. This UK GRAD study is a very welcome contribution and will be of considerable use in helping us to understand and influence inter-regional flows in employment, and the mobility of these highly valuable researchers, some of whom will undoubtedly go on to become the UK's top business leaders and managers – the very core of our global competitiveness.

Pam Alexander

Chief Executive, South East England Development Agency: Regional Development Agency Representative on the Funders' Forum

'What Do PhDs Do? – A Regional Analysis'

Published by CRAC Ltd (Careers Research and Advisory Centre) www.crac.org.uk



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To order a copy please contact UK GRAD.
Tel: 01223 448540 or email: orders@grad.ac.uk
Price where sold: £49.95
ISBN-10: 0-9547565-3-3
ISBN-13: 978-0-9547565-3-6

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Introduction

In 2004, 'What Do PhDs Do?'¹ analysed the first destinations of PhD graduates from UK universities for the first time. 'What Do PhDs Do? – A Regional Analysis' takes the same cohort and presents a detailed picture of PhD graduate employment across the regions of the UK; looking at regional differences and migration patterns.

The original edition of 'What Do PhDs Do?' (WDPD?) was produced in response to requests from UK GRAD's key stakeholders – PhD researchers, their supervisors, the bodies which fund and represent them; careers advisers and employers. At a series of launches for WDPD? across the UK, information was also presented on the regional labour markets. The levels of interest in this data and the questions that we were asked about inflows, outflows, reasons for leaving and remaining in regions have added to the motivation to produce this new publication. We hope that the information we present on the sectors and occupations currently employing PhD graduates will be valuable to those interested in exploiting their knowledge and skills.

Since the publication of 'What Do PhDs Do?' we have seen a dramatic growth in research training activity driven by the recommendations of the SET for Success review² and increasing interest in the role that PhD graduates can play in local and national labour markets. Our researchers have a vital role to play in the development of the UK economy³ with its increased focus on knowledge and technology based industries. Much of this economic activity is being delivered through the UK regions⁴, so there is a stronger need than ever for a clear picture of how and where researchers are employed.

'What Do PhDs Do?' gave us the first detailed view of our PhD graduates, providing information on the subjects they studied, gender and how they studied and their employment rates. It showed us how UK-domiciled PhD graduates were employed and described the differences in employment patterns for different subject areas.

'What Do PhDs Do? – A Regional Analysis' (WDPDR) complements and extends this with details of the variation in gender, mode of study and subject groups⁵ within the UK regions, information on the variations between the regions in terms of employment sectors and types of work attracting doctoral graduates, and migration patterns between the regions.

We have mapped the data for WDPDR against the boundaries of the nine Regional Development Agencies for England⁶, see Figure One. Data for Northern Ireland, Scotland and Wales



Figure One: Geographical regions used in WDPDR

UK overview of the regions

Chapter Two gives an overview of the regional distribution of PhD graduates and relative response rates to the DLHE⁸ survey. It identifies the regional profile of UK-domiciled PhD graduates by subject groups, gender and mode of study. For UK-domiciled PhD graduates working in the UK, it examines the balance of employment sectors by their region of study. This chapter also looks at the employment sectors of UK-domiciled PhD graduates leaving the UK for work.

Chapter Three gives an overview of the regional employment patterns; the total number employed by region, retention within the region and incoming migration. It also explores the gender balance and regional employment by sector. It further breaks down the profile of the two sub-sets of UK-domiciled PhDs employed within their region of study and those recruited from other regions. Finally it looks at national migration patterns for different employment sectors.

The regional picture

The main body of this publication consists of an analysis of the twelve regions. For each region we give a brief overview of the higher education institutions awarding PhD degrees and the regional economic strengths. We present the demographic profile of UK-domiciled PhD graduates from the region by gender, type of study and subject grouping. We explore the first destinations, employment sectors and occupations for PhD graduates from the region in comparison to UK averages. We look at migration patterns both out and into the region. Finally we explore the employment sectors and occupations of PhD graduates employed in the region, irrespective of their region of graduation.

¹ What Do PhDs Do? www.grad.ac.uk/wdpd

² Sir Gareth Roberts' review 'SET for Success: the supply of people with science, technology, engineering and mathematics skills' www.hm-treasury.gov.uk/documents/enterprise_and_productivity/research_and_enterprise/ent_res_roberts.cfm

³ 'Prosperity for All', DTI strategy (2003) www.dti.gov.uk/about/strategy-objectives/index.html, and previously in the UK Government's Competitiveness White Papers

⁴ Frameworks for Regional Employment and Skills Action (FRESA) (October 2002)

⁵ These are the physical sciences (including engineering), social sciences, arts and humanities, biosciences and medical sciences

⁶ www.englishrdas.com

⁷ For convenience all areas are reported in one table and the term 'region' is used to denote Northern Ireland, Scotland, Wales and the English regions

⁸ Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

The regional debate

With this regional analysis of PhD graduates' destination data, 'What Do PhDs Do? – A Regional Analysis' aims to stimulate further debate about the employment of our most highly qualified graduates. The information in WDPDR raises a number of strategic questions for a range of stakeholders:

- What are the implications of almost 50% of our PhD graduates moving out of the region they were studying in?
- Does this migration support or hinder regional development agendas?
- Is a mobile postgraduate researcher population important for the UK?
- What role should HEIs be playing in this agenda?

By raising these questions, we hope that this publication will contribute to a strategic debate about how we train and prepare our researchers for their professional careers.

Our postgraduate researchers make a significant contribution to the UK labour market across a wide range of employment sectors and occupations – only by understanding the picture more fully can we both support our researchers effectively, and harness their contribution to the regions, and the UK as a whole.

We hope this publication will strengthen common interests within the UK regions with regard to the development of regional knowledge based economies and help those engaged in these agendas see the potential contributions of our researchers.

Profile of UK PhD graduates by region

This chapter presents an overview of the profile of UK-domiciled PhD graduates by region, with variations by gender balance and mode of study. It explores the popularity of subject areas in each of the regions. It then looks at the employment rates and the principle employment sectors for UK-domiciled PhD graduates working in the UK by their region of study. Finally, it presents the employment sectors for PhD graduates leaving the UK for work.

Key Facts:

There were 7270¹ UK-domiciled PhD graduates from UK institutions in 2003:

- 55%² were male and 45% female, with significant regional variations
- 27% studied part-time, with large regional variations from 15% to 38%
- The most popular subjects were medicine, chemistry, psychology and biology, also with regional variations.

Of the 4695 who responded to the 2004 DLHE³ survey:

- 80.7%⁴ entered employment in the UK, with regional variations from 76.4% to 85.5%
- 3.2% were unemployed, with regional variations from 1.4% to 5.1%
- 8.1% continued their careers outside the UK, with regional variations ranging from 4.7% to 12.2%.

Of the 3765 UK-domiciled PhD graduates who entered employment in the UK:

- 47.8% entered the education sector, with relatively small variations across the regions of the UK
- 16.3% were employed in manufacturing, 15.5% in health, 9.1% in business, finance and IT and 5.7% in public administration. These sectors saw more considerable variations across the regions.

Of the 390 UK-domiciled PhD graduates who left the UK for work or work and study:

- 59.1% were employed in the education sector, predominantly higher education
- 25.7% were employed in manufacturing, and 6.7% in the health sector, with the other employment sectors accounting for the remaining 8.5%.

Who responded to the survey?

The DLHE questionnaire is sent to all PhD graduates whose home domicile is within the EU. Non-EU international researchers are excluded from the survey. For the purpose of this analysis EU researchers domiciled outside of the UK have been excluded. The overall response rate for UK domiciled PhD graduates was 65% and representative in terms of gender, type of study and subject area. Response rates for each region are given in Table One.

Region	Percentage of total PhD graduates	Number of PhD graduates	Number of respondents	% response rate
North East	4.0%	295	180	61.0
North West	8.1%	590	415	70.3
Yorkshire & The Humber	9.6%	695	375	54.0
East Midlands	6.6%	480	290	60.4
West Midlands	8.8%	640	390	60.9
East	9.4%	680	485	71.3
London	10.9%	790	495	62.7
South East	16.8%	1220	730	59.8
South West	6.0%	435	325	74.7
Scotland	10.9%	795	550	69.2
Wales	5.2%	380	255	67.1
Northern Ireland	3.6%	265	205	77.4
UK Total	100.0%	7270	4695	64.6

Table One: Response to the DLHE survey: UK-domiciled PhD graduates only

¹ All figures quoted in WDPDR are rounded to the nearest five for data protection

² The regional male / female proportions are rounded to the nearest percent

³ Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

⁴ 72.7% are classified as 'working in the UK'; 8.0% are 'working and studying in the UK'. The data throughout WDPDR on employment includes both classifications

Overview of PhD graduates from the regions

The higher education institutions in the UK produced 12520 PhD graduates in 2003. Of these, 7270 (58%) were UK-domiciled. Table Two shows a regional breakdown of these PhD graduates and includes their gender balance and the proportion that studied part-time.

Region of origin	Number of PhD graduates	Proportion of UK total (%)	Male/Female ratio (%)	Proportion part-time (%)
North East	295	4.1	58 / 42	38
North West	590	8.1	52 / 48	29
Yorkshire and the Humber	695	9.6	55 / 45	26
East Midlands	480	6.6	62 / 38	36
West Midlands	640	8.8	55 / 45	25
East	680	9.4	62 / 38	15
London	790	10.9	50 / 50	37
South East	1220	16.8	57 / 43	25
South West	435	6.0	55 / 45	31
Scotland	795	10.9	52 / 48	21
Wales	380	5.2	56 / 44	16
Northern Ireland	265	3.6	55 / 45	36
UK Total	7270	100.0	55 / 45	27

Table Two: Breakdown of PhD graduates from institutions in the UK regions in 2003

The South East produced the greatest number of PhD graduates (1220, 16.8% of the total). This region was followed by Scotland (795, 10.9%), London (790, 10.9%), Yorkshire and the Humber (695, 9.6%) and the East of England (680, 9.4%). These five regions account for well over half the total number of PhD graduates and contain a high proportion of research-active institutions including 10 of the 19 members of the Russell Group⁵ of research-driven institutions.

Gender balance

The national male to female ratio for UK-domiciled PhD graduates in 2003 was 55% and 45%. The regional breakdown presented in Table One shows that this ratio varied significantly across the regions. For example, females accounted for just 38% of the UK-domiciled PhD graduates from HEIs in the East of England and the East Midlands. However, in London, they accounted for 50% of the PhD graduates.

These differences in gender balance between regions can be rationalised by considering the discipline variations discussed below (Table Two). For instance, the East Midlands produced the highest proportion of PhD graduates from the physical sciences, which have the lowest percentage of female PhD graduates (25.8%) compared to other disciplines. Conversely, London has the highest proportion of PhD graduates from the medical and biosciences: subject groupings that have the highest percentage of female PhD graduates (57%).

Mode of study

Across the UK, 27% of all UK-domiciled PhD graduates studied for their qualification part-time. However, within the regions there was significant variation. Part-time study was more common in London, the North East, East Midlands and Northern Ireland, accounting for 36% to 38% of PhD graduates from these regions. The East of England and Wales had the lowest proportion of those who studied part-time at 15% and 16%, respectively.

Although it is difficult to fully rationalise these figures, it is likely that some of these variations in mode of study are associated with the profile of the institutions in a region. For example the figures for the East of England are dominated by PhD graduates from the University of Cambridge, which only recently started accepting registrations for part-time PhD study.

Popularity of subject groups by region

The discipline breakdown presented in 'What Do PhDs Do?' gave four subject areas – biomedical and biological sciences (including all clinical and medical subjects), physical sciences (including engineering), social sciences, and arts and humanities. Following feedback from the sector for WDPDR we have further broken down the biomedical and biological sciences into two subject groups, medical sciences and biosciences, to allow a better understanding of the different employment trends of both groups.

A regional analysis of PhD graduates by these five subject groups shows that there are significant variations compared to the UK average. In Table Three the top three regions for each subject group are highlighted. Institutions in London produced the most medical science PhDs (40.7% compared to 26.9% across the UK). Scotland had the highest proportion of PhD graduates from the biosciences (16.3% compared to 12.4%) and the East Midlands produced the greatest proportion of physical scientists and engineers (40.7% compared to 32%). The North West produced the highest proportion of social scientists (15.1% compared 11.1%). Finally, the East was the region with the highest proportion of PhD graduates in the arts and humanities (20.6% compared to 13.7% across the UK).

⁵ The Russell Group consists of 19 research-led institutions, www.russellgroup.ac.uk

⁶ What Do PhDs Do? 2004, p5, Table two: gender breakdown for UK-domiciled PhD graduates across subject groups, www.grad.ac.uk/wdpp

Region of origin	Subject groups (%), top three regions are highlighted					
	Medical sciences	Bio-sciences	Physical sciences	Social sciences	Arts and Humanities	Other
North East	28.8	8.5	37.2	8.5	10.2	6.8
North West	25.2	10.9	33.6	15.1	10.1	5.1
Yorkshire and the Humber	23.6	13.6	32.1	14.3	11.4	5.0
East Midlands	26.0	10.4	40.7	9.4	10.4	3.1
West Midlands	27.3	14.1	28.9	11.7	14.9	3.1
East	21.3	11.0	33.8	10.3	20.6	3.0
London	40.7	7.0	18.5	13.4	14.0	6.4
South East	22.1	13.9	36.5	8.6	16.4	2.5
South West	25.8	12.4	33.7	12.4	10.1	5.6
Scotland	30.0	16.3	30.6	8.1	12.5	2.5
Wales	19.7	14.5	36.9	11.8	14.5	2.6
Northern Ireland	35.9	13.2	24.5	11.3	11.3	3.8
UK Total	26.9	12.4	32.0	11.1	13.7	3.9

Table Three: Subject groups of UK-domiciled PhD graduates from institutions in the UK regions expressed as a percentage of the total from each region

Figure One compares the total numbers of UK-domiciled PhD graduates by region by subject group. Although the South East cannot claim the highest proportion of PhD graduates in any subject grouping, as Figure One illustrates, it produced the largest number of PhD graduates in the biosciences, physical sciences and arts and humanities. London and the South East jointly produced the largest number of social science PhD graduates, closely followed by Yorkshire and the Humber. London produced the highest number of medical science PhD graduates.

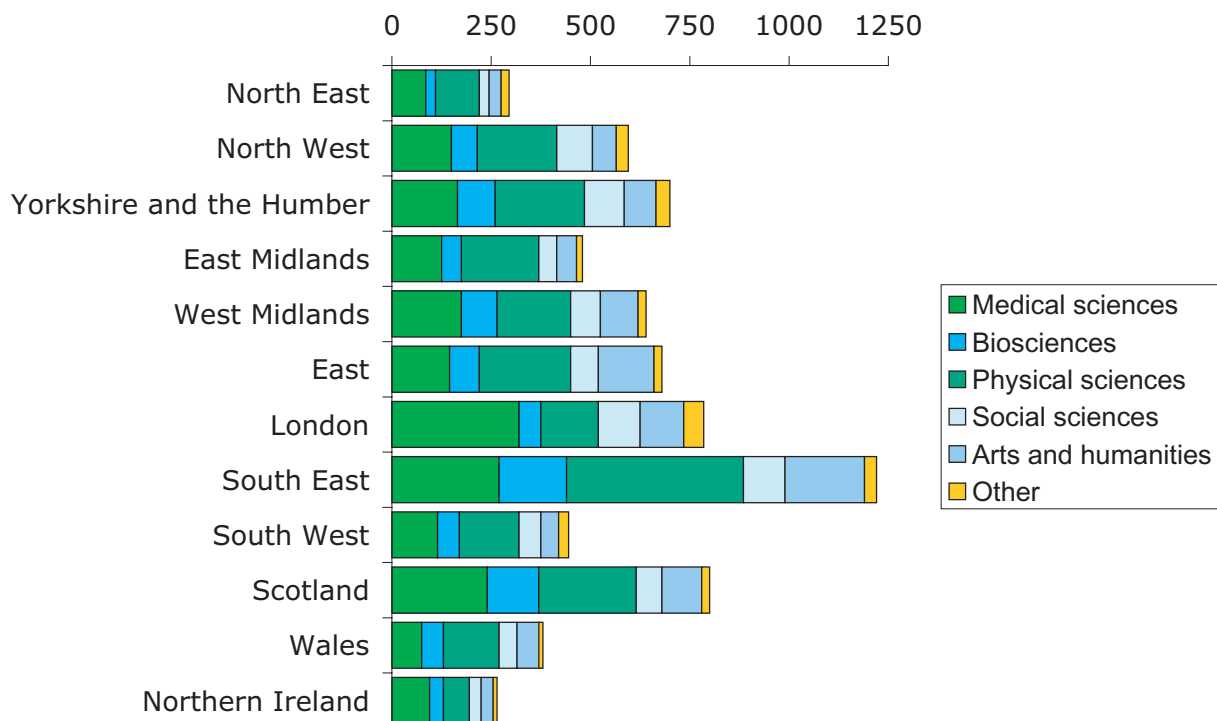


Figure One: Subject groups of UK-domiciled PhD graduates from the UK regions

More information on the popularity of the subjects studied is given in the regional chapters.

Employment rates of PhD graduates from the UK regions

Of the 7270 UK-domiciled PhD graduates in 2003 from UK higher education institutions who were eligible for the HESA survey, 4695 (65%) responded. Overall 80.7% were employed in the UK (72.7% of the respondents had started work and 8% were engaged in work and study). 8.1% of the UK-domiciled PhD graduates had moved abroad for employment and the average unemployment rate amongst all respondents was 3.2%. Table Four and Figure Two provide an overview of the regional variations.

Region of origin	Number of respondents	Employed in the 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

Table Four: Regional analysis of employment rates for PhD graduates who responded to the 2004 DLHE survey, with the top three highlighted in each case

The employment rates⁷ range from 85.5% for graduates from institutions in the North East and Northern Ireland to 76.4% for graduates from HEIs in Scotland. The largest single region, the South East was close to the UK average at 80.5%. In terms of a proportional deviation from the average, these regional variations are not large.

The regional unemployment rates display proportionally larger variations, with the highest unemployment rates being for PhD graduates from Welsh institutions (5.1%), the North West and West Midlands (both 4.1%). The lowest unemployment rates were for PhD graduates from Northern Ireland (1.4%), the South West (2.2%).

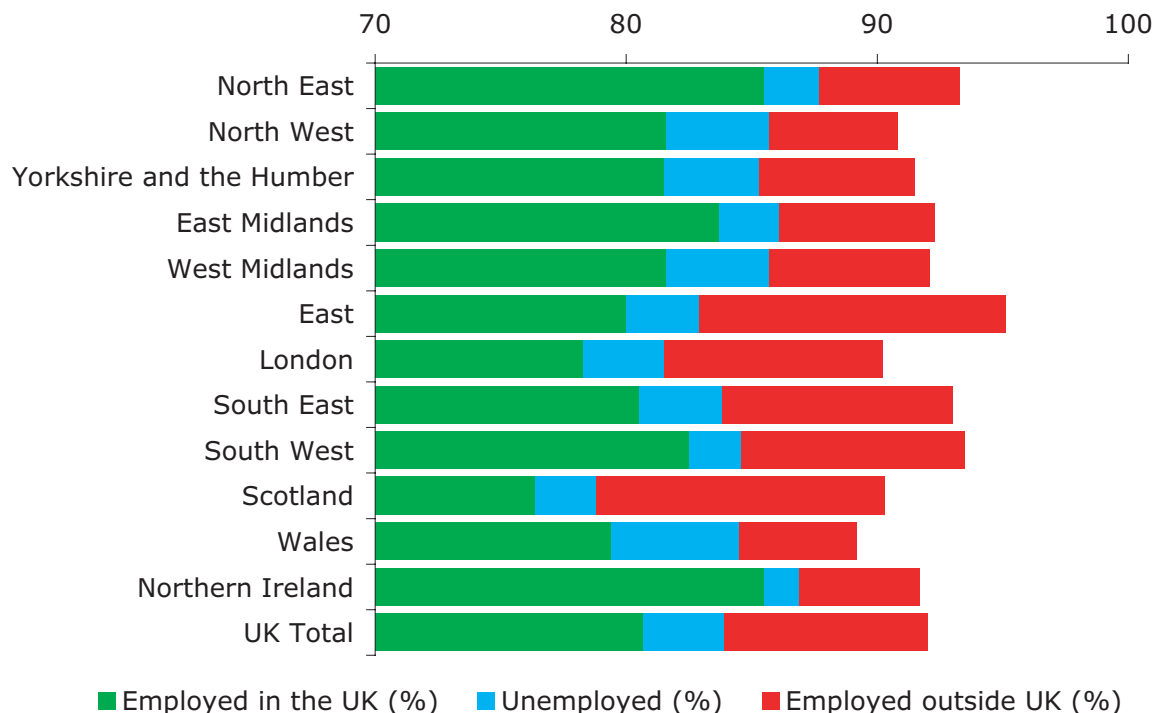


Figure Two: Proportions of UK-domiciled PhD graduates in employment in the UK, unemployed and employed outside the UK

⁷ Throughout WDPDR employment statistics include the classification 'working in the UK' and 'working and studying in the UK'

The proportion of PhD graduates from the regions that continued their careers outside the UK also varied from region to region. PhD graduates from institutions in Wales and Northern Ireland were the least likely to move outside the UK (4.7% and 4.8% respectively). In contrast, 12.2% of PhD graduates from institutions in the East England continued their careers overseas, compared to a UK total of 8.1%.

Employment sectors of regional PhD graduates working across the UK⁸

3765 UK-domiciled PhD graduates from the UK regions were in employment across the UK at the time of the 2004 DLHE survey. There were significant variations between the regions in terms of the employment sectors entered by their PhD graduates, particularly in the relative proportions of the smaller sectors. Table Five and Figure Three provide an overview here. More detail is presented in the regional chapters.

As Table Five shows, the East Midlands produced the highest proportion of PhD graduates who were employed in the manufacturing sector (22% compared to 16.3% across the UK). Although education was the largest employment sector for PhD graduates from institutions in all regions, it was particularly strong for those from Northern Ireland (52.3% compared to the UK average of 47.8%). Northern Ireland also produced the highest proportion of those employed in the health sector (19.9% compared to 15.5% across the UK). The South West produced the highest proportion on those employed in business, finance and IT (11.6% compared to 9.1%), Wales produced the highest proportion of those employed in public administration (10.4% compared to 5.7%) and 'other' sectors (8.9% compared to 5.6% across the UK).

Region of origin ⁹	Employment sector (%), top three regions are highlighted					
	Manufacturing	Education	Health	Business, finance, IT	Public Administration	Other
North East	19.5	44.8	16.2	9.1	5.2	5.2
North West	12.3	49.6	19.2	6.9	5.1	6.9
Yorkshire and Humber	14.8	50.0	13.5	10.5	6.9	4.3
East Midlands	24.1	46.9	10.0	9.1	6.6	3.3
West Midlands	16.9	44.5	19.5	7.5	4.7	6.9
East	22.0	49.7	11.8	10.5	3.1	2.9
London	10.7	50.3	18.7	8.3	4.7	7.3
South East	18.2	44.6	17.0	9.4	5.3	5.5
South West	13.1	48.7	14.6	11.6	5.6	6.4
Scotland	17.5	48.2	12.5	9.4	6.2	6.2
Wales	13.9	44.5	12.4	9.9	10.4	8.9
Northern Ireland	10.2	52.3	19.9	5.1	9.1	3.4
UK Total	16.3	47.8	15.5	9.1	5.7	5.6

Table Five: Percentage of UK-domiciled PhD graduates by employment sector expressed as a total of UK-domiciled PhD graduates from that region in employment across all regions in the UK

Figure Three illustrates the comparative numbers of PhD graduates by region by employment sector employed across the UK. The South East provided the highest number of PhD graduates employed in all sectors, reflecting the dominance of this region in volume of PhD graduates. The East of England and Scotland provided other notable contributions into the manufacturing sector, whilst other large contributions to the health sector came from London, the North West and West Midlands.

⁸ This section refers to UK-domiciled PhD graduates from the regions working in all regions across the UK

⁹ This table refers to UK-domiciled PhD graduates from the regions working in all regions across the UK

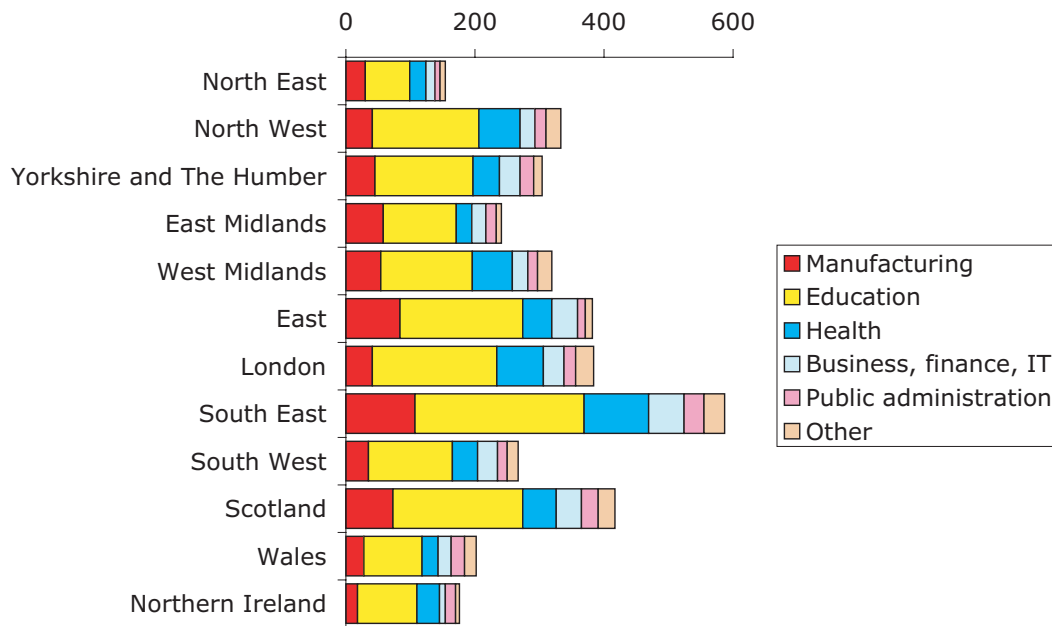


Figure Three. Employment sectors of UK-domiciled PhD graduates from the regions entering into employment across the UK

Employment sectors for PhD graduates leaving the UK

The 390 UK-domiciled PhD graduates who left the UK for work or work and study were employed in a range of sectors as outlined in Figure Four¹⁰, which provides a comparison to the figures for those UK-domiciled PhD graduates employed in the UK.

In particular, the education sector is even more dominant in these PhD graduates leaving the UK, and accounts for 59.1% (compared to 47.8% for UK employed PhD graduates). Around half of these are employed as post-doctoral researchers. The manufacturing sector also accounted for a high proportion of PhD graduates leaving the UK for employment, accounting for over a quarter (25.7% compared to 16.3%). All of the other employment sectors represented less than half their normal proportion of the total. Thus the health sector employed just 6.7% of those PhD graduates continuing their careers overseas, business, finance and IT 3.3%, public administration and assorted other sectors 2.6% each.

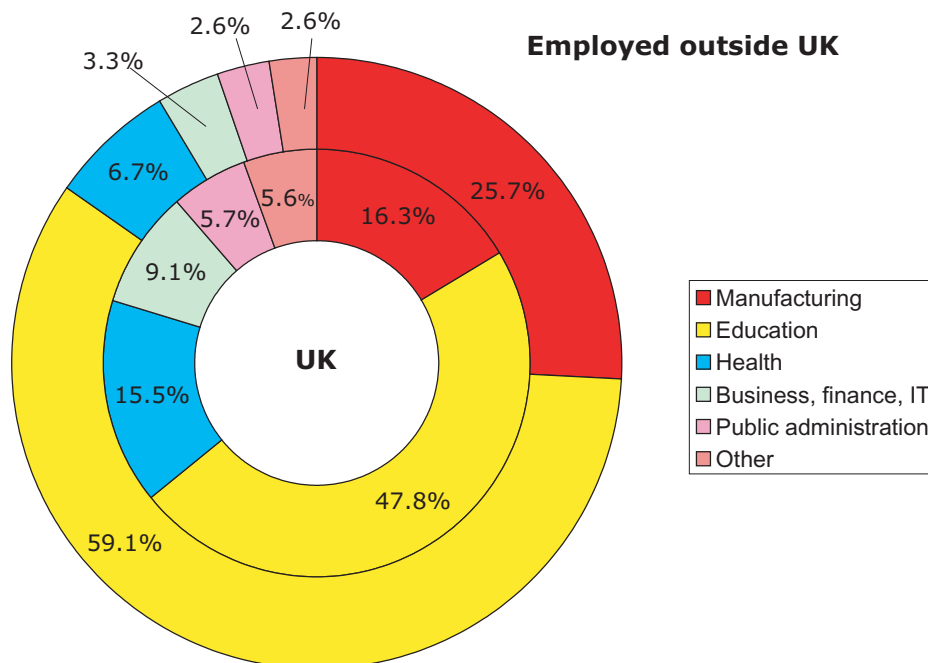


Figure Four: Employment sectors entered by UK-domiciled PhD graduates employed outside the UK (outer ring) compared to UK employed PhD graduates (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

Summary

This overview of the regional characteristics of PhD graduates demonstrates that there are significant variations by region in terms of gender balance, mode of study and subject studied. There were also significant variations in the employment sectors entered by PhD graduates from institutions in the regions. These factors influence the UK migration patterns and type of work undertaken by these PhD graduates, as will be explored in more detail in the next chapter.

¹⁰ Only the national picture is presented here. Data protection prohibits us from a full regional analysis of this data

Overview of regional employment and migration

This chapter gives an overview of the regional employment patterns. It presents a profile of the total number of UK-domiciled PhD graduates employed by region; those retained in the region and incoming migration patterns, the gender balance and the breakdown by employment sectors. It further explores the sub-sets of UK-domiciled PhD graduates employed within their region of study and UK-domiciled PhD graduates recruited from other UK regions. Finally it looks at the national migration patterns for different employment sectors.

Key statistics:

Of the 3765¹ UK-domiciled PhD graduates employed in the UK:

- 2195 (58%) stayed in their regions of study for employment
- 1475 (39%)² moved to other known regions of the UK
- 53.2% were male and 46.8% female.

Of the 2195 PhD graduates who entered employment in their region of study:

- 57.1% entered the education sector, with relatively small variations across the regions of the UK
- 12.2% were employed in manufacturing, 16.6% in the health, 6.7% in business, finance and IT and 3.6% in public administration. These sectors saw more considerable variations across the regions
- 51.5% were male and 48.5% female.

Of the 1475³ PhD graduates who were recruited from other regions of the UK:

- 35.1% entered the education sector, 14.0% were employed in health: lower proportions than for those retained in the regions
- 21.8% were employed in manufacturing, 12.5% in business, finance and IT, 9.0% in public administration: higher proportions than for those retained in the regions
- 55.5% were male and 44.5% female.

The national migration patterns by employment sector highlights that:

- 71% of those PhD graduates employed in the education sector stayed in their regions of study, 29% came from other UK regions
- 65% of PhD graduates employed in the health sector stayed in their region of study, 36% came from other UK regions
- 45% of PhD graduates employed in manufacturing stayed in their region of study, 55% came from other UK regions.

Regional employment of PhD graduates: retention and incoming migration

Of the 4695 PhD graduates who responded to the 2004 DLHE⁴ survey, 3765 (80.7%) were employed in the UK. Table One provides an overview of PhD graduate employment by region, highlighting the proportions employed locally and from other UK regions. London employed the greatest number of PhD graduates (585, 15.5% of the total employed in the UK), closely followed by the South East (545, 14.5%). Other regions that employed large numbers of PhD graduates were the East of England (385, 10.2%), Scotland (370, 9.9%), the North West (325, 8.7%) and South West (310, 8.3%). In total these six regions employed over two-thirds of the total number of UK-domiciled PhD graduates employed in the UK.

¹ Note that all figures quoted in WDPDR are rounded to the nearest 5 for data protection.

² 2.5% of the employed respondents did not specify a specific region of employment within the UK

³ Those PhD graduates who did not specify a region of employment are excluded from this analysis

⁴ Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

Region of employment ⁵	PhDs employed	Proportion of UK total (%)	Number from region (%)	Incoming number (%)
North East	120	3.2	85 (70%)	35 (30%)
North West	325	8.7	190 (58%)	135 (42%)
Yorkshire and the Humber	235	6.2	160 (68%)	75 (32%)
East Midlands	210	5.6	115 (55%)	95 (45%)
West Midlands	240	6.4	155 (64%)	85 (36%)
East	385	10.2	205 (53%)	180 (47%)
London	585	15.5	250 (43%)	335 (57%)
South East	545	14.5	300 (55%)	245 (45%)
South West	310	8.3	160 (51%)	155 (49%)
Scotland	370	9.9	305 (82%)	65 (18%)
Wales	165	4.4	115 (69%)	50 (31%)
Northern Ireland	170	4.5	155 (92%)	15 (8%)
Region not defined	100	2.6	-	-
UK Total	3765 ⁶	100.0	2195 (58%)	1475 (39%)

Table One: Number of UK-domiciled PhD graduates employed in the UK in 2003

In total, 2195 PhD graduates (58% of those employed in the UK) were employed in their region of study, whilst 1475 (39%) were recruited from other regions of the UK. There is significant regional variation contained within these totals, as shown in Table One and Figure One. At one extreme, the PhD graduate workforce in Northern Ireland was derived almost exclusively from local PhD graduates (92%). In contrast, the two largest regions for PhD employment, London and the South East, employed only 43% and 55%, respectively of local PhD graduates.



Figure One: Overview of PhD graduates employed in each of the regions based on their region of origin

⁵ This table refers to the UK-domiciled PhD graduates employed within each of the regions in the UK

⁶ All figures quoted in WDPDR are rounded to the nearest five for data protection

Gender balance

Of the 3765 PhD graduates who were in employment in the UK and who responded to the 2004 DLHE, the male to female ratio was 53.2% to 46.8%. For the 2195 PhD graduates who were employed in their region of study, 51.5% were male and 48.5% female. The 1475 PhD graduates that moved to other regions of the UK, 55.4% male and 44.6% female.

It would appear that in general, male UK-domiciled PhD graduates in employment were slightly more likely to migrate out of their region of study than female PhD graduates. However, this is likely to be related to the migration patterns of specific employment sectors, discussed later in this chapter, rather than inherently less mobility in female PhD graduates.

Employment sectors

Naturally, the national picture for all PhD graduates employed in the UK corresponds to that for all PhD graduates from the regions in employment in the UK, which was outlined in the previous chapter. However, due to the migration of PhD graduates for employment within the UK, in most regions there are significant differences between the employment sector analyses for the PhD graduates from the region versus the PhD graduates employed in the region.

The regional employment sectors for UK-domiciled PhD graduates employed in the regions are compared to the national picture in the later chapters of WDPDR, but an overview is provided here (Table Two and Figure Two).

Region of employment	Employment sector (%), top three regions are highlighted					
	Manufacturing	Education	Health	Business, finance, IT	Public Administration	Other
North East	10.0	58.4	23.3	3.3	3.3	1.7
North West	15.0	52.0	19.6	7.6	3.1	2.7
Yorkshire and Humber	10.7	61.5	13.2	6.4	3.9	4.3
East Midlands	21.2	50.9	14.2	6.6	1.9	5.2
West Midlands	11.6	46.7	20.7	7.8	6.6	6.6
East	29.6	42.1	10.9	7.0	4.7	5.7
London	8.9	38.4	22.4	14.9	8.0	7.4
South East	23.8	46.4	9.4	10.3	5.1	5.0
South West	12.5	49.2	13.5	10.0	8.0	6.8
Scotland	15.6	52.0	12.7	9.2	5.7	4.8
Wales	13.8	53.9	12.0	6.6	7.8	5.9
Northern Ireland	8.9	53.2	20.1	4.7	9.5	3.6
Region not defined	24.3	29.3	14.1	13.1	5.1	14.1
UK Total	16.3	47.8	15.5	9.1	5.7	5.6

Table Two. Employment sectors of UK-domiciled PhD graduates working in the regions expressed as a percentage of the total employed in each region

Education is consistently the largest employer of PhD graduates in all the regions. The percentage employed in the health sector is also fairly consistent across the regions. However, most of the other employment sectors suffer large changes in employment patterns from region to region determined by the local economies. More detail on this is presented in the regional chapters.

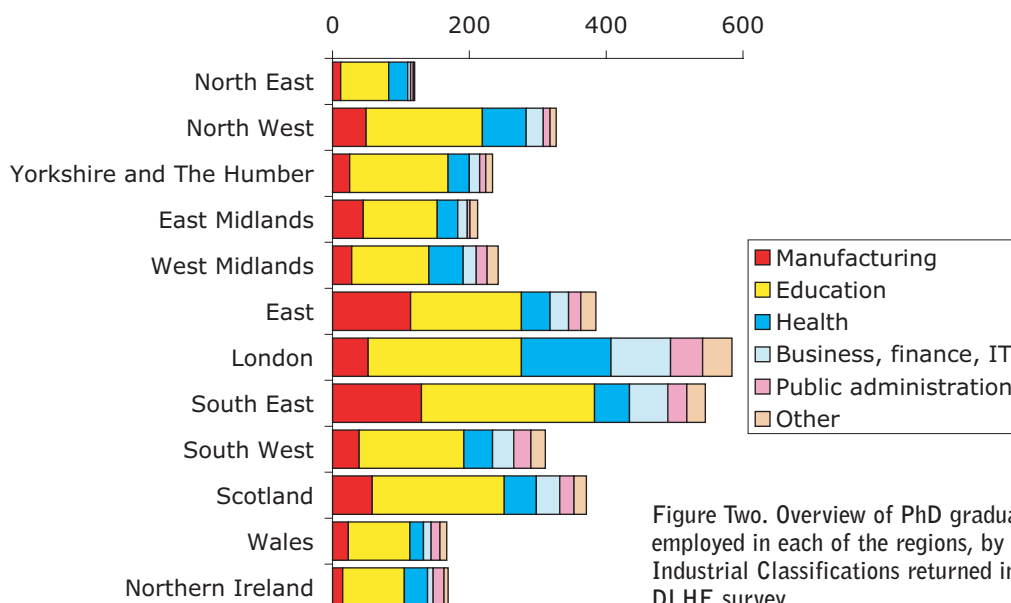


Figure Two. Overview of PhD graduates employed in each of the regions, by Standard Industrial Classifications returned in the 2004 DLHE survey

What do PhD graduates employed in their regions of study do?

Of the 3765 UK-domiciled PhD graduates working or working and studying in the UK at the time of the 2004 DLHE survey, 2195 (or 58% of the total employed) had entered employment in their own region of study. The employment sectors entered by these PhD graduates are compared to the wider UK picture for all PhD graduates in employment in Figure Three.

Of the PhD graduates employed in their regions, 57.1% entered the education sector, compared to a figure of 47.8% for all PhD graduates in employment in the UK. 16.6% of the PhD graduates who stayed in their regions were employed in the health sector, compared to 15.5% for all PhD graduates. In contrast, only 12.2% were employed in manufacturing (compared to 16.3%), 6.7% in business, finance and IT (compared to 9.1%) and 3.6% in public administration (compared to 5.7%).

From this national overview, it would appear that there were clear relationships between employment sector and the migration of PhD graduates. This is discussed in more detail later in this chapter.

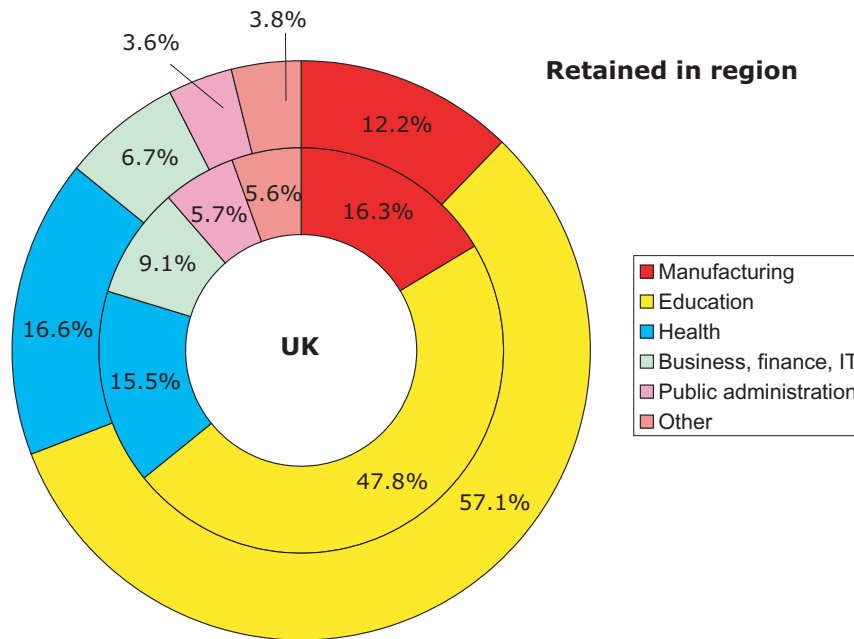


Figure Three. Employment sectors entered by UK-domiciled PhD graduates retained in their regions of study (outer ring) compared to all employed PhD graduates (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

A breakdown of employment sectors by region is given in Figure Four. This shows that the education sector was consistently the dominant employer of PhD graduates retained in their regions of study for employment. However, there were large regional differences in the smaller employment sectors, particularly in the manufacturing sector, governed by regional economies. These are discussed in detail in the regional chapters.

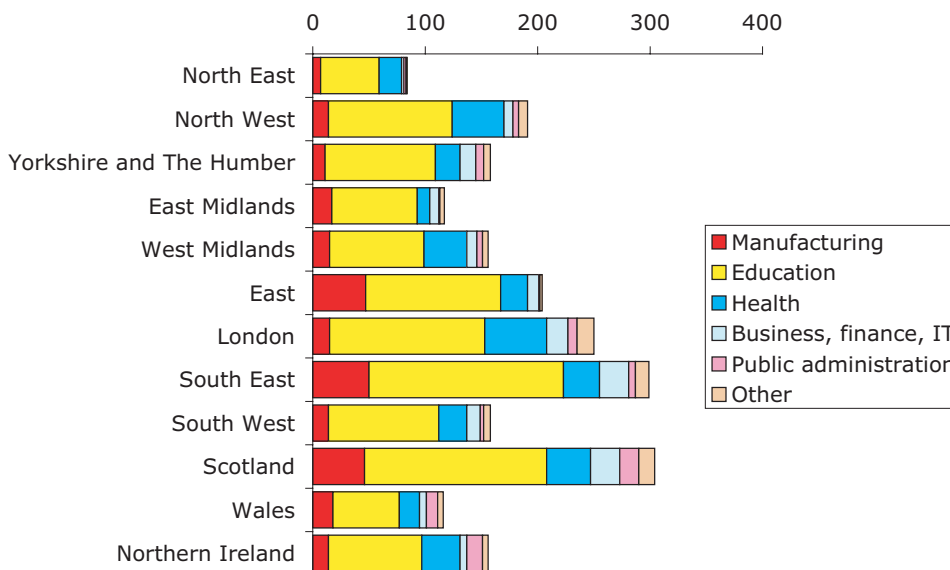


Figure Four. Overview of PhD graduates retained for employment in each of the regions, by Standard Industrial Classifications returned in the 2004 DLHE survey

What do PhD graduates recruited from other UK regions do?

Of the 3765 UK-domiciled PhD graduates employed in the UK at the time of the 2004 DLHE survey, 1475⁷ (or 39% of the total) had moved to a different region for employment. The employment sectors entered by these PhD graduates are compared to the wider UK picture for all PhD graduates in employment in Figure Five.

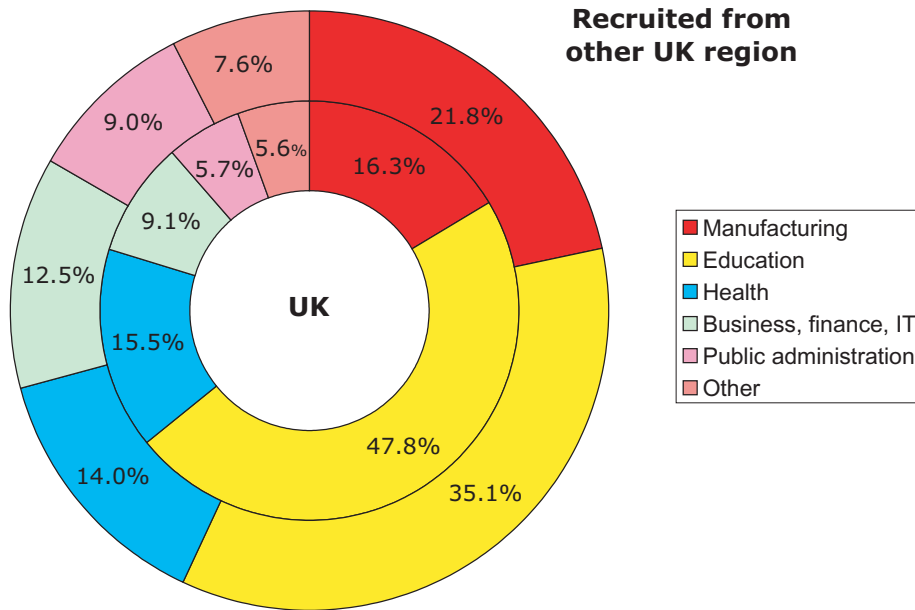


Figure Five. Employment sectors entered by UK-domiciled PhD graduates recruited from other regions of study (outer ring) compared to all employed PhD graduates (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

The percentages of PhD graduates who moved to another region for employment in the different sectors were more evenly balanced than those who stayed in their region. Education was significantly less dominant at 35.1%, compared to 47.8% for all PhD graduates in employment in the UK. All other sectors employed a higher percentage of the mobile PhD population than the national average. The next largest employment sector for those recruited from other regions was manufacturing at 21.8% compared to 16.3% nationally. The health sector employed 14.0% compared to 15.5% nationally. Business, finance and IT employed 12.5% compared to 9.1% nationally and public administration 9.0% compared to 5.7%.

Generally, PhD graduates entering the employment sector were less likely to migrate than those entering the manufacturing or business, finance and IT sectors.

A regional breakdown of the employment sectors for PhD graduates who moved from another region for employment is given in Figure Six. With education being a less dominant employment sector, other employment sectors become more significant (compare Figure Six with Figure Two). However, there are significant regional variations, particularly in the manufacturing sector, governed by the local economies.

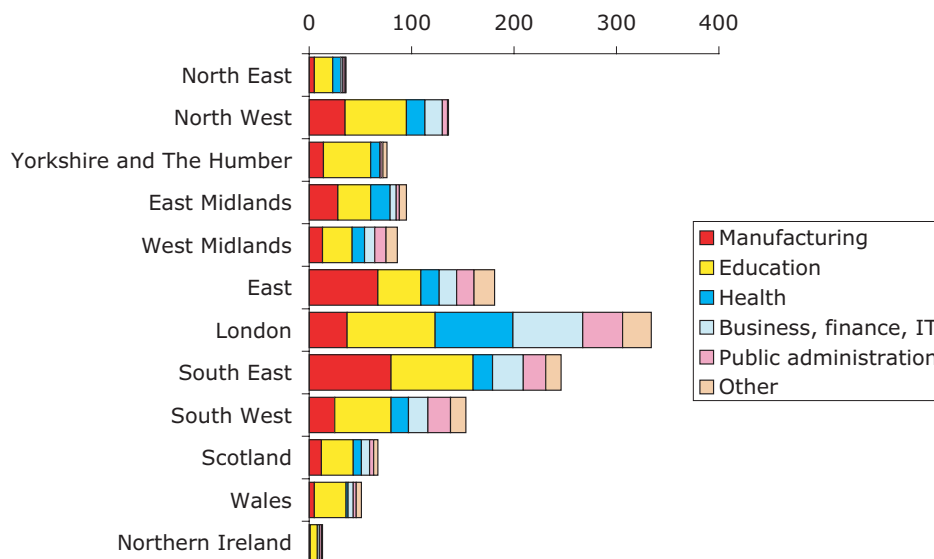


Figure Six. Overview of PhD graduates recruited from other regions for employment in the regions, by Standard Industrial Classifications returned in the 2004 DLHE survey

⁷ This excludes 2.5% of employed UK-domiciled PhD graduates who did not specify a region of employment in the survey

Where do PhD graduates employed in different employment sectors come from?

For the 3665 UK-domiciled PhD graduates employed in specified regions of the UK at the time of the 2004 DLHE survey, it is possible to examine employment and migration patterns by sector, as shown in Table Three.

Employment sector	Total PhDs employed	Employed in the regions ⁸	Retained by regions (%)	From other UK region (%)
Manufacturing	615	590	270 (45%)	320 (55%)
Education	1800	1770	1255 (71%)	515 (29%)
Health	585	570	365 (64%)	205 (36%)
Business, finance and IT	345	330	145 (44%)	185 (56%)
Public administration	215	210	80 (37%)	130 (63%)
Other	210	195	85 (43%)	110 (57%)
UK Total	3765	3665	2195 (60%)	1475 (40%)

Table Three. Number of UK-domiciled PhD graduates employed in the UK in 2003

For the largest employment sector, education, the majority of PhD graduates were employed in their region of study (71%), with only 29% being recruited from other regions in the UK. The health sector also more likely to recruit PhDs from within the region (64%), with only 36% being recruited from other regions in the UK.

The other employment sectors retained a lower proportion of PhD graduates in their region of study. For instance, in the manufacturing sector, 45% of the PhD graduate employees were derived from their regions of study, while 55% were recruited from other regions. Similarly, in business, finance and IT (44%) and 'other' (43%) sectors recruited less than half of their PhD graduate employees from their regions of study. The public sector employed the lowest proportion of PhD graduates within their region of study at 37%, with 63% being recruited from other regions of the UK. Figure Seven presents the migration analysis by employment sector.

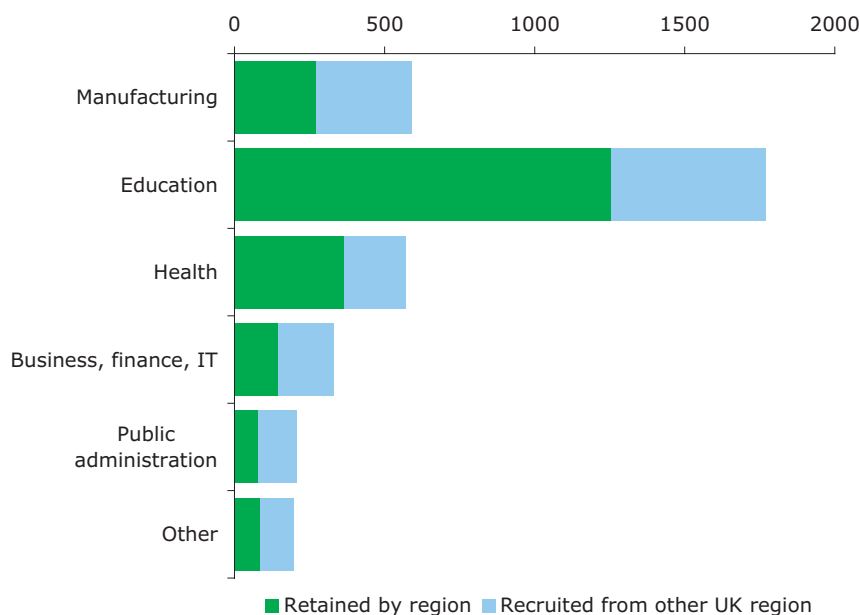


Figure Seven. Overview of PhD graduates employed in each employment sector, based on their region of origin

Summary

Out of the 3765 PhD graduates who were employed in the UK at the time of the DLHE survey, 2195 were retained by their regions of study for employment whilst 1475 moved to other regions of the UK for employment. For those that stayed in their region of study, education was by far the largest employment sector, followed by health and manufacturing. For those that migrated to another UK region for employment, education was much less dominant, although still the largest single employment sector, followed by manufacturing and health. The changing gender balance in these groups of PhD graduates to a certain extent can be rationalised by these employment sectors.

⁸ This analysis excludes the 100 UK-domiciled PhD graduates who did not specify a region of employment in the survey

North East England

The North East produced 4% of UK-domiciled PhD graduates and employed 3% of the UK PhD workforce in the DLHE survey. PhD graduates from North East universities were less likely to be unemployed and less likely to move overseas at the start of their careers. Slightly more than half of them (51%) remained in the North East for work.

Key statistics:

The 295¹ UK-domiciled PhD graduates from institutions in the North East made up 4% of the UK total:

- 58% were male and 42% female, compared to the UK average of 55% and 45%
- 38% studied part-time, higher than the UK average 27%
- The most popular subjects were medicine, chemistry, biology and psychology.

Of the 180 (61%) who responded to the 2004 DLHE² survey:

- 85.5% entered employment in the UK³
- 2.2% were unemployed, lower than the UK average of 3.2%
- 5.6% continued their careers overseas compared to 8.1% across the UK.

Of the 155 PhD graduates from North East institutions who entered employment in the UK:

- 44.8% entered the education sector, predominantly in higher education
- 19.5% were employed in manufacturing and 16.2% in the health sector
- 55% remained in the North East and 45% moved to other regions in the UK.

The North East employed 120 (2.9%) of the UK-domiciled PhD graduate workforce:

- 70% gained their PhD at North East institutions
- 30% moved to the North East from other regions of the UK
- 58% were employed in the education sector: 50% of these as postdoctoral researchers; 38% in university teaching roles, primarily as lecturers
- 29% of all PhD graduates working in the North East were employed as postdoctoral researchers.

The North East was a net exporter (-27%) of UK-domiciled PhD graduates:

- PhD graduates who left the North East for work were most likely to move to the North West, Scotland and the South East
- The North East attracted only 2% of the UK-domiciled PhD graduates who left their region of study for known UK locations
- PhD graduates moving to the region were most likely to come from Yorkshire, Scotland, the North West and East Midlands and to work in the education (50%) or health (22%) sector.

Overview of North East higher education institutions⁴

There are five universities in the North East, ranging in size from 25,000 students studying at all levels at the University of Northumbria at Newcastle (around 71% full-time) to around 12,000 students at the University of Sunderland. Although there are no higher education colleges in the region, there are 18 further education colleges providing additional higher education courses. Most of the higher education provision is based in the Tyne and Wear area.

Figures from HEFCE for 2003/2004 state that 4.0% of the total student count of 95,968 were enrolled on postgraduate research degree programmes. The only two institutions with a significant number of PhD researchers are the University of Newcastle upon Tyne and the University of Durham.

Higher education institution	Final year PhD numbers
University of Newcastle upon Tyne	280
University of Durham	235
University of Northumbria at Newcastle	15
University of Teesside	10
Total	540

Table One: Final year PhD researchers by HEI in the North East⁵

The research strengths of universities in the North East are reflected in Figure One, derived from the results of the 2001 Research Assessment Exercise (RAE)⁶. Further analysis of the RAE results shows that 62% of submissions from the region's institutions were rated at 4 or above, with more than a third (37%) scoring the highest ratings of 5 and 5*. These top rated departments are across the subject spectrum indicating the broad range of expertise available in the region's institutions. Only the University of Newcastle upon Tyne and the University of Durham derive a significant proportion of their income from research grants.

¹ All figures are rounded to the nearest five for data protection

² Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

³ 74.4% are classified as 'working in the UK'; 11.1% are 'working and studying in the UK'. The data on employment throughout WDPDR includes both classifications

⁴ HEFCE 2004 Regional Profiles: North East

⁵ These figures were derived from the HESA student record data for those who were scheduled to complete their enrolment period in 2002/03. They include international PhD researchers who were not included in the DLHE survey www.hesa.ac.uk/pi/0203/research.htm

⁶ Data set available at www.hero.ac.uk/rae/Results

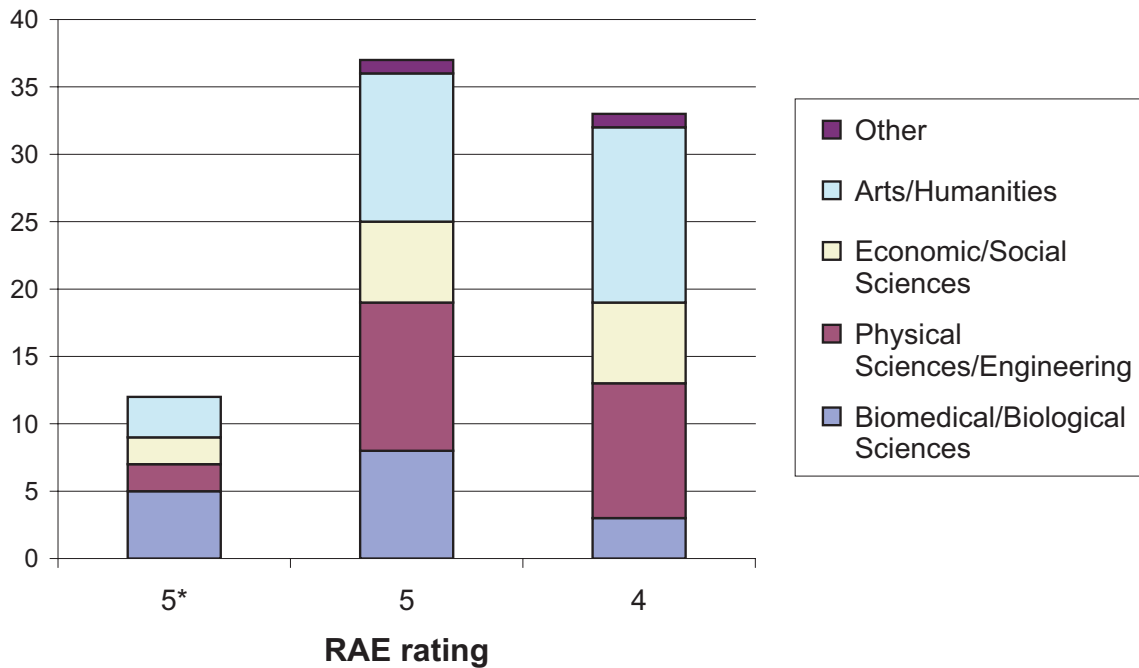


Figure One: Research subjects of top graded RAE submissions in the North East

Economic strengths

The North East has a traditional strength in the manufacturing industries that is still evident. Figures from HEFCE⁷ for 2003/2004 report that these industries contribute a higher than average proportion to the regional economy (around 24% compared to the UK average of 19%). Although the region continues to attract inward investment, the North East has higher than average unemployment and only 25% of the labour force is educated to NVQ level four or equivalent, compared to the 29.5% English average.

When compared to other UK regions, levels of Research and Development (R&D) expenditure are low. The Business Enterprise R&D Survey, conducted by the Office of National Statistics⁸, reported that in 2002, the Gross Domestic Expenditure on R&D, as a percentage of Total Gross Value Added, was only 0.9% for the North East, compared to 2.0% for the UK as a whole.

To address this, the region is actively promoting and developing research and innovation, which is seen as the basis of future economic strength. Science-based economic development is at the heart of an on-going regeneration strategy, with Newcastle named as one of the UK government's six 'Science Cities'. By 2010 up to 100 new technology-based companies could be set up or attracted to the region creating up to 5000 new jobs. The region's 'Strategy for Success'⁹ aims to make the North

East a leader in emerging technologies and has already achieved significant increases in research and development expenditure by business and the highest level of technology start-ups for any region.

Profile of PhD graduates from the North East

Of the 7270 UK-domiciled PhDs who graduated in the UK in 2003, 4.0% (295) graduated from North East Higher Education Institutions. Of the UK-domiciled PhD graduates, 42% were female and 58% male – a slight bias towards male researchers when compared with the UK average of 45% and 55%. Part time study was more common in the North East than in other regions, accounting for 38% of degrees awarded, compared to the UK average of 27%.

Figure Two shows the breakdown of PhD graduates by subject groups. More PhD graduates from universities in the North East came from the physical sciences than the UK as a whole (37% compared to 32%), but fewer from the biomedical and biological sciences (8.5% compared to 12%); the arts and humanities (10.2% compared to 14%) and the economic and social sciences (8.5% compared to 11.1%). A slightly larger proportion graduated from the medical sciences (28.8% compared to 27% in the UK). The 6.8% from education and related subjects and combinations of other subjects was also higher than the UK average of 3.9%.

⁷ Regional profiles of higher education, HEFCE www.hefce.ac.uk/regions/

⁸ www.statistics.gov.uk/; also useful is 'Regional Competitiveness and State of the Regions' by Mukund Lad, available from www.dtistats.net/sd/rci/

⁹ www.strategyforsuccess.info

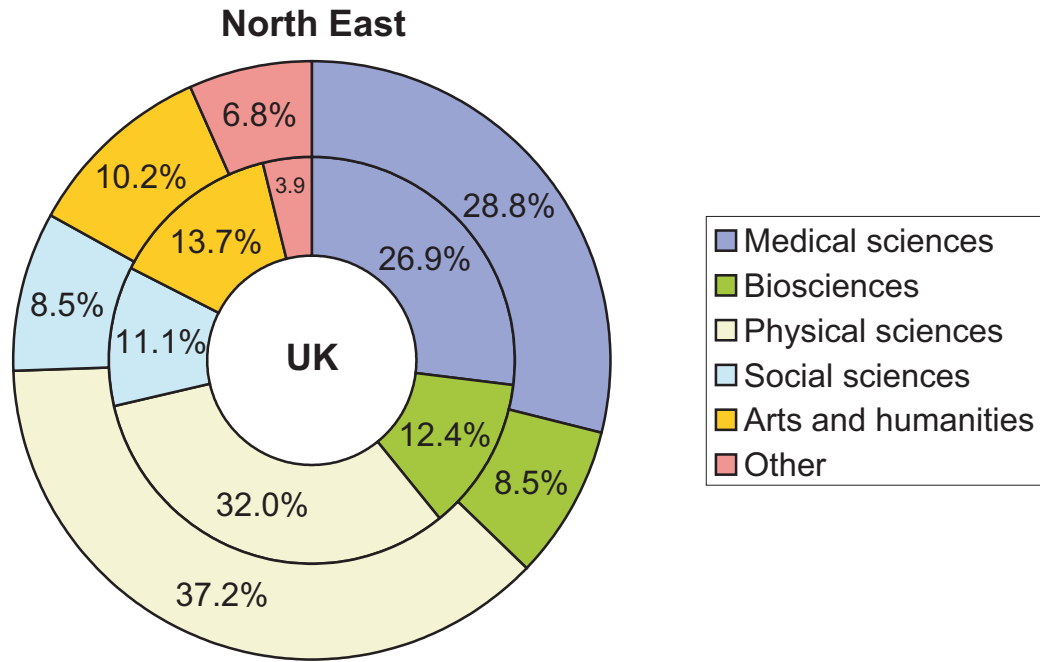


Figure Two: Subject groups of UK-domiciled PhD graduates from North East HEIs (outer ring) compared to all UK HEIs (inner ring) in 2003

The list of the 'top ten' subjects for PhD graduates from the North East HEIs (Table Two) is dominated by the same two subjects found at the top of the UK table: clinical medicine and chemistry. Although there are many consistent subjects in the North East table compared to the UK, the relative proportions are smaller. There are also a few notable differences – agriculture and geology jointly occupy 8th position in the North East, but only 32nd and 29th, respectively, in the national table. Mathematics also appears high in the top ten, compared to 13th place in the UK as a whole.

Subject and ranking	North East	Total (and position) in UK
1. Clinical medicine	8.1%	8.2% (1)
2. Chemistry	7.8%	7.7% (2)
3. Biology	4.4%	5.2% (4)
4. Psychology	3.1%	7.6% (3)
5. Mathematics	3.1%	2.1% (13)
6. Academic studies in education	2.7%	3.1% (6)
7. English studies	2.4%	2.5% (8)
8. Agriculture	2.0%	0.6% (32)
9. History by period	2.0%	2.5% (9)
10. Physics	2.0%	4.4% (5)
11. Geology	2.0%	0.9% (29)

Table Two: Top subjects studied by PhD graduates in North East HEIs compared to the UK figures

What do PhD graduates from the North East do?¹⁰

Of the 295 UK-domiciled PhD graduates in 2003 from Higher Education Institutions in the North East who were eligible for the 2004 survey, 180 responded (61% response rate).

Over 74% of UK-domiciled PhD graduates from North East institutions had entered the workplace when the survey was conducted, consistent with the overall UK figure of 72.7%. A further 11.1% were engaged in work and study simultaneously – higher than the UK average of 8%. Fewer PhD graduates had moved overseas (5.6%) than for the UK as a whole (8%). Unemployment rates for UK-domiciled PhD graduates from North East institutions were lower than the UK average (3.2%) at just 2.2%.

¹⁰ The data in this section refers to PhD graduates from North East HEIs who were working in all regions of the UK

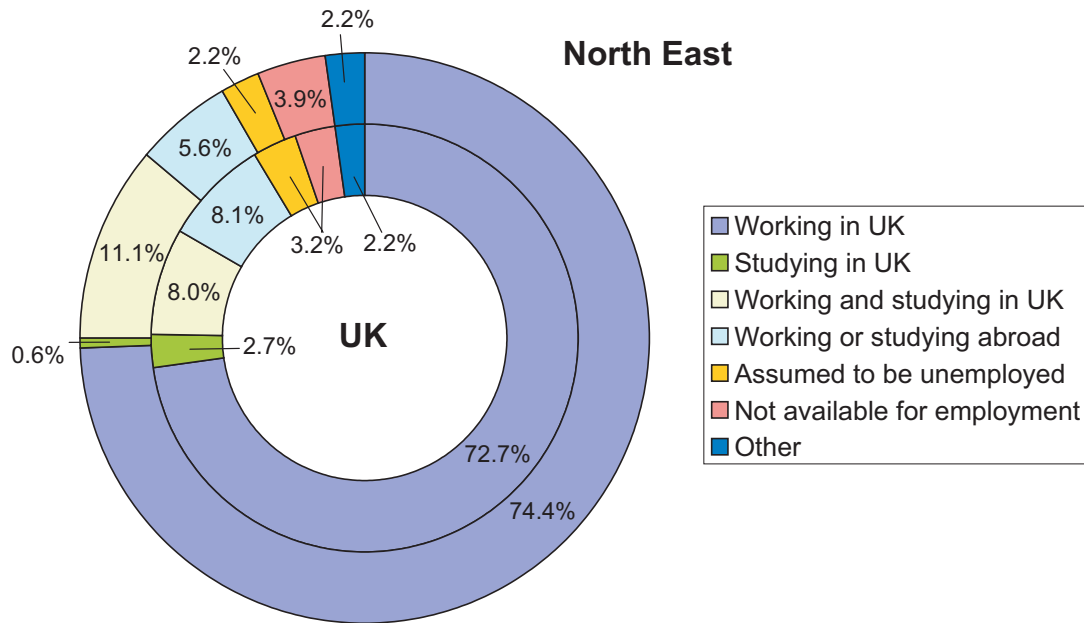


Figure Three: First destinations of UK-domiciled PhD graduates for all subjects from HEIs in the North East (outer ring) compared to all UK HEIs (inner ring) from 2004 DLHE survey responses

Employment sectors

The 85.5% of PhD graduates from North East HEIs working or working and studying in the UK were employed in a range of sectors across the UK. Consistent with the UK average (47.8%), the education sector employed 44.8% of PhD graduates from HEIs in the region, predominantly in higher education.

The balance (55%) were employed in a range of occupations across all sectors, as shown in Figure Four where small differences with the UK picture emerge.

Manufacturing industries employed 19.5% of PhD graduates from the North East, noticeably more than the 16.3% employed across the UK as a whole. 87% of these were employed in the chemical and pharmaceutical industries, i.e. 17% of all North East doctoral graduates (compared to a national figure of 11%).

The other employment sectors of health, business, finance, IT and public administration employed very similar proportions of PhD graduates from North East universities as they did of all UK PhD graduates.

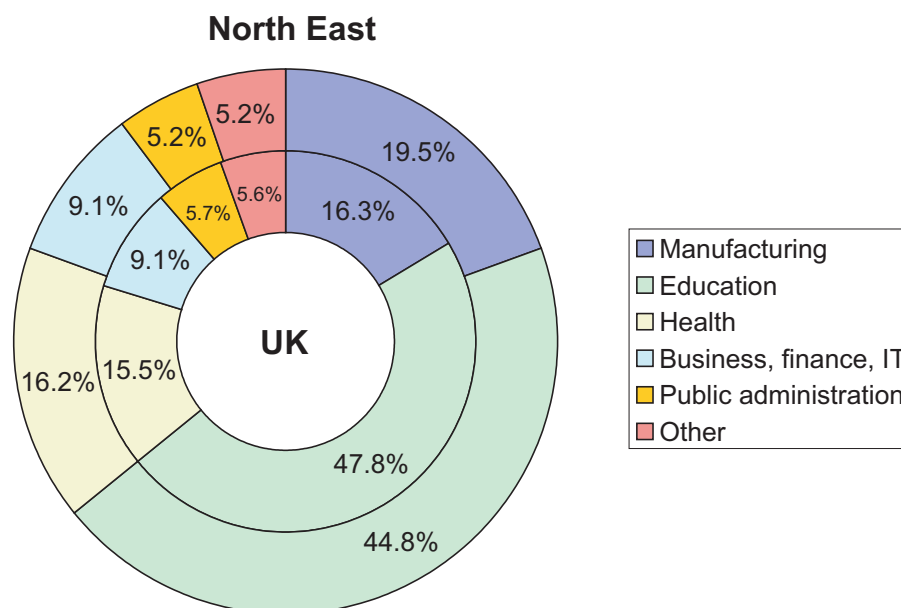


Figure Four: Employment sectors entered by UK-domiciled PhD graduates from North East HEIs (outer ring) compared to all UK HEIs (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

Career occupations

We examined the specific occupations entered by PhD graduates from North East universities. A similar picture to the UK average emerges with anticipated variations caused by different types of employers and supply of PhD subjects. The most significant difference is in the 'other professionals' category, which includes postdoctoral researchers and psychologists. This reflects the dominance of the education sector as an employer of the region's PhD graduates and 40.9% of the region's PhD graduates worked in these occupations - a substantially higher proportion than the 30% nationally.

Differences also appear in the engineering professions where a smaller number were employed (1.9% of the North East PhD graduates, compared to 5.3% nationally), marketing, sales and media related occupations (1.3% North East c.f. 3.2% UK) and in scientific research and development (14.3% North East c.f. 18.1% UK).

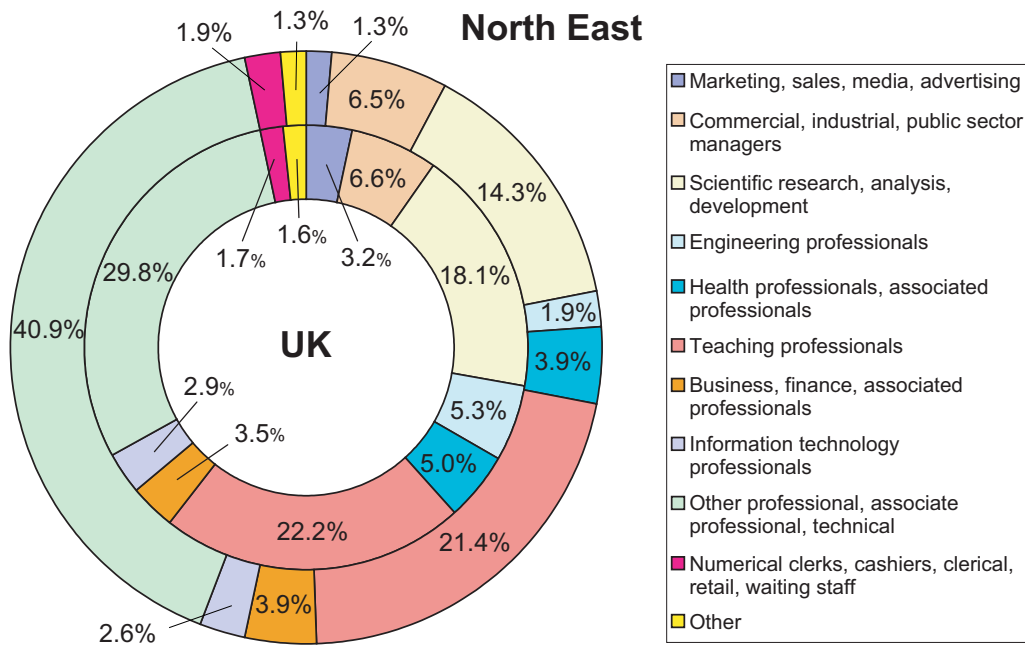


Figure Five: Types of work entered by UK-domiciled PhD graduates from HEIs in the North East (outer ring) compared to all UK HEIs (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

Migration

We examined the migration patterns of UK-domiciled PhD graduates from North East HEIs who were in employment at the time of the survey.

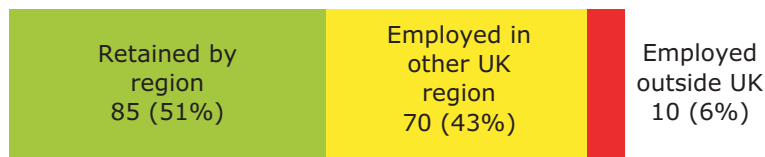
In common with most regions, the North East saw a net loss of PhD graduates with 27% fewer PhD graduates starting work in the region than the total number of PhD graduates from the region¹¹. 70 PhD graduates (43% of total employed) left the North East for employment in other regions in the UK. This proportion is slightly higher than the average figure for all UK regions of 38%. PhD graduates from the North East move across the UK with the South East most popular, attracting 8%. Other popular regions were the North West and Scotland¹².

Another 10 PhD graduates (6% of total employed) left the North East for work or work and study abroad (compared to the national proportion of 9%).

¹¹ The net migration figures should be treated with care. 2.5% of the total DLHE respondents did not identify a specific region of employment. If these respondents are skewed to one region this will impact significantly on the net migration figures

¹² Data protection prohibits a full analysis of region to region migration

(a) PhDs graduating from the North East



(b) PhDs employed in the North East

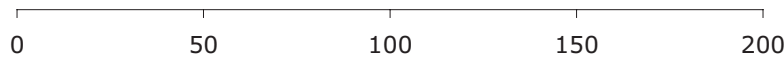
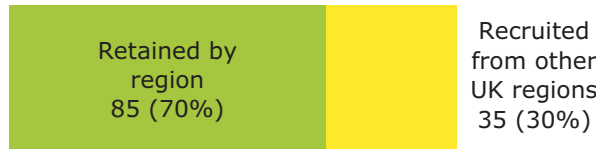


Figure Six: Mobility of North East PhD graduates in employment (a) and origin (region of study) of PhD graduates working in the North East (b)

What do PhD graduates employed in the North East do?¹³

85 UK-domiciled PhD graduates from North East HEIs were working in the region at the time of the survey, representing 70% of the total PhDs working in the region. These were joined by 35 UK-domiciled PhD graduates from other regions in the UK, who gained employment in the North East. Within this cohort, small numbers came from each of the other UK regions, but Yorkshire and the Humber provided the most substantial number (6% of those employed in the North East). Scotland, the North West and the East Midlands each provided a further 4% of the total employed in the region. In total, only 2% of UK-domiciled PhD graduates who left their regions of study for known UK locations moved to the North East. Amongst the regions, only Northern Ireland attracted smaller numbers of PhD graduates.

Employment sectors

The employment sectors for PhD graduates employed in North East are compared with the national picture in Figure Seven. The most obvious difference is that the education sector is even more dominant in the North East and employed 58.4% of PhD graduates in the region (compared to 47.8% across the UK), predominantly in higher education. The health sector also employed more PhD graduates (23.3% compared to 15.5% across the UK). The balance (18.3%) was employed in manufacturing (10%), business finance and IT (3.3%), administration (3.3%) and others. All of these sectors employed significantly less PhD graduates in the region when compared to the national picture.

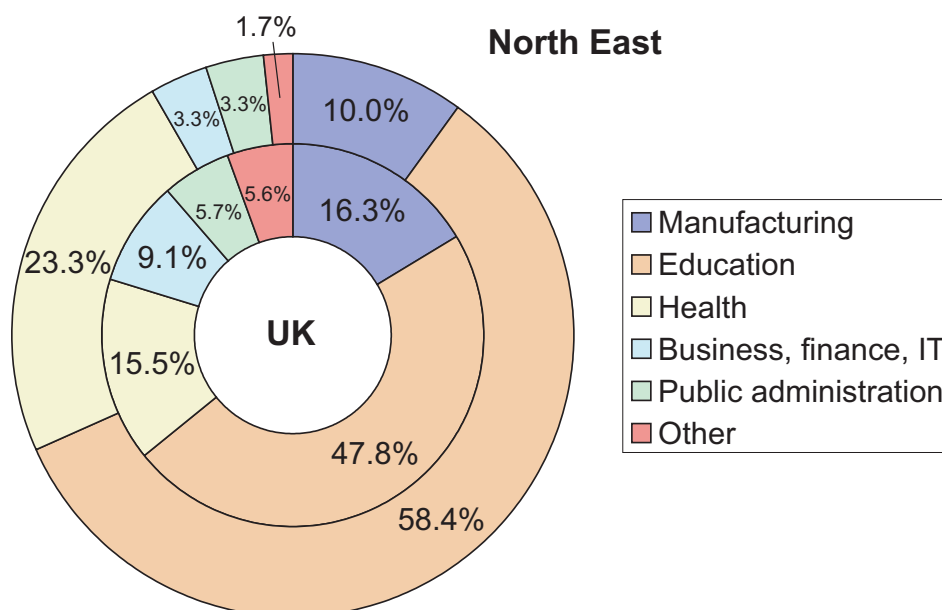


Figure Seven: Employment sectors entered by UK-domiciled PhD graduates employed in the North East (outer ring) compared to all UK regions (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

¹³ The data in this section refers to PhD graduates from all regions of the UK who were working in the North East

A comparison of Figure Seven and Figure Four indicates that the North East was a net exporter of those entering the manufacturing sector, but a net importer of those entering the education and health sectors.

For the 35 PhD graduates who moved to the North East for employment, the biggest employment sector was education (50%), predominantly in the universities. Of these, 50% were employed as lecturers and 44% as postdoctoral researchers¹⁴. The other significant employment sectors were the health sector, that employed 22% of the incoming PhD graduates, and the manufacturing sector that employed 14%.

Career occupations

We examined the specific occupations entered by PhD graduates employed in the North East. The picture is quite different to the UK as a whole, as outlined in Figure Eight.

The largest difference between the regional and national types of work occurs in the 'other professionals' category, which includes some postdoctoral researchers and reflects the dominance of the higher education sector as an employer of PhD graduates in the region. Half of those who gained employment in the education sector (50%) are identifiable as postdoctoral researchers. Of the remainder, 39% were in teaching positions, predominantly as lecturers in higher education. Others were employed in a range of positions encompassing educational advice and policy, administrative and other supporting roles. 7% of those employed in education were employed as secondary school teachers.

Overall, 29% of all the PhD graduates working in the North East are identifiable as postdoctoral researchers, higher than the UK average of 22%.

Compared to the national averages, the North East employed a higher proportion of PhD graduates as both teaching and health professionals, but fewer in scientific research, engineering, IT and business and finance.

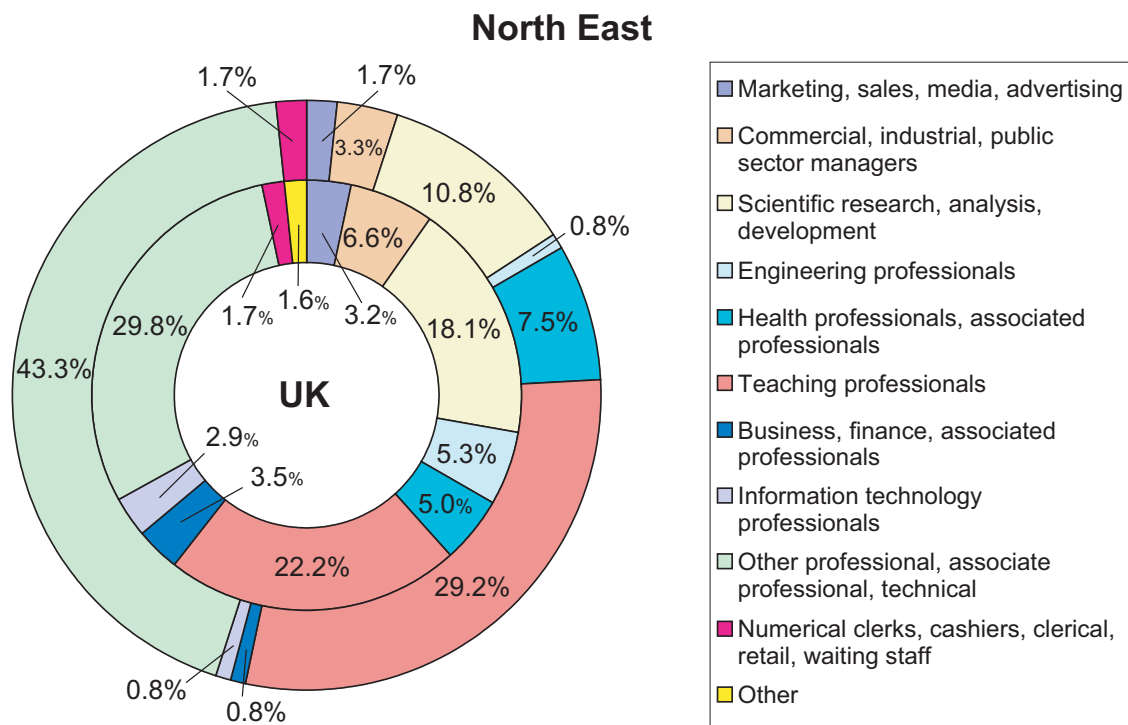


Figure Eight: Types of work entered by UK-domiciled PhD graduates employed in the North East (outer ring) compared to all UK regions (inner ring), based on Standard Occupational Classifications returned in 2004

¹⁴ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities www.grad.ac.uk/wdpd

North West England

The North West produced 8.1% of UK-domiciled PhD graduates and employed 7.9% of the UK PhD workforce in the DLHE survey. The region saw only a small net outflow of PhD graduates. When compared to the national averages, PhD graduates from North West HEIs had one of the higher unemployment rates. Just over half of them remained in the North West for work.

Key statistics:

The 590¹ UK-domiciled PhD graduates from institutions in the North West made up 8.1% of the UK total:

- 52% were male and 48% female, compared to the UK average of 55% and 45%
- 29% studied part-time, consistent with the UK average of 27%
- The most popular subjects were medicine, chemistry, biology and physics.

Of the 415 (70%) who responded to the 2004 DLHE² survey:

- 81.6% entered employment in the UK³
- 4.1% were unemployed, higher than the UK average of 3.2%
- 5.1% continued their careers overseas compared to 8.1% across the UK.

Of the 330 PhD graduates from HEIs in the North West who entered employment in the UK:

- 49.6% entered the education sector, predominantly in higher education
- 19.2% were employed in the health sector and 12.3% in manufacturing
- 58% remained in the North West and 42% moved to other regions in the UK.

The North West employed 7.9% of the UK-domiciled PhD graduate workforce:

- 58% of these gained their PhD at North West institutions
- 42% moved to the North West from other regions of the UK
- 52% were employed in the education sector: 47% as postdoctoral researchers; 36% in university teaching roles, primarily as lecturers
- 24.5% of all PhD graduates working in the North West were employed as postdoctoral researchers.

The North West was a net exporter (-8.1%) of UK-domiciled PhD graduates:

- PhD graduates who left the North West for work were most likely to move to London, the South East and Yorkshire and the Humber
- The North West attracted 9% of all the UK-domiciled PhD graduates who left their region of study for known UK locations
- PhD graduates moving to the region were most likely to come from Yorkshire and the Humber, the West Midlands, the South East and East of England and work in the education sector (44%).

Overview of North West higher education institutions⁴

There are seven universities and seven higher education colleges in the North West. In 2003/04, there were nearly 180,000 full-time equivalent (FTE) students in higher education institutions (HEIs) in the region. The largest institution is the University of Manchester with over 31,000 student FTEs.

3.5% of students in the region were registered for postgraduate research degrees, predominantly at the institutions with large research incomes – the Universities of Manchester, which dominates the region in terms of research income, Liverpool and Lancaster (see Table One).

Higher education institution	Final year PhD numbers
The University of Manchester	710
The University of Liverpool	280
The University of Lancaster	225
The University of Salford	70
Manchester Metropolitan University	60
Liverpool John Moores University	20
The University of Central Lancashire	20
Chester College of HE	10
Edge Hill College of Higher Education	10
St Martin's College	10
Total	1415

Table One: Final year PhD researchers by HEI in the North West⁵

The research strengths of universities in the North West are reflected in Figure One, derived from the results of the 2001 Research Assessment Exercise (RAE)⁶. Further analysis of the RAE results shows that 63.5% of submissions from the region's institutions were rated at 4 or above, with over a third (36.5%) scoring the highest ratings of 5 and 5*. These top rated departments were across the subject spectrum indicating the broad range of research expertise in the region.

¹ All figures are rounded to the nearest five for data protection

² Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

³ 74.1% are classified as 'working in the UK'; 7.5% are 'working and studying in the UK'. The data throughout WDPDR on employment includes both classifications

⁴ HEFCE 2004 Regional Profiles: North West

⁵ These figures were derived from the HESA student record data for those who were scheduled to complete their enrolment period in 2002/03. They include international PhD researchers who were not included in the DLHE survey www.hesa.ac.uk/pi/0203/research.htm

⁶ Data set available at www.hero.ac.uk/rae/Results

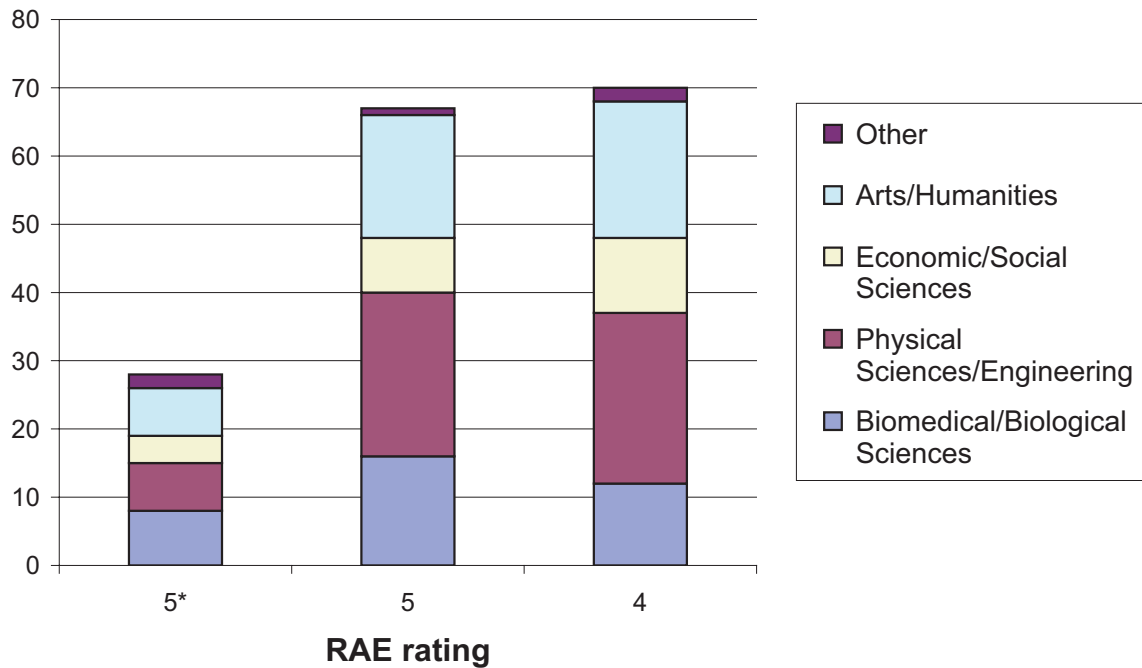


Figure One: Research subjects of top graded RAE submissions in the North West

Economic strengths

The North West economy has traditionally been strong in industries such as textiles, shipping and engineering, but as these have declined, the economy has shifted towards new sectors such as biotechnology, chemicals, aerospace and ICT. Unemployment in the region stands at 4.9%⁷, just above the English average of 4.8%.

The North West Development Agency (NWDA) sees the region's education and science base as an asset, which needs to be fully utilized. A major driver within the economic policy of the NWDA is the need to improve the productivity of the region, by investing in innovation, R&D, leadership and higher level skills. The NWDA is also focusing funding and support on knowledge-based sectors, including biomedical science, energy and environmental technologies, advanced flexible materials and the digital and creative industries. By 2009 the region aims to have created 80,000 new jobs in the 'knowledge' occupations.

When compared to other UK regions, levels of research and development (R&D) expenditure in the North West are higher than the UK average. The Business Enterprise R&D Survey, conducted by the Office of National Statistics⁸, reported that in 2002, the gross domestic expenditure on R&D, as a percentage of Total Gross Value Added, was 2.2% for the North West,

compared to 2.0% for the UK as a whole. However, the NWDA recognizes that much of this is concentrated in a few large companies and that many companies invest little in R&D and innovation.

Profile of PhD graduates from the North West

Of the 7270 UK-domiciled PhDs who graduated in the UK in 2003, 8.1% (590) graduated from North West HEIs. Of the UK-domiciled PhD graduates, 48% were female and 52% male, giving the North West a higher proportion of female doctoral graduates than the UK average (45%). Part-time study was slightly more common in the North West than in other regions, accounting for 29% of degrees awarded, compared to the UK average of 27%.

Figure Two shows the breakdown of PhD graduates by subject groups compared to the UK average. Overall, the picture is consistent with the national average. Proportionally more PhD graduates from institutions in the North West came from the economic and social sciences (15.1% compared to 11.1% across the UK) and the physical sciences (33.6% compared). Fewer came from the arts and humanities subject area (10.1% compared to 13.7% across the UK) and the biosciences (10.9% compared to 12.4%). The remainder came from 'other' subjects including education (5.1% compared to 3.9%).

⁷ HEFCE 2004 Regional Profiles: North West

⁸ www.statistics.gov.uk/; also useful is 'Regional Competitiveness and State of the Regions' by Mukund Lad, available at www.dtistats.net/sd/rci/

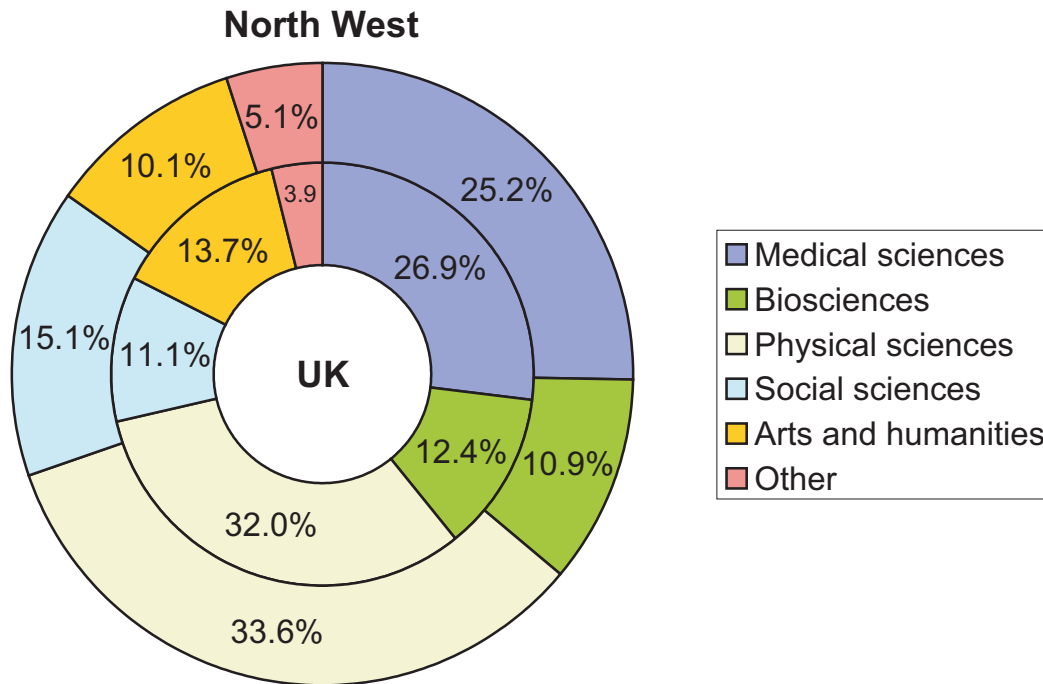


Figure Two: Subject groups of all UK-domiciled PhD graduates from North West HEIs (outer ring) compared to all UK HEIs (inner ring) in 2003

The list of 'top ten' subjects for PhD graduates from the North West (Table Two) shows strong parallels with the UK results. The main exception is the appearance of social policy in a far higher position than in the national subject rankings.

Subject and ranking	North East	Total (and position) in UK
1. Clinical Medicine	3.4%	8.2% (1)
2. Chemistry	4.7%	7.7% (2)
3. Biology	2.9%	5.2% (4)
4. Physics	4.1%	4.4% (5)
5. Psychology	4.9%	7.6% (3)
6. Academic studies in education	2.5%	3.1% (6)
7. Social Policy	2.9%	1.0% (28)
8. Pharmacology, toxicology and pharmacy	2.4%	2.9% (7)
9. Physical terrestrial geographical and environmental sciences	2.0%	2.1% (11)
10. Mechanical engineering	2.0%	2.0% (16)
10. History by period	4.3%	2.5% (9)

Table Two: Top subjects studied by PhD graduates in North West HEIs compared to UK figures

What do PhD graduates from the North West do?⁹

Of the 590 UK-domiciled PhD graduates in 2003 from North West Higher Education Institutions who were eligible for the 2004 survey, 415 responded. At 70%, this response rate is higher than the UK average 66%.

Figure Three summarises the responses to the DLHE survey. 74.1% of UK-domiciled PhD graduates from North West institutions had entered the workplace when the survey was conducted, slightly higher than the overall UK figure of 72.7%. A further 7.5% were engaged in work and study simultaneously, slightly lower than the UK average 8%. Fewer PhD graduates had moved overseas (5.1%) than for the UK as a whole (8.1%). At 4.1%, unemployment rates for UK-domiciled PhD graduates from institutions in the region were slightly higher than the UK average 3.2%.

⁹ The data in this section refers to PhD graduates from North West HEIs who were working in all regions of the UK

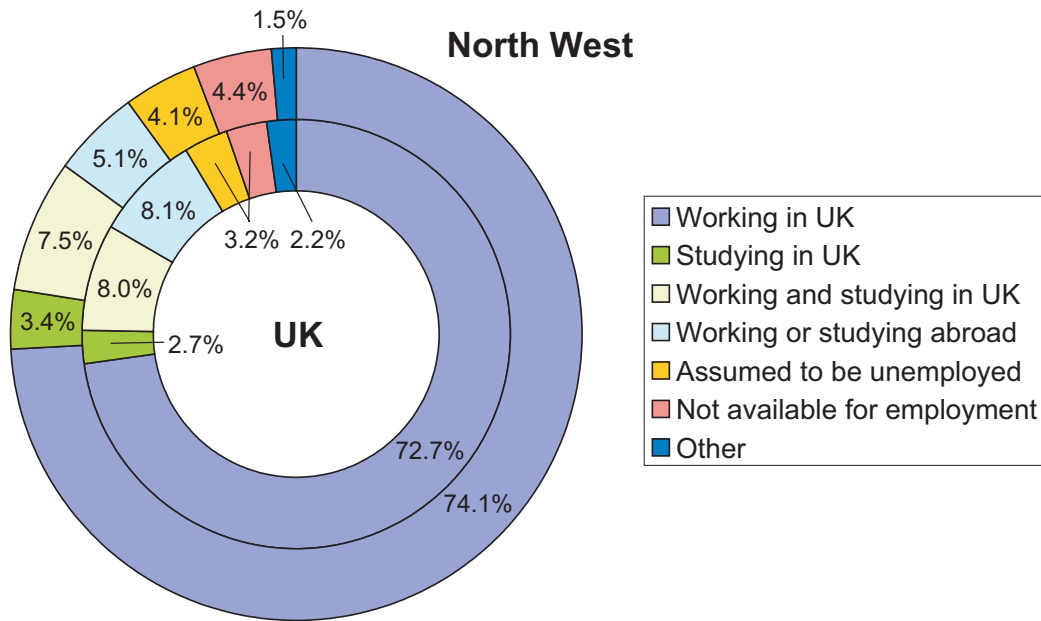


Figure Three: First destinations of UK-domiciled PhD graduates for all subjects from North West HEIs (outer ring) compared to all UK HEIs (inner ring) from 2004 DLHE survey responses

Employment sectors

The 81.6% of PhD graduates from North West HEIs working or working and studying in the UK were employed in a range of sectors across the UK. Consistent with the UK average, education was the dominant employment sector (49.6% compared to 47.8% across the UK), predominantly in higher education.

The balance (50.4%) were employed in a range of occupations across all sectors, although as Figure Four illustrates, there are some differences with the UK average figures.

Manufacturing industries employed a lower proportion of North West PhD graduates, accounting for 12.3% compared to 16.3% across the UK as a whole. 66% of these PhD graduates were employed in the chemical and pharmaceutical industries, accounting for 8% of all North West UK-domiciled PhD graduates (compared to a national proportion of 11%).

The health service employed more PhD graduates from this region's HEIs (19.2%) compared to the UK average (15.5%). Slightly lower numbers were employed by business, finance and IT industries and in the public sector. Assorted other industrial sectors accounted for the remaining 6.9% of PhD graduates.

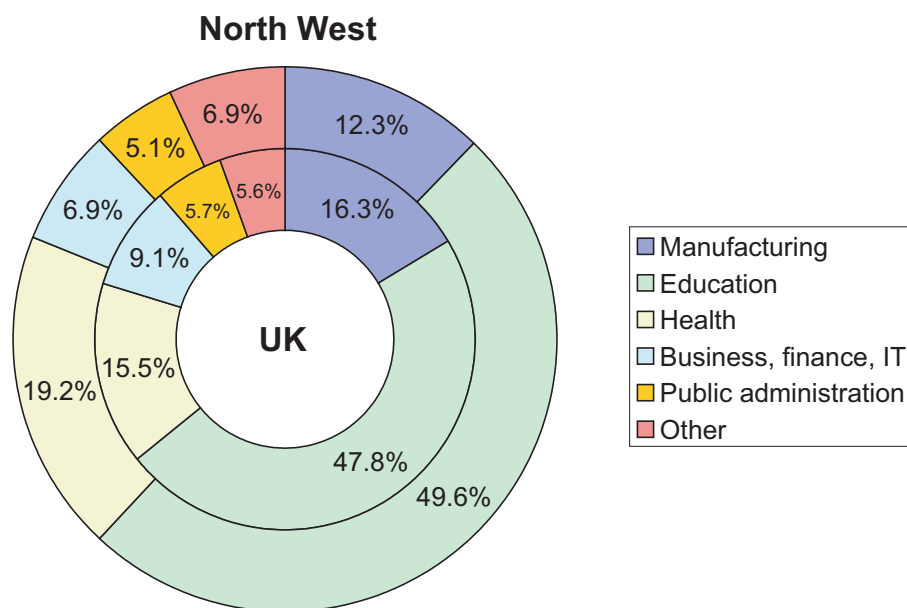


Figure Four: Employment sectors entered by UK-domiciled doctoral graduates from North West HEIs (outer ring) compared to all UK HEIs (inner ring), based on Standard Industrial Classifications returned in 2004 DLHE survey.

Career occupations

We examined the specific occupations entered by PhD graduates from North West HEIs. As the previous employment sector analysis predicts, when compared to the UK average figures, variations are modest.

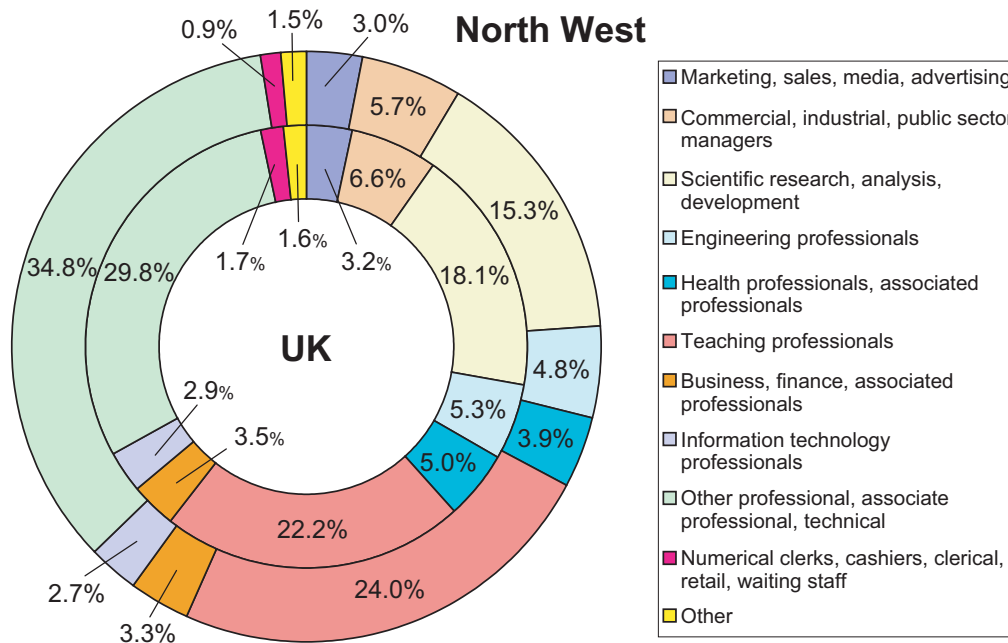


Figure Five: Types of work entered by UK-domiciled PhD graduates from HEIs in the North West (outer ring) compared to all UK institutions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey.

The most noticeable variations were in the proportions working in scientific research, analysis and development roles, which were around 3% lower than the national figure, and in 'other professional' roles (including postdoctoral researchers and psychologists), which were 5% higher than the UK. These figures are consistent with the variations in the employment sectors, with more PhD graduates employed in education and fewer in manufacturing. None of the other occupational categories has significant variations from the UK averages.

Migration

We examined the migration patterns of UK-domiciled PhD graduates from North West HEIs who were in employment at the time of the survey (see Figure Six).

In common with most regions, the North West saw a net loss of PhD graduates with 8.1% fewer PhD graduates starting work in the region than the total number of PhD graduates from the region¹⁰. 140 PhD graduates (40% of total employed) left the North West for employment in other regions of the UK. This proportion is in line with the average figure for all regions of 38%. PhD graduates from the North West moved across the UK with London and the South East most popular, each attracting 6%. Other popular regions were Yorkshire and the Humber, the West Midlands and the East of England¹¹.

Another 25 PhD graduates (6% of total employed) left the North West for work or work and study abroad, compared to the national average of 9%.

¹⁰ The net migration figures should be treated with care. 2.5% of the total DLHE respondents did not identify a specific region of employment. If these respondents are skewed to one region this will impact significantly on the net migration figures

¹¹ Data protection prohibits a full analysis of region to region migration

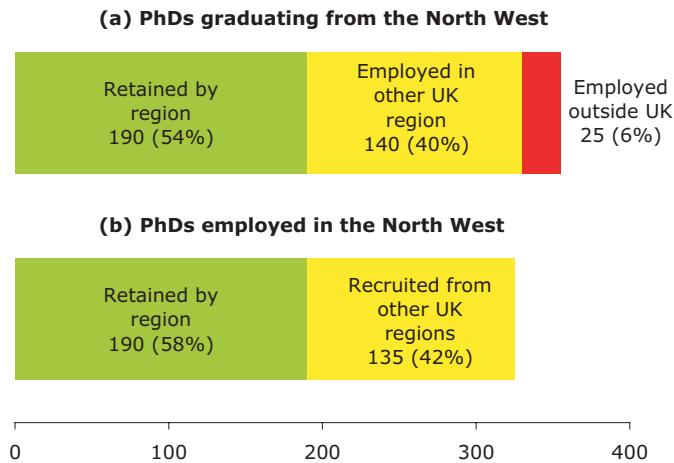


Figure Six: Mobility of PhD graduates from the North West in employment (a) and origin (region of study) of PhD graduates working in the North West (b)

What do PhD graduates employed in the North West do?¹²

190 PhD graduates from the North West HEIs were working in the region at the time of the 2004 DLHE survey, representing 58% of the total number of PhDs working in the region. These were joined by 135 PhD graduates from elsewhere in the UK who gained employment in the region. Within this cohort, small numbers came from each of the other UK regions, but Yorkshire and the Humber provided the most substantial number (7% of the total North West doctoral labour force), followed by the West Midlands and South East (both 6%) and East of England (5%). In total, 9% of all UK-domiciled PhD graduates who left their regions of study for known UK locations moved to the North West.

Employment sectors

The employment sectors for all PhD graduates employed in the North West are compared to the national picture in Figure Seven.

Consistent with the national picture, education was the dominant employment sector for PhD graduates in the North West (52% compared to 47.8% across the UK). Of these, 47% were employed as postdoctoral researchers and 36% in university teaching roles, primarily as lecturers. Overall, 24% of the PhD graduates working in the North West were employed as postdoctoral researchers¹³, slightly higher than the UK average of 22%.

The health sector is the second largest employment sector in the North West (19.6% compared to 15.5% across the UK). Manufacturing employed a similar proportion to the UK total (15.0% compared to 16.3%). Business, finance and IT and public administration employed fewer PhD graduates in the North West than across the UK.

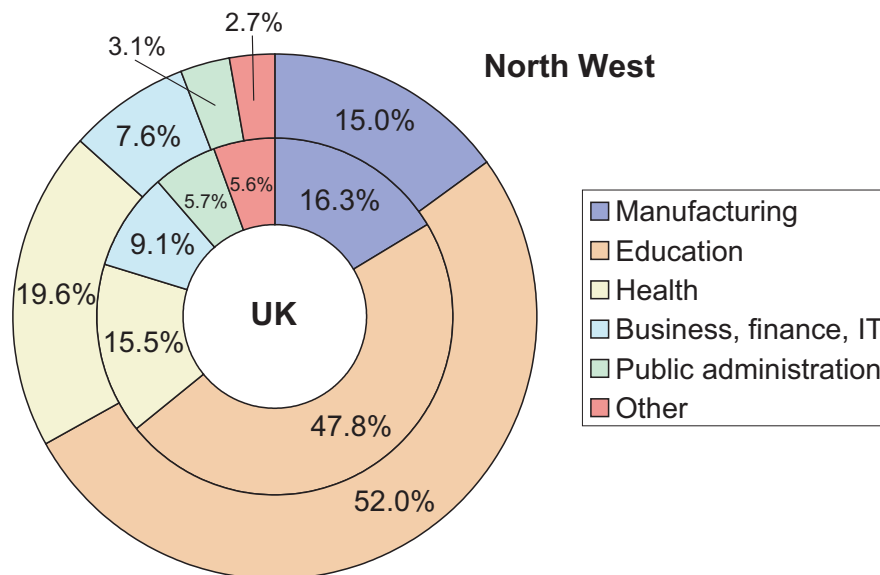


Figure Seven: Employment sectors entered by UK-domiciled PhD graduates employed in the North West (outer ring) compared to all UK regions (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

¹² The data in this section refers to PhD graduates from all regions of the UK who were working in the North West

¹³ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities www.grad.ac.uk/wdps

For the 135 PhD graduates who moved to the North West for employment, education was the largest employment sector (44%). Of these, 32% were employed as university teaching staff and 50% as postdoctoral researchers. Other sectors that employed PhD graduates moving to the region were manufacturing (25%), health and business and finance (both 13%). The public sector and other industries and organizations employed the remainder.

Career occupations

We compared the specific occupations of UK-domiciled PhD graduates employed in the North West to the UK picture as shown in Figure Eight.

A higher proportion of PhD graduates were employed as teaching professionals (24.8% compared to 22.2% across the UK) and in the 'other professionals' classification (33.9% compared to 29.8%), which includes some postdoctoral researchers. Slightly fewer were employed in the scientific research classification (16.2% compared to 18.1%). All of the other smaller classifications accounted for a similar proportion of PhD graduates in the North West when compared to the national picture.

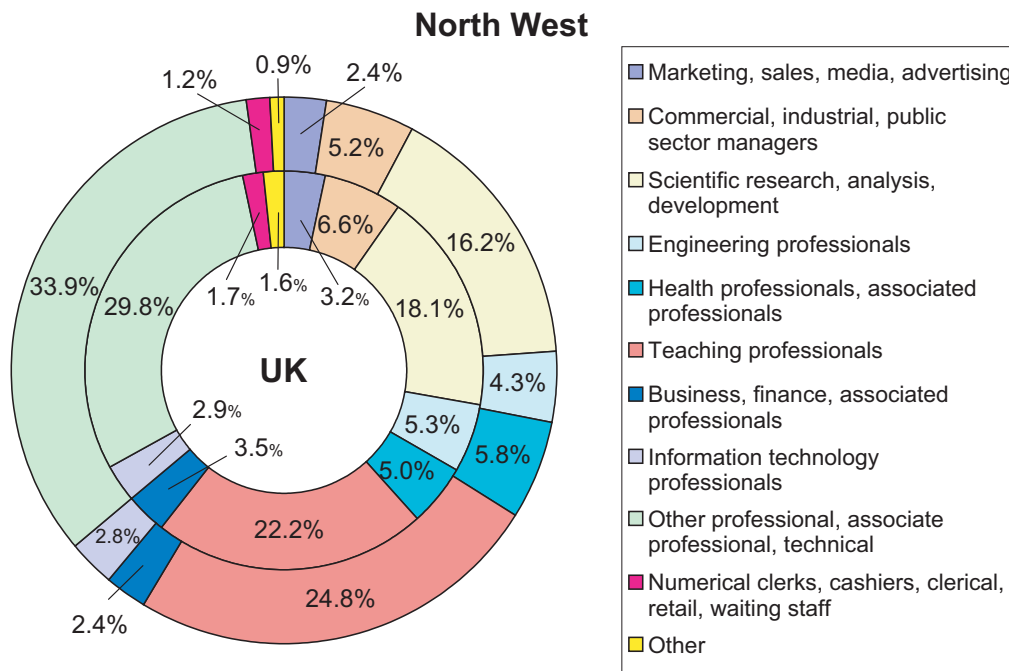


Figure Eight: Types of work entered by UK-domiciled PhD graduates employed in the North West (outer ring) compared to all UK regions (inner ring), based on Standard Occupational Classifications returned in

Yorkshire and the Humber

Yorkshire and the Humber produced 9.6% of UK-domiciled PhD graduates and employed 5.6% of the UK PhD workforce in the DLHE survey. The region was one of the less popular for mobile PhD graduates. When compared to the national averages, PhD graduates from Yorkshire and the Humber universities had slightly higher unemployment rates and were slightly less likely to gain work outside the UK. Just under half remained in Yorkshire and the Humber for work.

Key statistics:

The 695¹ UK-domiciled PhD graduates from institutions in Yorkshire and the Humber made up 9.6% of the UK total:

- 55% were male and 45% female, identical to the UK average
- 26% studied part-time, consistent with the UK average of 27%
- The most popular subjects were chemistry, psychology, medicine and education.

Of the 375 (54%) who responded to the 2004 DLHE² survey:

- 81.5% entered employment in the UK³
- 3.8% were unemployed, higher than the UK average of 3.2%
- 6.2% continued their careers overseas compared to 8.1% across the UK.

Of the 305 PhD graduates from universities in Yorkshire and the Humber who entered employment in the UK:

- 50% entered the education sector, predominantly in higher education
- 14.8% were employed in manufacturing and 13.5% in the health sector
- 52% remained in the region and 48% moved to other regions of the UK.

Yorkshire and the Humber employed 245 (5.6%) of the UK-domiciled PhD graduate workforce:

- 68% of these gained their PhD at institutions in the region
- 32% moved to Yorkshire and the Humber from other regions of the UK
- 61.5% were employed in the education sector: 50% as postdoctoral researchers; 33% in university teaching roles, primarily as lecturers
- 31% of all PhD graduates working in Yorkshire and the Humber were employed as postdoctoral researchers.

Yorkshire and the Humber was a net exporter (-28.4%) of UK-domiciled PhD graduates:

- PhD graduates who left Yorkshire and the Humber for work were most likely to move to the North West, East Midlands, the South East and London
- Yorkshire and the Humber attracted 5% of the UK-domiciled PhD graduates who left their region of study for known UK locations
- PhD graduates moving to the region were most likely to come from the North West, East Midlands and East of England and work in the education (61%) or manufacturing (18%) sector.

Overview of Yorkshire and the Humber higher education institutions⁴

There are eight universities and two higher education colleges in Yorkshire and the Humber. The higher education population in these institutions was around 140,000 full-time equivalent (FTE) students in 2003/04. The largest institution in the region was the University of Leeds with over 27,000 student FTEs.

Within Yorkshire and the Humber, 4% of students were registered for postgraduate research degrees, predominantly at the institutions with a substantial research income: the Universities of Sheffield and Leeds, which dominate the region in terms of research income, York, Bradford and Hull (see Table One).

Higher education institution	Final year PhD numbers
The University of Sheffield	445
The University of Leeds	435
The University of York	155
The University of Hull	125
The University of Bradford	90
Sheffield Hallam University	45
The University of Huddersfield	35
Leeds Metropolitan University	10
York St John College	10
Total	1350

Table One: Final year PhD researchers by HEI in Yorkshire and the Humber⁵

The research strengths of universities in Yorkshire and the Humber are reflected in Figure One, derived from the results of the 2001 Research Assessment Exercise (RAE)⁶. Further analysis of the RAE results shows that 68% of submissions from the region's institutions were rated at 4 or above, with 43% scoring the highest ratings of 5 and 5* – the fourth highest proportion of any UK region. These top rated departments were across the subject spectrum indicating the broad range of research expertise in the region, with particular strengths in the physical sciences.

¹ All figures are rounded to the nearest five for data protection

² Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

³ 74% are classified as 'working in the UK'; 7.5% are 'working and studying in the UK'. The data throughout WDPDR on employment includes both classifications

⁴ HEFCE 2004 Regional Profiles: Yorkshire and the Humber

⁵ These figures were derived from the HESA student record data for those who were scheduled to complete their enrolment period in 2002/03. They include international PhD researchers who were not included in the DLHE survey. See www.hesa.ac.uk/pi/0203/research.htm

⁶ Data set available at www.hero.ac.uk/rae/Results

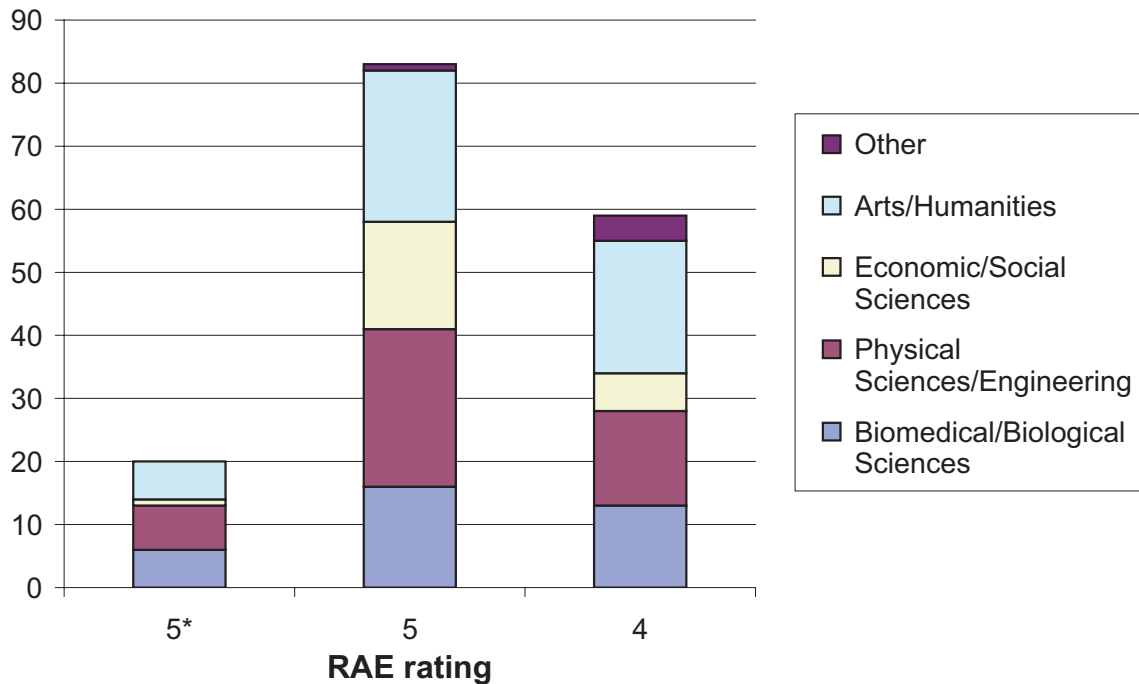


Figure One: Research subjects of top graded RAE submissions in Yorkshire and the Humber

Economic strengths

Manufacturing accounts for almost 18% of the region’s employment, compared to a figure of 14% across England, but traditional industries, such as coal mining, textiles and steel, have declined. Conversely, financial and call-centre based service industries have grown. Unemployment in Yorkshire and the Humber stands at 5%⁷, in-line with the English average of 4.8%.

Yorkshire Forward, the region’s Regional Development Agency, puts research at the heart of its economic strategy⁸, seeing the potential of universities to drive forward development activities. It describes them as “businesses in their own right, engines of technology transfer to stimulate research and development in businesses, catalysts of new business start-ups, magnets for inward investment, significant employers and trainers of people from local economies and producers of graduates and intellectual capital”. In addition to developing and strengthening the links between the HEIs and other sectors in the region, specific high-technology industries have also been identified, which include advanced engineering and metals, bioscience, chemicals, digital industries and food and drink (including agriculture).

When compared to other UK regions, research in Yorkshire and the Humber is behind other regions. Its levels of research and development (R&D) expenditure are amongst the lowest of

any UK region. The Business Enterprise R&D Survey, conducted by the Office of National Statistics⁹, reported that in 2002, the gross domestic expenditure on R&D, as a percentage of Total Gross Value Added, was 1.1% for Yorkshire and the Humber, compared to 2.0% for the UK as a whole.

Profile of PhD graduates from Yorkshire and the Humber

Of the 7270 UK-domiciled PhDs who graduated in the UK in 2003, 9.6% (695) graduated from higher education institutions (HEIs) in Yorkshire and the Humber. Of these PhD graduates, 45% were female and 55% male, giving Yorkshire and the Humber the same proportion of female doctoral graduates as the UK average. Part time study was slightly less common in Yorkshire and the Humber than in other regions, accounting for 26% of degrees awarded, compared to the UK average of 27%.

Figure Two shows the breakdown of PhD graduates from the region by subject groups: similar figures to the UK averages. More PhD graduates from universities in Yorkshire and the Humber came from the biosciences (13.6% compared to 12.4% across the UK), social sciences (14.3% compared to 11.1% across the UK). Slightly fewer came from the arts and humanities (11.4% compared to 13.7%) and the medical sciences (23.6% compared to 26.9%), with an almost identical proportion in the physical sciences (32.1% compared to 32%).

⁷ HEFCE 2004 Regional Profiles: Yorkshire and the Humber

⁸ The Regional Economic Strategy is available from www.yorkshire-forward.com/

⁹ www.statistics.gov.uk/; also useful is “Regional Competitiveness and State of the Regions” by Mukund Lad at www.dtistats.net/sd/rci/

Yorkshire & The Humber

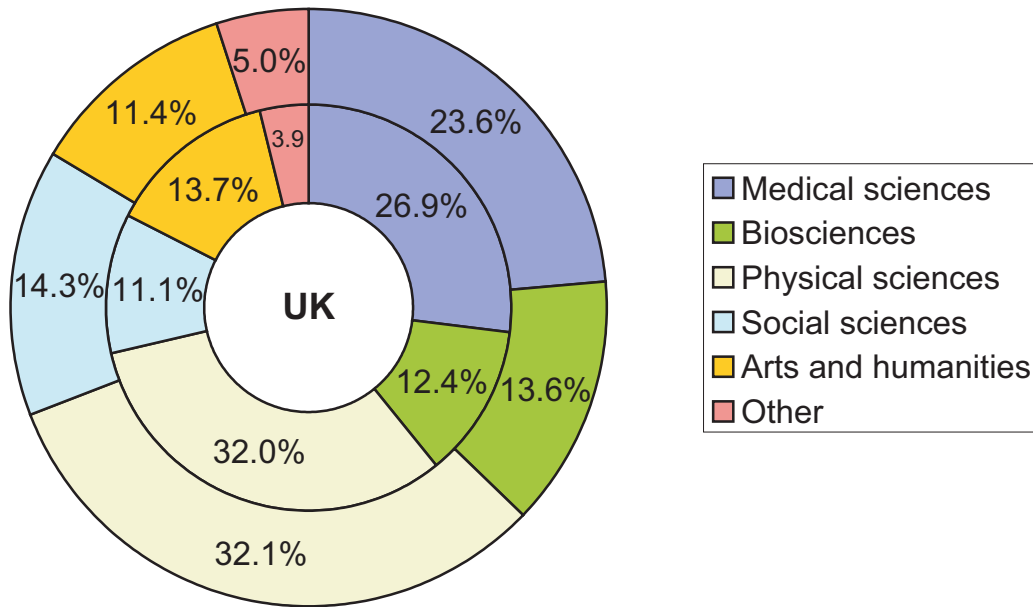


Figure Two: Subject groups of UK-domiciled PhD graduates from Yorkshire and the Humber HEIs (outer ring) compared to all UK HEIs (inner ring) in 2003

The list of 'top ten' subjects for PhD graduates from Yorkshire and the Humber (Table Two) shows little consistency with the UK figures. The same subjects of chemistry, psychology and medicine are in the top three, although in a different order. Five subjects appear in the table for Yorkshire and the Humber, which do not appear in the UK chart: business studies, civil, mechanical, electronic and electrical engineering, and subjects allied to medicine. Many of the actual proportions are low, indicating that there is a wide spread of subjects in the region.

Subject and ranking	Yorkshire and the Humber	Total (and position) in UK
1. Chemistry	6.2%	7.7% (2)
2. Psychology	3.7%	7.6% (3)
3. Clinical Medicine	3.5%	8.2% (1)
4. Academic studies in education	2.7%	3.1% (6)
5. Biology	2.5%	5.2% (4)
6. Molecular biology, biophysics and biochemistry	2.2%	2.5% (9)
7. Business studies	2.2%	2.1% (14)
8. Civil engineering	1.7%	1.2% (23)
9. Mechanical engineering	1.7%	2.0% (16)
10. Others in subjects allied to medicine	1.6%	1.8% (18)
10. Electronic and electrical engineering	1.6%	2.1% (11)

Table Two: Top subjects studied by PhD graduates in Yorkshire and the Humber HEIs compared to the UK figures

What do PhDs from Yorkshire and the Humber do?¹⁰

Of the 695 UK-domiciled PhD graduates in 2003 from Yorkshire and the Humber HEIs eligible for the 2004 survey, 375 responded. At 54%, this is the lowest response rate of any region, well below the UK average 66%.

Figure Three summarises the responses to the DLHE survey. 74% of UK-domiciled PhD graduates from Yorkshire and the Humber institutions had entered the workplace when the survey was conducted, consistent with UK figure of 72.7%. A further 7.5% were engaged in work and study simultaneously – slightly lower than the UK average of 8%. Fewer PhD graduates moved overseas (6.2%) than for the UK as a whole (8.1%). At 3.8%, the unemployment rate for UK-domiciled PhD graduates from institutions in the region was slightly higher than the UK average of 3.2%.

¹⁰ The data in this section refers to PhD graduates from Yorkshire and the Humber HEIs who were working in all regions of the UK

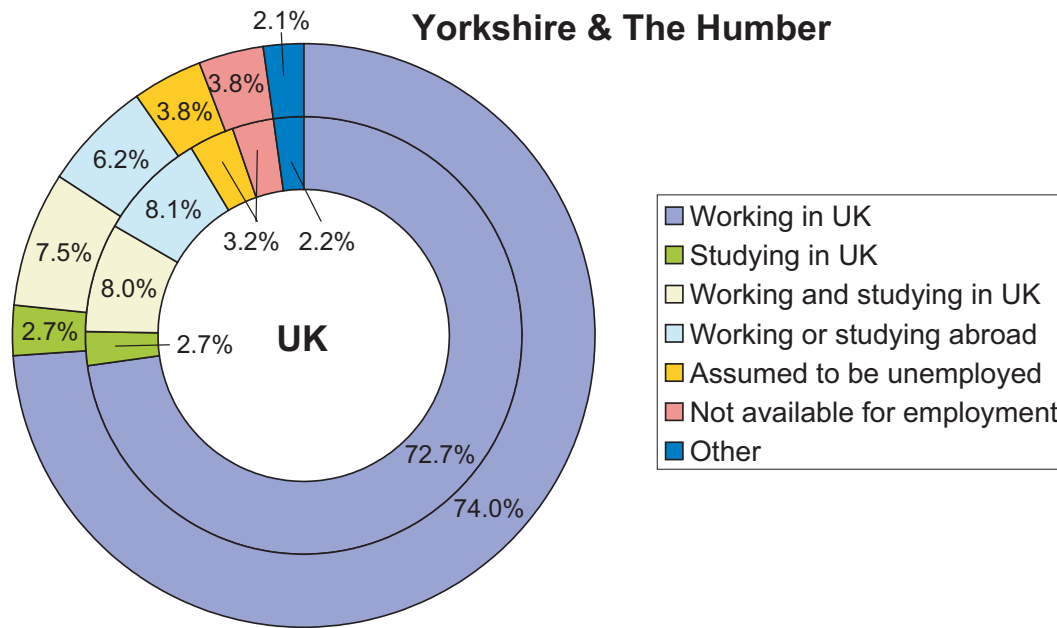


Figure Three: First destinations of UK-domiciled PhD graduates for all subjects from HEIs in Yorkshire and the Humber (outer ring) compared to all UK HEIs (inner ring) from 2004 DLHE survey responses

Employment sectors

The 81.5% of PhD graduates from Yorkshire and the Humber HEIs working or working and studying in the UK were employed in a range of sectors across the UK. Consistent with the UK average (47.8%), the education sector was the dominant destination, employing 50%, predominantly in higher education.

The balance (50%) were employed in a range of occupations across all sectors, although as Figure Four illustrates, the breakdown of employers was similar to the UK average figures.

Manufacturing industries employed 14.8% of Yorkshire and the Humber PhD graduates, slightly less than the 16.3% employed in the sector across the UK. 64% of these PhD graduates were employed in the chemical and pharmaceutical industries, accounting for 9.5% of all Yorkshire and the Humber UK-domiciled PhD graduates (compared to a national proportion of 11%).

The health service employed fewer PhD graduates from this region's universities (13.5% compared to 15.5% across the UK). Slightly greater numbers were employed by business, finance and IT industries and in the public sector. Assorted other industrial sectors accounted for the remaining 4.3% of PhD graduates.

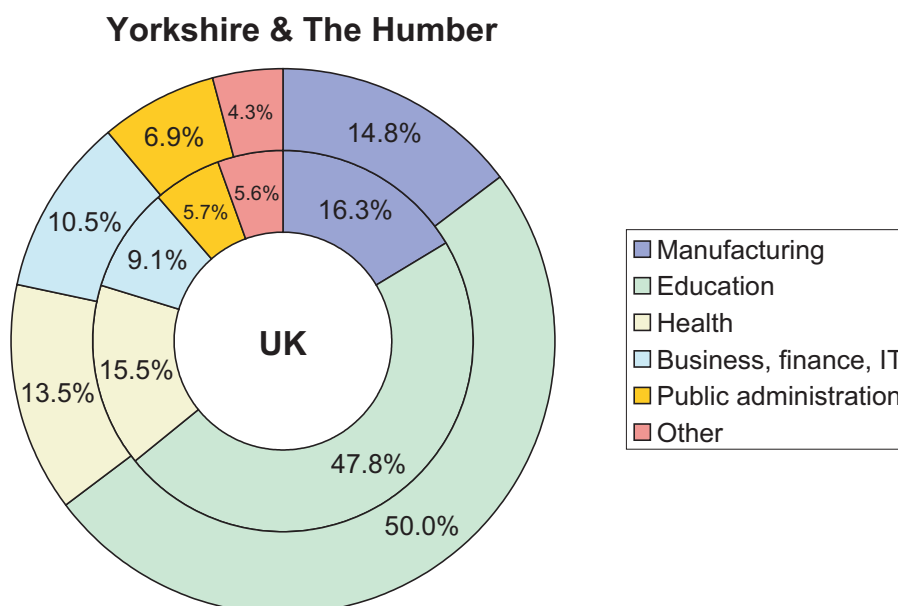


Figure Four: Employment sectors entered by UK-domiciled doctoral graduates from Yorkshire and the Humber HEIs (outer ring) compared to all UK HEIs (inner ring), based on Standard Industrial Classifications returned in 2004 DLHE survey

Career occupations

We examined the specific occupations entered by PhD graduates from Yorkshire and the Humber institutions. Although the previous employment sector analysis was similar to the UK as a whole, stronger variations emerge in the actual occupations of PhD graduates (Figure Five).

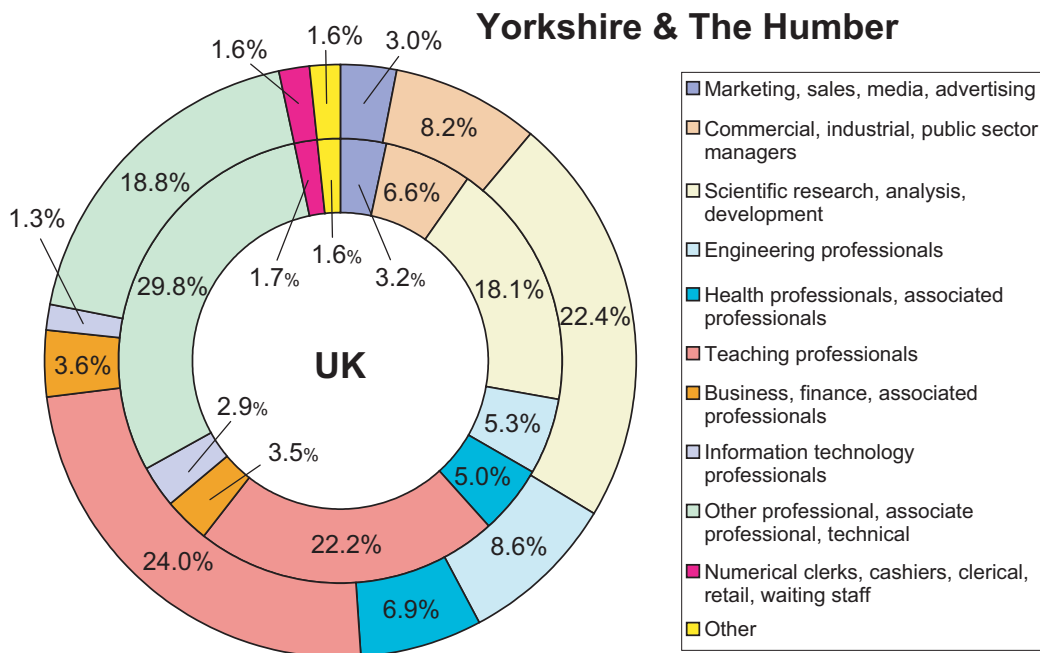


Figure Five: Types of work entered by UK-domiciled PhD graduates from HEIs in Yorkshire and the Humber (outer ring) compared to all UK institutions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

The 'other professionals' classification (18.8%), which includes postdoctoral researchers¹¹, accounts for a significantly lower proportion of PhD graduates from the region entering employment compared with the UK average (29.8%). At first sight, this appears to indicate that significantly less PhD graduates from Yorkshire and the Humber were employed in postdoctoral positions than the UK average. However, the proportion of UK-domiciled PhD graduates working in scientific research, analysis and development was higher for Yorkshire and the Humber (22.4%) compared to the UK average (18.1%). As the manufacturing sector employed a lower percentage of PhD graduates from the region than the UK average, this is unlikely to account for the difference. On further examination, this category also included the coding of some scientists who were working in academic laboratories. The engineering professionals classification also included some postdoctoral researchers in named engineering specialisms within academia. Overall the percentage of PhD graduates from Yorkshire and the Humber going into postdoctoral positions across the UK is slightly higher than average at 23% compared to the UK average of 22%.

Migration

We examined the migration patterns of UK-domiciled PhD graduates from Yorkshire and the Humber's HEIs who were in employment at the time of the survey (Figure Six).

In common with most other regions, the outflow of PhD graduates from Yorkshire and the Humber outstripped the intake. 28% fewer PhD graduates started work in the region than the total number of PhD graduates from the region¹². 145 PhD graduates (45% of total employed) left Yorkshire and the Humber for employment in other regions of the UK. This proportion is higher than the average figure for all regions of 38%. PhD graduates from Yorkshire and the Humber moved across the UK with the North West and East Midlands being most popular, each attracting 8%. Other popular regions were the South East and London¹³.

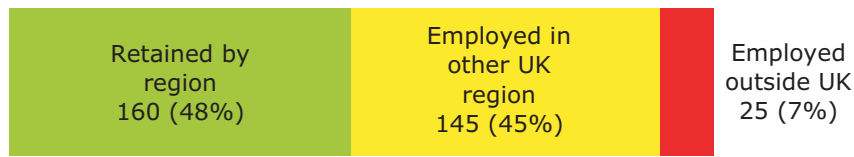
Another 25 PhD graduates (7% of total employed) left Yorkshire and the Humber for work or work and study abroad, compared to the national proportion of 9%.

¹¹ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities www.grad.ac.uk/wdpd

¹² The net migration figures should be treated with care. 2.5% of the total DLHE respondents did not identify a specific region of employment. If these respondents are skewed to one region this will impact significantly on the net migration figures

¹³ Data protection prohibits a full analysis of region to region migration

(a) PhDs graduating from Yorkshire and the Humber



(b) PhDs employed in the region

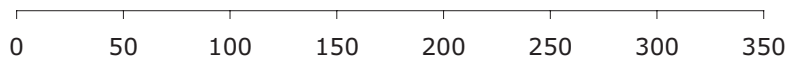


Figure Six: Mobility of Yorkshire and the Humber PhD graduates in employment (a) and origin (region of study) of PhD graduates working in Yorkshire and the Humber (b)

What do PhD graduates employed in Yorkshire and the Humber do?¹⁴

160 UK-domiciled PhD graduates from Yorkshire and the Humber HEIs were working in the region at the time of the survey, representing 68% of the total number of PhDs working in the region. These were joined by 75 UK-domiciled PhD graduates from other regions in the UK who gained employment in the region. Within this cohort, small numbers came from each of the other UK regions, but the North West provided the most substantial number at 8% of the regional PhD labour force, along with the East Midlands (5%) and the East of England (4%). In total, 5% of all UK-domiciled PhD graduates who leave their regions of study for known UK locations move to Yorkshire and the Humber for work or work and study.

Employment sectors

The employment sectors for PhD graduates employed in Yorkshire and the Humber are compared with the national picture in Figure Seven. The most obvious difference is that the education sector is very dominant in this region and employed 61.5% of PhD graduates (compared to 47.8% across the UK), predominantly in higher education. Of those employed in education, 50% were employed as postdoctoral researchers and 33% in university teaching roles, primarily as lecturers. Consequently, in Yorkshire and the Humber all the other sectors employed a lower proportion of PhD graduates compared to the UK picture.

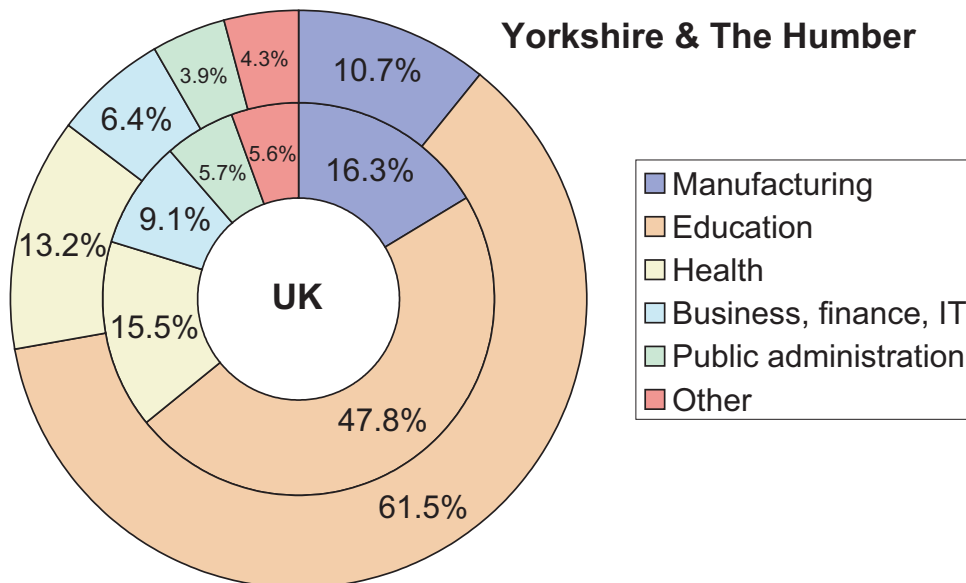


Figure Seven: Employment sectors entered by UK-domiciled PhD graduates employed in Yorkshire and the Humber (outer ring) compared to all UK regions (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

¹⁴ The data in this section refers to PhD graduates from all regions in the UK who were working in Yorkshire and the Humber

For the 145 PhD graduates who moved to Yorkshire and the Humber for employment, the largest employment sector was education (61%), predominantly in higher education. Of those employed in the education sector, 52% were employed as postdoctoral researchers and 39% as university teaching staff. Other sectors that employed PhD graduates moving to the region were manufacturing (18%) and health (12%).

Career occupations

We examined the specific occupations entered by UK-domiciled PhD graduates employed in Yorkshire and the Humber. The picture is quite different to the UK average, as outlined in Figure Eight.

As with the analysis of the employment of UK-domiciled PhD graduates from the region (Figure Five), one obvious difference is the proportion working in scientific research, analysis and development, which was higher in Yorkshire and the Humber (22.6% compared to 18.1% for the UK average). As the manufacturing sector employed a smaller proportion of PhD graduates in the region than across the UK as a whole, this sector is unlikely to account for the difference. However, also included in this type of work are some scientists working in academic laboratories, so the higher proportion of scientists is more likely to be due to the coding of academic scientists in this category. The engineering professionals category also includes postdoctoral researchers in named engineering specialisms. In line with this explanation, the 'other professionals' classification accounts for a lower proportion of PhD graduates working in the region (20.9% compared to 29.8% across the UK).

As with Yorkshire and the Humber PhD graduates employed across the UK, the 'other professionals' classification (20.9%), which includes postdoctoral researchers, accounts for a significantly lower proportion of PhD graduates entering employment within the region compared with the UK average (29.8%). Although this appears to indicate that significantly less PhD graduates from Yorkshire and the Humber were employed in postdoctoral positions than the UK average, further examination identified PhD graduates coded to scientific research, analysis and development employed in Yorkshire and the Humber as scientists within academic laboratories, and others coded as engineering professionals, working in named engineering specialisms within academia.

Overall, 31% of the all PhD graduates working in Yorkshire and the Humber were employed as postdoctoral researchers, markedly higher than the UK average of 22%.

A higher than average percentage (26.9%) of UK-domiciled PhD graduates also were employed in Yorkshire and the Humber as teaching professionals compared to the UK average of 22.2%. Conversely, the proportion of PhD graduates employed in IT within the region was low at 0.9% compared to 2.9% across the UK. The proportion of PhD graduates employed in most other types of occupations in Yorkshire and Humber were more in line with the UK figures.

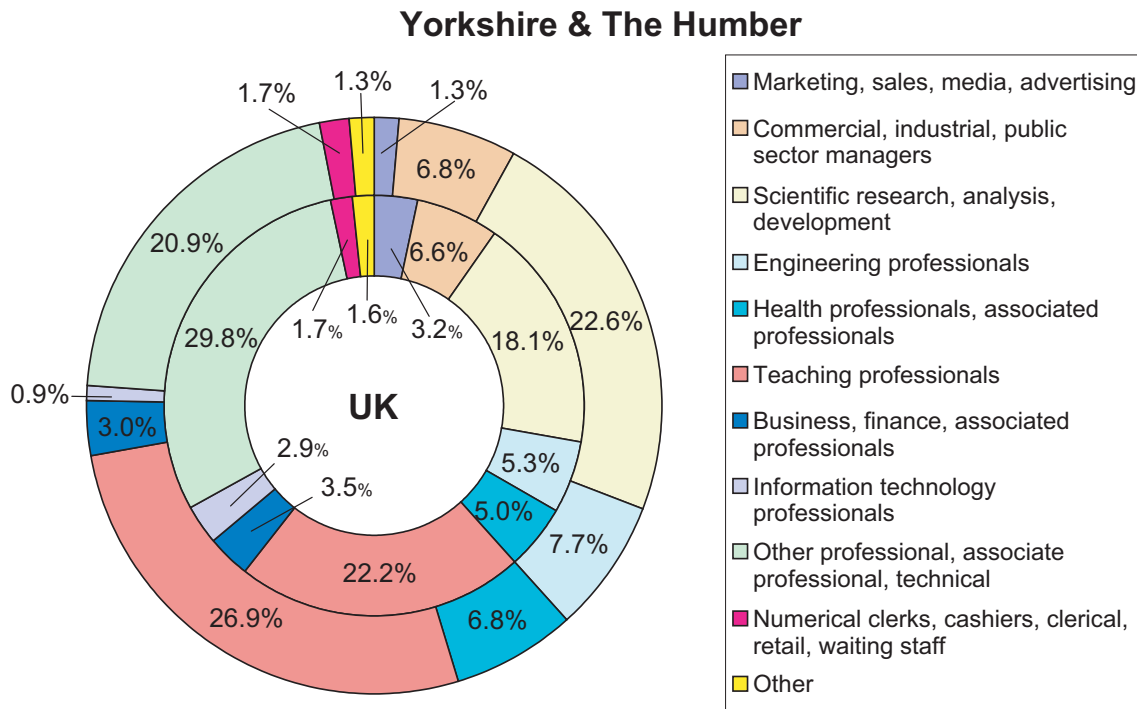


Figure Eight: Types of work entered by UK-domiciled PhD graduates employed in Yorkshire and the Humber (outer ring) compared to all UK regions (inner ring), based on Standard Occupational

East Midlands

The East Midlands produced 6.6% of UK-domiciled PhD graduates and employed 5.1% of the UK PhD workforce as reported in the DLHE survey. The region was a net exporter PhD graduates. When compared to the national averages, PhD graduates from East Midlands' HEIs had lower unemployment rates and were the most likely to gain work in the manufacturing sector. Fewer than half of them remained in the East Midlands for work.

Key statistics:

The 480¹ UK-domiciled PhD graduates from East Midlands institutions made up 6.6% of the UK total:

- 62.5% were male and 37.5% female, compared to the UK average of 55% and 45%
- 36% studied part-time, higher than the UK average 27%
- The most popular subjects were chemistry, clinical medicine, physics and mechanical engineering.

Of the 290 (60%) who responded to the 2004 DLHE² survey:

- 83.7% entered employment in the UK³
- 2.4% were unemployed, which was less than the UK average of 3.2%
- 6.2% continued their careers overseas compared to 8.1% across the UK.

Of the 240 PhD graduates from East Midlands HEIs who had entered employment in the UK:

- 46.9% entered the education sector, predominantly in higher education
- 24.1% (the highest proportion of any region) were employed in manufacturing and 10% in the health sector
- 48% remained in the East Midlands and 52% moved to other regions of the UK.

The East Midlands employed 5.1% of the UK-domiciled PhD graduate workforce:

- 55% gained their PhD at institutions in the East Midlands
- 45% moved to the East Midlands from other regions of the UK
- 50.9% were employed in the education sector: 46% of these as postdoctoral researchers; 42% in university teaching roles, primarily as lecturers
- 24% of all PhD graduates working in the East Midlands were employed as postdoctoral researchers.

The East Midlands was a net exporter (-18%) of UK-domiciled PhD graduates:

- PhD graduates who left the East Midlands for work were most likely to move to the South East, London, East or South West
- The East Midlands attracted 6.5% of the UK-domiciled PhD graduates who left their region of study for known UK locations
- PhD graduates moving to the region were most likely to come from Yorkshire and the Humber, West Midlands and the North West and work in the education (34%), manufacturing (29%) or health (20%) sectors.

Overview of East Midlands higher education institutions⁴

There are seven universities and two higher education colleges in the East Midlands. The institutions range in size from the University of Nottingham with over 24,000 student FTEs to Bishop Grosseteste College with just over 1,000 student FTEs. 70% of students are registered as full-time and 30% part-time across all degree programmes. Just over 4% of the students in the higher education institutions (HEIs) were registered for postgraduate research degrees (see Table One).

Higher education institution	Final year PhD numbers
The University of Nottingham	400
Loughborough University	175
The University of Leicester	160
De Montfort University	90
The Nottingham Trent University	55
University of Derby	20
University College Northampton	10
Total	910

Table One: Final year PhD researchers by HEI in the East Midlands⁵

Of the nine HEIs in the region, only three institutions, the universities of Nottingham, Leicester and Loughborough, have substantial research income of more than £25 million in 2002/03). The research strengths of universities in the East Midlands are reflected in Figure One, derived from the results of the 2001 Research Assessment Exercise (RAE)⁶. Further analysis of the RAE results shows that 60% of submissions from the region's institutions were rated at 4 or above, with almost a third (32%) scoring the highest ratings of 5 or 5*. These top rated departments are across the subject spectrum indicating the broad range of expertise available in the region's HEIs, with the arts and humanities appearing particularly active.

¹ All figures are rounded to the nearest five for data protection

² Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

³ 75.4% are classified as 'working in the UK'; 8.3% are 'working and studying in the UK'. The data throughout WDPDR on employment includes both classifications

⁴ HEFCE 2004 Regional Profiles: East Midlands

⁵ These figures are derived from the HESA student record data for those who were scheduled to complete their enrolment period in 2002/03. They include international PhD researchers who were not included in the DLHE survey www.hesa.ac.uk/pi/0203/research.htm

⁶ Data set available at www.hero.ac.uk/rae/Results

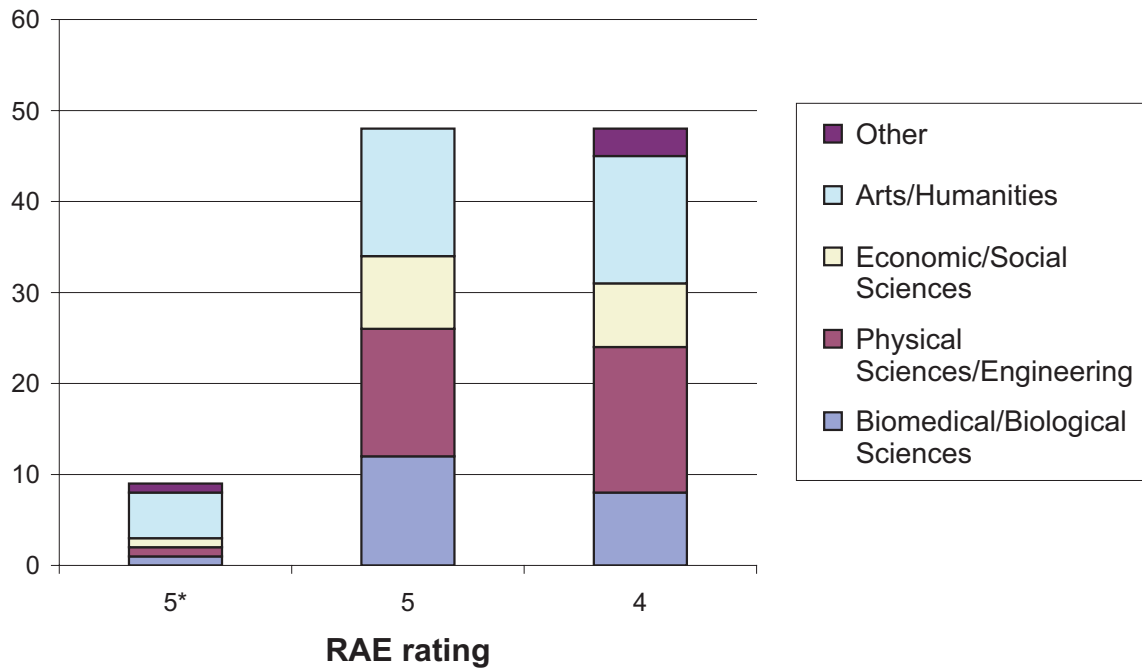


Figure One. Research subjects of top graded RAE submissions in East Midlands

Economic strengths

The East Midlands economy is diverse with strengths in research-dependent industries, including electronics, engineering, pharmaceuticals and food and drink. The East Midlands Development Agency aims to make the region one of Europe's Top 20 regions by 2010⁷, having jumped seven places to 28th position in 2003. The Agency's strategy includes a target to see business expenditure on research and development (R&D) increased by 20% by 2010. Other objectives underpinning the region's ambitions offer great opportunities for researchers – these include increased employment in new technology industries and a commitment to renewable energy sources.

When compared to other UK regions, the region seems well on track: its levels of R&D expenditure are higher than the UK average. The Business Enterprise R&D Survey, conducted by the Office of National Statistics⁸, reported that in 2002 the gross domestic expenditure on R&D, as a percentage of Total Gross Value Added, was 2.3% for the East Midlands, compared to 2.0% for the UK as a whole.

Profile of PhD graduates from the East Midlands

Of the 7270 UK-domiciled PhDs who graduated in the UK in 2003, 6.6% (480) graduated from HEIs in the East Midlands. Of these PhD graduates, 37.5% were female and 62.5% male: a stronger bias towards male students than the UK averages of 45% and 55%. Part-time study was much more common in the East Midlands than in other regions, accounting for 36% of degrees awarded, compared to the UK average of 27%.

Figure Two shows the breakdown of PhD graduates by subject groups. Significantly more UK-domiciled PhD graduates from East Midlands institutions came from the physical sciences than any other region of the UK and well above the UK average of 32%. Fewer PhD graduates came from the arts and humanities (10.4%) compared to the UK average (13.7%). The other subject groupings were more similar to the national picture with biomedical and biological sciences, at 10.4% compared with 12.4% nationally; the economic and social sciences were 9.4% compared to 11.1% and medical sciences 26% compared to 26.9%.

⁷ 'Destination 2010' www.emda.org.uk

⁸ www.statistics.gov.uk/; also useful is 'Regional Competitiveness and State of the Regions' by Mukund Lad at www.dtistats.net/sd/rci/

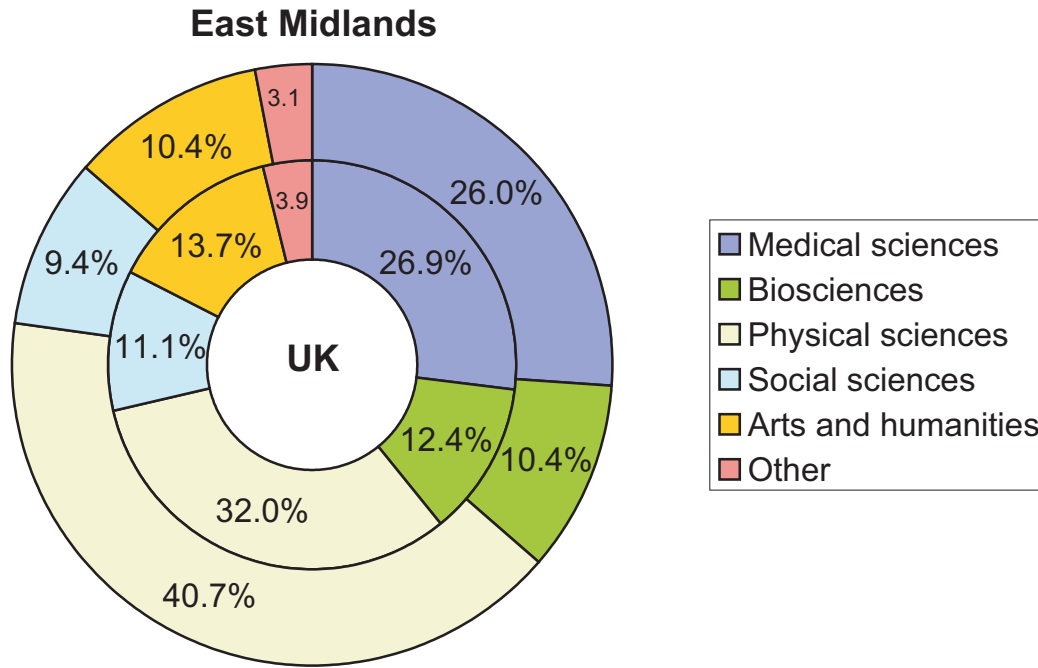


Figure Two: Subject groups of UK-domiciled PhD graduates from HEIs in the East Midlands (outer ring) compared to all UK HEIs (inner ring) in 2003

The 'top ten' subjects studied in the region reflect the stronger science and engineering bias (Table Two). Chemistry and other scientific and medically related subjects are strong in the East Midlands. Only two non-science or engineering subjects appear: business studies and education.

Subject and ranking	East Midlands	Total (and position) in UK
1. Chemistry	6.9%	7.7% (2)
2. Clinical Medicine	5.4%	8.2% (1)
3. Physics	3.1%	4.4% (5)
4. Mechanical Engineering	3.1%	2.0% (16)
5. Academic studies in education	2.7%	3.1% (6)
6. Pharmacology, toxicology & pharmacy	2.5%	2.9% (7)
7. Business studies	2.5%	2.1% (14)
8. Electronic & Electrical Engineering	2.3%	2.5% (10)
9. Psychology	1.9%	7.6% (3)
10. Pre-clinical medicine	1.7%	0.9% (30)

Table Two: Top subjects studied by PhD graduates in East Midlands HEIs with comparisons to UK figures

What do East Midlands' PhDs do?⁹

Of the 480 UK-domiciled PhD graduates from the East Midlands' HEIs in 2003 eligible for the 2004 survey, 290 responded. At 60% this response rate is lower than the UK average 66%.

Figure Three summarises the responses to the DLHE survey. 75.4% of UK-domiciled PhD graduates from the East Midlands' institutions had entered the workplace when the survey was conducted, compared to the overall UK figure of 72.7%. In line with the UK average, a further 8.3% were engaged in work and study simultaneously. Fewer PhD graduates had moved overseas (6.2%) than for the UK as a whole (8.1%). Unemployment rates for UK-domiciled PhD graduates from East Midlands's institutions were low at 2.4% compared to 3.2% across the UK.

⁹ The data in this section refers to PhD graduates from East Midlands HEIs who are working in all regions of the UK

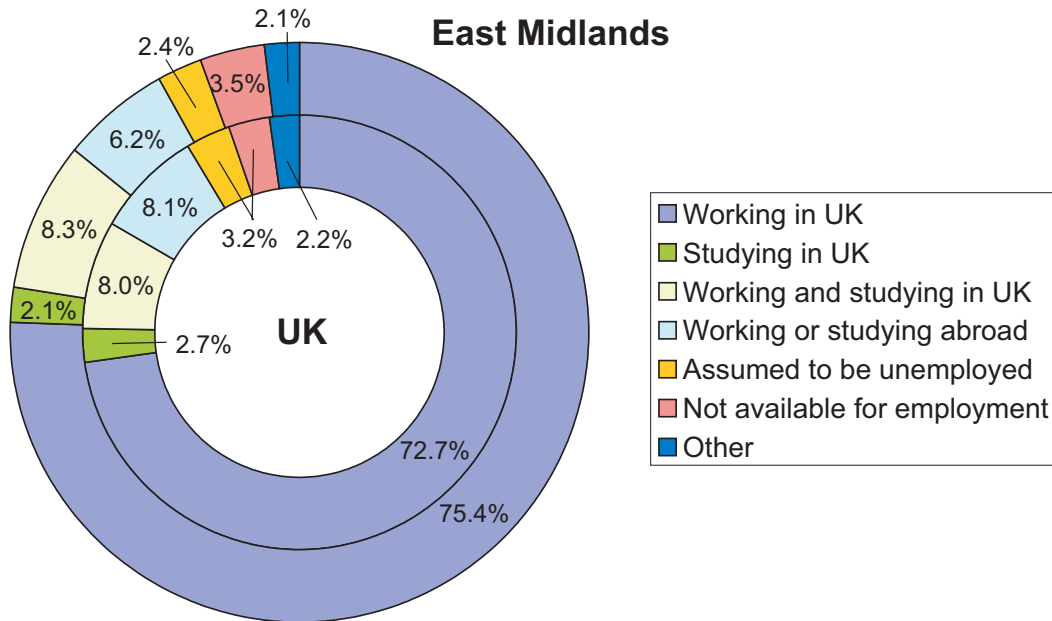


Figure Three: First destinations of UK-domiciled PhD graduates for all subjects from HEIs in East Midlands (outer ring) compared to all UK HEIs (inner ring) from 2004 DLHE survey responses

Employment sectors

The 83.7% PhD graduates from HEIs in the East Midlands working or working and studying in the UK were employed in a range of sectors across the UK (Figure Four). Consistent with the UK average (47.8%), the education sector was the dominant destination, employing 46.9%, predominantly in higher education.

The balance (53.1%) were employed in a range of occupations across all sectors, with the most noticeable difference in the proportion employed by the manufacturing industries at 24.1% compared to the UK average of 16.3%. 53% of these PhD graduates were employed in the chemical and pharmaceutical industries, accounting for 13% of all East Midlands UK-domiciled PhD graduates (compared to a national figure of 11%).

The health service employed fewer PhD graduates from this region's HEIs at 10% compared to 15.5% across the UK. A slightly higher percentage of PhD graduates were employed in the public sector, while the business, finance and IT industries employed the same as the UK average.

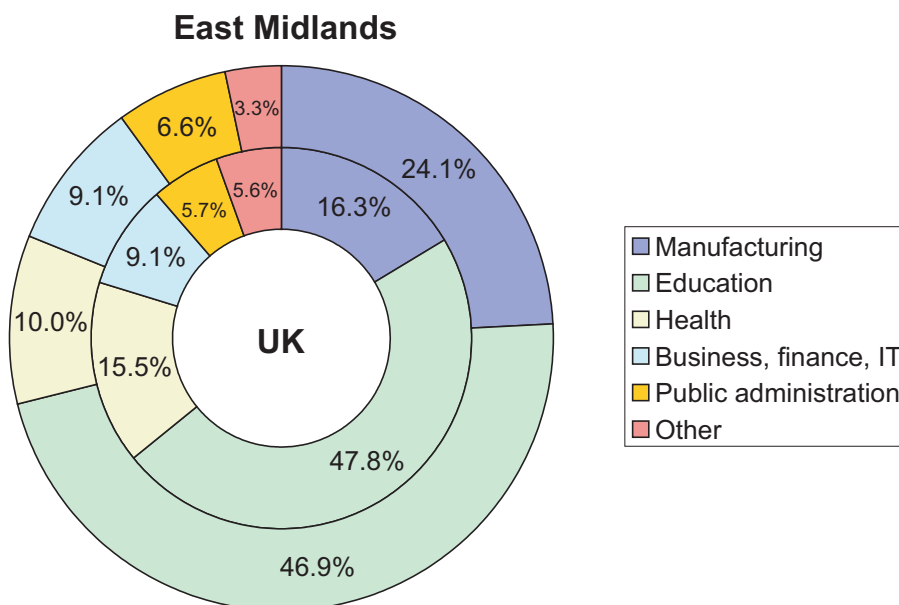


Figure Four: Employment sectors entered by UK-domiciled doctoral graduates from East Midlands' HEIs (outer ring) compared to all UK HEIs (inner ring), based on Standard Industrial Classifications returned in 2004 DLHE survey

Career Occupations

We examined the specific occupations entered by UK-domiciled PhD graduates from the East Midlands HEIs. As with the previous employment sector analysis, some differences to the UK picture emerged (Figure Five).

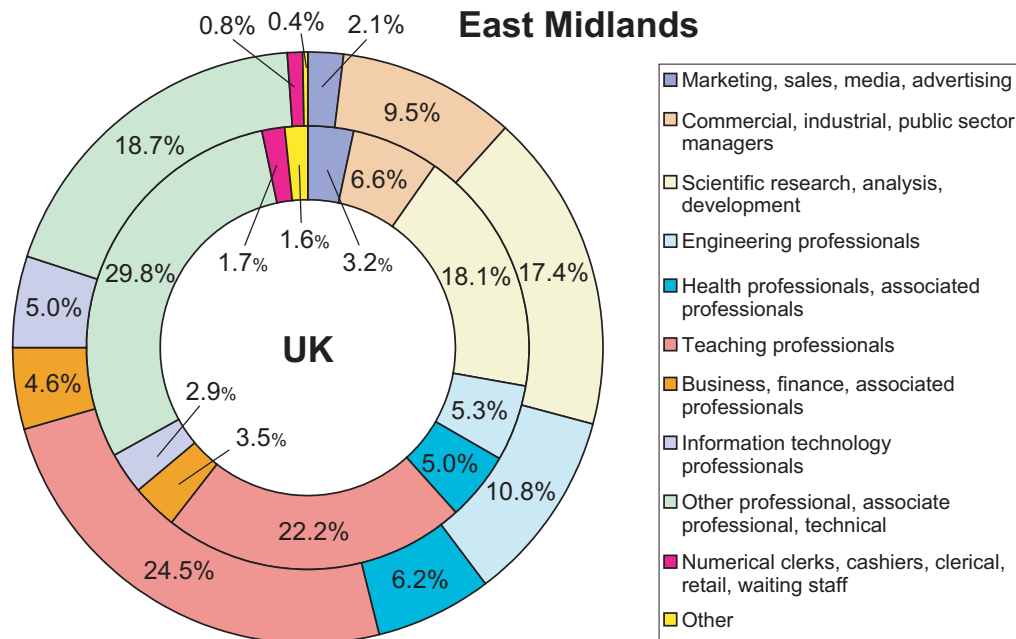


Figure Five: Types of work entered by UK-domiciled PhD graduates from HEIs in the East Midlands (outer ring) compared to all UK HEIs (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

It appears that PhD graduates from the East Midlands are more evenly employed across the occupational classifications, with managerial, engineering, health, business and finance, IT and teaching professions all more strongly represented than for the UK average.

The number in 'other professions', which includes some postdoctoral researchers and psychologists is substantially smaller than the UK figure. Close examination of the coding reveals that PhD graduates from the East Midlands were only slightly less likely to be employed as postdoctorate researchers (21%) than the UK average (22%)¹⁰.

We identified previously that the manufacturing industries employed significantly more East Midlands PhD graduates than the UK average. Figure five indicates that these are more likely to be engineers, rather than scientists.

Migration

We examined the migration patterns of UK-domiciled PhD graduates from the East Midlands HEIs who were in employment at the time of the survey (Figure Six).

In common with most regions, the East Midlands saw a net loss of PhD graduates with 18% fewer PhD graduates starting work in the region than the total number of PhD graduates from the region¹¹. 125 PhD graduates (48% of total employed) left the East Midlands for employment in other regions of the UK. This proportion is higher than the average figure for all regions of 38%. PhD graduates from the East Midlands moved across the UK with the East of England and the South East most popular, attracting 10% and 9% respectively. Other popular regions were London, the South West and West Midlands¹².

Another 20 PhD graduates (7% of total employed) left the East Midlands for work or work and study abroad, compared to the national average of 9%

¹⁰ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities www.grad.ac.uk/wdgd

¹¹ The net migration figures should be treated with care. 2.5% of the total DLHE respondents did not identify a specific region of employment. If these respondents are skewed to one region this will impact significantly on the net migration figures

¹² Data protection prohibits us from a full analysis of region to region migration

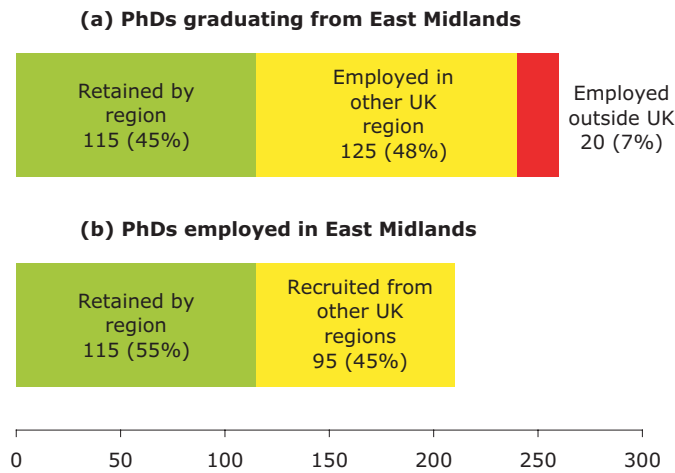


Figure Six: Mobility of East Midlands PhD graduates in employment (a) and origin (region of study) of PhD graduates working in the East Midlands (b)

What do PhD graduates employed in the East Midlands do?¹³

115 UK-domiciled PhD graduates from East Midlands HEIs were working in the region at the time of the survey, representing 55% of the total PhD graduates working in the region. These were joined by 95 PhD graduates from other regions in the UK who gained employment in the East Midlands. Within this cohort, small numbers came from each of the other UK regions, but Yorkshire and the Humber provided the most substantial number (12% of the regional PhD labour force), along with the West Midlands (8%) and North West (5%). In total, 6% of UK-domiciled PhD graduates who left their region of study for known UK locations moved to the East Midlands for work or work and study.

Employment sectors

The employment sectors for UK-domiciled PhD graduates employed in the East Midlands are compared with the national picture in Figure Seven.

The most obvious difference is that the education sector was more dominant in the region than the UK average (47.8%), employing 50.9% of PhD graduates, predominantly in higher education. Of those employed in education, 46% were postdoctoral researchers and 42% in university teaching roles, primarily as lecturers. Manufacturing also employed a greater proportion of PhD graduates in the East Midlands at 21.2% compared to 16.3% across the UK. All the other sectors employed lower proportions of PhD graduates in the region. The health sector employed 14.2% compared to the 15.5% UK average, business, finance and IT employed 6.6% compared to 9.1%, and public administration just 1.9% compared to 5.7%.

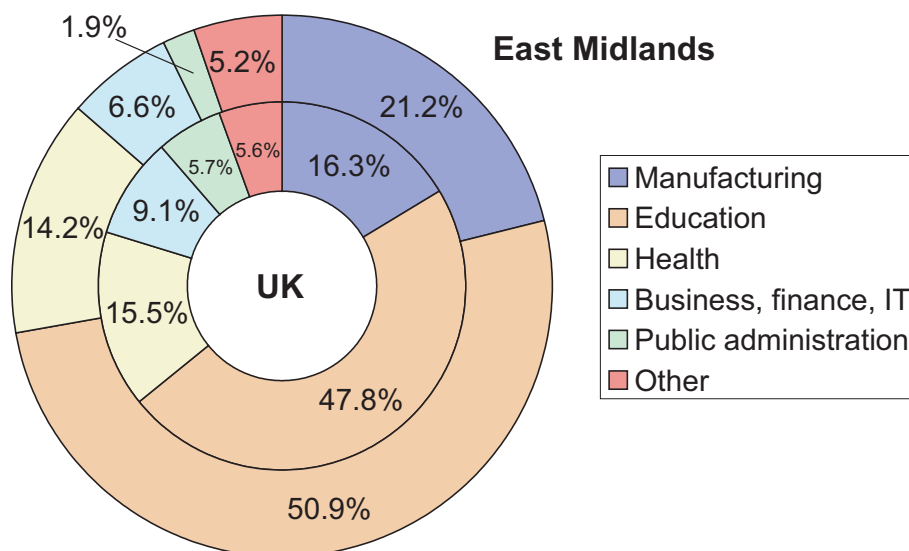


Figure Seven: Employment sectors entered by UK-domiciled PhD graduates employed in the East Midlands (outer ring) compared to all UK regions (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

¹³ The data in this section refers to PhD graduates from all regions in the UK who were working in the East Midlands

For the 95 UK-domiciled PhD graduates moving to the East Midlands for employment, the largest employment sector was education at 34% of the total. Of these, 47% were employed as university teaching staff, predominantly lecturers and 47% as postdoctoral researchers. The manufacturing industries also attracted a high percentage of incoming PhD graduates at 30%, while the health sector employed another 20%, demonstrating the balanced range of opportunities in the East Midlands.

Career occupations

We examined the specific occupations entered by PhD graduates employed in the East Midlands, as outlined in Figure Eight. In general terms, PhD graduates employed in the East Midlands are more 'evenly spread' across the occupational classifications, with commercial, industrial and public sector managers, health or engineering professionals all more strongly represented in the region.

The proportion of PhD graduates employed in scientific research (18.4%) in the East Midlands is in line with the UK figure of 18.1%. Similarly, the proportion employed in teaching is 23.6% compared to the UK average of 22.2%. The proportion employed in 'other professions', which includes some postdoctoral researchers and psychologists is smaller (23.6% compared to 29.8%). However, closer examination of the coding reveals that 24% of all PhD graduates working in the East Midlands were employed as postdoctoral researchers compared to a UK average of 22%¹⁴.

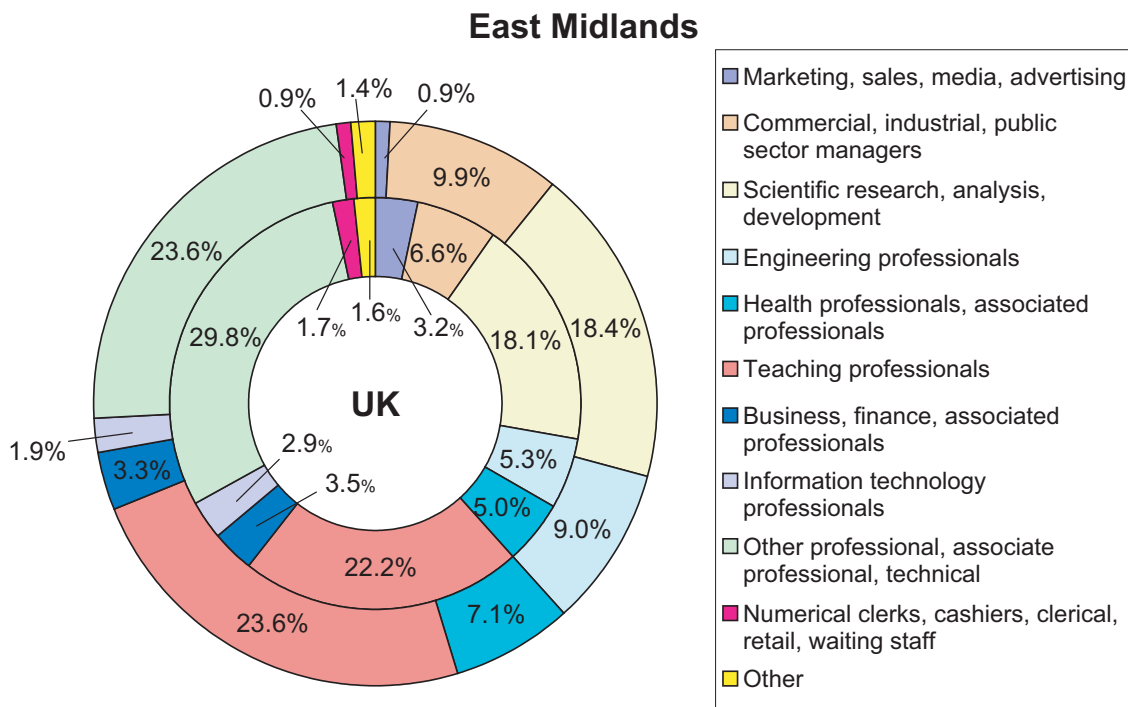


Figure Eight. Types of work entered by UK-domiciled PhD graduates employed in the East Midlands (outer ring) compared to all UK regions (inner ring), based on Standard Occupational Classifications returned in 2004

¹⁴ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities www.grad.ac.uk/wdps

West Midlands

The West Midlands produced 8.8% of UK-domiciled PhD graduates and employed 5.8% of the UK PhD workforce in the DLHE survey. The region saw the highest net outflow of PhDs of any region at almost 30%. When compared to the national averages, PhD graduates from West Midlands HEIs had slightly higher unemployment rates and were slightly less likely to gain work outside the UK. 45% of West Midlands PhD graduates remained in the West Midlands for work.

Key statistics:

The 640¹ UK-domiciled PhD graduates from institutions in the West Midlands made up 8.8% of the UK total:

- 55.5% were male and 44.5% female, close to the UK average of 55% and 45%
- 25% studied part-time, slightly lower than the UK average of 27%
- The most popular subjects were psychology, medicine, biology and chemistry.

Of the 390 (61%) who responded to the 2004 DLHE² survey:

- 81.6% entered employment in the UK³
- 4.1% were unemployed, higher than the UK average of 3.2%
- 6.4% continued their careers overseas compared to 8.1% across the UK.

Of the 320 PhD graduates from West Midlands HEIs who entered employment in the UK:

- 44.5% entered the education sector, predominantly in higher education
- 16.9% were employed in manufacturing and 19.5% in the health sector
- 48% remained in the West Midlands and 52% moved to other regions of the UK.

The West Midlands employed 240 (5.8%) of the UK-domiciled PhD graduate workforce:

- 65% gained their PhD at West Midlands institutions
- 35% moved to the West Midlands from other regions of the UK
- 46.7% were employed in the education sector: 52% as postdoctoral researchers; 32% in university teaching roles, primarily as lecturers
- 24% of all PhD graduates working in the West Midlands were employed as postdoctoral researchers.

The West Midlands was a net exporter (-29.7%) of UK-domiciled PhD graduates:

- PhD graduates who left the West Midlands for work were most likely to move to the South East, London, the East and South West
- The West Midlands attracted 6% of the UK-domiciled PhD graduates who left their region of study for known UK locations
- PhD graduates moving to the region were most likely to come from the South East, North West, Wales and East Midlands and to work in the education (34%), manufacturing (15%) or health (14%) sectors.

Overview of West Midlands higher education institutions⁴

There are 12 higher education institutions in the West Midlands: eight universities and four higher education colleges. The higher education student population is almost 130,000 full-time equivalent (FTE) students. The University of Birmingham is the largest in the region with over 24,000 student FTEs.

Just over 3% of students in the region were registered for postgraduate research degrees, predominantly at the institutions with a substantial research income – the Universities of Birmingham and Warwick (see Table One).

Higher education institution	Final year PhD numbers
The University of Birmingham	555
The University of Warwick	280
The University of Keele	75
Aston University	65
Coventry University	30
Staffordshire University	25
The University of Wolverhampton	20
University of Central England in Birmingham	20
University College Worcester	5
Total	1075

Table One: Final year PhD researchers by HEI in the West Midlands⁵

The research strengths of the institutions in the West Midlands, derived from the results of the 2001 Research Assessment Exercise (RAE)⁶ are reflected in Figure One. Further analysis of the RAE results shows that 53% of submissions from the regions' institutions were rated at 4 or above, with over a third (37%) scoring the highest ratings of 5 and 5* – the highest proportion of any UK region. These top rated departments are across the subject spectrum indicating the broad range of research expertise in the region.

¹ Note that all figures are rounded to the nearest 5 for data protection

² Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

³ 72.7% are classified as 'working in the UK'; 8.9% are 'working and studying in the UK'. The data in on employment throughout WDPDR includes both classifications

⁴ HEFCE 2004 Regional Profiles: West Midlands

⁵ These figures were derived from the HESA student record data for those who were scheduled to complete their enrolment period in 2002/03. They include international PhD researchers who were not included in the DLHE survey www.hesa.ac.uk/pi/0203/research.htm

⁶ Data set available at www.hero.ac.uk/rae/Results

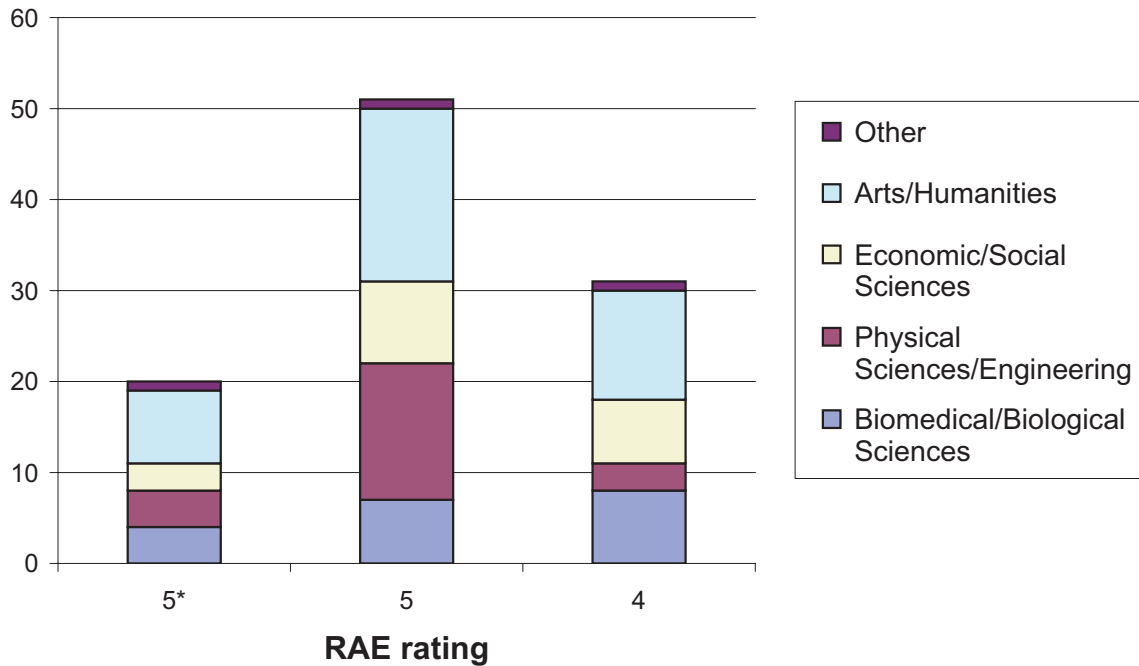


Figure One: Research subjects of top graded RAE submissions in the West Midlands

Economic strengths

Unemployment in the West Midlands stands at 5.8%⁷, which is higher than the English average of 4.8%. The region is the heart of UK manufacturing and this sector makes a larger contribution to the local economy than it does in any other UK region. Over 20% of everyone in employment in the West Midlands work in the manufacturing sector, compared with just over 15% nationally.

The West Midlands development agency, Advantage West Midlands⁸, is keen to build upon the West Midlands' long standing reputation for innovation and creativity. A survey by the European Commission⁹ places the West Midlands at the top of the league of innovating regions, with 52% of companies reporting innovative activity. Future development in the birthplace of the industrial revolution aims to exploit the existing industrial strengths and to promote high technology enterprises.

Advantage West Midlands is developing Business Clusters¹⁰ to exploit existing industry strengths and promote emerging opportunities. These are based in a range of industrial sectors including information and communication technologies,

environmental technologies and medical technologies. However, the Business Enterprise R&D Survey, conducted by the Office of National Statistics¹¹, reported that in 2002, the gross domestic expenditure on research and development (R&D), as a percentage of Total Gross Value Added, was 1.3% for the West Midlands, compared to 2.0% for the UK as a whole.

Profile of PhD graduates from West Midlands

Of the 7270 UK-domiciled PhDs who graduated in the UK in 2003, 8.8% (640) graduated from higher education institutions in the West Midlands. Of these PhD graduates, 44.5% were female and 55.5% male, a similar proportion to the UK average of 45% and 55%. Part-time study was slightly less common in the West Midlands than in the rest of the UK, accounting for 25% of degrees awarded, compared to the UK average of 27%.

Figure Two shows the breakdown of PhD graduates by subject groups. Most subject groupings are similar to the UK average figures. Slightly more PhD graduates came from the biosciences (14.1% compared to 12.4%) and medical (27.3% compared to 26.9%) subjects and slightly fewer from the physical sciences (28.9% compared to 32%).

⁷ HEFCE 2004 Regional Profiles: West Midlands

⁸ www.advantagewm.co.uk/

⁹ European Commission 'Community Innovation Survey – Innovative Activity'

¹⁰ www.advantagewm.co.uk/business-clusters.html

¹¹ www.statistics.gov.uk/; also useful is 'Regional Competitiveness and State of the Regions' by Mukund Lad at www.dtiStats.net/sd/rci/

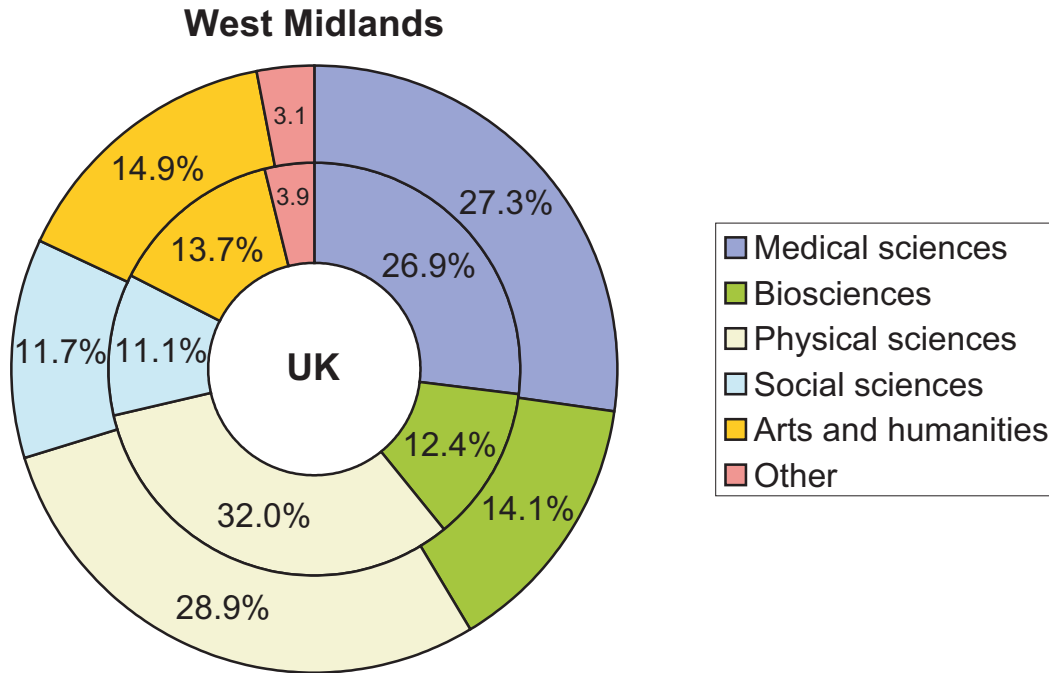


Figure Two: Subject groups of all UK-domiciled PhD graduates from HEIs in the West Midlands (outer ring) compared to all UK HEIs (inner ring) in 2003

The list of 'top ten' subjects for PhD graduates from the West Midlands (Table Two) shows parallels with those seen in the UK table. Psychology was the most popular research subject in the region, followed by biology, clinical medicine and chemistry. In contrast to the UK top table, general engineering and business studies appear in the region's top subjects.

Subject and ranking	West Midlands	Total (and position) in UK
1. Psychology	8.9%	7.6% (3)
2. Biology	5.2%	5.2% (4)
3. Clinical medicine	4.1%	8.2% (1)
4. Chemistry	3.4%	7.7% (2)
5. Physics	3.0%	4.4% (5)
6. Academic studies in education	2.3%	3.1% (6)
7. General engineering	2.3%	2.0% (15)
8. Molecular biology, biophysics and biochemistry	2.2%	2.5% (10)
9. Pharmacology, toxicology and pharmacy	2.0%	2.9% (7)
10. Business studies	1.0%	2.1% (14)

Table Two: Top subjects that were studied by PhD graduates in West Midlands universities with comparisons to UK figures

What do PhDs from the West Midlands do?¹²

Of the 640 UK-domiciled PhD graduates from West Midlands higher education institutions in 2003 eligible for the 2004 survey, 390 responded. This response rate (57%) is lower than the UK average (66%) and is one of the lowest response rates of any region.

Figure Three summarises the responses to the DLHE survey. 72.7% of UK-domiciled PhD graduates from West Midlands institutions had entered the workplace when the survey was conducted, echoing the overall UK figure of 73%. A further 6.4% were engaged in work and study simultaneously – lower than the UK average of 8%. Fewer PhD graduates moved overseas (6.4%) than for the UK as a whole (8%). At 4.1%, the unemployment rate for UK-domiciled PhD graduates from institutions in the region was higher than the UK average of 3.2%.

¹² The data in this section refers to PhD graduates from West Midlands HEIs who were working in all regions of the UK

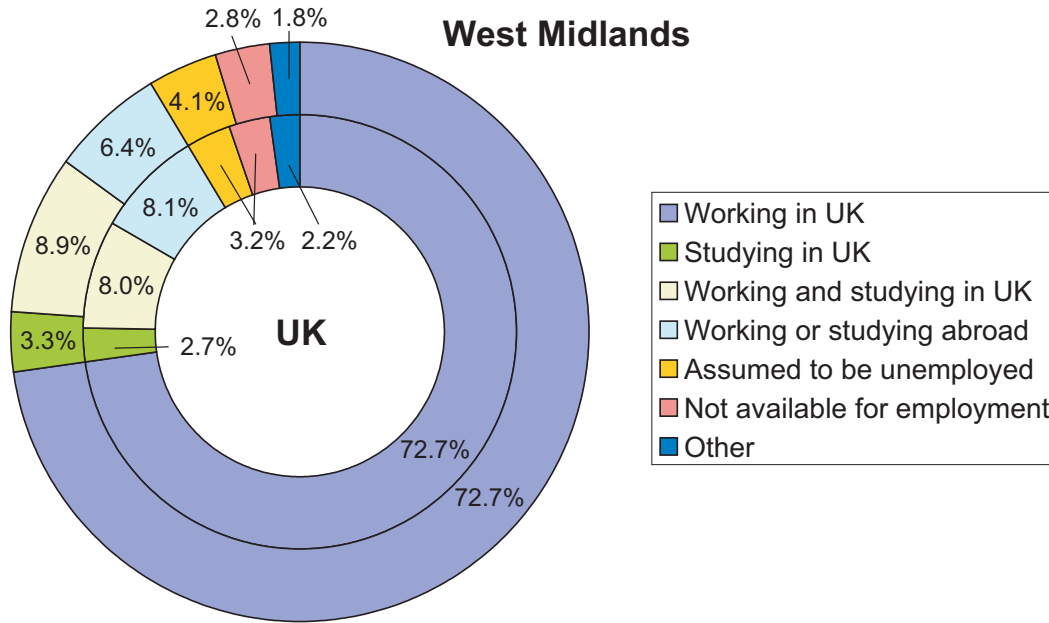


Figure Three: First destinations of UK-domiciled PhD graduates for all subjects from HEIs in the West Midlands (outer ring) compared to all UK HEIs (inner ring) from 2004 DLHE survey responses.

Employment sectors

The 81.6% of PhD graduates from West Midlands HEIs working or working and studying in the UK were employed in a range of sectors across the UK. Consistent with the UK average of 47.8%, the education sector was the dominant destination, employing 44.5%, predominantly in higher education.

The balance (55.5%) were employed in a range of sectors, and as Figure Four illustrates, there are only small differences compared to the UK average figures.

At 16.9% the manufacturing industries employed a slightly higher proportion of West Midlands PhD graduates than the UK average (16.3%). This sector is dominated by the chemical and pharmaceutical industries; accounting for 73% of those employed in this sector, or 12.5% of all West Midlands PhD graduates (compared to a national figure of 11%).

The health service employed significantly more PhD graduates from the West Midlands universities (19.5%) compared to 15.5% from across the UK. Slightly fewer were employed by business, finance and IT industries and the public sector. A variety of other employment sectors accounted for the remaining 6.9% of PhD graduates.

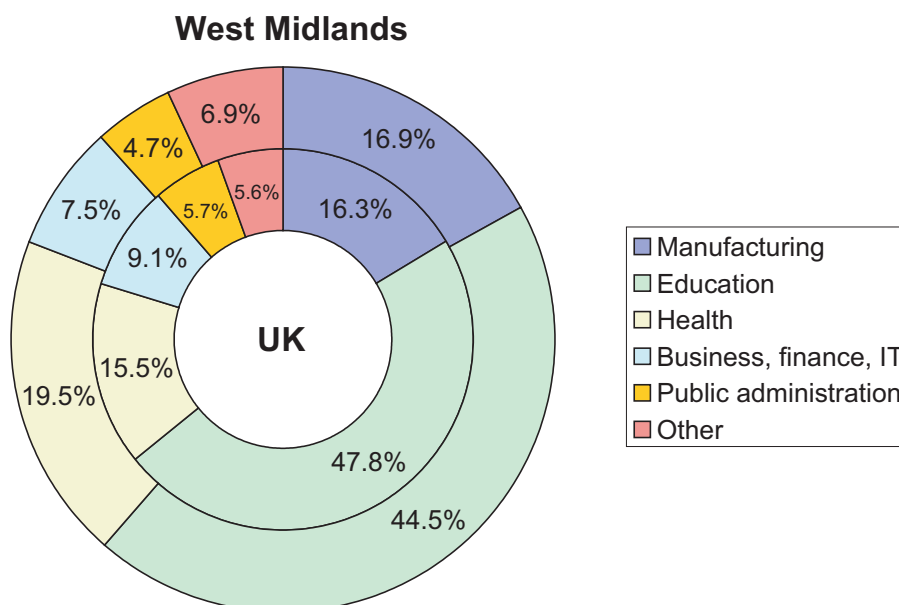


Figure Four: Employment sectors entered by UK-domiciled PhD graduates from West Midlands HEIs (outer ring) compared to all UK HEIs (inner ring), based on Standard Industrial Classifications returned in 2004 DLHE survey.

Career occupations

We examined the specific occupations entered by PhD graduates from West Midlands HEIs. As the previous employment sector analysis might suggest, there are strong similarities with the UK average figures.

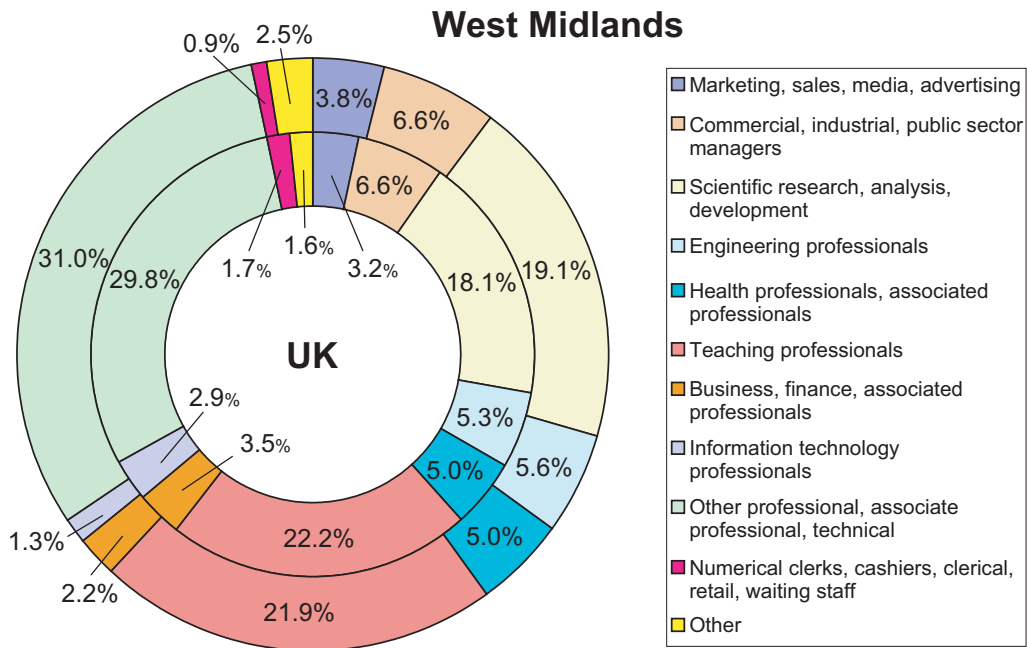


Figure Five: Types of work entered by UK-domiciled PhD graduates from HEIs in the West Midlands (outer ring) compared to all UK HEIs (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

All of the occupational categories are within 2% of the average UK figures. However, the greatest proportional differences are in IT professionals (1.3% compared to 2.9% across the UK) and business, finance and associated professionals (2.2% compared to 3.5% across the UK). The professions more popular than the UK average were scientific research (19.1% compared to 18.1%) and the other professions including psychologists and postdoctoral researchers (31% compared to 29.8%).

Migration

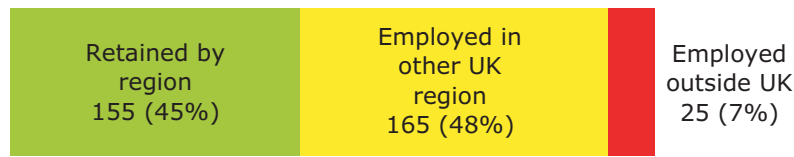
We examined the migration patterns of UK-domiciled PhD graduates from the West Midlands’s HEIs who were in employment at the time of the survey, shown in Figure Six. In common with most regions, the West Midlands saw a net loss of PhD graduates with 29.7% less starting work in the region than the total number of PhD graduates from the region. This is the highest proportional difference of any region in the UK¹³. 165 PhD graduates (48% of total employed) left the West Midlands for employment in other regions in the UK. This proportion is significantly higher than the average figure for all regions of 38%. PhD graduates from the West Midlands moved across the UK with the South East and London most popular, each attracting 7%. Other popular regions were the South West, East and North West¹⁴.

Another 25 PhD graduates (7% of total employed) left the West Midlands for work or work and study abroad: lower than the UK average of 9%.

¹³ The net migration figures should be treated with care. 2.5% of the total DLHE respondents did not identify a specific region of employment. If these respondents are skewed to one region this will impact significantly on the net migration figures.

¹⁴ Data protection prohibits a full analysis of region to region migration.

(a) PhDs graduating from West Midlands



(b) PhDs employed in West Midlands



Figure Six: Mobility of West Midlands PhD graduates in employment (a) and origin (region of study) of PhD graduates working in the West Midlands (b)

What do PhD graduates employed in the West Midlands do?¹⁵

155 UK-domiciled PhD graduates from West Midlands HEIs were working in the region at the time of the survey, representing 64% of the total working in the region. They were joined by 85 UK-domiciled PhD graduates from other regions in the UK who gained employment in the West Midlands. Within this cohort, small numbers came from each of the other UK regions, but the South East provided the most substantial number (7% of those employed in the region) along with the North West (6%), Wales (5%) and East Midlands (5%). In total, 6% of all UK-domiciled PhD graduates who left their regions of study for known UK locations moved to the West Midlands.

Employment sectors

The employment sectors for all UK-domiciled PhD graduates employed in the West Midlands are compared to the national picture in Figure Seven. As with all other regions, and in line with the national average, education was the largest single employment sector in the region. Surprisingly, given the predominance of the manufacturing sector in the West Midlands, this sector employed significantly less PhD graduates (11.6%) compared to the UK average of 16.3%. Conversely, the health sector employed significantly more (20.7% compared to 15.5%). The other employment sectors of business, finance and IT, public administration and other professions employed similar percentages of PhD graduates in the West Midlands as the UK average.

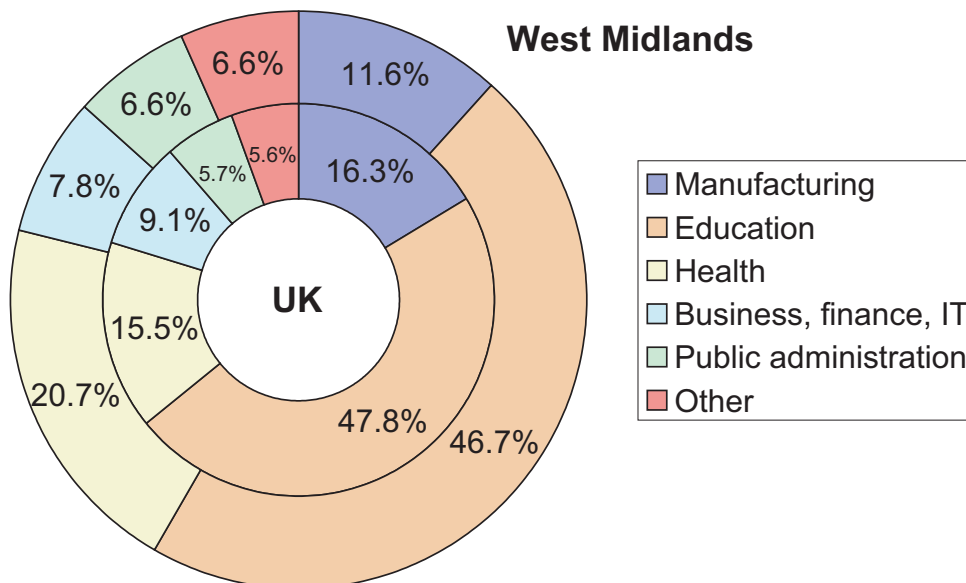


Figure Seven: Employment sectors entered by UK-domiciled PhD graduates employed in the West Midlands (outer ring) compared to all UK regions (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

¹⁵ The data in this section refers to PhD graduates from all regions of the UK who were working in the West Midlands

Like many regions, the education sector employed the highest proportion of the 85 PhD graduates moving into the West Midlands (34%) followed by manufacturing (15%) and health (14%). The business and finance public sectors employed 12% and 13% respectively.

Career occupations

We examined the specific occupations entered by PhD graduates employed in the West Midlands. The picture is quite different to the UK as a whole, as outlined in Figure Eight. The largest difference occurs in the 'other professionals' category (35.1% compared to 29.8% across the UK), which includes most postdoctoral researchers and reflects the dominance of the higher education sector as an employer of PhD graduates in the region. Of those employed in the education sector, 45% were employed as university teaching staff and 35% as postdoctoral researchers¹⁶. Overall, 24% of the PhD graduates working in the West Midlands are identifiable as postdoctoral researchers, slightly higher than the UK average of 22%.

Compared to the national averages, the West Midlands employed a higher proportion of PhD graduates as engineering and health professionals, but fewer in teaching, scientific research, IT and business, finance and associated professionals.

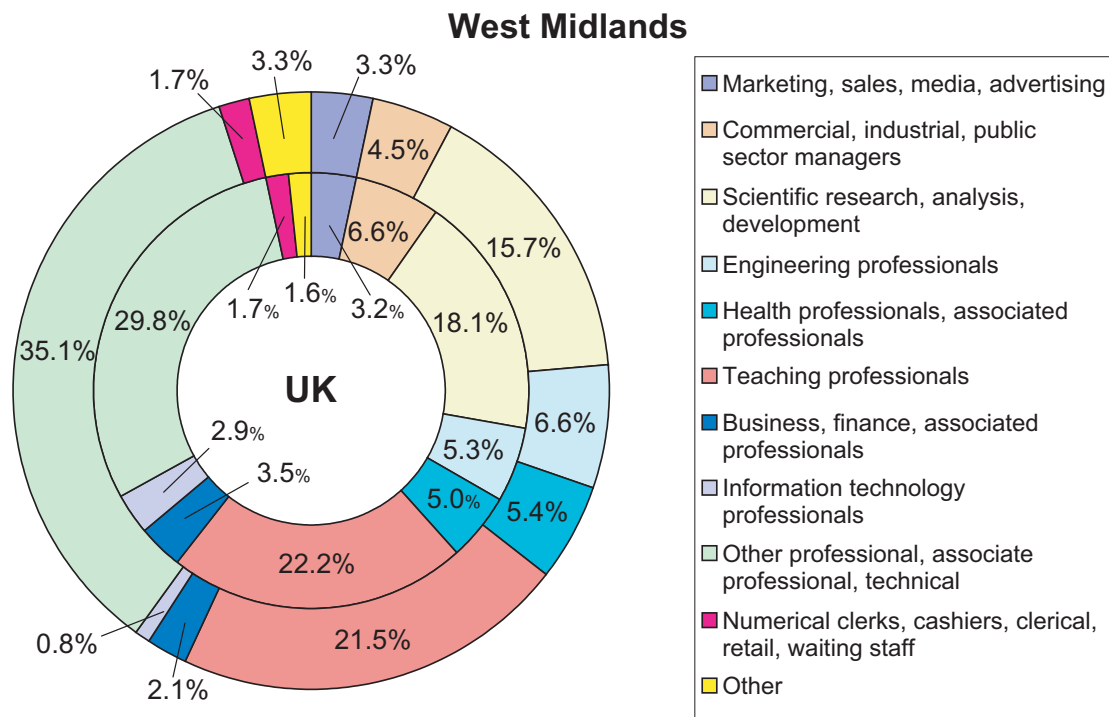


Figure Eight: Types of work entered by UK-domiciled PhD graduates employed in the West Midlands (outer ring) compared to all UK regions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

¹⁶ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities www.grad.ac.uk/wdps

East of England

The East of England produced 9.4% of UK-domiciled PhD graduates and employed 9.3% of the UK PhD workforce in the DLHE survey. The region was one of the most popular for mobile PhD graduates. When compared to the UK averages, PhD graduates from East of England HEIs had a slightly lower unemployment rate and were more likely to gain work outside the UK. Just under half of PhD graduates from the East of England remained in the East for work.

Key statistics:

The 680¹ UK-domiciled PhD graduates from institutions in the East of England made up 9.4% of the UK total:

- 62% were male and 38% female, compared to the UK average of 55% and 45%
- 15% studied part-time, significantly lower than the UK average of 27%
- The most popular subjects were engineering, psychology, chemistry and history.

Of the 485 (71%) who responded to the 2004 DLHE² survey:

- 80% entered employment in the UK³
- 2.9% were unemployed, slightly lower than the UK average of 3.2%
- 12.2% continued their careers overseas compared to 8.1% across the UK.

Of the 385 PhD graduates from universities in the East who entered employment in the UK:

- 49.7% entered the education sector, predominantly in higher education
- 22% were employed in manufacturing and 11.8% in the health sector
- 53% remained in the East and 47% moved to other regions of the UK.

The East employed 385 (9.3%) of the UK-domiciled PhD graduate workforce:

- 53% gained their PhD at institutions in the East
- 47% moved to the East from other regions of the UK
- 42% were employed in the education sector: 57% as postdoctoral researchers; 29% in university teaching roles, primarily as lecturers
- 24% of all PhD graduates working in the East were employed as postdoctoral researchers.

The East was a net exporter (-13.5%) of UK-domiciled PhD graduates:

- PhD graduates who left the East for work were most likely to move to London, the South East and outside the EU
- The East attracted 12% of the UK-domiciled PhD graduates who left their region of study for known UK locations
- PhD graduates moving to the region are most likely to come from the South East, East Midlands and London and work in the manufacturing (37%) or education (23%) sector.

Overview of East of England higher education institutions⁴

There are nine higher education institutions (HEIs) in the East of England: seven universities and two higher education colleges. The higher education student population at these institutions is over 87,000 full-time equivalent (FTE) students. The institutions range in size from the University of Cambridge (over 19,000 student FTEs) to Norwich School of Art and Design (around 700 student FTEs). According to HEFCE, the East of England has the highest proportion of postgraduate research students, and the highest percentage of part-time students.

Almost 8% of students in the region are registered for postgraduate research degrees (see Table One), predominantly at the institutions with a substantial research income – the University of Cambridge (which dominates the region in terms of research income), UEA, Cranfield University and the University of Essex.

Higher education institution	Final year PhD numbers
The University of Cambridge	865
The University of East Anglia	180
Cranfield University	145
The University of Essex	135
Anglia Polytechnic University	70
University of Hertfordshire	60
University of Luton	5
Total	1460

Table One: Final year PhD researchers by HEI in the East⁵

The research strengths of universities in the East are reflected in Figure One, derived from the results of the 2001 Research Assessment Exercise (RAE)⁶. Further analysis of the RAE results shows that 71% of submissions from the region's institutions were rated at 4 or above, with over half (53%) scoring the highest ratings of 5 and 5*, the highest proportion of any UK region. These top rated departments are across the subject spectrum indicating the broad range of research expertise in the region.

¹ All figures are rounded to the nearest five for data protection

² Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

³ 72.8% are classified as 'working in the UK'; 7.2% are 'working and studying in the UK'. The data in WDPDR on employment includes both classifications

⁴ HEFCE 2004 Regional Profiles: East of England

⁵ These figures are derived from the HESA student record data for those who were scheduled to complete their enrolment period in 2002/03. They include international PhD researchers who were not included in the DLHE survey www.hesa.ac.uk/pi/0203/research.htm

⁶ Data set available at www.hero.ac.uk/rae/Results

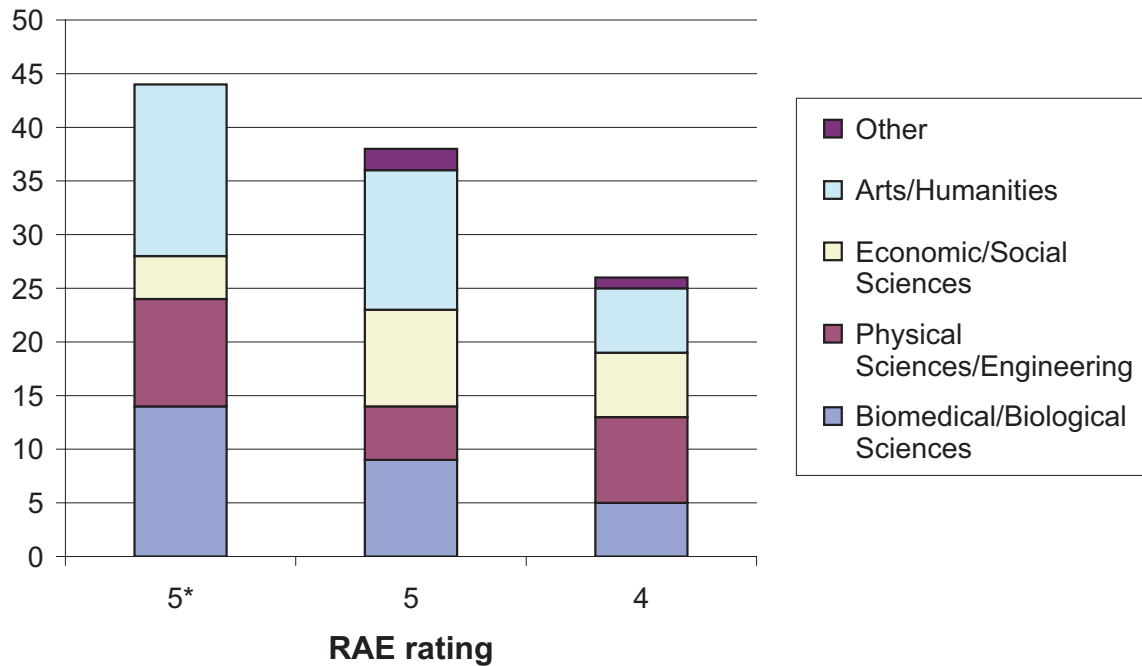


Figure One: Research subjects of top graded RAE submissions in the East of England

Economic strengths

Unemployment in the East stands at 3.5%⁷, lower than the English average of 4.8%. The economy includes a range of industries that value knowledge and research, namely telecommunications, electronics, pharmaceuticals, agriculture and food processing. The Cambridge area has the highest concentration of biotechnology firms outside small areas of the United States.

The East of England Development Agency (EEDA) is keen to build upon the region's global strength in research, development and innovation⁸. The region has the highest proportion of employees in Research and Development (R&D) of anywhere in the UK and is the home of many large private companies which invest heavily in R&D. The EEDA is particularly keen to build links between the universities and research institutes, and the private sector, and to support the commercialisation of knowledge.

When compared to other UK regions, research in the East of England is in a strong position. Its levels of R&D expenditure are higher than any other UK region. The Business Enterprise R&D Survey, conducted by the Office of National Statistics⁹,

reported that in 2002, the gross domestic expenditure on R&D, as a percentage of Total Gross Value Added, was 4.2% for the East, compared to 2.0% for the UK as a whole.

Profile of PhD graduates from the East of England

Of the 7270 UK-domiciled PhDs who graduated in the UK in 2003, 9.4% (680) graduated from higher education institutions in the East of England. Of these PhD graduates, 38% were female and 62% male, giving the East a lower proportion of female doctoral graduates than the UK average of 45%. Part-time study was much less common in the East than in other regions, accounting for 15% of degrees awarded, compared to the UK average of 27%.

Figure Two shows the breakdown of PhD graduates by subject groups. The East of England had the highest proportion of PhD graduates of any region from the arts and humanities (20.6% compared to 13.7% across the UK). Fewer PhD graduates came from medical sciences (21.3% compared to 26.9% across the UK). Most other subject groupings, including the biosciences, social sciences, and physical sciences were similar to the UK average figures.

⁷ HEFCE 2004 Regional Profiles: East of England

⁸ A Shared Vision, <http://www.eeda.org.uk/>

⁹ www.statistics.gov.uk/; also useful is "Regional Competitiveness and State of the Regions" by Mukund Lad at www.dtistats.net/sd/rci/

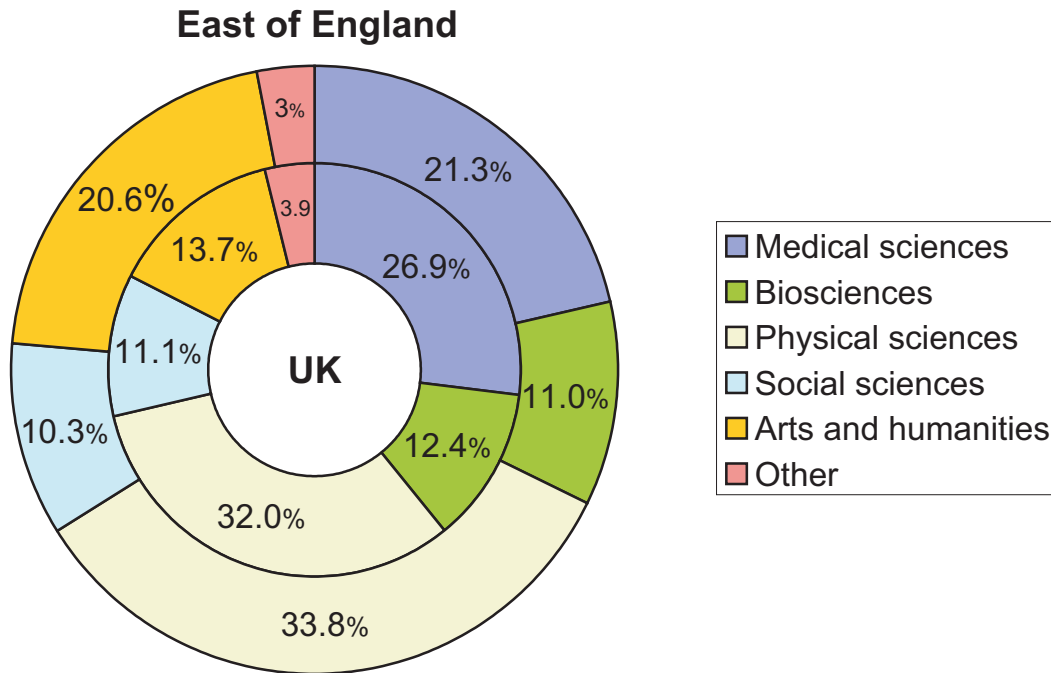


Figure Two: Subject groups of all UK-domiciled PhD graduates from East of England HEIs (outer ring) compared to all UK HEIs (inner ring) in 2003

The list of 'top ten' subject for PhD graduates from the East of England HEIs (Table Two) shows some striking differences with the average UK 'top ten' table. General engineering appears at the top of the subject ranking in the East, compared to 15th in the national table. Other differences reflect the strength of the arts and humanities research shown in Figure Two with Music, History and English all appearing in the table. The most common subject for PhD graduates in the UK, clinical medicine, appears only 7th in the table for the East of England.

Subject and ranking	East	Total (and position) in UK
1. General Engineering	5.0%	2.0% (15)
2. Psychology	4.9%	7.6% (3)
3. Chemistry	4.7%	7.7% (2)
4. History by period	4.3%	2.5% (9)
5. Music	4.3%	1.3% (21)
6. Physics	4.1%	4.4% (5)
7. Clinical Medicine	3.4%	8.2% (1)
8. Biology	2.9%	5.2% (4)
9. Academic studies in education	2.5%	3.1% (6)
10. English studies	2.1%	2.5% (8)

Table Two: Top subjects studied by PhD graduates in East of England HEIs compared to UK figures

What do PhDs from the East of England do?¹⁰

Of the 680 UK-domiciled PhD graduates from East of England Higher Education Institutions in 2003 eligible for the 2004 survey, 485 responded. At 71%, this is one of the highest response rates of any region.

Figure Three summarises the responses to the DLHE survey. 72.8% of UK-domiciled PhD graduates from East of England institutions had entered the workplace when the survey was conducted, almost identical to the overall UK figure of 72.7%. A further 7.2% were engaged in work and study simultaneously – slightly lower than the UK average of 8%. More PhD graduates had moved overseas (12.2%) than for the UK as a whole (8.1%). Unemployment rates for UK-domiciled PhD graduates from institutions in the region were slightly lower than the UK average (3.2%) at 2.9%.

¹⁰ The data in this section refers to PhD graduates from East of England HEIs who were working in all regions of the UK

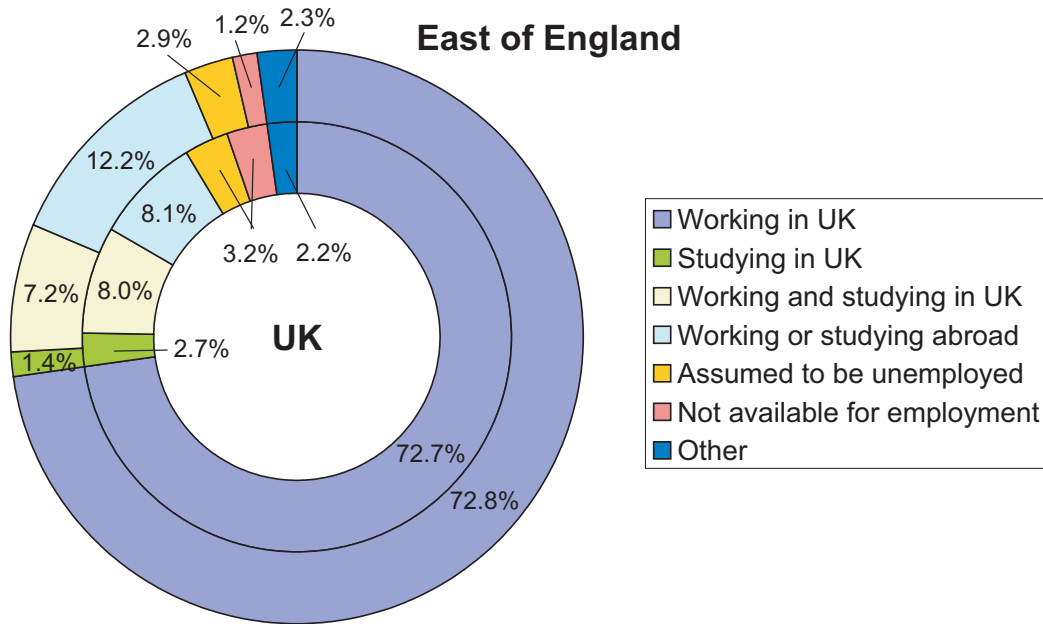


Figure Three: Survey response of UK-domiciled PhD graduates for all subjects from HEIs in the East of England (outer ring) compared to all UK HEIs (inner ring) from 2004 DLHE survey responses

Employment sectors

The 80% of PhD graduates from East of England universities working or working and studying in the UK were employed in a range of sectors across the UK. Consistent with the UK average (47.8%), the education sector was the dominant destination, employing 49.7%, predominantly in higher education.

The balance (50.3%) were employed in a range of occupations across all sectors, although as Figure Four illustrates, there are some differences with the UK average figures.

Manufacturing industries employed a significantly higher proportion of East of England graduates, accounting for 22% (compared to 16.3% across the UK as a whole). 67% of these were employed in the chemical and pharmaceutical industries, ie 15% of all East of England PhD graduates (compared to a national figure of 11%).

The health service employed fewer PhD graduates from the East of England’s institutions (11.8% compared to 15.5% across the UK). Slightly greater numbers were employed by business, finance and IT industries, but slightly fewer in the public sector than the UK average. Assorted other employment sectors account for the remaining 2.9% of PhD graduates.

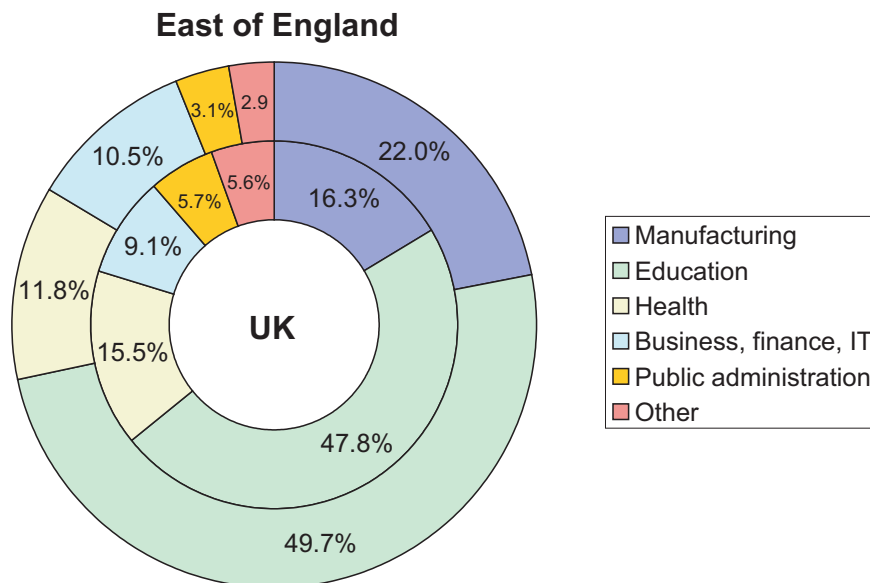


Figure Four: Employment sectors entered by UK-domiciled doctoral graduates from East of England HEIs (outer ring) compared to all UK HEIs (inner ring), based on Standard Industrial Classifications returned in 2004 DLHE survey

Career occupations

We examined the specific occupations entered by PhD graduates from East of England HEIs. As the previous employment sector analysis predicts, when compared to the UK average figures, variations emerge.

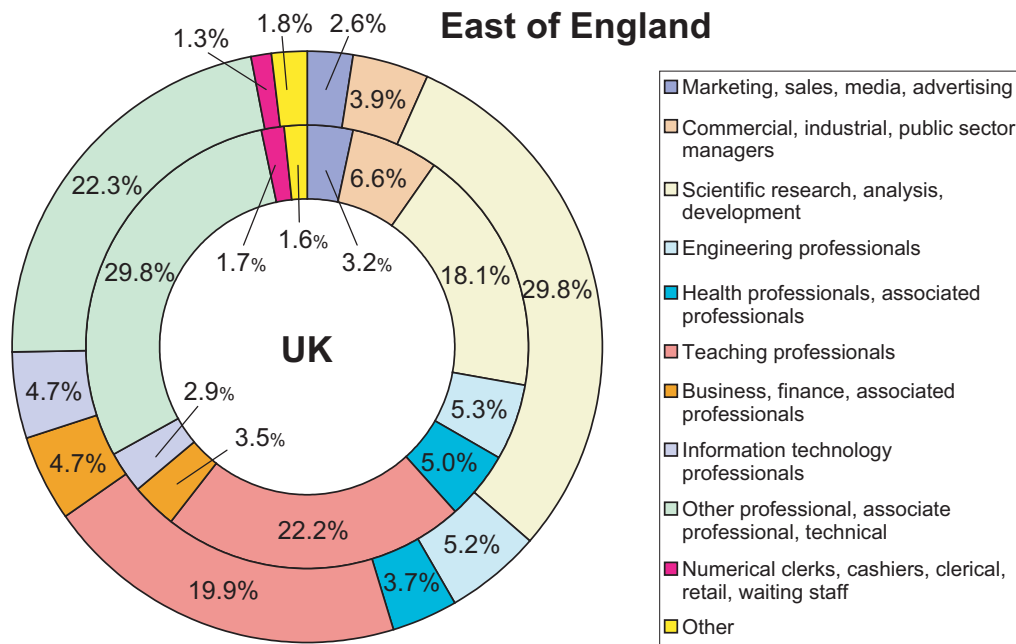


Figure Five: Types of work entered by UK-domiciled PhD graduates from East of England HEIs (outer ring) compared to all UK HEIs (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

The most striking difference is found in the proportion working in scientific research, analysis and development, which is significantly higher in the East of England (29.8% compared to 18.1% across the UK). The strength of the chemical and pharmaceutical industries partly accounts for the numbers working in this category. Also included in this category are some 'scientists' working in academic laboratories¹¹. Business and finance (4.7%) and IT (4.7%) professions also account for a higher proportion of the occupations of East of England PhD graduates than the UK average (3.5% and 2.9% respectively). Smaller proportions are found in teaching and other professional roles – in this case, the latter is partly due to the coding of some postdoctoral researchers as scientists.

Migration

We examined the migration patterns of UK-domiciled PhD graduates from the East of England's HEIs who were in employment at the time of the survey, shown in Figure Six.

180 PhD graduates (40% of total employed) left the East for employment in other regions in the UK. This proportion is slightly higher than the UK average of 38%. PhD graduates from the East move throughout the UK with London being the most popular, attracting 15%. Other popular regions were the South East, South West and North West¹².

The East of England is a popular destination for mobile UK graduates and the closest to a balanced system. An equal number of PhD graduates (180) moved to the East of England from other regions on the UK.

The net loss of PhD graduates from the East of England is effectively accounted for by 65 PhD graduates (14% of total employed) leaving the East for work or work and study abroad: significantly more than the national proportion of 9%.

¹¹ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities www.grad.ac.uk/wdpp

¹² Data protection prohibits a full analysis of region to region migration

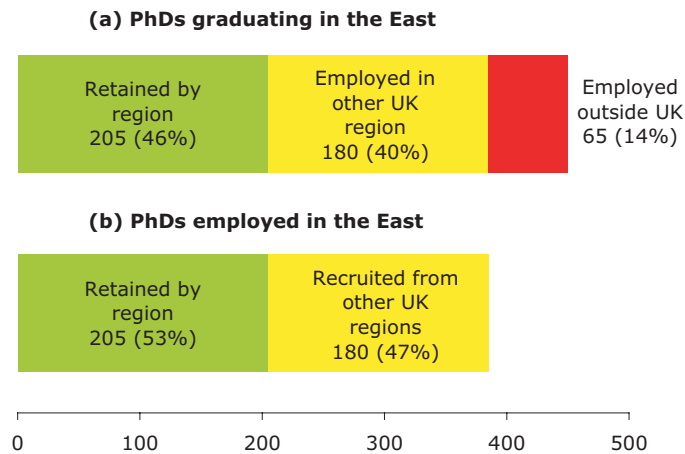


Figure Six: Mobility of East of England PhD graduates in employment (a) and origin (region of study) of PhD graduates working in the East of England (b)

What do PhD graduates employed in the East of England do?¹³

205 UK-domiciled PhD graduates from the East of England HEIs were working in the East at the time of the 2004 DLHE survey, representing 53% of the total number of PhDs working in the region. These were joined by 180 UK-domiciled PhD graduates from other regions in the UK who gained employment in the region. Within this cohort, small numbers came from each of the other UK regions, but the South East provided the most substantial number (10% of those employed in the East), along with the East Midlands (7%) and London (7%). In total, 12% of those who left their regions of study for known UK locations moved to the East of England, making this region the third most popular destination for UK-domiciled PhD graduates.

Employment sectors

The employment sectors for PhD graduates employed in the East are compared with the national picture in Figure Seven. A striking difference is that the manufacturing sector is a much more dominant employer of PhD graduates in the East than across the UK as a whole (29.6% compared to 16.3%). This represents the largest manufacturing PhD employment sector of all the UK regions. The education sector is less dominant in the East and employed 42.1% of PhD graduates in the region, predominantly in higher education, compared to 47.8% across the UK. The health sector also employed fewer PhD graduates (10.9%) compared to the UK average (15.5%). The balance (17.4%) were employed in business, finance and IT (7%), administration (4.7%) and 'other' sectors.

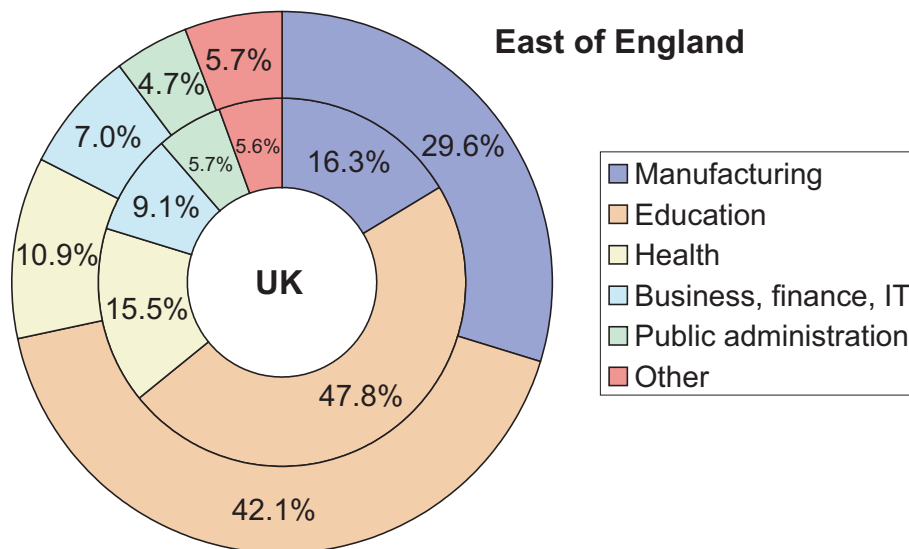


Figure Seven: Employment sectors entered by UK-domiciled PhD graduates employed in the East (outer ring) compared to all UK regions (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

¹³ The data in this section refers to PhD graduates from all regions of the UK who were working in the North East

Comparing Figure Seven with Figure Four, it appears that even though the East of England HEIs produced a greater than average proportion of PhD graduates who entered the manufacturing sector, the region was still a net importer of PhD graduates for this employment sector.

For the 180 PhD graduates who moved to the East for employment, the biggest employment sector was manufacturing (37%), followed by education (23%) with all other employment sectors employing around 10%.

Career occupations

We examined the specific occupations entered by PhD graduates employed in the East. As expected from the employment sector analysis, the picture is quite different to the UK average, as outlined in Figure Eight.

The most obvious difference in types of work occurs in the scientific research classification (29.9% compared to 18.1% across the UK). The 'other professionals' category, which includes some postdoctoral researchers and the teaching classification are both less dominant in the region than across the UK.

Of those employed in education, 29% can be identified as university teaching staff, and 50% as postdoctoral researchers¹⁴. Overall, 24% of the PhD graduates working in the East of England were employed as postdoctoral researchers, slightly higher than the UK average of 22%.

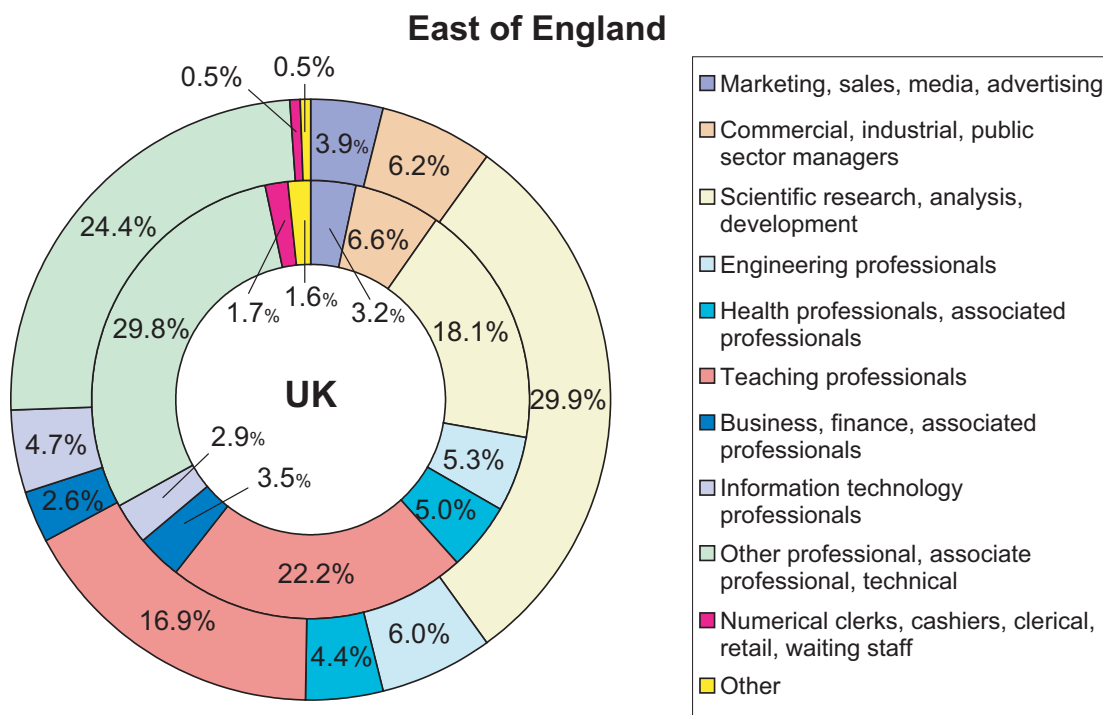


Figure Eight: Types of work entered by UK-domiciled PhD graduates employed in the East (outer ring) compared to all UK regions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

¹⁴ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities. www.grad.ac.uk/wdpp

London

London produced 11% of the UK-domiciled PhD graduates and employed 14% of the UK PhD workforce in the DLHE survey. It was one of only two regions to see a net influx of PhD graduates. PhD graduates from London universities have the most equal gender balance, a high proportion of part-time study and more than half of them remained in London for work.

Key statistics:

The 790¹ UK-domiciled PhD graduates from London institutions made up 11% of the UK total:

- 50% were male and 50% female, compared to the UK average of 55% and 45%
- 37% studied part-time, higher than the UK average 27%
- The most popular subjects were medicine, pharmacology, psychology and education.

Of the 495 (63%) who responded to the 2004 DLHE² survey:

- 78.3% entered employment in the UK³
- 3.2% were unemployed identical to the UK average
- 8.7% continued their careers overseas compared to 8.1% across the UK.

Of the 385 PhD graduates from London institutes who had entered employment in the UK:

- 50.3% entered the education sector, predominantly in higher education
- 18.7% were employed in the health sector and 10.7% in manufacturing
- 65% remained in London and 35% moved to other regions in the UK for work.

Overall, London employed 14% of the UK-domiciled PhD graduate workforce:

- 43% of these gained their PhD at London institutions
- 57% moved to the London from other regions of the UK
- 38% were employed in the education sector: 50% of these as postdoctoral researchers; 32% in university teaching roles, primarily as lecturers
- 19% of all PhD graduates working in London were employed as postdoctoral researchers.

London was a substantial net importer (+37%) of UK-domiciled PhD graduates:

- PhD graduates who left London for work were most likely to move to the South East, the East or to leave the UK
- London attracted 23% of all UK-domiciled PhD graduates who left their region of study for known UK locations
- PhD graduates moving to the region were most likely to come from the South East and the East of England and work in the education (26%) or health (23%) sectors.

Overview of London higher education institutions⁴

London has the largest concentration of higher education in the UK, with 39 higher education institutions (HEIs) including 12 universities, 10 higher education colleges and 17 colleges and schools of the University of London. These institutions range in size from London Metropolitan University (over 23,000 student FTEs) to the Institute for Cancer Research (just over 100 student FTEs).

4.6% of students in the region were registered for postgraduate research degrees and were predominantly based in the institutions with high research profiles and income: University College London, Imperial College of Science, Technology and Medicine, and King's College, London. (Table One)

Higher education institution	Final year PhD numbers
University College London	570
Imperial College of Science, Technology and Medicine	455
King's College London	375
Queen Mary and Westfield College	125
London School of Economics and Political Science	115
Brunel University	110
The School of Oriental and African Studies	65
Birkbeck College	50
City University	50
Institute of Education	50
London Metropolitan University	50
St George's Hospital Medical School	35
Goldsmiths College	35
Middlesex University	30
The University of Greenwich	30
The School of Pharmacy	25
Institute of Cancer Research	20
Courtauld Institute of Art	15
The Royal Veterinary College	15
The University of East London	15
The University of Westminster	15

continued on next page

¹ All figures are rounded to the nearest five for data protection

² Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

³ 73.6% are classified as 'working in the UK'; 4.7% are 'working and studying in the UK'. The data in WDPDR on employment includes both classifications

⁴ HEFCE 2004 Regional Profiles: London

Higher education institution	Final year PhD numbers
Kingston University	10
London School of Hygiene and Tropical Medicine ¹⁰	
London South Bank University	10
Royal College of Art	10
London Business School	5
Thames Valley University	5
University of London (Institutes and activities)	5
University of Surrey, Roehampton	5
Total	2310

Table One. Final year PhD researchers by HEI in London⁵

The research strengths of universities in London are reflected in Figure One, derived from the results of the 2001 Research Assessment Exercise (RAE)⁶. Further analysis of the RAE results shows that 62.4% of submissions from the region's institutions were rated at 4 or above, with 41.8% scoring the highest ratings of 5 and 5*. These top rated departments are across the subject spectrum indicating the broad range of research expertise in the region, with particular strengths in the arts and humanities.

Economic strengths

London's economy⁷ is dominated by financial and business services, which make up the highest proportion of any regional economy in England. Conversely, manufacturing accounts for the lowest proportion in England. The London Development Agency (LDA)⁸ reports that London has the highest productivity rate in the UK, the world's 4th largest economy and a gross value added of over £160 billion a year.

When compared to other UK regions, however, the capital's research and development base looks weaker. Its levels of research and development (R&D) expenditure are much lower

than the UK average. The Business Enterprise R&D Survey, conducted by the Office of National Statistics⁹, reported that in 2002, the gross domestic expenditure on R&D, as a percentage of Total Gross Value Added, was 1.2% for London, compared to 2.0% for the UK as a whole.

The LDA has developed the London Innovation Strategy to build upon the existing strengths of the capital. This strategy differs from other regions by including the creative and cultural sectors in its "science policy". The strategy aims to bring the broad expertise in London's academic sector together with the business sector "to make London the world's leading knowledge economy".

The innovation strategy is just one of many initiatives. The scale of economic activity in the capital means that there are a huge range of development opportunities, which have the potential to increase demand for the knowledge and skills of researchers from all disciplines.

Profile of PhD graduates from London

Of the 7270 UK-domiciled PhDs who graduated in the UK in 2003, 11% (790) graduated from London HEIs. Of these, 50% were male and 50% female, giving London the highest proportion of female PhD graduates of any region (UK average figures are 55% and 45%). Part-time study was more common in London than in other regions, accounting for 37% of degrees awarded, compared to the UK average of 27%.

Figure Two shows the breakdown of PhD graduates by subject groups. Significantly more PhD graduates from London HEIs came from the medical sciences (40.7%) compared to the UK average of 26.9%. To a lesser extent, the economic and social science subjects are also better represented in London (13.4% compared to 11%). There is also a concentration of 'other' subjects, predominantly education (6.4% compared to 3.9%). Conversely there are fewer PhD graduates from the physical sciences (18.5%) compared to the UK average (32.0%) and biosciences (7%) compared to (12.4%). The proportion of arts and humanities PhD graduates in London is similar to the UK picture (around 14%).

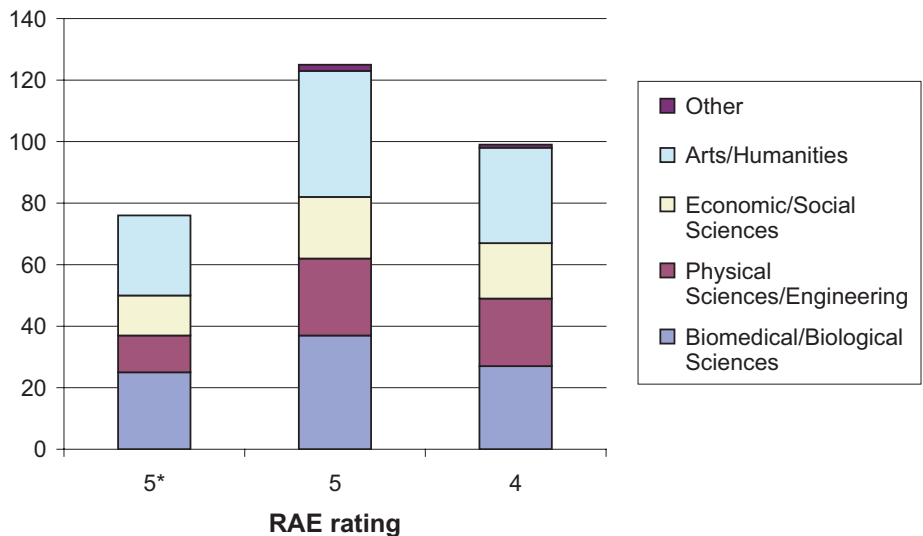


Figure One: Research subjects of top graded RAE submissions in London

⁵ These figures were derived from the HESA student record data for those who were scheduled to complete their enrolment period in 2002/03. They include international PhD researchers who were not included in the DLHE survey www.hesa.ac.uk/pi/0203/research.htm
⁶ Data set available at www.hero.ac.uk/rae/Results
⁷ HEFCE 2004 Regional Profiles: London
⁸ www.lda.gov.uk
⁹ www.statistics.gov.uk/; also useful is 'Regional Competitiveness and State of the Regions' by Mukund Lad at www.dtistats.net/sd/rci/

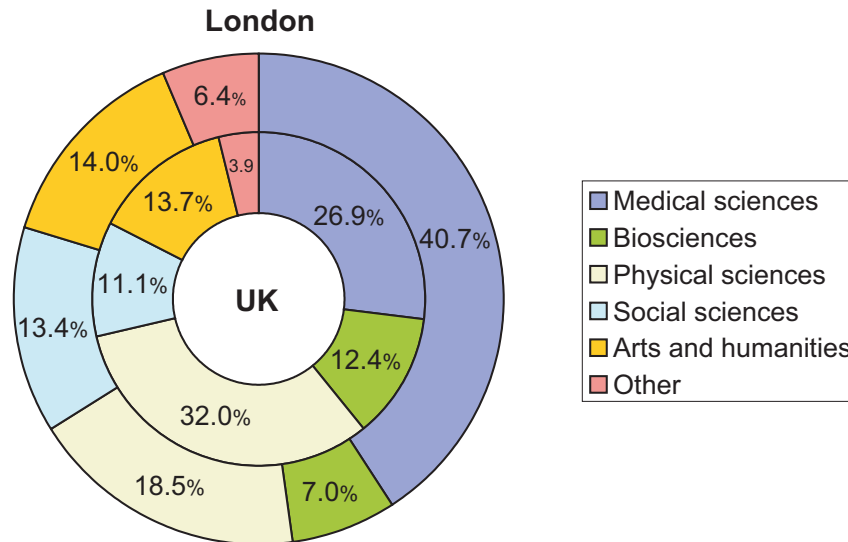


Figure Two: Subject groups of all UK-domiciled PhD graduates from London HEIs (outer ring) compared to all UK HEIs (inner ring) in 2003

The list of 'top ten' subjects for PhD graduates from London HEIs (Table Two) is consistent with the medical science strengths illustrated above. Clinical medicine is substantially ahead of the next nearest subject and other medical and biomedical research subjects dominate the rankings. The physical sciences that do appear, chemistry and physics, are both at much lower percentages than the national figures.

Subject and ranking	London	Total (and position) in UK
1. Clinical medicine	8.0%	8.2% (1)
2. Pharmacology, toxicology & pharmacy	4.3%	2.9% (7)
3. Psychology	3.9%	7.6% (3)
4. Academic studies in education	3.4%	3.1% (6)
5. Pre-clinical medicine	3.3%	2.0% (30)
6. Biology	2.3%	5.2% (4)
7. Physics	2.2%	4.4% (5)
8. Anatomy, physiology and pathology	1.8%	1.8% (19)
8. Chemistry	1.8%	7.7% (2)
10. Sociology	1.6%	1.9% (17)

Table Two: Top subjects studied by PhD graduates from London HEIs compared to UK figures

What do London's PhD graduates do?¹⁰

Of the 790 UK-domiciled PhD graduates from London's HEIs in 2003 eligible for the 2004 survey, 495 responded (63% response rate).

The proportion of UK-domiciled PhD graduates from London's institutions that had entered the workplace when the survey was conducted (73.6%), is close to the overall UK figure of 72.7%. A further 4.7% were engaged in work and study simultaneously, lower than the UK average of 8%. Slightly more PhD graduates had moved overseas (8.7%) than for the UK as a whole (8.1%). Unemployment rates for UK-domiciled PhD graduates from London institutions were the same as the UK average at 3.2%.

¹⁰ The data in this section refers to PhD graduates from London HEIs who were working in all regions of the UK

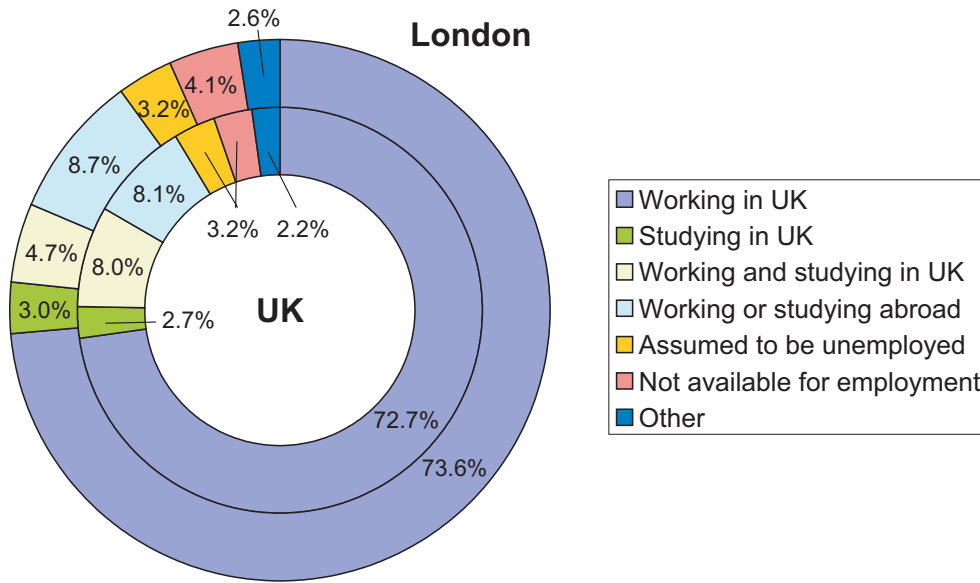


Figure Three: Survey response of UK-domiciled PhD graduates for all subjects from HEIs in London (outer ring) compared to all UK HEIs (inner ring) from 2004 DLHE survey responses

Employment sectors

The 78.3% of PhD graduates from London HEIs working or working and studying in the UK were employed in a range of sectors across the UK. Consistent with the UK average (47.8%), the education sector was the dominant destination, employing 50.3%, predominantly in higher education. The balance (49.7%) were employed in a range of occupations across all sectors, with some differences compared to the picture for UK-domiciled PhD graduates from all UK HEIs.

The health sector employed more London PhD graduates, accounting for 18.7%, compared to 15.5% across the UK as a whole. The manufacturing sector accounted for a much smaller proportion of PhD graduates (10.7% compared to 16.3%). 61% of these PhD graduates were employed in the chemical and pharmaceutical industries, accounting for 6.5% of all London UK-domiciled PhD graduates (compared to a national proportion of 11%).

Although business, finance and IT are all particularly strong in the capital, this is not reflected in the employment of PhD graduates from the region's HEIs (8.3% compared to 9.1% across the UK). Similarly, public administration and 'other' sectors were lower than the UK average.

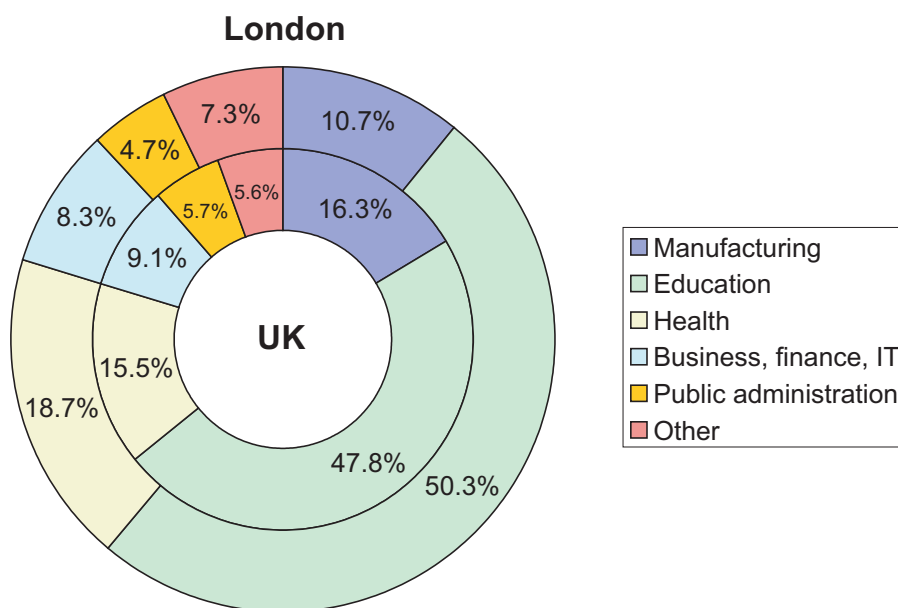


Figure Four: Employment sectors entered by UK-domiciled doctoral graduates from London HEIs (outer ring) compared with all UK institutions (inner ring), based on Standard Industrial Classifications returned in 2004 DLHE survey.

Career occupations

We examined the specific occupations entered by PhD graduates from London’s institutions. As the previous employment sector analysis predicts, when compared to the UK average figures, variations emerge (see Figure Five).

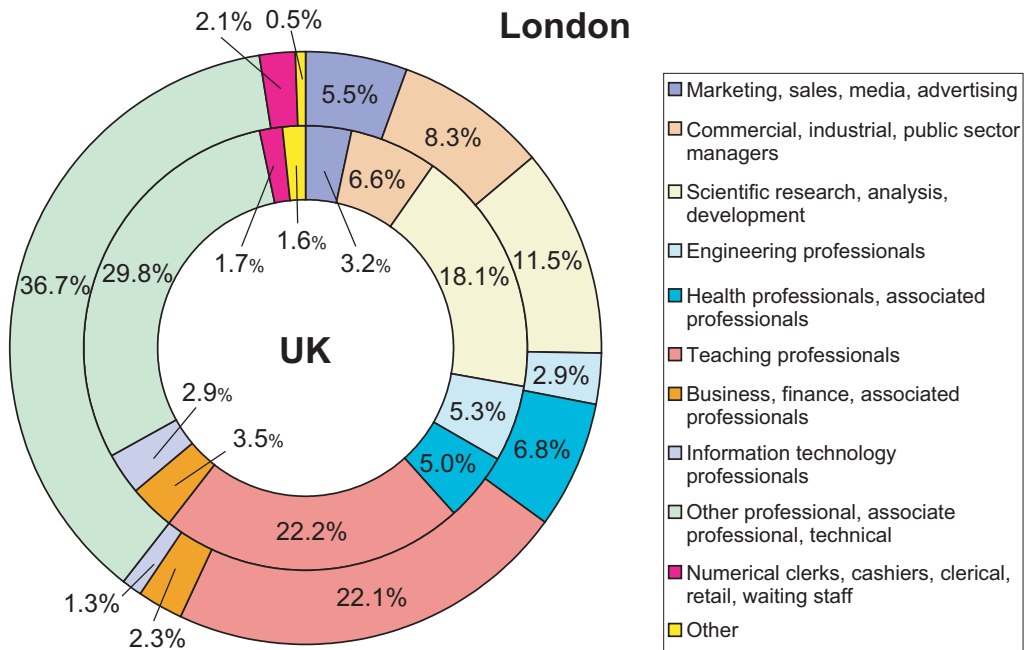


Figure Five: Types of work entered by UK-domiciled PhD graduates from HEIs in London (outer ring) compared to all UK institutions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey.

PhD graduates from London HEIs were more likely to be employed as ‘other professionals’ – this category includes postdoctoral researchers: 36.7% compared to 29.8% for the UK average. Conversely, the region employed fewer scientific researchers (11.5% compared to 18.1%), fewer business, finance and IT professionals and fewer engineers. Not surprisingly, the numbers working as health professionals at 6.8% were higher than the UK average of 5.0%. More surprisingly, given the strength of the financial and business services sectors in the region, London PhD graduates were less likely to be employed in these sectors (2.3%) than the UK average (3.5%).

Migration

We examined the migration patterns of UK-domiciled PhD graduates from London’s HEIs who were in employment at the time of the survey (see Figure Six).

135 PhD graduates (32% of the total employed) left London for employment in other regions of the UK. This proportion was lower than the UK average of 38%. PhD graduates from London moved across the UK, but many remained close to home with the South East (12%) and the East of England (6%) the most popular destinations¹¹. Another 40 PhD graduates (9% of the total employed) left London for work or work and study abroad, consistent with the national average of 9%.

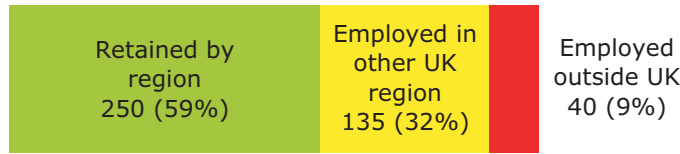
335 PhD graduates, came to London from other regions of the UK for employment, equivalent to 57% of the total PhD graduates employed in London. Within this sizeable cohort, PhD graduates came from all UK regions, particularly the South East (21% of the total London doctoral labour force), the East of England (11%) and the South West (5%). The capital was by far the most popular destination for PhD graduates, with 23% of all those who left their regions of study for known UK locations moving to London. (The next most popular region was the South East, which attracted 17%).

As a result and in contrast to most regions, London saw a significant net gain of UK-domiciled PhD graduates, 37.4% more PhD graduates started work in the region than the total number of PhD graduates from the region¹².

¹¹ Data protection prohibits a full analysis of region to region migration

¹² The net migration figures should be treated with care. 2.5% of the total DLHE respondents did not identify a specific region of employment. If these respondents were skewed to one region this will impact significantly on the net migration figures

(a) PhDs graduating from London



(b) PhDs employed in London



Figure Six: Mobility of London PhD graduates in employment (a) and origin (region of study) of PhD graduates working in London (b)

What do PhD graduates employed in London do?¹³

250 PhD graduates from London’s institutions were working in the capital at the time of the survey, representing 43% of the total number of PhDs working in the region. They were joined by 335 UK-domiciled PhD graduates from other regions in the UK who moved to London for employment.

Employment sectors

The employment sectors for 585 PhD graduates employed in London (14% of the UK-domiciled PhD graduate workforce) are compared with the national picture in Figure Seven. There are significant differences to the national picture, reflecting the unique economy of the capital. The health sector was significantly higher than average at 22.4% compared to 15.5%. The business, finance and IT sector employed more PhD graduates in London than any other region of the UK (14.9% compared to 9.1% across the UK). Similarly, public administration employed more PhD graduates (8.0%) than the national average (5.7%).

The education sector employed the smallest percentage of any UK region (38.4% compared to 47.8). Of those employed in education 50% were postdoctoral researchers and 32% in university teaching roles, primarily as lecturers. In total 19% of the PhD graduates working in London were employed as postdoctoral researchers¹⁴, lower than the UK average of 22%.

Similarly, the proportion employed in manufacturing was (with Northern Ireland) the lowest proportion of all the UK regions (8.9% compared to 16.3%).

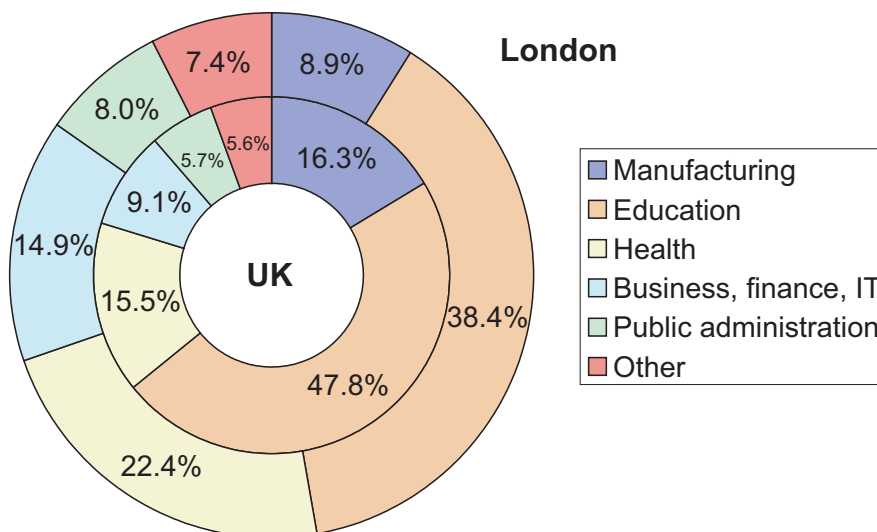


Figure Seven: Employment sectors entered by UK-domiciled PhD graduates employed in London (outer ring) compared to all UK regions (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

¹³ The data in this section refers to PhD graduates from all regions of the UK who were working in London

¹⁴ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities www.grad.ac.uk/wdpd

For the 335 UK-domiciled PhD graduates who moved to London from other regions in the UK, the main employment sector was education (38.4%), but at a much lower level than the UK average (47.8%). Of these, 29% were employed as lecturers and 43% as postdoctoral researchers. Unsurprisingly, other popular employment sectors were business and finance (20% of those moving to London) and health (23%). Manufacturing employed a small proportion of those entering the capital (11%), as did public administration (12%) with a range of other sectors (notably publishing and cultural activities) employing the remaining 8%.

Overall, London was a net exporter of those entering the education sector, but a net importer of those entering the health and business, finance and IT sectors.

Career occupations

In Figure Eight we compare the specific occupations of UK-domiciled PhD graduates who moved to London for employment to the UK average. PhD graduates moving to London were more likely to be employed in the 'other professionals' classification (34.8%), which includes some postdoctoral researchers, than the UK average (29.8%). Fewer were employed as teaching professionals (16.8% compared to 22.2% across the UK) and in the scientific research classification (13.2% compared to 18.1%). A significantly higher proportion of PhD graduates were employed as business and finance professionals (7.5% compared to 3.5%). Most of the other proportions based on the standard occupational classifications employed a similar proportion of PhD graduates moving to London compared to the UK as a whole.

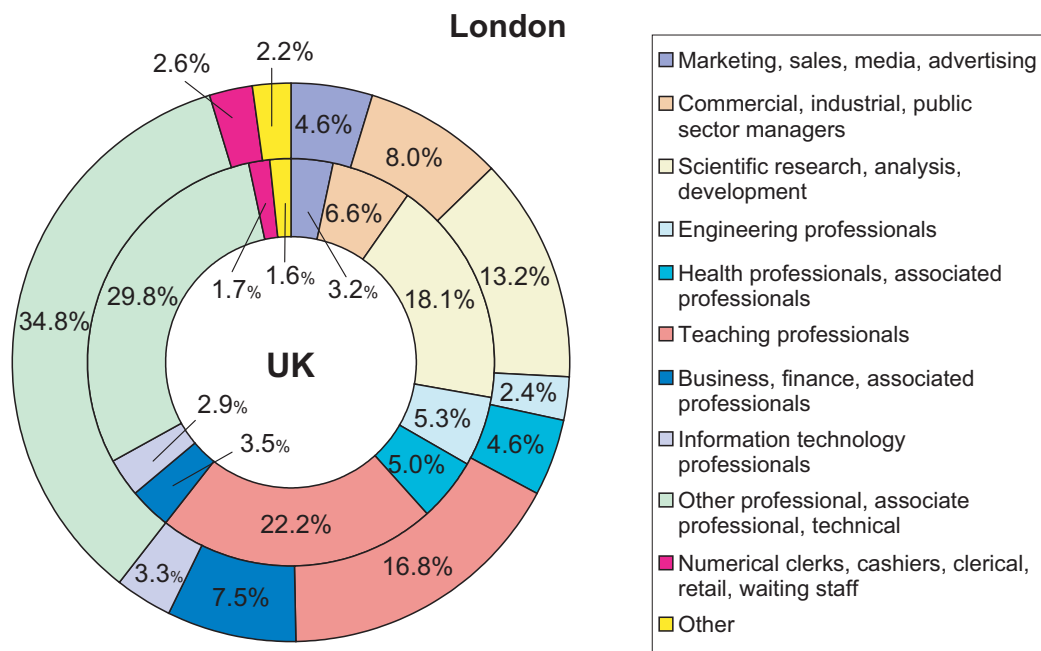


Figure Eight: Types of work entered by UK-domiciled PhD graduates employed in London (outer ring) compared to all UK regions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

South East England

The South East produced 17% of UK-domiciled PhD graduates and employed 13% of the UK PhD workforce in the DLHE survey. The employment and unemployment rates for PhD graduates from South East universities were very similar to the UK averages. Although the migration figures show that the region is attractive to PhD graduates from other regions, overall the region was a net exporter of PhD graduates. More than half of the region's PhD graduates leave the South East for work or work and study.

Key statistics:

The 1220¹ UK-domiciled PhD graduates from South East institutions made up 17% of the UK total:

- 57% were male and 43% female, compared to the UK average of 55% and 45%
- 25% studied part-time, consistent with the UK average 27%
- The most popular subjects were psychology, chemistry, physics and biology.

Of the 730 (60%) who responded to the 2004 DLHE² survey:

- 80.5% entered employment in the UK³
- 3.3% were unemployed, very similar to the UK average 3.2%
- 9.2% continued their careers overseas compared to 8.1% across the UK.

Of the 590 PhD graduates from South East HEIs who had entered employment in the UK:

- 44.6% entered the education sector, predominantly in higher education
- 18.2% were employed in manufacturing and 17% in the health sector
- 51% remained in the South East and 49% moved to other regions of the UK.

The South East employed 545 (13%) of the UK-domiciled PhD graduate workforce:

- 55% gained their PhD at South East institutions
- 45% moved to the South East from other regions of the UK
- 46% were employed in the education sector: 44% as postdoctoral researchers; 37% in university teaching roles, primarily as lecturers
- 20% of all PhD graduates working in the South East were employed as postdoctoral researchers.

The South East was a net exporter (-16.7%) of UK-domiciled PhD graduates:

- PhD graduates who left the South East for work were most likely to move to London and the South West or the East of England
- The South East attracted 17% of the UK-domiciled PhD graduates who left their region of study for known UK locations
- PhD graduates moving to the region were most likely to come from the London or the East of England and work in the education or manufacturing sectors (both 33%).

Overview of South East higher education institutions⁴

In the South East of England, there are nine universities, one school of the University of London, and seven higher education colleges. There are over 171,000 full-time equivalent (FTE) higher education students in these institutions. The largest higher education institution (HEI) in the region is the University of Oxford with almost 19,000 student FTEs, and the smallest is the Kent Institute of Art & Design with just over 2,000 student FTEs.

Just over 5% of students in the region were registered for postgraduate research degrees, predominantly at the institutions with a substantial research income – the Universities of Oxford (which dominates the region in terms of research income), Reading, Surrey, Southampton and Sussex (see Table One).

Higher education institution	Final year PhD numbers
The University of Oxford	725
The University of Southampton	375
The University of Reading	225
The University of Surrey	200
The University of Sussex	195
Open University	130
The University of Kent	115
Royal Holloway and Bedford New College	90
Oxford Brookes University	55
The University of Portsmouth	40
The University of Brighton	20
Buckinghamshire Chilterns University College	20
Southampton Institute	15
King Alfred's College, Winchester	10
Canterbury Christ Church University College	5
Total	2220

Table One. Final year PhD researchers by HEI in the South East⁵

The research strengths of universities in the South East are reflected in Figure One, derived from the results of the 2001 Research Assessment Exercise (RAE)⁶. Further analysis of the RAE results shows that 68.5% of submissions from the region's institutions were rated at 4 or above, with 45% scoring the highest ratings of 5 and 5* - the second highest proportion of any UK region. These top rated departments are across the subject spectrum indicating the broad range of research expertise in the region.

¹ All figures are rounded to the nearest five for data protection

² Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

³ 71.3% are classified as 'working in the UK'; 9.2% are 'working and studying in the UK' The data in WDPDR on employment includes both classifications

⁴ HEFCE 2004 Regional Profiles: South East

⁵ These figures are derived from the HESA student record data for those who were scheduled to complete their enrolment period in 2002/03. They include international PhD researchers who were not included in the DLHE survey www.hesa.ac.uk/pi/0203/research.htm. In line with the survey statistics, all Open University PhD graduates are included in this region

⁶ Data set available at www.hero.ac.uk/rae/Results

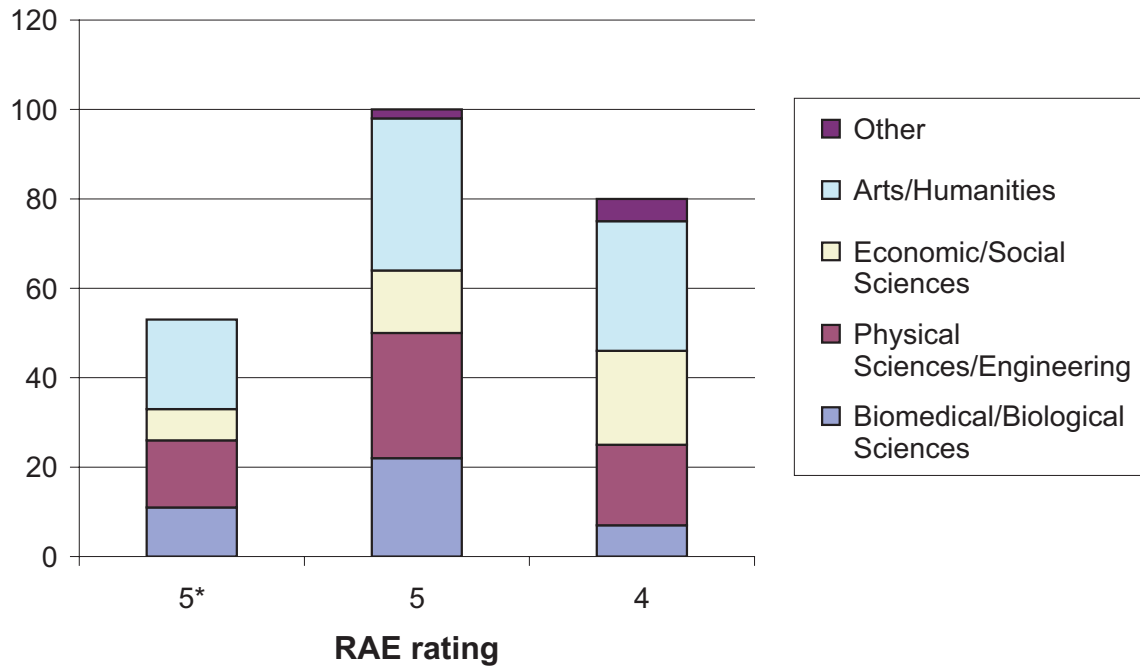


Figure One: Research subjects of top graded RAE submissions in South East England

Economic strengths

The South East England Development Agency (SEEDA)⁷ acknowledges the prosperity of this region, citing low unemployment (3.85% compared with the UK average of 4.9%) and high disposable income amongst its measures. It describes the South East as the 'locomotive of the UK economy' as its performance is critical to that of the UK as a whole.

The South East research profile is one of the strongest in the UK. The Business Enterprise R&D Survey conducted by the Office of National Statistics⁸, reported that in 2002, the gross domestic expenditure on research and development (R&D), as a percentage of Total Gross Value Added was 3.1% for the South East, compared to 2.0% for the UK as a whole. Additionally, over a quarter of all expenditure on research and development performed in UK businesses took place in the South East in 2001. With this huge resource, SEEDA's focus is different from many other regions. Rather than looking to create new research economies, it is intent on maximizing the outputs of its research base, and to transform this potential into economic wealth that can be retained within the region.

Profile of PhD graduates from the South East

Of the 7270 UK-domiciled PhDs who graduated in the UK in 2003, 16.8% (1220) graduated from South East HEIs. This was the largest number of PhD graduates from any region in the UK. Of these PhD graduates, 43% were female and 57% male, consistent with the UK average of 45% and 55%. Part-time study accounted for 25% of PhD degrees awarded, in line with the UK average of 27%.

Figure Two shows the breakdown of UK-domiciled PhD graduates by subject groups. A higher percentage of PhD graduates from South East universities (36.5%) came from the physical sciences than the UK average (32%). Slightly higher percentages came from the biosciences (13.9% compared to 12.4%) and the arts and humanities (16.4% compared to 13.7%). A smaller proportion graduated from the economic and social sciences (8.6% compared to 11.1%) and the medical sciences (22.1% compared to 26.9% across the UK).

⁷ The Regional Economic Strategy www.seeda.co.uk

⁸ www.statistics.gov.uk/; also useful is 'Regional Competitiveness and State of the Regions' by Mukund Lad at www.dtistats.net/sd/rci/

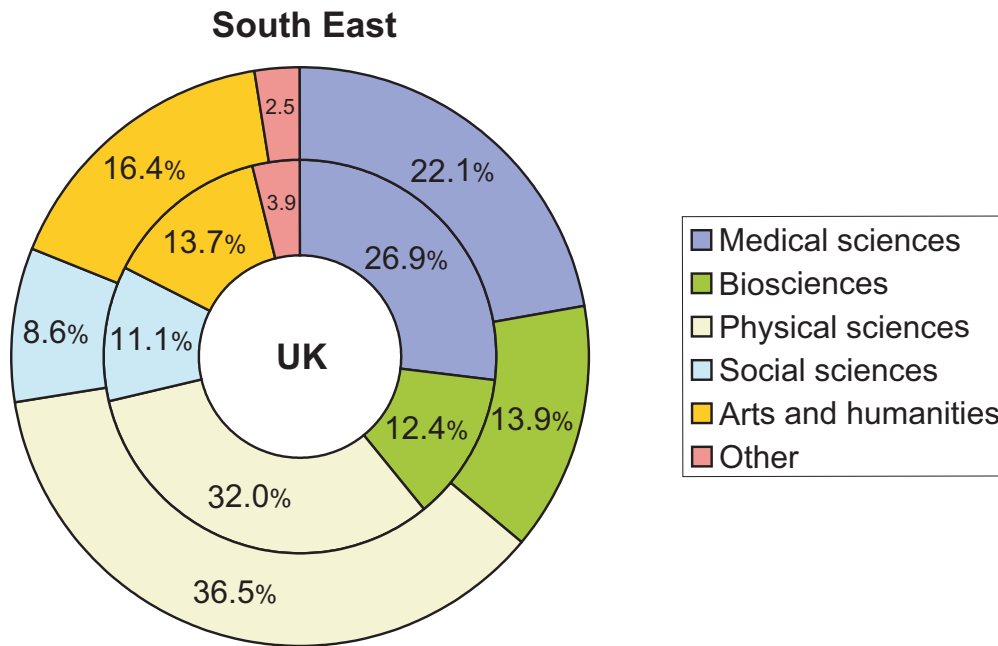


Figure Two: Subject groups of all UK-domiciled PhD graduates from HEIs in the South East (outer ring) compared to all UK HEIs (inner ring) in 2003

The list of the 'top ten' subjects for PhD graduates from the South East HEIs (Table Two) shows a stronger bias towards scientific and technical subjects than the UK table. Psychology, chemistry, physics, biology and other biological subjects top the table, although the most popular UK subject, clinical medicine, was ranked only at number 10 in the South East. Engineering subjects were also better represented in the South East than the UK average. From the arts and humanities, only history appears in the South East 'top ten'.

Subject and ranking	South East	Total (and position) in UK
1. Psychology	8.6%	7.6% (3)
2. Chemistry	6.4%	7.7% (2)
3. Physics	3.6%	4.4% (5)
4. Biology	2.9%	5.2% (4)
5. Other biological sciences	2.9%	1.2% (22)
6. Physical terrestrial geography and environmental sciences	2.4%	2.1% (11)
7. History by period	2.0%	2.5% (9)
8. Electronic and Electrical Engineering	1.8%	2.1% (11)
9. General Engineering	1.6%	2.0% (15)
10. Clinical Medicine	1.6%	8.2% (1)

Table Two. Top subjects studied by PhD graduates in South East HEIs compared to UK figures

What do South East PhDs do?⁹

Of the 1220 UK-domiciled PhD graduates from South East HEIs in 2003 eligible for the 2004 survey, 730 responded (60% response rate).

71.3% of UK-domiciled PhD graduates from South East institutions had entered the workplace when the survey was conducted, slightly lower than the overall UK figure of 72.7%. A further 9.2% were engaged in work and study simultaneously, slightly higher than the UK average of 8%. Slightly more PhD graduates had moved overseas (9.2%) than for the UK as a whole (8%). At 3.3%, unemployment rates for UK-domiciled PhD graduates from South East institutions were consistent with the UK average of 3.2%.

⁹ The data in this section refers to PhD graduates from South East HEIs who were working in all regions of the UK

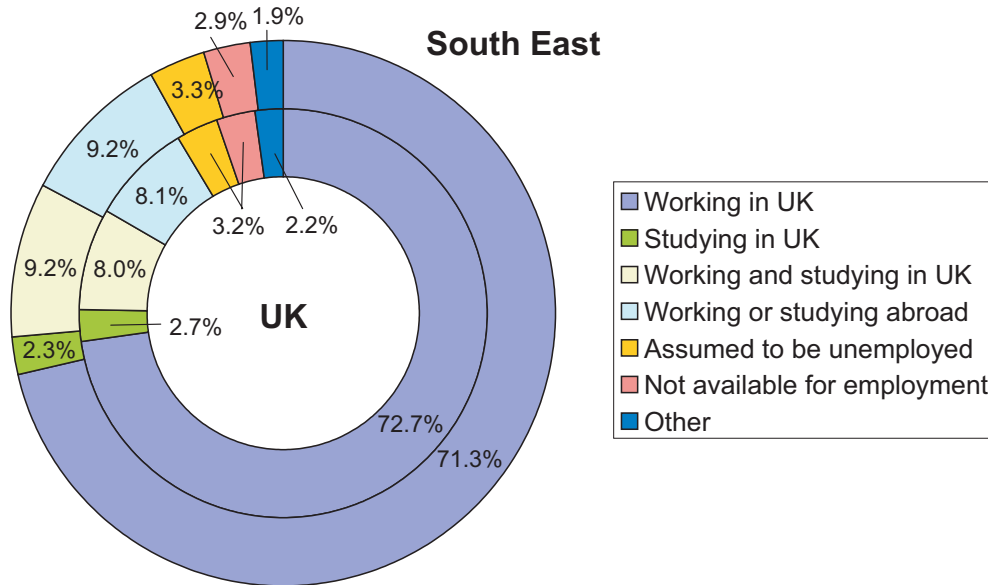


Figure Three: First destinations of UK-domiciled PhD graduates for all subjects from HEIs in the South East (outer ring) compared to all UK HEIs (inner ring) from 2004 DLHE survey responses

Employment sectors

The 80.5% of PhD graduates from South East HEIs working or working and studying in the UK were employed in a range of sectors across the UK. Consistent with the UK average (47.8%), the education sector was the dominant destination, employing 44.6%, predominantly in higher education.

The balance were employed in a range of occupations across all sectors, with only small differences against the UK picture, as shown in Figure Four.

Manufacturing industries employed 18.2% of the South East PhD graduates compared to 16.3% across the UK. 68% of these were employed in the chemical and pharmaceutical industries, accounting for 12% of all South East PhD graduates, close to the national figure of 11%).

The health sector employed a higher percentage of PhD graduates from South East universities at 17% compared to 15.5% across the UK. Slightly higher were employed in business, finance, IT (9.4% compared to 9.1%) and slightly less in the public sector (5.3% compared to 5.7%).

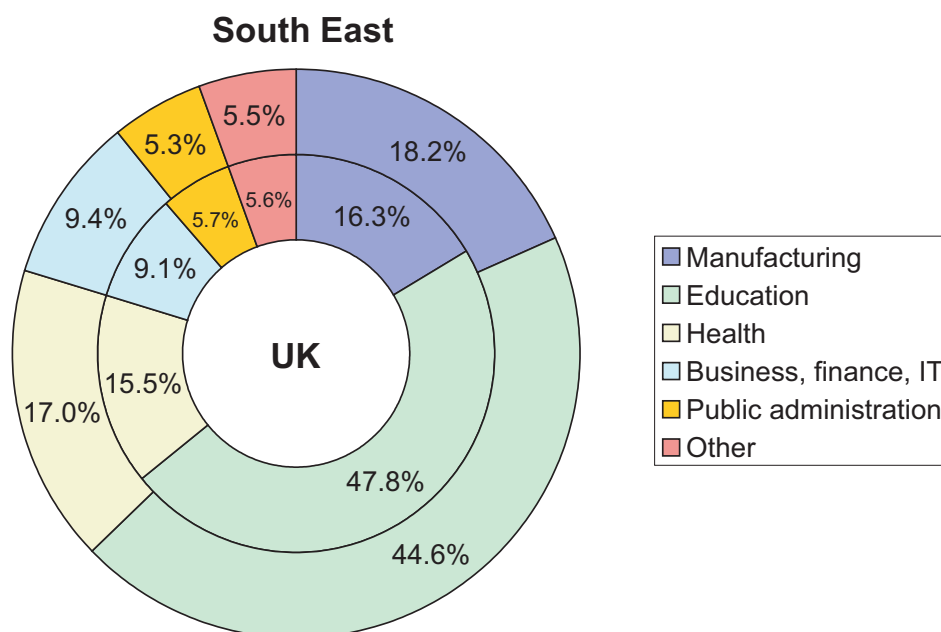


Figure Four: Employment sectors entered by UK-domiciled doctoral graduates from South East HEIs (outer ring) compared to all UK institutions (inner ring), based on Standard Industrial Classifications returned in 2004 DLHE survey

Career occupations

We examined the specific occupations entered by PhD graduates from South East universities. Given the similar picture of PhD degree subjects and employment sectors, it is not surprising that the occupations of South East PhD graduates reflect the UK average.

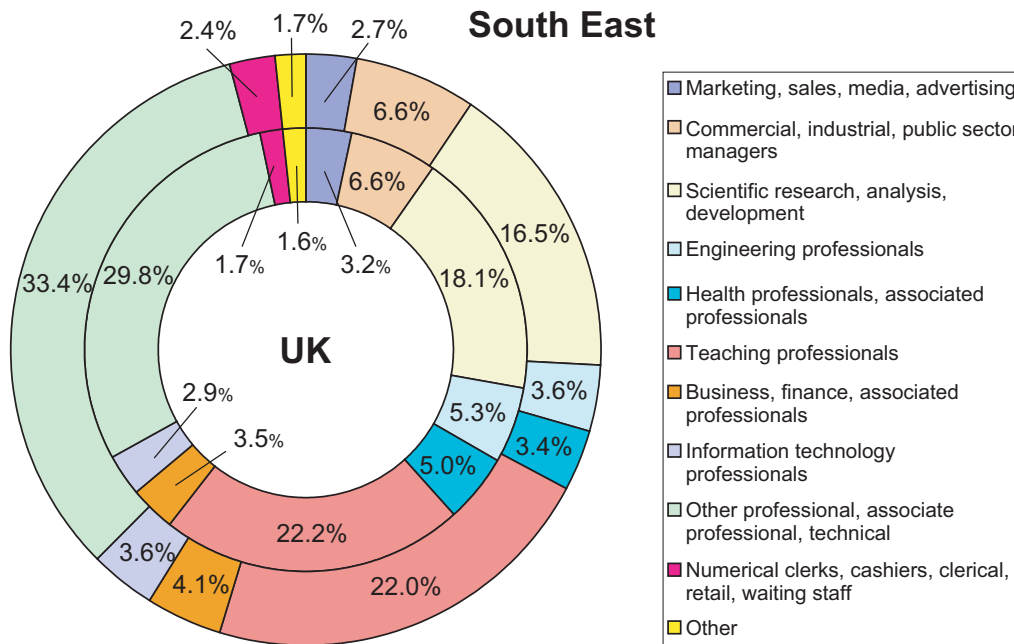


Figure Five: Types of work entered by UK-domiciled PhD graduates from HEIs in the South East (outer ring) compared to all UK institutions (inner ring), based on Standard Occupational Classifications returned in the 2004 DLHE survey.

The largest variation in the occupations of PhD graduates from South East HEIs and the national picture is in 'other professions', which includes some postdoctoral researchers. 33.4% of South East PhD graduates were employed in this sector compared to the UK average of 29.8%. Conversely, the region produced slightly fewer scientific researchers (16.5% compared to the 18.1% UK average) and engineers (3.6% compared to the UK average of 5.3%).

Migration

We examined the migration patterns of UK-domiciled PhD graduates from South East HEIs who were in employment at the time of the survey.

In common with most regions, the South East saw a net loss of PhD graduates. 16.7% fewer PhD graduates started work in the South East than the total number of PhD graduates from the region¹⁰. 290 PhD graduates (44% of total employed) left the South East for employment in other regions of the UK. This proportion is higher than the average figure for all regions of 38%. PhD graduates from the South East moved across the UK, but London was the most popular, attracting 19% of the total. Other popular regions for migration were the East of England and the West Midlands¹¹.

Another 65 PhD graduates (10% of total employed) left the South East for work or work and study abroad (compared to the national average of 9%).

¹⁰ The net migration figures should be treated with care. 2.5% of the total DLHE respondents did not identify a specific region of employment. If these respondents are skewed to one region this will impact significantly on the net migration figures

¹¹ Data protection prohibits a full analysis of region to region migration

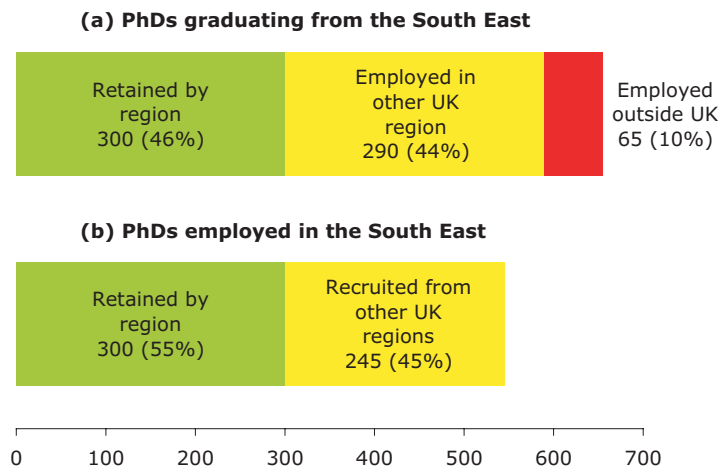


Figure Six: Mobility of South East PhD graduates in employment (a) and origin (region of study) of PhD graduates working in the South East (b)

What do PhD graduates employed in the South East do?¹²

300 UK-domiciled PhD graduates from South East HEIs were working in the South East at the time of the survey, representing 55% of the total employed in the region.

These were joined by 245 UK-domiciled PhD graduates from other regions in the UK, who gained employment in the South East. Within this cohort, small numbers came from each of the other UK regions, but London supplied the highest percentage at 9% of the South East PhD labour force, followed by the East of England (7%) and the West Midlands (5%). In total, 17% of UK-domiciled PhD graduates who left their regions of study for known UK locations moved to the South East. Amongst the regions, only London attracted greater numbers of PhD graduates.

Employment sectors

The employment sectors for all PhD graduates employed in the South East are compared to the national picture in Figure Seven. In line with the rest of the UK, the education sector employed 46.4% of PhD graduates in the region, compared to 47.8% across the UK. Of these, 37% were employed as university lecturers and 44% as postdoctoral researchers. Overall, 20% of all the UK-domiciled PhD graduates employed in the South East were employed as postdoctoral researchers, slightly lower than the UK average of 22%.

The most striking difference is that the manufacturing sector is a more dominant employer of PhD graduates in the South East than across the UK as a whole: 23.8% compared to the UK average of 16.3%. This represents the second largest manufacturing sector in all UK regions: only the East of England employed a higher proportion of PhD graduates in manufacturing. In contrast, the health sector employed fewer PhD graduates in the South East at 9.4% compared to 15.5% across the UK. The public sector and 'other' sector were more in line with the UK averages.

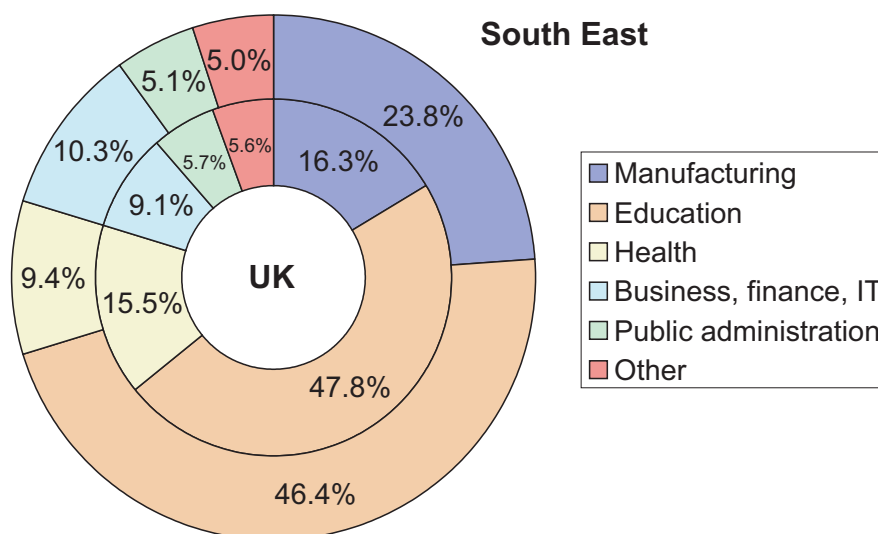


Figure Seven: Employment sectors entered by UK-domiciled PhD graduates employed in the South East (outer ring) compared to all UK regions (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

¹² The data in this section refers to PhD graduates from all regions of the UK who were working in the South East

For the 245 PhD graduates who moved to the South East for employment, 33% were employed in the education sector. Of this cohort, 29% were employed as lecturers, 36% as postdoctoral researchers and 19% in further and school education. The manufacturing sector employed 33% of those PhD graduates moving to the region, whilst the business sector employed 12%, public administration 9% and health 8%.

Career occupations

We examined the specific occupations entered by PhD graduates employed in the South East. Overall, the picture is similar to the UK as a whole, as outlined in Figure Eight.

The most significant differences are in the scientific research classification, higher at 21.3% compared to the UK average of 18.1%, and the 'other professionals' classification (this includes some postdoctoral researchers), which is lower at 25.9% compared to 29.8% nationally. Overall, 20% of all PhD graduates working in the South East were employed as postdoctoral researchers¹³ compared to the UK average of 22%.

In other occupations, slightly more PhD graduates were employed as teaching professionals in the South East at 23.1% compared to 22.2% across the UK. Similarly, more PhD graduates were employed as IT professionals (4.8%) within the region than the UK average (2.9%).

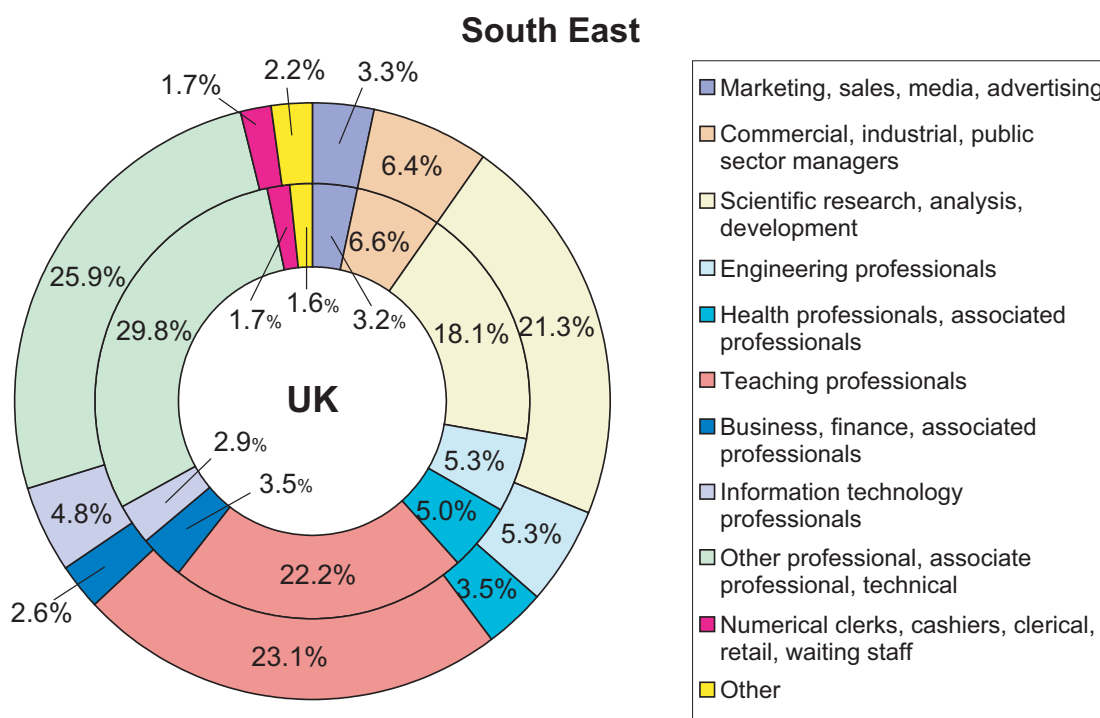


Figure Eight: Types of work entered by UK-domiciled PhD graduates employed in the South East (outer ring) compared to all UK regions (inner ring), based on Standard Occupational Classifications returned

¹³ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities www.grad.ac.uk/wdppd

South West England

The South West produced 6% of UK-domiciled PhD graduates and employed 7.5% of the UK PhD workforce in the DLHE survey. The region is one of only two that is a net “importer” PhD graduates. When compared to the national averages, PhD graduates from South West HEIs have lower unemployment rates, are slightly more likely to gain work outside the UK and more than half of them (53%) remain in the South West for work.

Key statistics:

The 435¹ UK-domiciled PhD graduates from South West institutions made up 6% of the UK total:

- 55% were male and 45% female, identical to the UK average
- 31% studied part-time, slightly higher than the UK average of 27%
- The most popular subjects were chemistry, psychology, biology and engineering.

Of the 325 (75%) who responded to the 2004 DLHE² survey:

- 82.5% entered employment in the UK³
- 2.1% were unemployed, lower than the UK average of 3.2%
- 8.9% continued their careers overseas compared to 8.1% across the UK.

Of the 270 PhD graduates from South West HEIs who had entered employment in the UK:

- 48.7% entered the education sector, predominantly in higher education
- 13.1% were employed in manufacturing and 14.6% in the health sector
- 59% remained in the South West and 41% moved to other regions in the UK.

The South West employed 315 (7.5%) of the UK-domiciled PhD graduate workforce:

- 51% gained their PhD at institutions in the South West
- 49% moved to the South West from other regions of the UK
- 49.2% were employed in the education sector: 40% of these as postdoctoral researchers; 42% in university teaching roles, primarily as lecturers
- 21% of all the PhD graduates working in the South West were employed as postdoctoral researchers.

The South West was a net importer (4%) of UK-domiciled PhD graduates: the only other UK region along with London to have a net gain of PhD graduates:

- PhD graduates who left the South West for work were most likely to move to London and the South East
- The South West attracted 10% of the UK-domiciled PhD graduates who left their region of study for known UK locations
- PhD graduates who moved to the region were most likely to come from the South East, West Midlands and the East and work in the education sector (36%).

Overview of South West higher education institutions⁴

There are seven universities and six higher education colleges in the South West of England. In 2004, the regional profile for the South West produced by HEFCE reported the total student population at these institutions to be over 111,000 full-time equivalent (FTE) students. Provision of higher education is varied with institutions ranging in size from the University of the West of England in Bristol (over 22,000 student FTEs) to Dartington College of Arts (under 500 student FTEs).

Of the HE students in the South West, 3.5% were registered for postgraduate research degrees, predominantly at the institutions with a substantial research income; the Universities of Bristol (which dominates the region in terms of research income), Bath and Exeter (see Table One).

Higher education institution	Final year PhD numbers
The University of Bristol	325
The University of Exeter	175
The University of Bath	145
The University of Plymouth	60
University of the West of England, Bristol	45
University of Gloucestershire	15
Bournemouth University	5
Total	770

Table One: Final year PhD researchers by HEI in the South West⁵

The research strengths of higher education institutions (HEIs) in the South West are reflected in Figure One, derived from the results of the 2001 Research Assessment Exercise (RAE)⁶. Further analysis of the RAE results shows that 66% of submissions from South West institutions were rated at 4 or above, with over a third (38.5%) scoring the highest ratings of 5 and 5* – the highest proportion of any UK region. These top rated departments are across the subject spectrum indicating the broad range of research expertise in the region.

¹ All figures are rounded to the nearest five for data protection

² Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

³ 71.5% are classified as ‘working in the UK’; 11.0% are ‘working and studying in the UK’. The data throughout WDPDR on employment includes both classifications

⁴ HEFCE 2004 Regional Profiles: South West

⁵ These figures are derived from the HESA student record data for those who were scheduled to complete their enrolment period in 2002/03. They include international PhD researchers who were not included in the DLHE survey www.hesa.ac.uk/pi/0203/research.htm

⁶ Data set available at www.hero.ac.uk/rae/Results

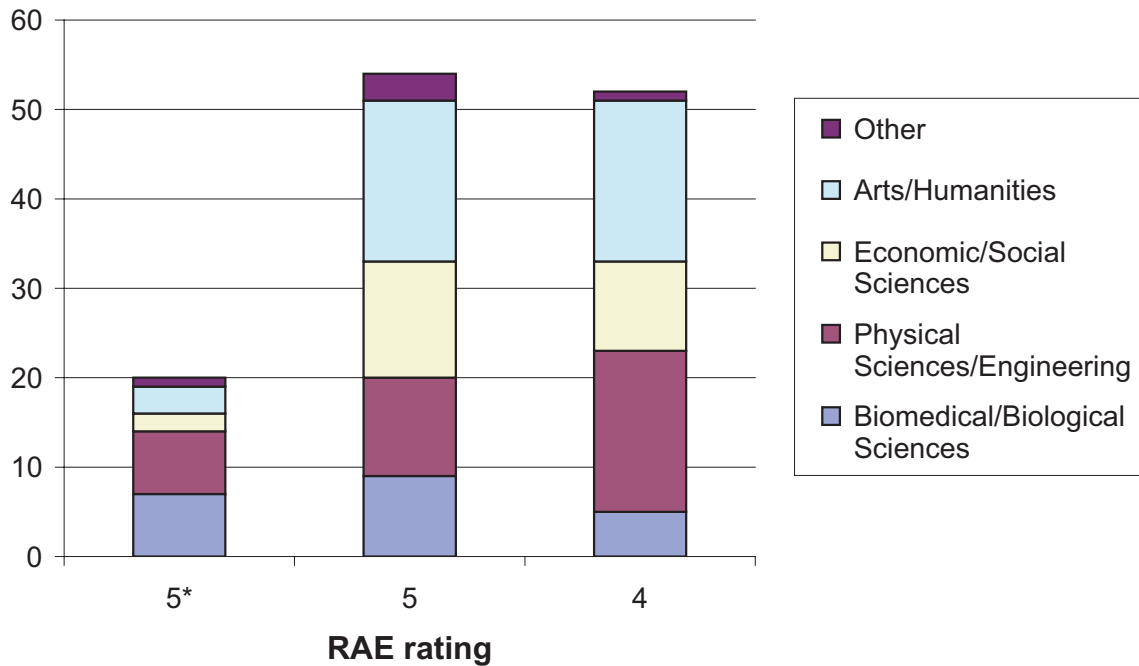


Figure One: Research subjects of top graded RAE submissions in the South West

Economic strengths

The rate of unemployment across the region is 2.7%⁷, significantly lower than the English average of 4.8%. The most economically successful parts of the region are the North and East, where high-tech, financial and industrial companies are based and South Gloucestershire is an important centre for the aerospace industry. Although, the level of Research and Development (R&D) expenditure at 2.3% is higher than the UK average of 2.0%, it is lower than other UK regions such as the East and South East, which have larger high technology industry sectors.

The South West of England Regional Development Agency (South West RDA)⁸ has identified a number of economically important and emerging industries, which are important to the region's future prosperity. These include food and drink, advanced engineering & aerospace, information and communications technology (ICT), the creative industries, marine, tourism, environmental technologies and biotechnologies. If these sectors thrive in the region, there will be an increased demand for the knowledge and skills of researchers.

Profile of PhD graduates from the South West

Of the 7270 UK-domiciled PhDs who graduated in the UK in 2003, 6.0% (435) graduated from HEIs in the South West. Of these PhD graduates, 45% were female and 55% male in line with the UK average. Part time study was more common in the South West than in other regions, accounting for 31% of degrees awarded compared to the UK average 27%.

Figure Two shows the breakdown of PhD graduates by subject groups. More PhD graduates from South West HEIs came from the physical sciences than the UK as a whole (33.7% compared to 32%), but fewer from the arts and humanities (10.1% compared to 13.7%). The other subject groupings are very similar to the national picture, with small variations for the economic and social sciences (12.4% compared to 11.1%) and medical sciences (25.8% compared to 26.9%). The remaining 6% came from education and related subjects and combinations of other subjects (compared to 4% of the national figures).

⁷ HEFCE 2004 Regional Profiles: South West

⁸ www.southwestrda.org.uk

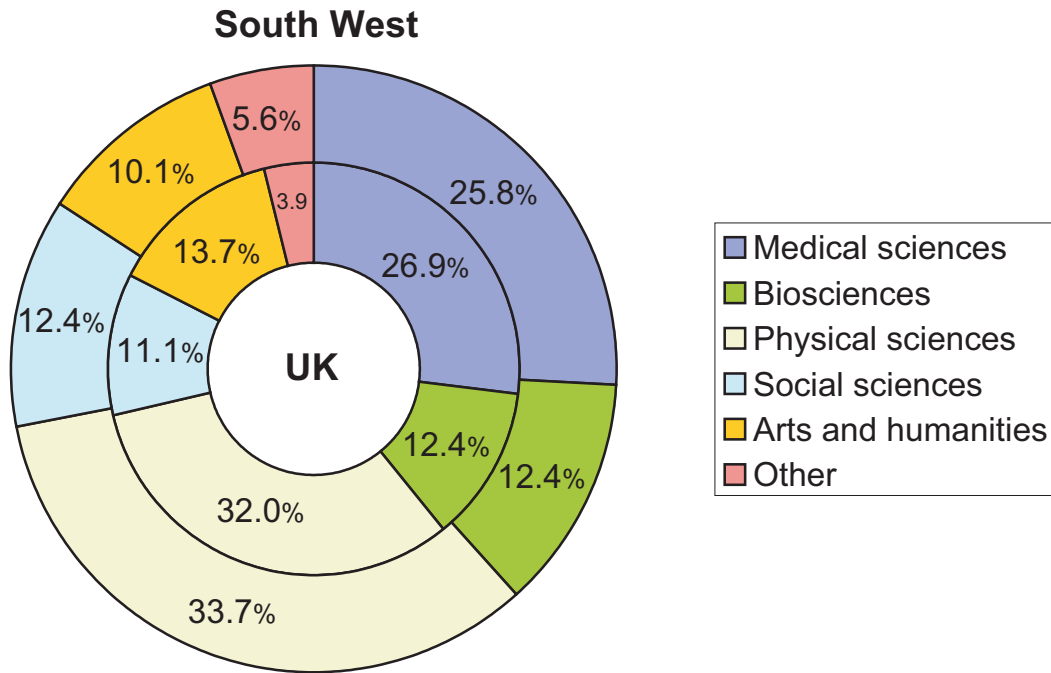


Figure Two: Subject groups of all UK-domiciled PhD graduates from HEIs in the South West (outer ring) compared to all UK HEIs (inner ring) in 2003

The list of the 'top ten' subjects for PhD graduates from the region contains six of the subjects in the UK table (see Table Two). Chemistry is particularly strong in the South West and the table shows a stronger scientific bias than the UK average. Only two non-science and engineering subjects appear, those of business studies and education.

Subject and ranking	South West	Total (and position) in UK
1. Chemistry	10.3%	7.7% (2)
2. Psychology	5.3%	7.6% (3)
3. Biology	5.8%	5.2% (4)
4. Mechanical Engineering	3.9%	2.0% (16)
5. Clinical Medicine	3.7%	8.2% (1)
6. Physics	3.7%	4.4% (5)
7. Molecular biology, biophysics and biochemistry	3.2%	2.5% (10)
8. Business studies	2.6%	2.1% (14)
9. Clinical veterinary medicine and dentistry	2.3%	0.5% (43)
10. Pharmacology, toxicology and pharmacy	2.6%	2.9% (7)
10. Others in education	2.1%	0.6% (39)

Table Two: Top subjects studied by PhD graduates in South West HEIs with comparisons to UK figures

What do PhD graduates from the South West do?⁹

Of the 435 UK-domiciled PhD graduates from South West HEIs in 2003 eligible for the 2004 survey, 325 responded. This is the second highest response rate of any region and at 75% is markedly higher than the UK average 66%.

Figure Three summarises the responses to the DLHE survey. 71.5% of UK-domiciled PhD graduates from South West HEIs had entered the workplace when the survey was conducted, compared to the overall UK figure of 72.7%. A further 11.0% were engaged in work and study simultaneously – higher than the UK average of 8%. Slightly more PhD graduates had moved overseas (8.9%) than for the UK as a whole (8.1%). Unemployment rates for UK-domiciled PhD graduates from South West institutions at 2.1% were lower than the UK average of 3.2%.

⁹ The data in this section refers to PhD graduates from South West HEIs who were working in all regions of the UK

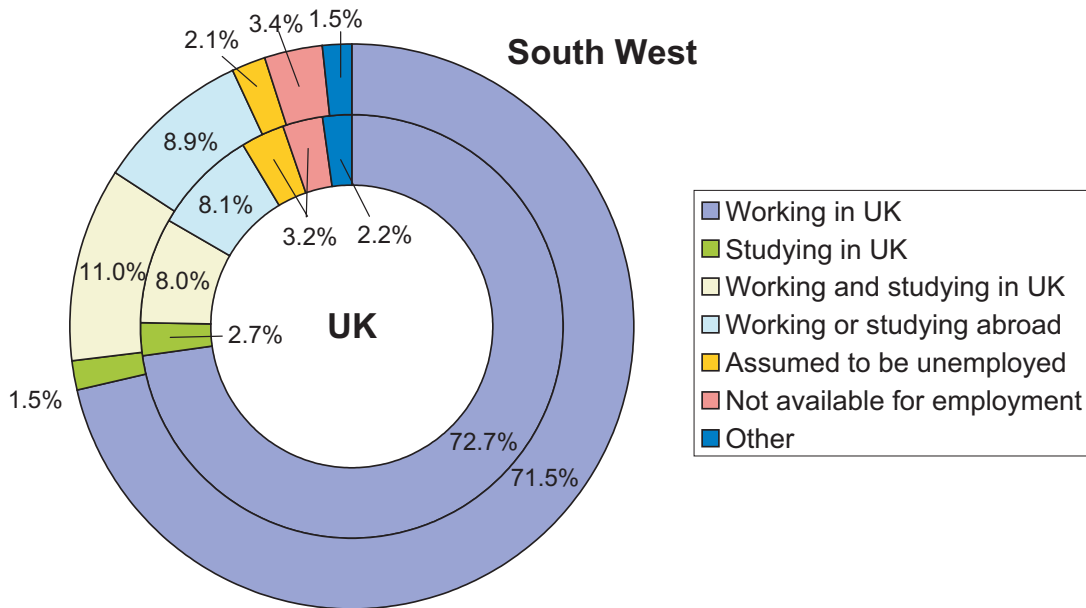


Figure Three: First destinations of UK-domiciled PhD graduates for all subjects from HEIs in the South West (outer ring) compared to all UK HEIs (inner ring) from 2004 DLHE survey responses

Employment sectors

The 82.5% PhD graduates from South West HEIs working or working and studying in the UK were employed in a range of sectors across the UK. Consistent with the UK average of 47.8%, the education sector was the dominant destination, employing 48.7%, predominantly in higher education.

The balance (51.3%) were employed in a range of occupations across all sectors, with minor differences against the UK picture, as Figure Four illustrates.

Manufacturing industries employed fewer South West PhD graduates at 13.1% compared to 16.3% across the UK. 66% of these were employed by the chemical and pharmaceutical industries, accounting for 9% of all South West UK-domiciled PhD graduates compared to a national figure of 11%.

At 13.8% the health service also employed fewer PhD graduates from South West HEIs compared to 15.5% across the UK. This probably reflects the smaller percentage graduating in clinical medicine from the region (see Table Two). A higher percentage were employed by business, finance and IT industries at 11.6% compared to 9.1% across the UK. Other sectors employed similar percentages to the UK averages.

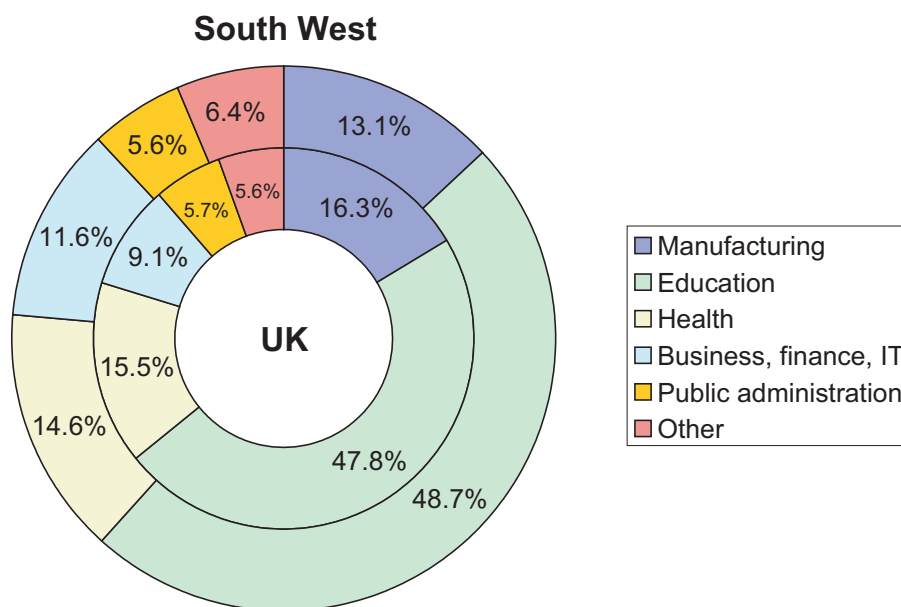


Figure Four: Employment sectors entered by UK-domiciled doctoral graduates from South West HEIs (outer ring) compared to all UK institutions (inner ring), based on Standard Industrial Classifications returned in 2004 DLHE survey

Career occupations

We examined the specific occupations entered by PhD graduates from South West HEIs. As the previous employment sector analysis indicates, a similar picture to the UK average emerged.

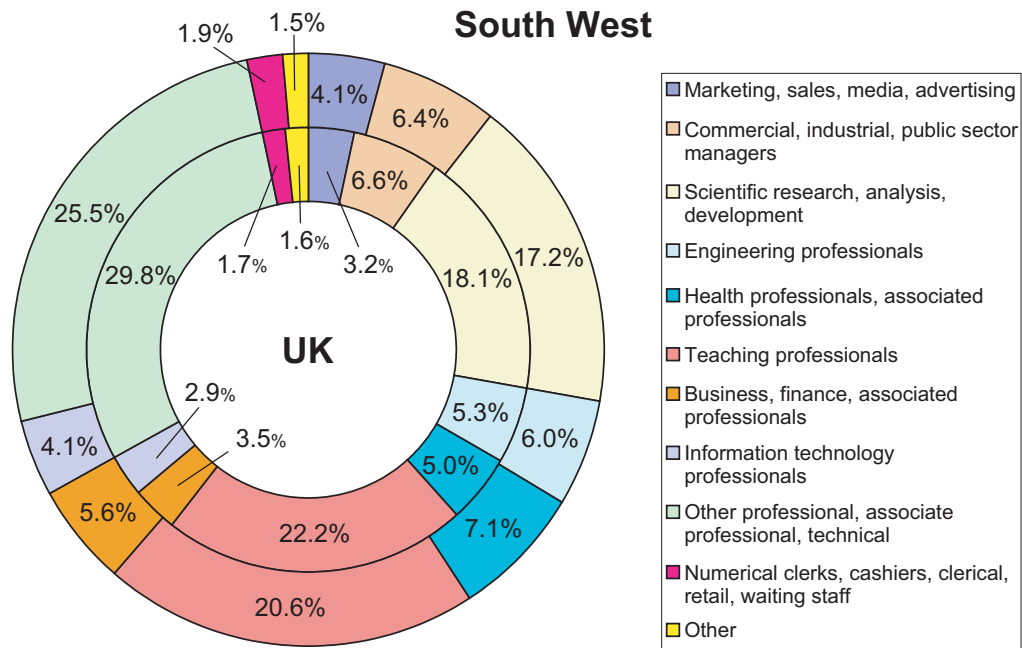


Figure Five: Types of work entered by UK-domiciled PhD graduates from HEIs in the South West (outer ring) compared to all UK institutions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

The largest variation from the UK average was in “other professions”, which includes some postdoctoral researchers. This sector employed 25.5% of South West PhD graduates compared to the UK average of 29.8%. A slightly higher percentage (7.1%) worked in the health professions compared to the UK average (5.0%). However, the most noticeable differences with the UK averages were in business, finance and associated professions (5.6% compared to a 3.5% UK average) and IT professionals (4.1% compared a 2.9% UK average).

Migration

We examined the migration patterns of UK-domiciled PhD graduates from the South West’s HEIs who were in employment at the time of the survey.

110 PhD graduates (37% of total employed) left the South West for employment in other regions of the UK. This proportion is very similar to the average figure for all UK regions of 38%. PhD graduates from the South West moved across the UK with London and the South East the most popular, attracting 9% and 8% respectively¹⁰.

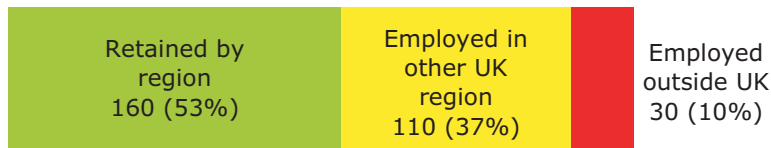
Another 30 PhD graduates (10% of total employed) left the South West for work or work and study abroad (compared to the national proportion of 9%).

155 PhD graduates moved to the South West for employment. Unlike most regions, the South West saw a net gain of PhD graduates with 4.4% more PhD graduates starting work in the region than studied for their PhDs there¹¹.

¹⁰ Data protection prohibits a full analysis of region to region migration

¹¹ The net migration figures should be treated with care. 2.5% of the total DLHE respondents did not identify a specific region of employment. If these respondents are skewed to one region this will impact significantly on the net migration figures

(a) PhDs graduating from the South West



(b) PhDs employed in the South West



Figure Six: Mobility of South West PhD graduates in employment (a) and origin (region of study) of PhD graduates working in the South West (b)

What do PhD graduates employed in the South West do?¹²

160 PhD graduates from HEIs in the region were working in the South West at the time of the survey, representing 51% of the total PhDs working in the region. These were joined by 155 PhD graduates from elsewhere in the UK who gained employment in the region. Small numbers of PhD graduates came from each of the other UK regions, but the South East provided the most substantial number (12% of those employed into the region), along with the West Midlands (7%) and East of England (6%). The South West was the fourth most popular destination amongst UK-domiciled PhD graduates who left their regions of study for known UK locations: 10% of mobile PhD graduates moved into the region. Along with London, the South West is one of only two regions to see a net in-flow of PhD graduates into the regional labour market.

Employment sectors

The employment sectors for all PhD graduates employed in the South West are compared to the national picture in Figure Seven. In line with the rest of the UK, the education sector employed 49.2% of PhD graduates in the region, compared to 47.8% across the UK. Of these, 42% were employed as university lecturers and 41% as postdoctoral researchers.

The manufacturing sector accounted for a lower proportion of PhD graduates in the South East, employing 12.5% compared to the UK average of 16.3%. Unlike other regions, where the chemical and pharmaceutical industries dominate manufacturing, the aerospace industry is a major employer in the South West¹³. The health sector employed a slightly lower percentage in the South West (13.5%) compared to the UK average (15.5%). The percentages employed in the business, finance and IT sector (10% compared to the 9.1% UK average) and public administration (8% compared to 5.7%) were slightly higher than the UK averages.

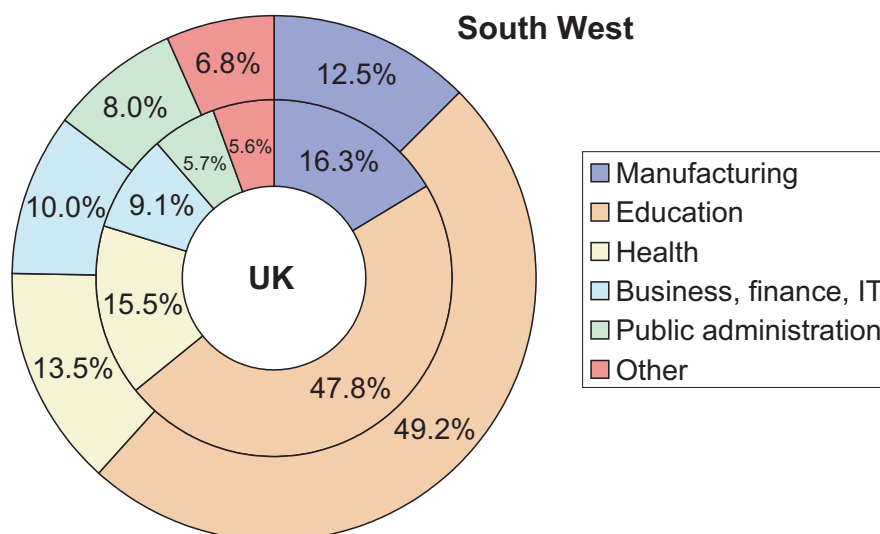


Figure Seven: Employment sectors entered by UK-domiciled PhD graduates employed in the South West (outer ring) compared to all UK regions (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

¹² The data in this section refers to PhD graduates from all regions of the UK who were working in the South West

¹³ For full definitions of Standard Industrial Classifications, see National Statistics Online www.statistics.gov.uk/

For the 155 PhD graduates who moved to the South West for employment, the largest employment sector was education (36%). Of these, 47% were employed as university lecturers and 27% as postdoctoral researchers¹⁴. However, at 36% the proportion of those moving into the region for employment in the education sector was lower than for many other regions and reflected the depth of the regional PhD labour market, including manufacturing (16%), public administration (14%) and business and finance (12% of those moving in to the region).

Career occupations

We examined the specific occupations entered by UK-domiciled PhD graduates employed in the South West. The picture is similar to the UK as a whole, as outlined in Figure Eight.

The most significant difference between the occupations of PhD graduates employed in the South West and the national picture was the higher proportion of PhD graduates employed as teaching professionals at 25.7% compared to 22.2% across the UK. Slightly fewer were employed in the scientific research classification (15.8% compared to 18.1%), and in the 'other professionals' classification (which includes some postdoctoral researchers) at 27.3% compared to 29.8%. Overall, 21% of all the UK-domiciled PhD graduates employed in the South West were employed as postdoctoral researchers, slightly lower than the UK average of 22%. All of the other classifications for the region were close to the national averages.

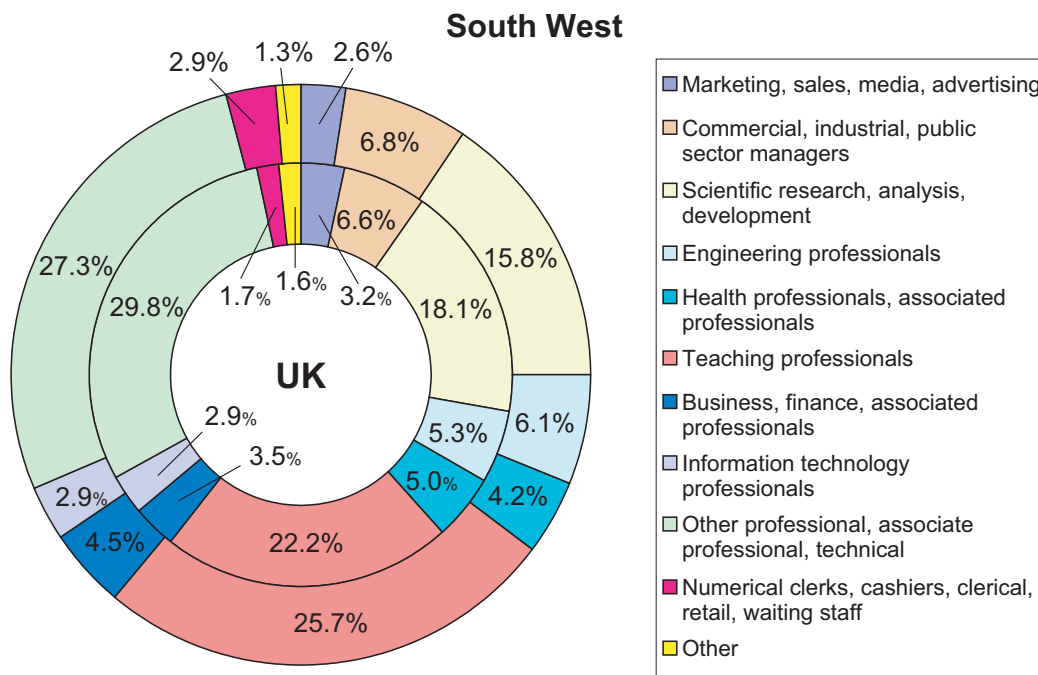


Figure Eight: Types of work entered by UK-domiciled PhD graduates employed in the South West (outer ring) compared to all UK regions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

¹⁴ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities www.grad.ac.uk/wdps

Scotland

Scotland produced 11% of UK-domiciled PhD graduates and employed 9% of the UK PhD workforce in the DLHE survey. PhD graduates from Scottish universities were more likely to start their careers overseas and less likely to be unemployed than the UK average. Close to two thirds of PhD graduates from Scottish HEIs remained in Scotland for work.

Key statistics:

The 795¹ UK-domiciled PhD graduates from Scottish institutions made up 11% of the UK total.

- 52% were male and 48% female, compared to the UK average of 55% and 45%
- 21% studied part-time, higher than the UK average of 27%
- The most popular subjects were medicine, chemistry, biology and anatomy.

Of the 550 (69%) who responded to the 2004 DLHE² survey:

- 76.4% entered employment in the UK³
- 2.4% were unemployed, lower than the UK average of 3.2%
- 11.5% continued their careers overseas compared to 8.1% across the UK.

Of the 420 PhD graduates from Scottish institutions who entered employment in the UK:

- 48.2% entered the education sector, predominantly in higher education
- 17.5% were employed in manufacturing and 12.5% in the health sector
- 73% remained in Scotland and 27% moved to other regions of the UK for work.

Scotland employed 370 (9%) of the UK-domiciled PhD graduate workforce:

- 82% gained their PhD at Scottish institutions
- 18% moved to Scotland from other regions of the UK
- 52% were employed in the education sector: 54% of these as postdoctoral researchers; 32% in university teaching roles, primarily as lecturers
- 28% of all PhD graduates working in Scotland were employed as postdoctoral researchers.

Scotland was a net exporter (-23%) of UK-domiciled PhD graduates:

- Compared to the national picture, PhD graduates who left the region for work or work and study were the most likely to move outside the UK
- Scotland attracted 4.5% of the UK-domiciled PhD graduates who left their region of study for known UK locations
- PhD graduates moving to the region were most likely to come from the North West and South East and work in the education (46%) or manufacturing (18%) sector.

Overview of Scottish higher education institutions⁴

In Scotland, there are 21 higher education institutions (HEIs): 13 universities, The Open University in Scotland, one university college, two colleges of higher education, two Art Schools, a conservatoire and the Scottish Agricultural College. In 2003/04 there were over 205,000 higher education students in these institutions. The largest higher education institutions in Scotland are the universities of Edinburgh, Glasgow and Strathclyde, all with around 24,000 students⁵ in 2003/04.

In 2003/04, 4.3% of students in the region were registered for doctoral level research degrees⁶, predominantly at the institutions with a substantial research income⁷; Glasgow, Dundee, Edinburgh, Aberdeen and St Andrews (see Table One).

Higher education institution	Final year PhD numbers
The University of Edinburgh	460
The University of Glasgow	310
The University of Strathclyde	180
The University of Aberdeen	170
The University of Dundee	105
The University of St Andrews	105
Heriot-Watt University	80
The University of Stirling	55
Glasgow Caledonian University	35
Napier University	25
The Robert Gordon University	20
The University of Abertay Dundee	10
The University of Paisley	10
Edinburgh College of Art	5
Queen Margaret University College, Edinburgh	5
Total	1575

Table One: Final year PhD researchers by HEI in the Scotland⁸

The research strengths of institutions in Scotland are reflected in Figure One, derived from the results of the 2001 Research Assessment Exercise (RAE)⁹. Further analysis of the RAE results shows that 71.6% of submissions from the region's institutions were rated at 4 or above, which was the highest proportion for any region. Over a third (36%) scored the highest ratings of 5 and 5*. These top rated departments were across the subject spectrum indicating the broad range of research expertise in the region.

¹ All figures are rounded to the nearest five for data protection

² Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

³ 70.4% were classified as 'working in the UK'; 6.0% were 'working and studying in the UK'. The data on employment throughout WDPDR includes both classifications

⁴ Universities Scotland www.universities-scotland.ac.uk/

⁵ 'Students in Higher Education at Scottish Institutions 2004/05' www.scotland.gov.uk/

⁶ 'Higher Education in Scotland: Second Update Report' www.sfc.ac.uk/publications/pubs_other.htm

⁷ Figures from Phase 3 Higher Education Review: The Competitiveness of Higher Education in Scotland; www.scotland.gov.uk/

⁸ These figures were derived from the HESA student record data for those who were scheduled to complete their enrolment period in 2002/03. They include international PhD researchers who were not included in the DLHE survey www.hesa.ac.uk/pi/0203/research.htm

⁹ Data set available at www.hero.ac.uk/rae/Results

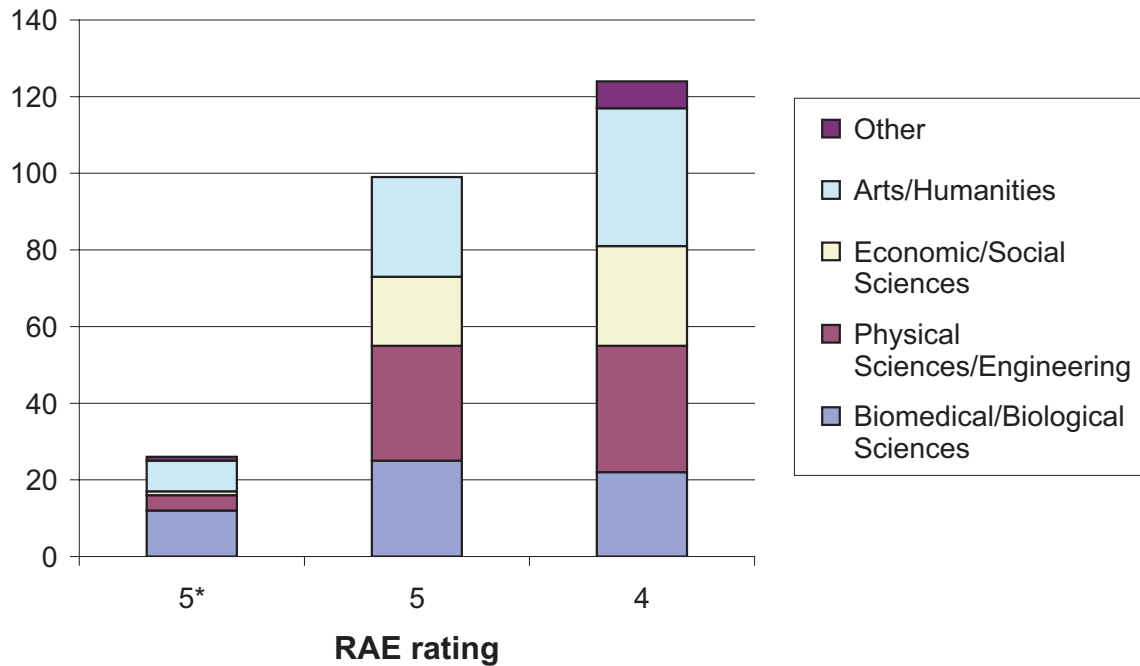


Figure One: Research subjects of top graded RAE submissions in Scotland

Economic strengths

A recent overview produced by Scottish Enterprise¹⁰ highlighted the strengths that Scotland enjoys, including the high education levels amongst its workforce. However, a declining population, low rates of business start-ups and low research and development (R&D) spend are all causes for concern. With unemployment levels higher than the UK average (at 6% in 2004)¹¹, the focus of future economic development is on growing businesses through R&D investment. Part of the strategy is to improve links between universities and industry – to help universities promote the knowledge generated by their research to industry and to help businesses articulate their needs and to exploit the potential of academic research. The focus aims to be on both established industry sectors (e.g. financial services, energy, food and drink, and tourism) and new areas with potential high growth (e.g. creative industries, life sciences and renewable energy).

Research in Scottish higher education is successful at securing government funding in competitive bidding. However, the levels of investment by Scottish businesses in research and development (R&D) are lower than the rest of the UK, and in 2003 it was falling¹². The Business Enterprise R&D Survey conducted by the Office of National Statistics¹³, reported that

in 2002, the Gross domestic expenditure on R&D, as a percentage of Total Gross Value Added, was 1.9% for Scotland, close to the 2.0% reported for the UK as a whole.

Profile of PhD graduates from Scotland

Of the 7270 UK-domiciled PhDs who graduated in the UK in 2003, 11% (795) graduated from Scottish higher education institutions. Of these UK-domiciled PhD graduates, 48% were female and 52% male – a more equitable gender balance than the UK average of 45% and 55%. Part time study was less common in Scotland than in other regions, accounting for only 21% of degrees awarded, compared to the UK average of 27%.

Figure Two shows the breakdown of PhD graduates by subject groups. More PhD graduates from Scottish institutions came from the biomedical and biological sciences (16.3% compared to 12.4%) and medical sciences (30% compared to 26.9%) than the UK as a whole. Slightly fewer came from the physical sciences (30.6% compared to 32%), the arts and humanities (12.5% compared to 13.7%) and the economic and social sciences (8.1% compared to 11.1%). The remaining 2.5% came from education and related subjects and combinations of other subjects (compared to 3.9% of the national figures).

¹⁰ Scotland – competing with the world www.scottish-enterprise.com/

¹¹ Scottish Economic Statistics 2005 www.scotland.gov.uk/

¹² 'Higher Education in Scotland: Second Update Report' www.sfc.ac.uk/publications/pubs_other.htm

¹³ www.statistics.gov.uk/; also useful is 'Regional Competitiveness and State of the Regions' by Mukund Lad at www.dtistats.net/sd/rci/

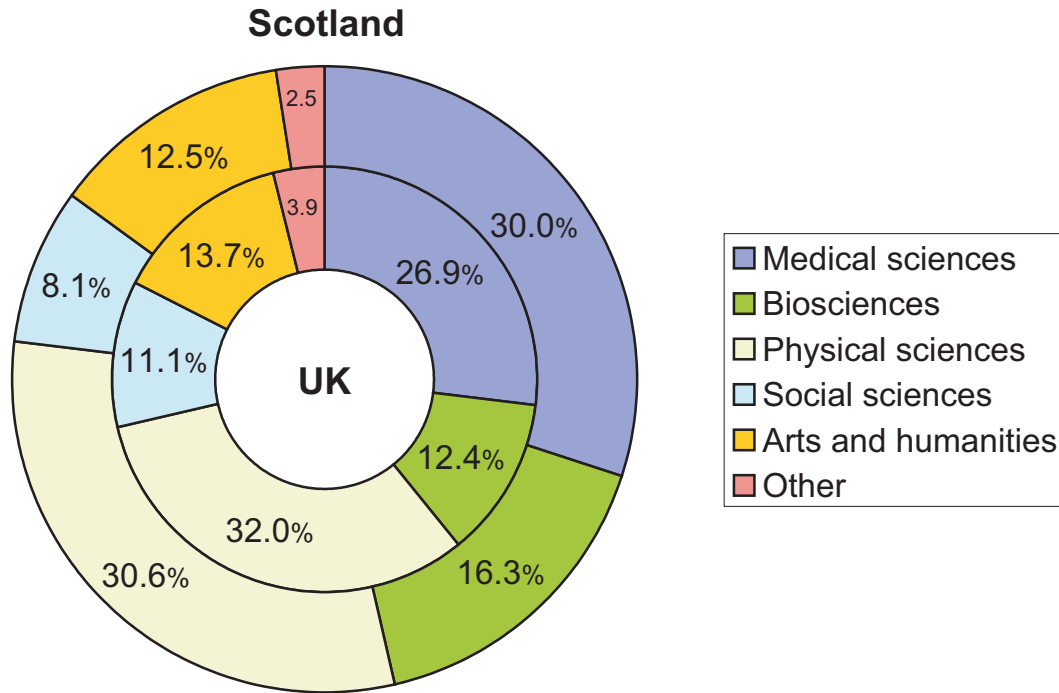


Figure Two: Subject groups of all UK-domiciled PhD graduates from Scottish HEIs (outer ring) compared to all UK HEIs (inner ring) in 2003

The list of the 'top ten' subjects for PhD graduates from the Scottish HEIs (Table Two) is headed by three of the top four subjects in the UK; clinical medicine (5.9%), chemistry (4.9%) and biology (3.8%). However, the lower proportions in each of these subjects suggests a more even distribution amongst all the subjects. Also appearing high in the table are 'other subjects allied to medicine' and anatomy, reflecting the strength of medical schools in the region. Theology also holds a stronger position in Scotland than the UK as a whole.

Subject and ranking	Scotland	Total (and position) in UK
1. Clinical Medicine	5.9%	8.2% (1)
2. Chemistry	4.9%	7.7% (2)
3. Biology	3.8%	5.2% (4)
4. Other subjects allied to medicine	3.0%	1.8% (18)
5. Anatomy	3.0%	1.8% (19)
6. Physics	2.9%	4.4% (5)
7. Molecular biology, biophysics and biochemistry	2.7%	2.5% (10)
8. Psychology	2.1%	7.6% (3)
9. Theology	1.9%	1.2% (24)
10. Pharmacology, toxicology and pharmacy	1.9%	2.9% (7)

Table Two: Top subjects studied by PhD graduates in Scottish HEIs compared to the UK figures

What do PhD graduates from Scotland do?¹⁴

Of the 795 UK-domiciled PhD graduates from Scottish HEIs in 2003 eligible for the 2004 survey, 550 responded (69% response rate).

Just over 70% of UK-domiciled PhD graduates from Scottish institutions had entered the workplace when the survey was conducted, compared to the overall UK figure of 72.7%. A further 6% were engaged in work and study simultaneously: higher than the UK average of 8%. Significantly more PhD graduates had moved overseas (11.5%) than for the UK as a whole (8.1%). Unemployment rates for UK-domiciled PhD graduates from Scottish institutions (2.4%) were lower than the UK average of 3.2%.

¹⁴ The data in this section refers to PhD graduates from Scottish HEIs who were working in all regions of the UK

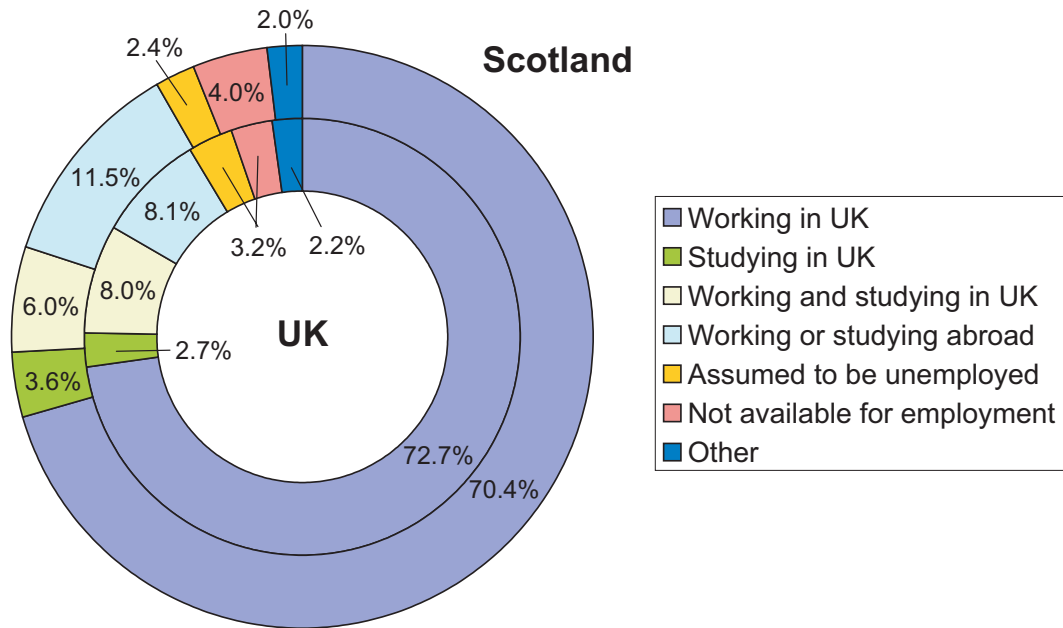


Figure Three: First destinations of UK-domiciled PhD graduates for all subjects from Scottish HEIs (outer ring) compared to all UK HEIs (inner ring) from 2004 DLHE survey responses

Employment sectors

The 76.4% of PhD graduates from Scottish HEIs working or working and studying in the UK were employed in a range of sectors across the UK. Consistent with the UK average (47.8%), the education sector was the dominant destination, employing 48.2%, predominantly in higher education.

The balance (51.8%) were employed in a range of occupations across all sectors, as shown in Figure Four, where small differences with the UK picture emerge.

Manufacturing industries employed 17.5% of PhD graduates from Scottish HEIs, compared to 16.3% across the UK as a whole. 75% of these in this broad sector are employed in the chemical and pharmaceutical industries: i.e. 13% of all Scottish PhD graduates, compared to a national figure of 11%.

The health sector employed slightly fewer PhD graduates from Scottish HEIs (12.5%) compared to 15.5% across the UK, which is perhaps surprising given that medicine and related subjects are such popular PhD disciplines in the region. The other employment sectors, consisting of business, finance, IT, public administration and 'other' sectors, employed very similar proportions of PhD graduates from Scotland as they did of all UK-domiciled PhD graduates.

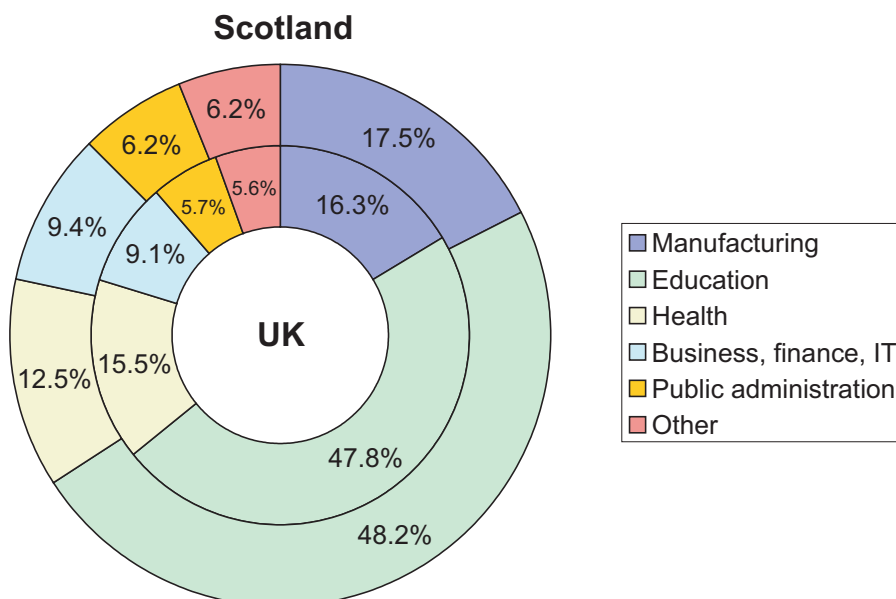


Figure Four: Employment sectors entered by UK-domiciled PhD graduates from Scottish HEIs (outer ring) compared to all UK HEIs (inner ring), based on Standard Industrial Classifications returned in 2004 DLHE survey

Career occupations

We examined the specific occupations entered by PhD graduates from Scottish HEIs. A similar picture to the UK average emerges, as shown in Figure Five. The biggest variations in occupations of Scottish PhD graduates are in 'other professions' (the category that includes postdoctoral researchers), which was higher than the national figure at 34.8% compared to 29.8%, and 'teaching' (predominantly university lecturing staff), which was slightly lower at 18.7% compared to 22.2%. Slightly more were employed in the scientific research category, but fewer in engineering and business and finance occupations compared to the UK average. However, compared to the UK average, these differences are small and generally speaking, the occupations entered by PhD graduates from Scottish HEIs were very similar to the UK national picture.

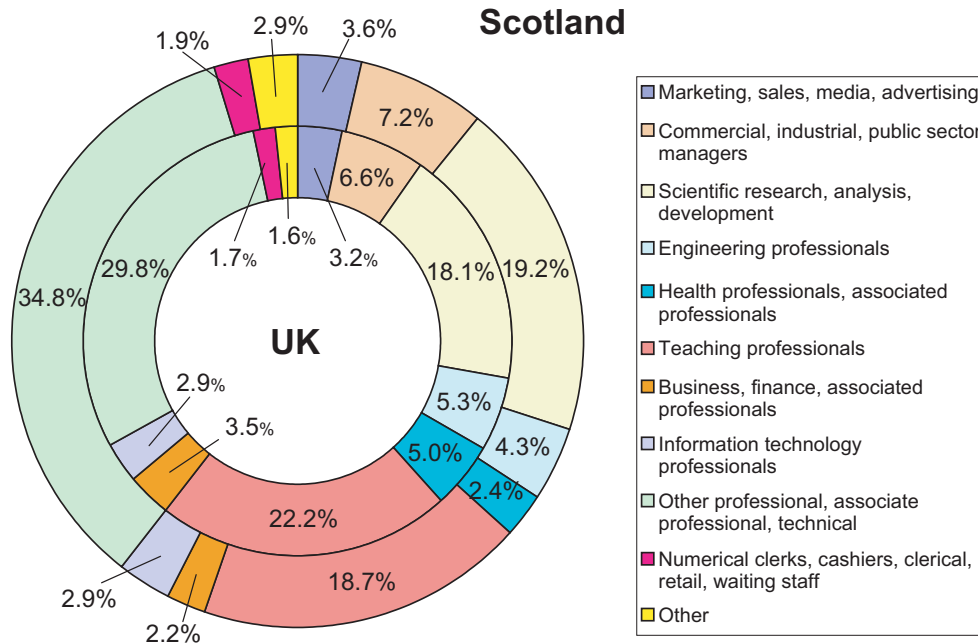


Figure Five: Types of work entered by UK-domiciled PhD graduates from Scottish HEIs (outer ring) compared to all UK HEIs (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

Migration

We examined the migration patterns of UK-domiciled PhD graduates from Scottish HEIs who were in employment at the time of the survey, shown in Figure Six. In common with most regions, Scotland saw a net loss of PhD graduates with 23% fewer starting work in the region than the total number of PhD graduates from the region¹⁵.

Of the 480 PhD graduates from Scottish HEIs in employment, 115 PhD graduates (24% of total employed) left the region for work or work and study in other regions of the UK. This proportion is considerably lower than the 38% average figure for all UK regions. PhD graduates from Scotland moved throughout the UK: London and the South East being the most popular, each attracting 4%. Other popular regions were the North West, South West and the East¹⁶.

Uniquely in the UK, a higher percentage of PhD graduates from Scotland moved overseas than to any one region in the UK. 65 PhD graduates (13% of total employed) left Scotland for work or work and study abroad (higher than the national proportion of 9%).

¹⁵ The net migration figures should be treated with care. 2.5% of the total DLHE respondents did not identify a specific region of employment. If these respondents were skewed to one region this will impact significantly on the net migration figures

¹⁶ Data protection prohibits a full analysis of region to region migration

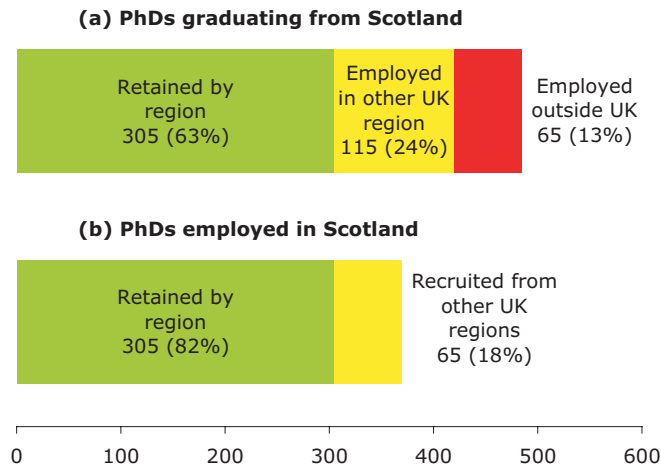


Figure Six: Mobility of Scottish PhD graduates in employment (a) and origin (region of study) of PhD graduates working in Scotland (b)

What do PhD graduates employed in Scotland do?¹⁷

305 PhD graduates from Scottish HEIs were working in Scotland at the time of the survey, representing 82% of the total PhDs working in the region. These were joined by 65 UK-domiciled PhD graduates from other regions in the UK, who gained employment in Scotland. Within this cohort, small numbers came from each of the other UK regions, but only the North West and South East supplied more than a handful (4% and 3% of those employed in Scotland). In total, 5% of UK-domiciled PhD graduates who left their regions of study for known UK locations moved to Scotland. Amongst the regions, only Wales, the North East and Northern Ireland attracted smaller numbers of PhD graduates.

Employment Sectors

The employment sectors for PhD graduates employed in Scotland are compared to the national picture in Figure Seven. Overall, the pattern of employment sectors for Scotland is very close to the UK picture. The education sector employed 52% of PhD graduates in the region (compared to 47.8% across the UK), predominantly in higher education. Manufacturing accounted for a lower proportion of PhD graduates in Scotland (15.6% compared to 16.3%), as did the health sector (12.7% compared to 15.5%). The proportions employed in the business, finance and IT (9.2%) and public administration (5.7%) sectors closely matched the UK averages.

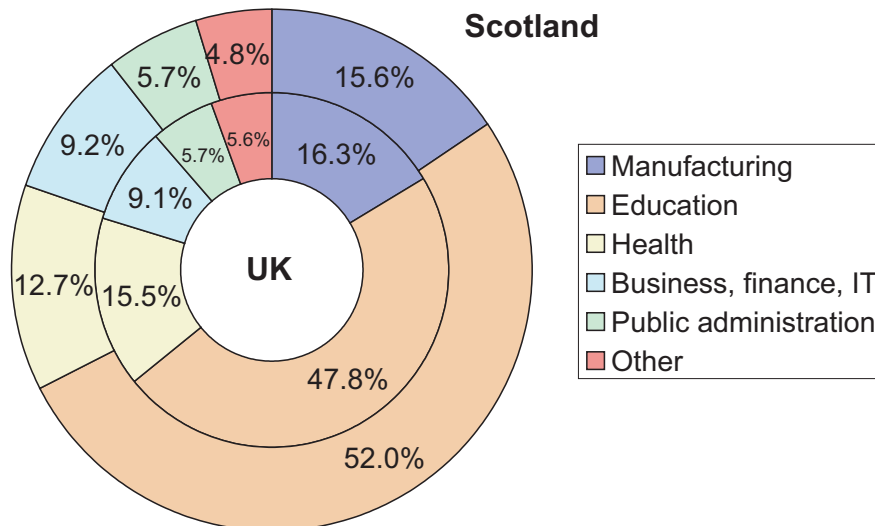


Figure Seven: Employment sectors entered by UK-domiciled PhD graduates employed in the Scotland (outer ring) compared to all UK regions (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

¹⁷ The data in this section refers to PhD graduates from all regions of the UK who were working in Scotland

The main sector employing the 65 PhD graduates moving into Scotland was education (primarily universities) employing 46%. This is a smaller proportion than many other regions. Of those who moved to Scotland's HEIs, 52% were employed as postdoctoral researchers, 32% were employed as lecturers, and the remainder in a range of administrative and supporting roles. Other popular employment sectors were manufacturing, business, finance and IT and the health sector employing 18%, 12% and 12%, respectively, of those moving to Scotland for work.

Career occupations

We examined the specific occupations entered by PhD graduates employed in Scotland. The picture is different to the UK as a whole, as outlined in Figure Eight. The largest difference occurs in the 'other professionals' category (36.4% compared to 29.8% across the UK), which includes most postdoctoral researchers and reflects the dominance of the higher education sector as an employer of PhD graduates in the region. Overall, 28% of all the PhD graduates working in Scotland are identifiable as postdoctoral researchers¹⁸, significantly higher than the UK average of 22%.

Scotland employed a lower proportion of PhD graduates in teaching (18.6% compared to 22.2% across the UK), health (3% compared to 5%) and scientific research (16.7% compared to 18.1%), but similar proportions in all the other occupation types.

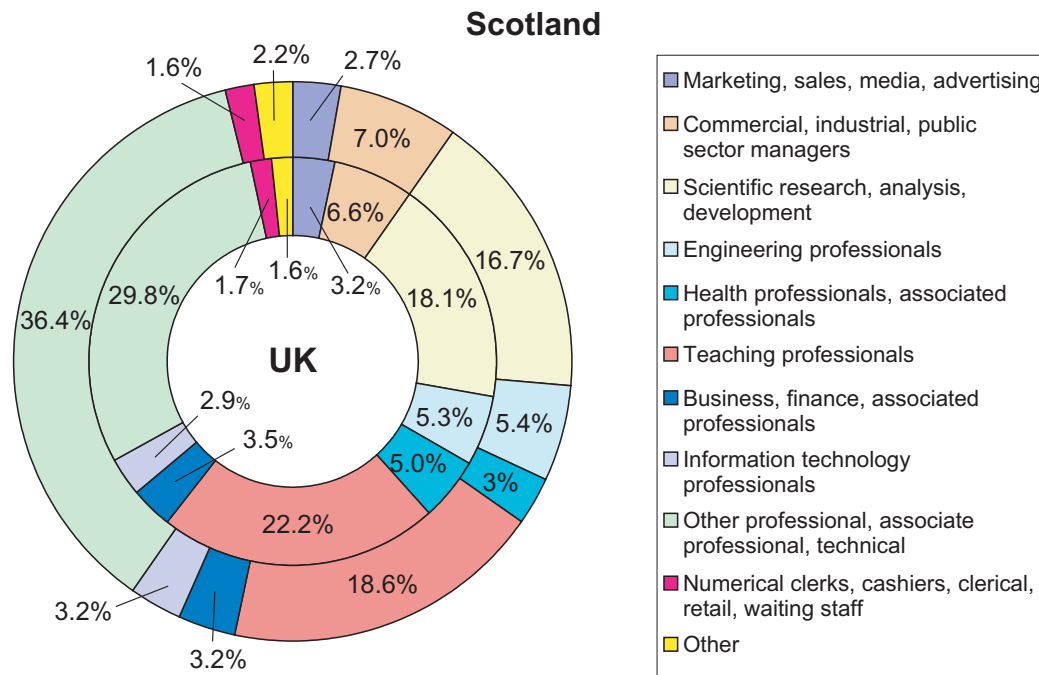


Figure Eight: Types of work entered by UK-domiciled PhD graduates employed in Scotland (outer ring) compared to all UK regions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

¹⁸ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities www.grad.ac.uk/wdppd

Wales

Wales produced 5% of UK-domiciled PhD graduates and employed 4% of the UK-domiciled PhD workforce in the DLHE survey. PhD graduates from Welsh universities were less likely to move overseas at the start of their careers and more than half of them (54%) remained in Wales for work.

Key statistics:

The 380¹ UK-domiciled PhD graduates from Welsh institutions made up 5% of the UK total:

- 56% were male and 44% female, in line with the UK average of 55% and 45%
- 16% studied part-time, significantly lower than the UK average 27%
- The most popular subjects were chemistry, biology, psychology and materials.

Of the 255 (67%) who responded to the 2004 DLHE² survey:

- 79.4% entered employment in the UK³
- 5.1% were unemployed, higher than the UK average of 3.2%
- 4.7% continued their careers overseas compared to 8.1% across the UK.

Of the 200 PhD graduates from Welsh HEIs who had entered employment in the UK:

- 44.5% entered the education sector, predominantly in higher education
- 13.9% were employed in manufacturing and 12.4% in the health sector
- 58% remained in Wales and 42% moved to other regions of the UK.

Wales employed 165 (4.0%) of the UK-domiciled PhD graduate workforce:

- 69% gained their PhD at Welsh institutions
- 31% moved to Wales from other regions of the UK
- 53.9% were employed in the education sector: 43% of these as postdoctoral researchers; 39% in university teaching roles, primarily as lecturers
- 23% of all PhD graduates working in Wales were employed as postdoctoral researchers.

Wales was a net exporter (-23%) of UK-domiciled PhD graduates:

- PhD graduates who left Wales for work were most likely to move to the South West and the West Midlands
- Wales attracted only 3.5% of the UK-domiciled PhD graduates who left their region of study for known UK locations
- PhD graduates moving to the region were most likely to come from the South West and South East and work in the education sector (61%).

Overview of Welsh higher education institutions⁴

Wales is home to 13 higher education institutions (HEIs) ranging in size from over 24,000 students at Cardiff University (around 70% full-time) to 7,000 at University of Wales, Lampeter (where a large majority are part-time students). Figures from HEFCW and NECTW for 2002/03 state that 5,085 students were enrolled on research degree programmes and that 605 doctorates were awarded (see Table One).

Higher education institution	Final year PhD numbers
Cardiff University	215
University of Wales, Swansea	135
University of Wales, Bangor	90
University of Wales, Aberystwyth	75
University of Wales College of Medicine	35
University of Glamorgan	25
University of Wales Institute, Cardiff	10
The University of Wales, Lampeter	10
University of Wales College, Newport	5
The North-East Wales Institute of Higher Education	5
Total	605

Table One: Final year PhD researchers by HEI in Wales⁵

The research strengths of the Welsh HEIs are reflected in Figure One, derived from the results of the 2001 Research Assessment Exercise (RAE)⁶. Further analysis of the RAE results shows that 62% of submissions from the regions' institutions were rated at 4 or above, with a third scoring the highest ratings of 5 and 5*. These top rated departments were across the subject spectrum indicating the broad range of expertise available in the Principality's institutions: arts and humanities subjects are particularly strong.

¹ All figures are rounded to the nearest five for data protection

² Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

³ 67.7% are classified as 'working in the UK'; 11.7% are 'working and studying in the UK'. The data throughout WDPDR on employment includes both classifications

⁴ Higher Education, Further Education and Training Statistics in Wales, National Council for Education and Training for Wales (NECTW) and the Higher Education Funding Council for Wales (HEFCW), 2002/03. www.elwa.org.uk/doc_bin/Research%20Reports/HE_FE_training_statistics_wales_2002_03.pdf

⁵ These figures are derived from the HESA student record data for those who were scheduled to complete their enrolment period in 2002/03. They include international PhD researchers who were not included in the DLHE survey www.hesa.ac.uk/pi/0203/research.htm

⁶ Data set available at www.hero.ac.uk/rae/Results

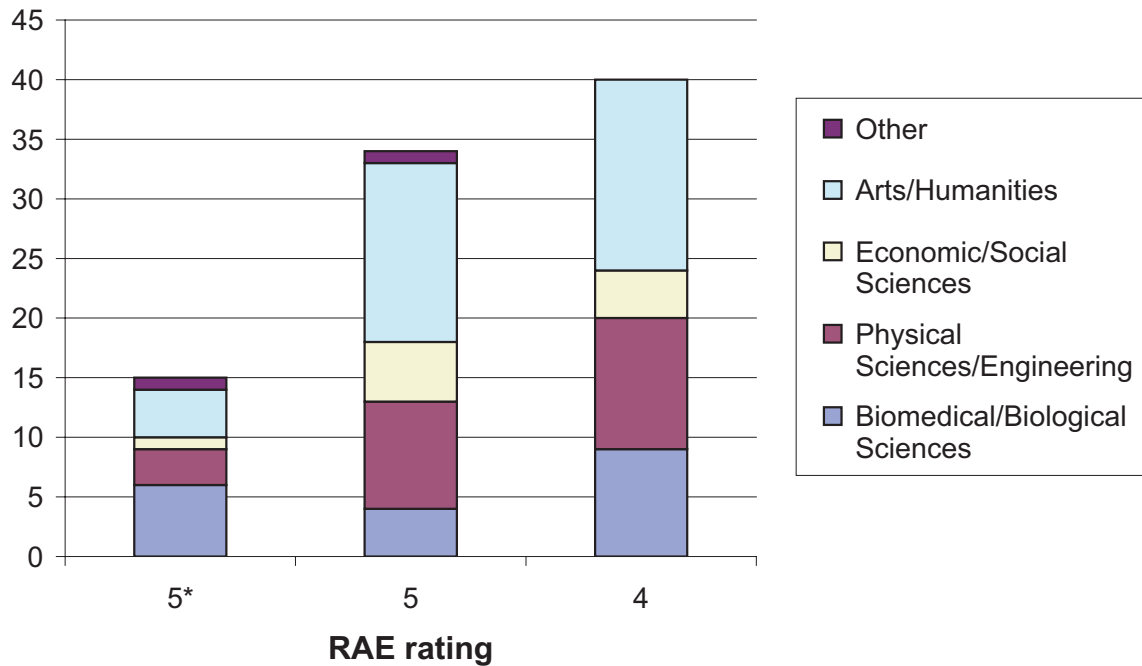


Figure One: Research subjects of top graded RAE submissions in Wales

Economic strengths

In November 2005, a report⁷ from the Welsh Assembly Government set out the recent transformation of the Welsh economy: 100,000 more people in work since 1999 and increased earnings and exports. At the heart of the plans for future development are commitments to “improve business productivity generally, create innovative, high value-added products, processes and services, and get more companies to base their head office, R&D units and other senior management functions in Wales”. If these plans come to fruition, there should be ample opportunities for researchers with a range of subject specialisms. The report notes that a number of sectors will be important to the future of the Welsh economy, namely aerospace, agriculture and food, high technology, tourism, financial services, automotive and the creative industries, most of which will depend on high skills levels and specific technical knowledge.

However, research and development (R&D) spending in Wales currently is low at 1.2% of GVA⁸, compared to 2.1% for the UK as a whole, largely because of lower levels of spending from the private sector. This is due to the current composition of the Welsh economy having fewer major R&D active businesses than the rest of the UK. With an apparent commitment to develop links between higher education and

business and a priority to develop jobs in innovative, knowledge-intensive sectors, those planning the future of the Welsh economy appear keen to exploit the skills and knowledge of its researchers.

Profile of PhD graduates from Wales

Of the 7270 UK-domiciled PhD graduates in the UK in 2003, 5.2% (380) graduated from Welsh HEIs. Of these PhD graduates, 44% were female and 56% male, consistent with the UK average of 45% and 55%. Part-time study was much less common in Wales than in other regions, accounting for just 16% of degrees awarded, compared to the UK average of 27%.

Figure Two shows the breakdown of PhD graduates by subject groups. A higher percentage of PhD graduates from Welsh universities came from the physical sciences than the UK average (36.9% compared to 32%). The biomedical and biological sciences were also higher at 14.5% compared to the UK average of 12.4%. Slightly higher percentages came from the arts and humanities (14.5% compared to 13.7%) and the economic and social sciences (11.8% compared to 11.1%). A significantly smaller proportion graduated from the medical sciences at 19.7% compared to 26.9% across the UK.

⁷ ‘Wales: A Vibrant Economy’ www.wales.gov.uk/subitradeindustry/content/wave/wave-report-e.pdf

⁸ GVA (Gross Value Added) differs from GDP in that subsidies are added and taxes on products are deducted

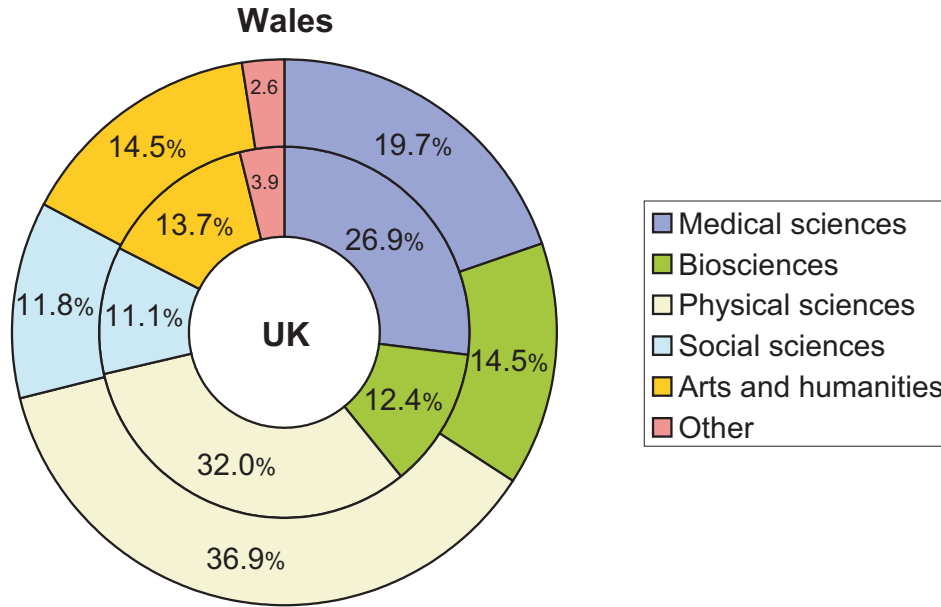


Figure Two: Subject groups of all UK-domiciled PhD graduates from Welsh HEIs (outer ring) compared to all UK HEIs (inner ring) in 2003

The list of the 'top ten' subjects for PhD graduates from the Welsh universities (Table Two) is headed by three of the top four subjects in the UK; chemistry, biology and psychology. However, the most popular UK subject, clinical medicine, does not rank highly in Wales, reflecting the small number of medical schools in the region. The region's strengths are spread across all discipline areas: ranging from technical and engineering subjects (materials technology and general engineering are both substantially more common than in the UK as a whole) to theology and politics.

Subject and ranking	Wales	Total (and position) in UK
1. Chemistry	7.1%	7.7% (2)
2. Biology	5.8%	5.2% (4)
3. Psychology	5.3%	7.6% (3)
4. Materials technology	4.5%	0.8% (33)
5. General engineering	3.4%	2.0% (15)
6. English studies	2.9%	2.5% (8)
7. Pharmacology	2.6%	2.9% (7)
8. Physical and terrestrial geography and environmental sciences	1.8%	2.1% (11)
8. Mathematics	1.8%	2.1% (13)
8. Theology	1.8%	1.2% (24)
8. Politics	1.8%	1.1% (25)

Table Two: Top subjects studied by PhD graduates in Welsh HEIs compared to the UK figures

What do Welsh PhDs do?⁹

Of the 380 UK-domiciled PhD graduates from Welsh HEIs in 2003 eligible for the 2004 survey, 255 responded: a 67% response rate, fractionally higher than the UK average of 65%.

Almost 68% of UK-domiciled PhD graduates from Welsh institutions had entered the workplace when the survey was conducted, compared to the overall UK figure of 72.7%. A further 11.7% were engaged in work and study simultaneously – higher than the UK average of 8%. Fewer PhD graduates had moved overseas (4.7%) than for the UK as a whole (8.1%). At 5.1%, unemployment rates for UK-domiciled PhD graduates from Welsh institutions were higher than the UK average 3.2% (see Figure Three).

⁹ The data in this section refers to PhD graduates from Welsh HEIs who were working in all regions of the UK

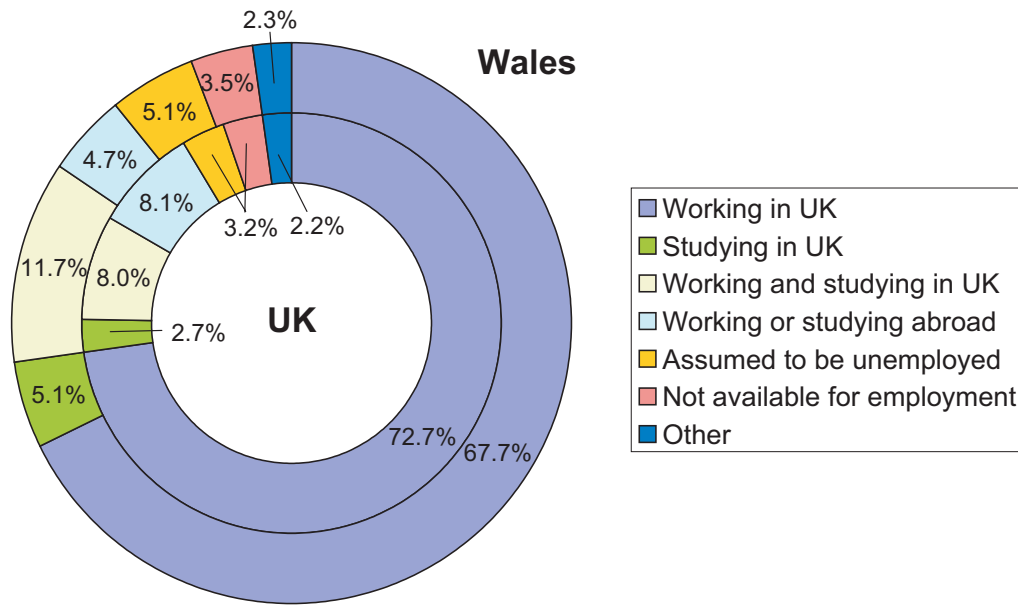


Figure Three: First destinations of UK-domiciled PhD graduates for all subjects from Welsh HEIs (outer ring) compared to all UK HEIs (inner ring) from 2004 DLHE survey responses

Employment sectors

The 79.4% UK-domiciled PhD graduates from Welsh universities working or working and studying in the UK were employed in a range of sectors across the UK. Consistent with the UK average of 47.8%, the education sector was the dominant destination, employing 44.5% of PhD graduates from Wales, predominantly in higher education.

The balance (55.5%) were employed in a range of occupations across all sectors, with some differences compared to the UK picture as shown in Figure Four.

Manufacturing industries employed fewer UK-domiciled PhD graduates from Welsh HEIs at 13.9% compared to 16.3% across the UK as a whole. 57% of these were employed in the chemical and pharmaceutical industries, accounting for 8% of all Welsh PhD graduates, compared to a national figure of 11%).

The health service also employed slightly fewer PhD graduates from Welsh universities (12.4% compared to 15.5% across the UK), reflecting the smaller numbers coming from clinical medicine. A significantly higher percentage was employed in the public sector at 10.4% compared to the UK average of 5.7%. The business, finance and IT sector employed fractionally more at 9.9% compared to 9.1%. Assorted other industrial sectors accounted for the remaining 8.9% of UK-domiciled PhD graduates from Welsh HEIs.

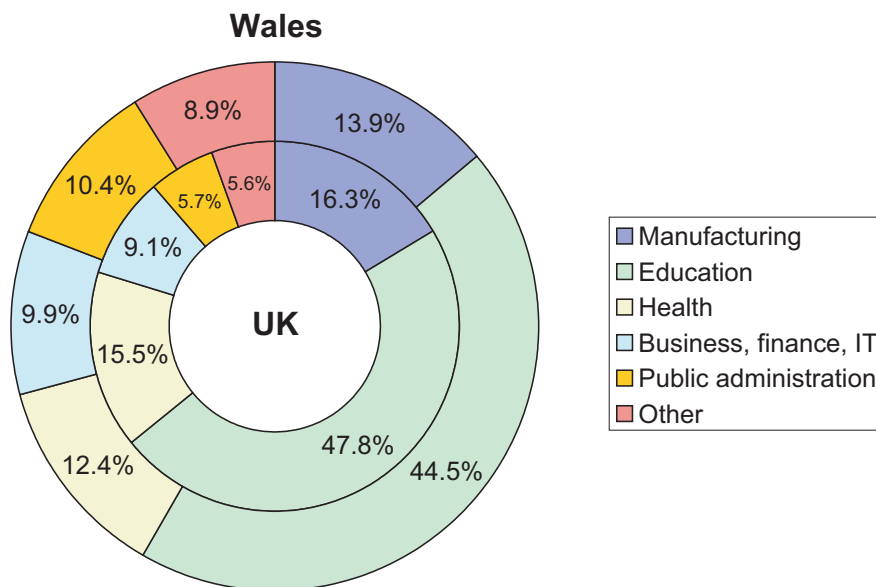


Figure Four: Employment sectors entered by UK-domiciled doctoral graduates from Welsh HEIs (outer ring) compared to all UK HEIs (inner ring), based on Standard Industrial Classifications returned in 2004 DLHE survey

Career occupations

We examined the specific occupations entered by UK-domiciled PhD graduates from Welsh HEIs. A similar picture to the UK average emerged, as shown in Figure Five.

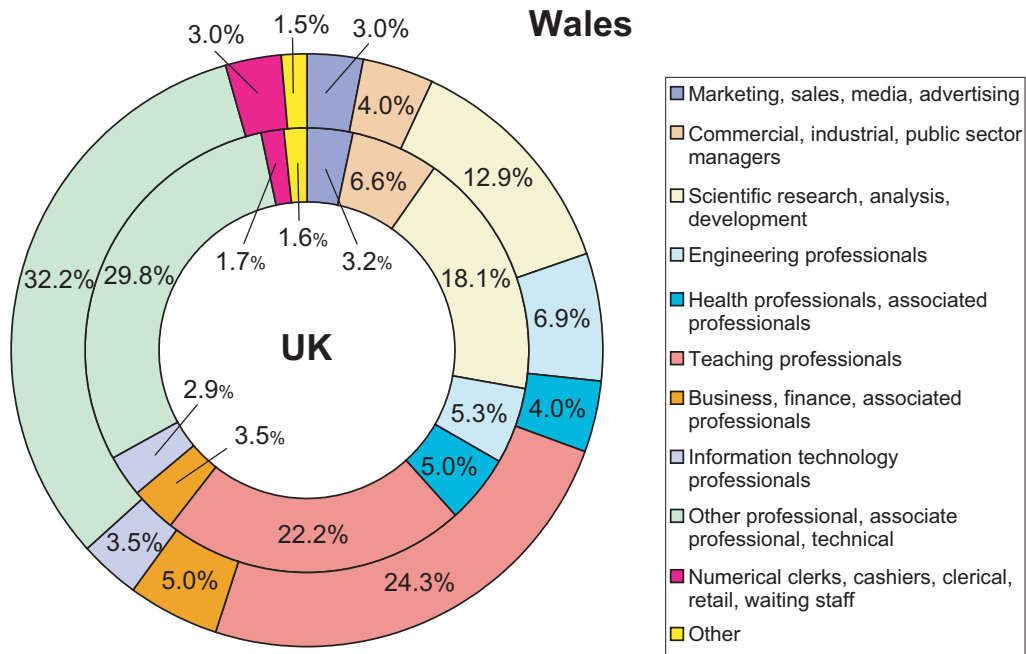


Figure Five: Types of work entered by UK-domiciled PhD graduates from Welsh HEIs (outer ring) compared to all UK institutions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

The largest variation occurs in the scientific research category, which accounted for 12.9% of PhD graduates employed from this region, compared to 18.1% across the UK. More were employed as engineers (6.9% compared to 5.3% across the UK), and in 'other professions', which includes some postdoctoral researchers (32.2% compared to 29.8%). Fractionally more were employed in teaching (24.3% compared to 22.2%) and business and finance occupations (5% compared to 3.5%).

Migration

We examined the migration patterns of UK-domiciled PhD graduates from Welsh HEIs who were in employment at the time of the survey.

In common with most regions, Wales saw a net loss of PhD graduates. 23% fewer PhD graduates started work in Wales than the total number of PhD graduates from the region¹⁰. 85 PhD graduates (40% of total employed) left Wales for employment in other regions of the UK. This proportion is similar to the average figure for all regions of 38%. PhD graduates from Wales moved across the UK with the South West the most popular region, attracting 7% of PhD graduates. Other popular regions were the West Midlands, North West and London¹¹.

Another 15 PhD graduates (6% of total employed) left Wales for work or work and study abroad (compared to the national proportion of 9%).

¹⁰ The net migration figures should be treated with care. 2.5% of the total DLHE respondents did not identify a specific region of employment. If these respondents are skewed to one region this will impact significantly on the net migration figures

¹¹ Data protection prohibits us from a full analysis of region to region migration

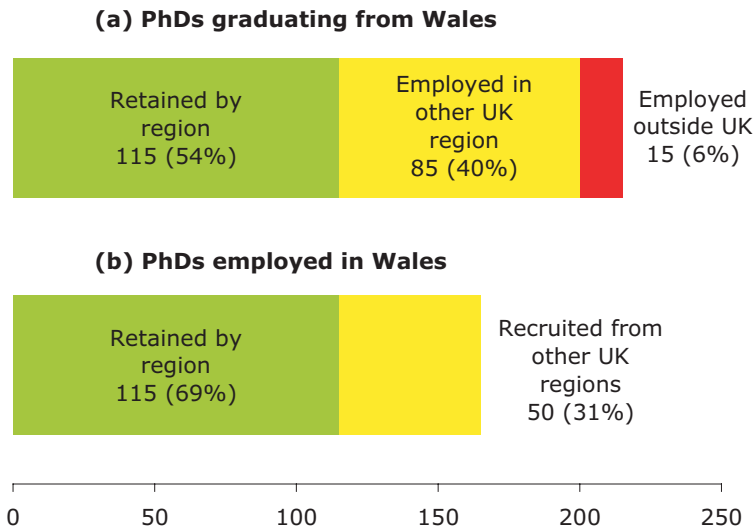


Figure Six: Mobility of PhD graduates from Wales in employment (a) and origin (region of study) of PhD graduates working in Wales (b)

What do PhD graduates employed in Wales do?¹²

115 UK-domiciled PhD graduates from Welsh HEIs were working in Wales at the time of the survey, representing 69% of the total number of PhD graduates working in the region. These were joined by 50 PhD graduates from other regions in the UK who gained employment in Wales. Within this cohort, small numbers of PhD graduates came from each of the other UK regions. Only the South East and South West supplied more than a handful at 6% and 5% of the Welsh doctoral labour force, respectively. Only 3.5% of the UK-domiciled PhD graduates who left their regions of study for known UK locations moved to Wales. Amongst the regions, only the North East and Northern Ireland attracted smaller numbers of PhD graduates.

Employment sectors

The employment sectors for all PhD graduates employed in Wales are compared to the national picture in Figure Seven. The education sector was particularly dominant in Wales and employed 53.9% of PhD graduates in the region compared to 47.8% across the UK. Of these, 43% were employed as postdoctoral researchers and 39% in university teaching roles, primarily as lecturers.

Manufacturing employed a lower proportion of PhD graduates in Wales at 13.8% compared to the UK average of 16.3%. The health sector was also smaller in Wales at 12% compared to 15.5%, as was the business, finance and IT sector (6.6% compared to 9.1%). The public administration sector was slightly larger in Wales (7.8% compared to 5.7% across the UK).

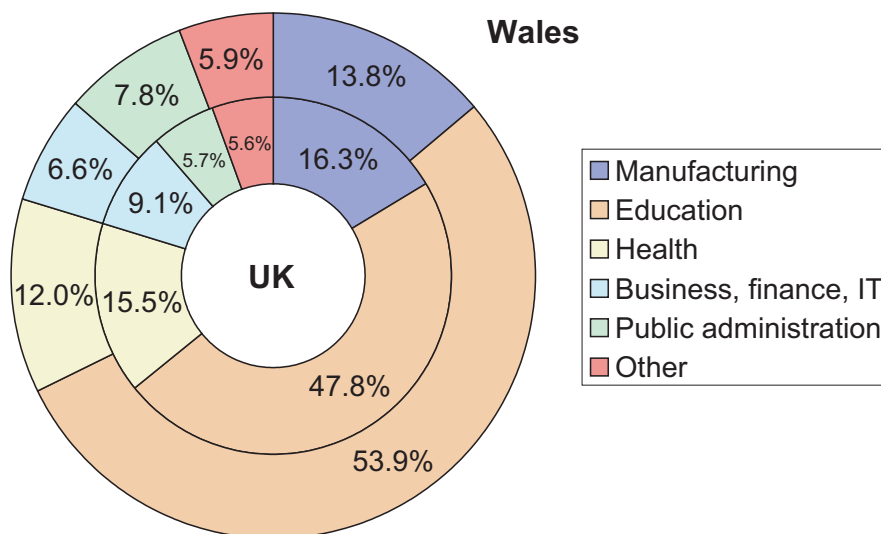


Figure Seven: Employment sectors entered by UK-domiciled PhD graduates employed in Wales (outer ring) compared to all UK regions (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

¹² The data in this section refers to PhD graduates from all regions of the UK who were working in Wales

For the 50 UK-domiciled PhD graduates who moved to Wales for employment, the biggest employing sector was education (61%). Of these, 42% were employed as lecturers, 42% as postdoctoral researchers and the remainder in a range of administrative and supporting roles. Other popular employment sectors for PhD graduates moving to Wales for employment were manufacturing and business, finance and IT, each employed around 10% of the total incoming PhD graduates.

Career occupations

We compared the specific occupations entered by PhD graduates employed in Wales to the UK picture as shown in Figure Eight.

A higher proportion of PhD graduates were employed as teaching professionals (25.7% compared to 22.2% across the UK) and in the 'other professionals' classification, which includes some postdoctoral researchers (34.1% compared to 29.8%). In total 25% of the PhD graduates working in Wales were employed as postdoctoral researchers¹³, higher than the UK average of 22%.

A lower percentage of PhD graduates in Wales were employed in the scientific research classification at 15% compared to the UK average of 18.1%. Conversely, a higher percentage was employed as engineering professionals at 7.2% compared to the 5.3% UK average.

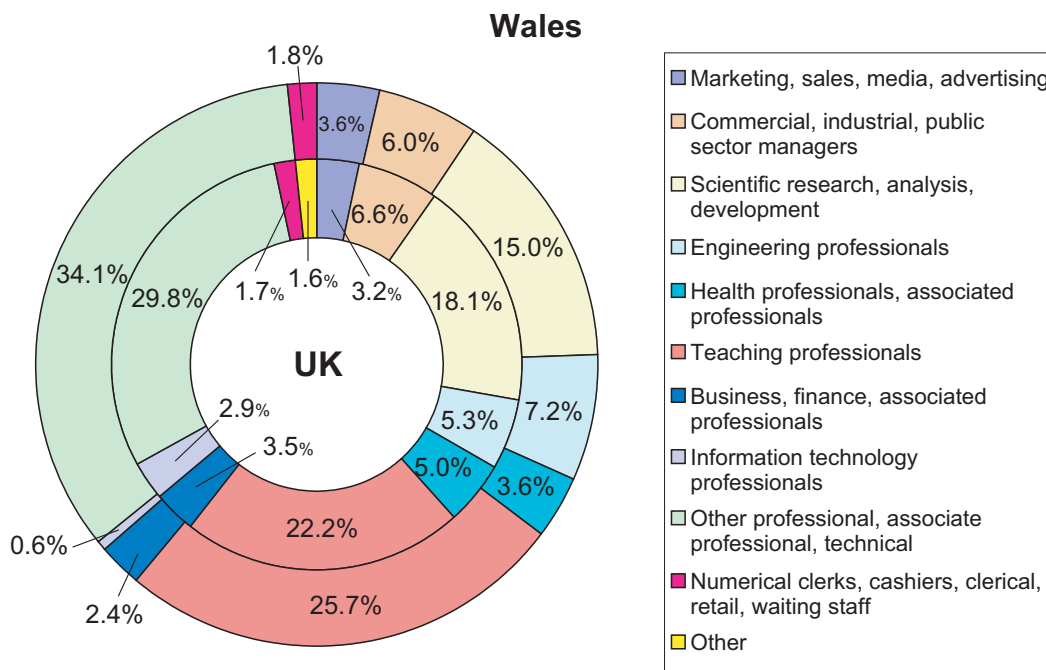


Figure Eight: Types of work entered by UK-domiciled PhD graduates employed in Wales (outer ring) compared to all UK regions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

¹³ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities www.grad.ac.uk/wdps

Northern Ireland

Northern Ireland produced 3.6% of the UK-domiciled PhD graduates and employed 4.1% of the UK PhD workforce in the DLHE survey. PhD graduates from Northern Ireland's universities were the least likely to be unemployed and were more likely to move to the EU at the start of their careers. The region had the highest retention rate in the UK with 83% of all the UK-domiciled

Key statistics:

The 265¹ UK-domiciled PhD graduates from Northern Ireland's institutions made up 3.6% of the UK total:

- 45% were male and 55% female, identical to the UK average
- 36% studied part-time, higher than the UK average 27%
- The most popular subjects were 'others allied to medicine', biology and psychology.

Of the 205 (77%) who responded to the 2004 DLHE² survey:

- 85.5% entered employment in the UK³
- 1.4% were unemployed, which is the lowest rate in the UK
- 4.8% started their careers overseas compared to 8.1% across the UK.

Of the 175 PhD graduates from Northern Ireland's universities entered employment in the UK:

- 52.3% entered the education sector, predominantly in higher education
- 19.9% were employed in the health sector and 10.2% in manufacturing
- 89% remained in Northern Ireland and 11% moved to other regions of the UK.

Northern Ireland employed 170 (4.1%) of the UK-domiciled PhD graduate workforce:

- 92% of these gained their PhD at Northern Ireland's institutions
- 8% moved to Northern Ireland from other regions of the UK
- 53.2% were employed in the education sector: 38% of these as postdoctoral researchers; 46% in university teaching roles, primarily as lecturers
- 20% of all PhD graduates working in Northern Ireland were employed as postdoctoral researchers.

Northern Ireland was a net exporter (-9.6%) of UK-domiciled PhD graduates:

- PhD graduates who left Northern Ireland for work were most likely to move to other parts of the EU (which may indicate Eire)
- Northern Ireland attracted only 1% of the UK-domiciled PhD graduates who left their region of study for known UK locations

Overview of Northern Ireland's higher education institutions

There are two universities and two university colleges in Northern Ireland, with over 53,000 students enrolled on higher education courses in 2003/04. The two largest institutions are Queen's University, Belfast and the University of Ulster, which over 70% of these students attended.

Figures from the Department for Education and Learning for 2003/04 state that 5% of the total student population in Northern Ireland were enrolled on postgraduate research degree programmes, predominately at the universities of Queen's and Ulster (see Table One).

Higher education institution	Final year PhD numbers
The Queen's University of Belfast	245
University of Ulster	135
Total	380

Table One: Final year PhD researchers by HEI in Northern Ireland⁵

The research strengths of the higher education institutions (HEIs) in Northern Ireland are reflected in Figure One, derived from the results of the 2001 Research Assessment Exercise (RAE)⁶. Further analysis of the RAE results shows that 69% of submissions from the region's institutions were rated at 4 or above, with just under a third (31%) scoring the highest ratings of 5 and 5*. These top rated departments are across the subject spectrum indicating the broad range of expertise available in the region's institutions, with particular strengths in arts and humanities.

¹ All figures are rounded to the nearest five for data protection

² Destination of Leavers from Higher Education – a survey of all UK and EU first and higher degree graduates

³ 78.7% are classified as 'working in the UK'; 6.8% are 'working and studying in the UK' The data in WDPDR on employment includes both classifications

⁴ Statistical Profile of Northern Ireland Higher Education 2003/04 www.delni.gov.uk/

⁵ These figures are derived from the HESA student record data for those who were scheduled to complete their enrolment period in 2002/03. They include international PhD researchers who were not included in the DLHE survey www.hesa.ac.uk/pi/0203/research.htm

⁶ Data set available at www.hero.ac.uk/rae/Results

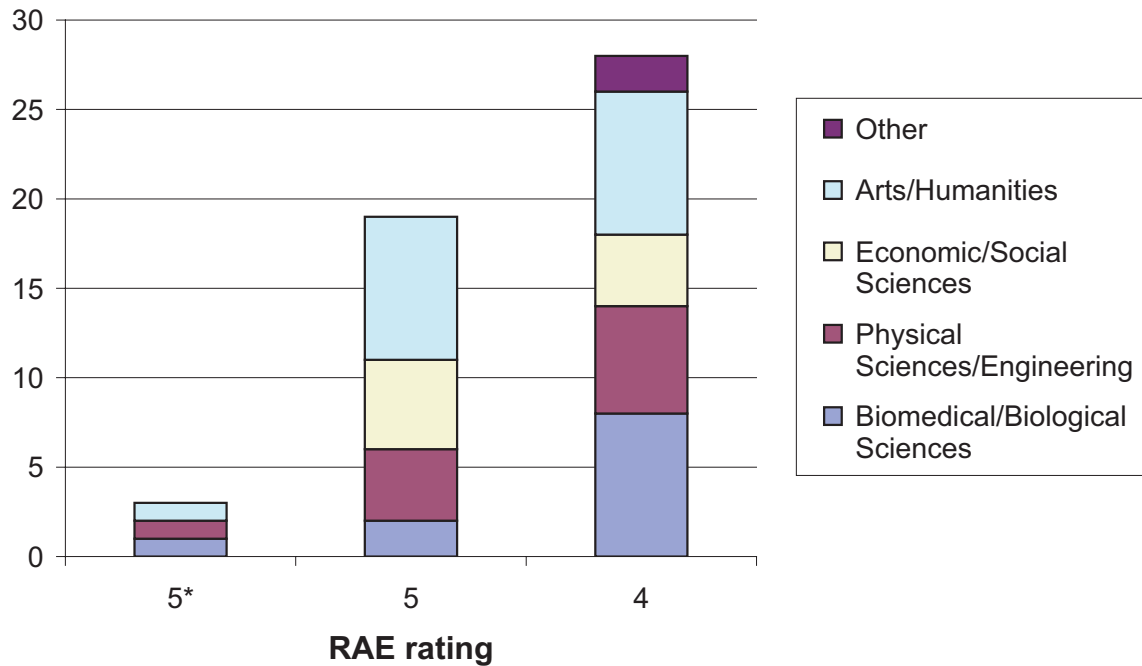


Figure One: Research subjects of top graded RAE submissions in Northern Ireland

Economic strengths

Northern Ireland had a traditional industrial economy, with strengths in shipbuilding, textiles and agriculture. As with most of the UK, this has gradually been eroded and replaced in part by service industries. However, Northern Ireland's main economic development organisation, Invest Northern Ireland⁷, envisages a very different economy in the future with knowledge-based industries at the heart of long-term prosperity.

The region now has a policy⁸ which aims to develop its science and technology driven and knowledge-based strengths through funded research and development (R&D) and through strengthened links between higher education and the business sector, all with a view to improving corporate productivity.

Although compared to the UK figures of 2.1%, R&D spending in Northern Ireland currently is low⁹ at 1.2% of GVA¹⁰, the region has seen a trend of increasing levels of R&D spending. However, much of this money comes from a small number of companies that invest heavily, while many companies are

investing well below the national average. The innovation strategy aims to address this and to maximize the knowledge and economic value of its researchers.

Profile of PhD graduates from Northern Ireland

Of the 7270 UK-domiciled PhDs who graduated in the UK in 2003, 3.6% (265) graduated from HEIs in Northern Ireland. Of these PhD graduates, 45% were female and 55% male, identical to the UK average. Part-time study was more common in Northern Ireland than in other regions, accounting for 36% of degrees awarded, compared to the UK average of 27%.

Figure Two shows the breakdown of UK-domiciled PhD graduates by subject groups. A significantly higher percentage of PhD graduates from Northern Ireland HEIs came from the medical sciences at 35.9% compared to 26.9% across the UK. Smaller proportions came from the physical sciences (24.5% compared to 32%) and arts and humanities (11.3% compared to 13.7%). The other subject areas were similar to the UK average figures.

⁷ www.investni.com/

⁸ 'think, create, innovate: the regional innovation strategy for Northern Ireland' www.detini.gov.uk/

⁹ www.statistics.gov.uk/; also useful is 'Regional Competitiveness and State of the Regions' by Mukund Lad at www.dtistats.net/sd/rci/

¹⁰ GVA (Gross Value Added) differs from GDP in that subsidies are added and taxes on products are deducted

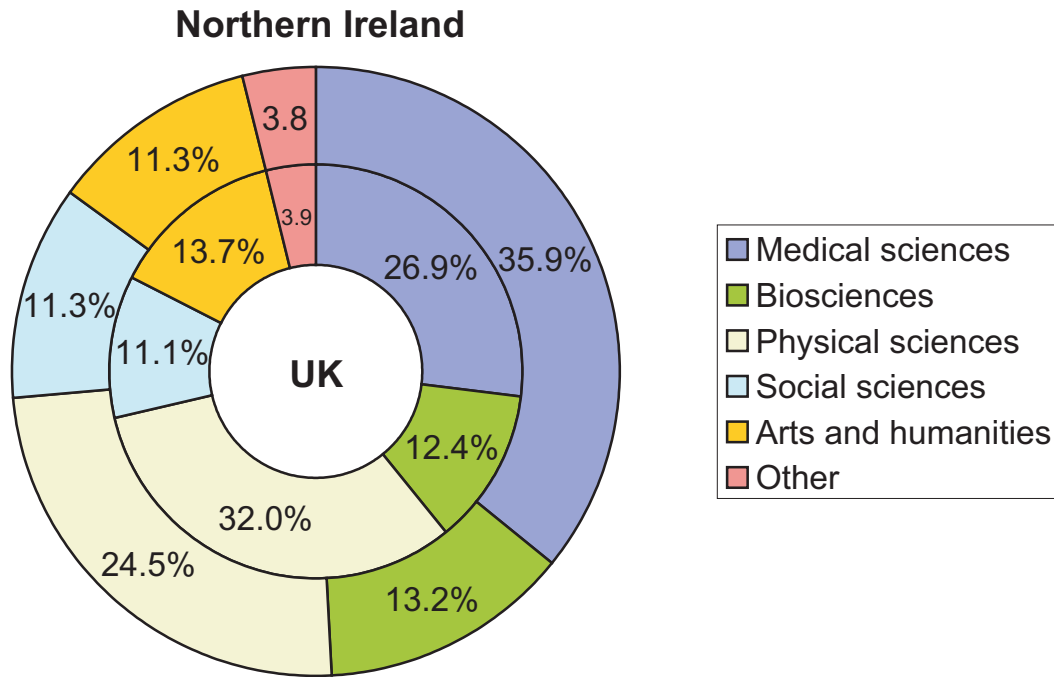


Figure Two: Subject groups of all UK-domiciled PhD graduates from HEIs in Northern Ireland (outer ring) compared to all UK HEIs (inner ring) in 2003

Five of the UK 'top ten' subjects for PhD graduates also appear in the table for Northern Ireland's HEIs (Table Two). The two most popular UK subjects, clinical medicine and chemistry, do not appear in the Northern Ireland table, but other medical sciences are popular. The category of 'other physical sciences' may better describe the multidisciplinary approach taken in the chemical sciences at Queen's University, Belfast. Civil engineering also makes an appearance on the Northern Ireland list.

Subject and ranking	Northern Ireland	Total (and position) in UK
1. Others in subjects allied to medicine	10.1%	1.8% (18)
2. Biology	6.0%	5.2% (4)
3. Psychology	4.9%	7.6% (3)
4. Others in medicine and dentistry	4.3%	0.5% (45)
5. Pharmacology, toxicology and pharmacy	4.0%	2.9% (7)
6. History by period	3.4%	2.5% (9)
7. Academic studies in education	2.6%	3.1% (6)
8. Electronic and electrical engineering	2.6%	2.1% (11)
9. Others in physical sciences	2.3%	0.3% (57)
10. Civil engineering	2.3%	1.2% (23)

Table Two: Top subjects studied by PhD graduates in Northern Ireland HEIs compared to UK figures

What do PhDs from Northern Ireland do?¹¹

Of the 265 UK-domiciled PhD graduates from Northern Ireland's HEIs in 2003 eligible for the 2004 survey, 205 responded. This 77% response rate was the highest of any region in the UK.

78.7% of UK-domiciled PhD graduates from Northern Ireland's institutions had entered the workplace when the survey was conducted, compared to the overall UK figure of 72.7%. A further 6.8% were engaged in work and study simultaneously. Fewer PhD graduates had moved overseas (4.8%) than for the UK as a whole (8.1%). At 1.4%, unemployment rates for UK-domiciled PhD graduates from Northern Ireland's institutions were significantly lower than the UK average of 3.2%.

¹¹ The data in this section refers to PhD graduates from Northern Ireland's HEIs who were working in all regions of the UK

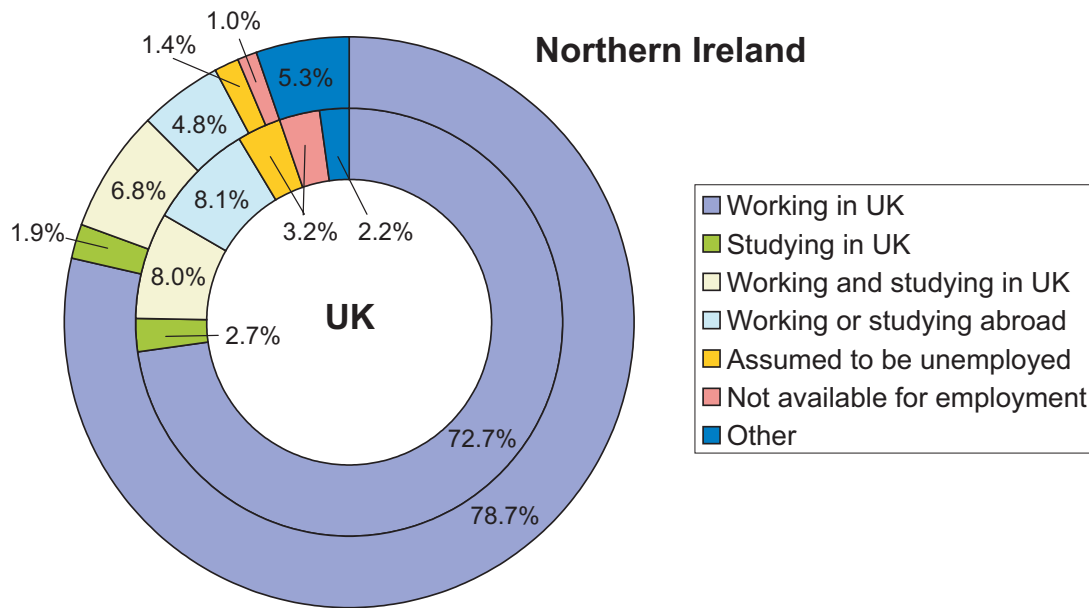


Figure Three: First destinations of UK-domiciled PhD graduates for all subjects from HEIs in Northern Ireland (outer ring) compared to all UK HEIs (inner ring) from 2004 DLHE survey responses

Employment sectors

The 85.5% PhD graduates from Northern Ireland’s HEIs working or working and studying in the UK were employed in a range of sectors across the UK. Consistent with the UK average (47.8%), the education sector was the dominant destination, employing 52.3%, predominantly in higher education.

The balance (47.7%) was employed in a range of occupations across all sectors. The differences, when compared to the UK picture, reflecting the nature of the Northern Ireland labour market and economy (see Figure Four).

Manufacturing industries employed a lower percentage of Northern Ireland PhD graduates, at 10.2% compared to 16.3% across the UK. 44% of these were employed in the chemical and pharmaceutical industries, accounting for 4.5% of all Northern Ireland doctoral graduates (compared to a national figure of 11%).

The health service employed proportionally more PhD graduates from Northern Ireland’s universities at 19.9% compared to 15.5% across the UK, reflecting the strength of the medical sciences. The public sector was also a more popular sector than across the UK at 9.1% compared to 5.7%. A smaller proportion (5.1%) were employed in the business, finance, IT sector compared to the UK average of 9.1%.

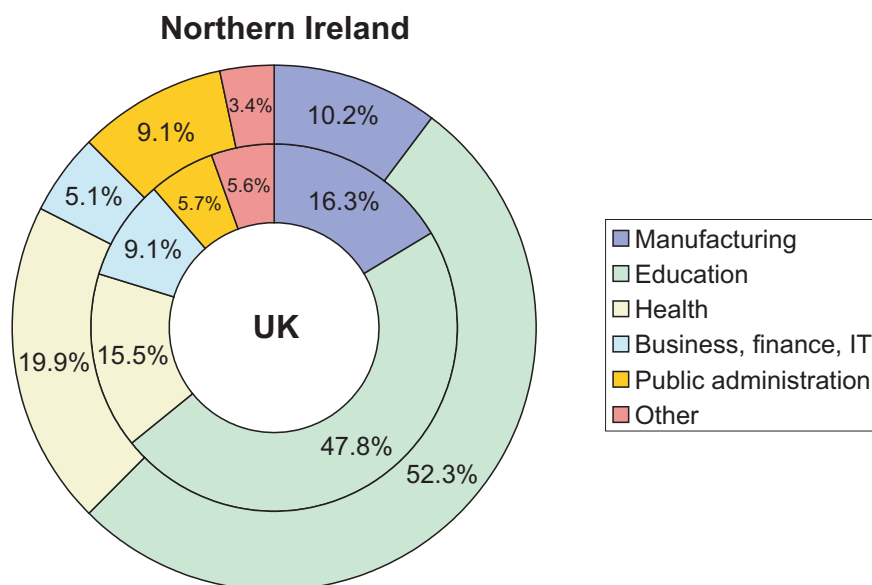


Figure Four: Employment sectors entered by UK-domiciled doctoral graduates from Northern Ireland’s HEIs (outer ring) compared to all UK HEIs (inner ring), based on Standard Industrial Classifications returned in 2004 DLHE survey

Career Occupations

We examined the specific occupations entered by UK-domiciled PhD graduates from Northern Ireland’s institutions. Differences with the UK average emerged that are consistent with the variations in subject areas of PhD graduates and employment sectors.

The biggest variation is in the health professionals category, which accounted for 11.9% of employed PhD graduates from this region compared to 5% nationally. A higher percentage were employed as teaching professionals at 28.4% compared to 22.2%, but fewer at 24.4% in ‘other professions’ (which includes some postdoctoral researchers) compared to 29.8% UK average. A slightly lower proportion was employed as scientific researchers at 16.5% compared to 18.1%. Generally, a lower percentage of Northern Ireland PhD graduates were employed in managerial or business positions, and in technical fields.

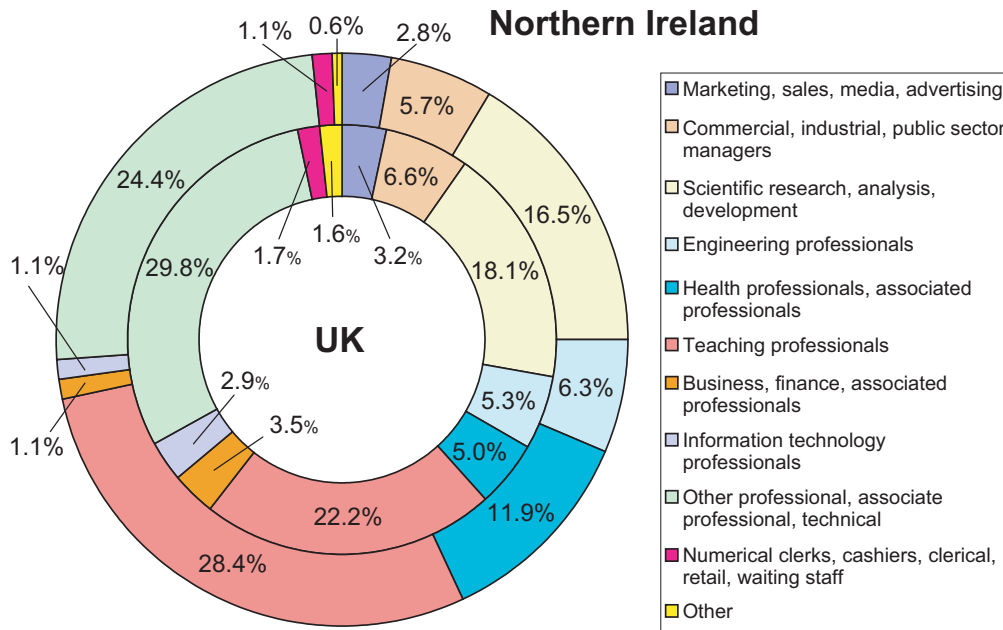


Figure Five: Types of work entered by UK-domiciled PhD graduates from HEIs in Northern Ireland (outer ring) compared to all UK institutions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey.

Migration

We examined the migration patterns of UK-domiciled PhD graduates from Northern Ireland’s HEIs who were in employment at the time of the survey.

89% of the UK-domiciled PhD graduates from Northern Ireland HEIs remained in Northern Ireland for employment. However, in common with almost all regions, Northern Ireland still saw a net loss of PhD graduates. 9.6% fewer PhD graduates started work in Northern Ireland than the total number of PhD graduates from the region¹².

20 PhD graduates (11% of total employed) left Northern Ireland for employment in other regions of the UK. This is the lowest proportion of any region and compares to the UK average figure of 38%. The majority of PhDs going to other regions of the UK described their destination as ‘England’, which prevents more detailed analysis.

Another 10 PhD graduates (6% of total employed) left Northern Ireland for work or work and study outside the UK (compared to the national proportion of 9%).

¹² The net migration figures should be treated with care. 2.5% of the total DLHE respondents did not identify a specific region of employment. If these respondents are skewed to one region this will impact significantly on the net migration figures

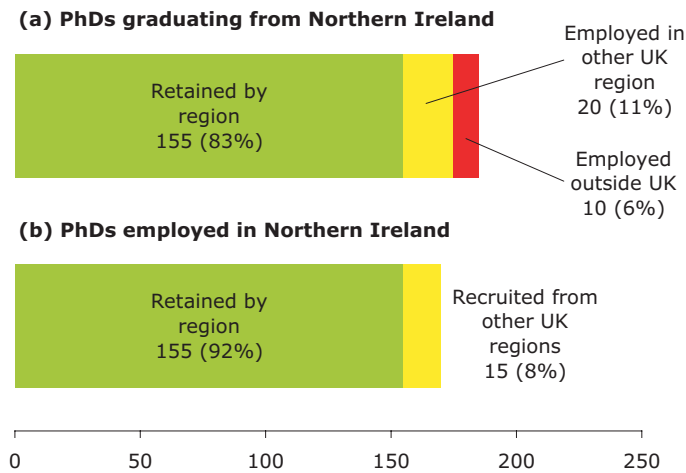


Figure Six: Mobility of PhD graduates from Northern Ireland in employment (a) and origin (region of study) of PhD graduates working in Northern Ireland (b)

What do PhD graduates employed in Northern Ireland do?¹³

155 UK-domiciled PhD graduates from Northern Ireland’s HEIs were working in the region at the time of the survey. This represented 92% of the total number of PhD graduates working in the region: the highest retention rate of any region. These were joined by 15 PhD graduates from elsewhere in the UK who had gained employment in Northern Ireland. Only 1% of UK-domiciled PhD graduates who left their regions of study for known UK locations moved to Northern Ireland: too small a number for further analysis. Of all the regions, it attracted the smallest number of PhD graduates.

Employment sectors

The employment sectors for all UK-domiciled PhD graduates employed in Northern Ireland are compared to the national picture in Figure Seven. As we might expect from the very high proportion of PhD graduates retained in the region, the employment sectors are similar to those of the PhD graduates from Northern Ireland’s institutions (presented in Figure Four).

In line with the rest of the UK, education was the largest employment sector in the region at 53.2% compared to 47.8% across the UK. Of these, 46% were employed as university lecturers and 38% as postdoctoral researchers.

The health service employed more PhD graduates in Northern Ireland at 20.1% compared to 15.5% across the UK. The public sector was also a more popular sector at 9.5% than the UK average of 5.7%.

Manufacturing industries employed a lower percentage of PhD graduates in Northern Ireland at 8.9% compared to 16.3% across the UK. Similarly, a smaller proportion were employed in the business, finance, IT sector at 4.7% compared to 9.1%.

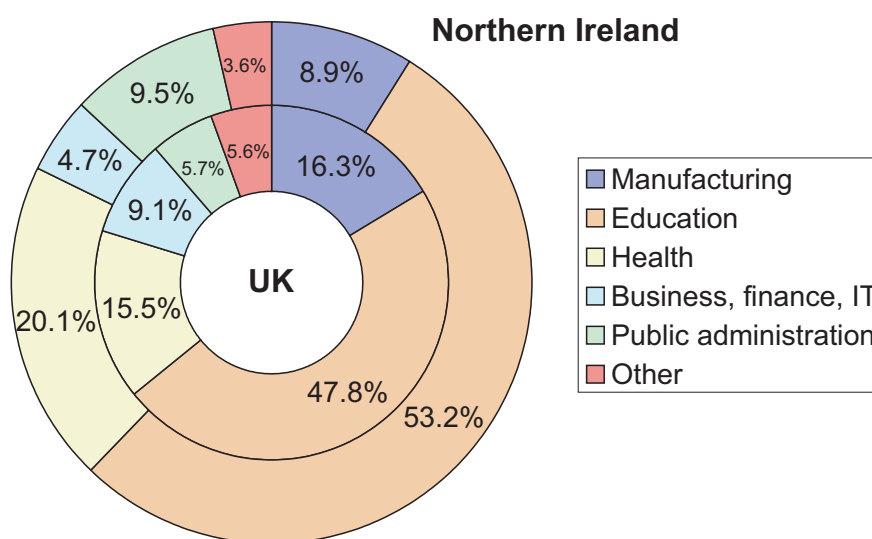


Figure Seven: Employment sectors entered by UK-domiciled PhD graduates employed in Northern Ireland (outer ring) compared to all UK regions (inner ring), based on Standard Industrial Classifications returned in the 2004 DLHE survey

¹³ The data in this section refers to PhD graduates from all regions of the UK who were working in Northern Ireland

For the 15 PhD graduates moving into Northern Ireland the biggest employment sector was education (53%), roughly equally divided between university lecturers and postdoctoral researchers. Other popular employment sectors were the business, finance and IT sector and the public sector, each employing 15% of those moving to the region¹⁴.

Career occupations

We examined the specific occupations entered by PhD graduates employed in Northern Ireland (Figure Eight). As for the previous sector analysis, the overall picture is quite similar to the occupations entered by PhD graduates from Northern Ireland's HEIs, and is also broadly similar to the UK picture.

The biggest variation is in the health professionals category, which accounted for 12.4% of the PhD graduates employed in the region, compared to 5% nationally. A higher percentage was employed as teaching professionals in the region at 30.2% compared to 22.2% across the UK.

A lower percentage (24.3%) was employed as 'other professions', which includes some postdoctoral researchers, compared to the UK average of 29.8% and as scientific researchers (16.6% compared to 18.1%).

Overall, 20% of all the UK-domiciled PhD graduates employed in Northern Ireland were employed as postdoctoral researchers¹⁵, slightly lower than the UK average of 22%.

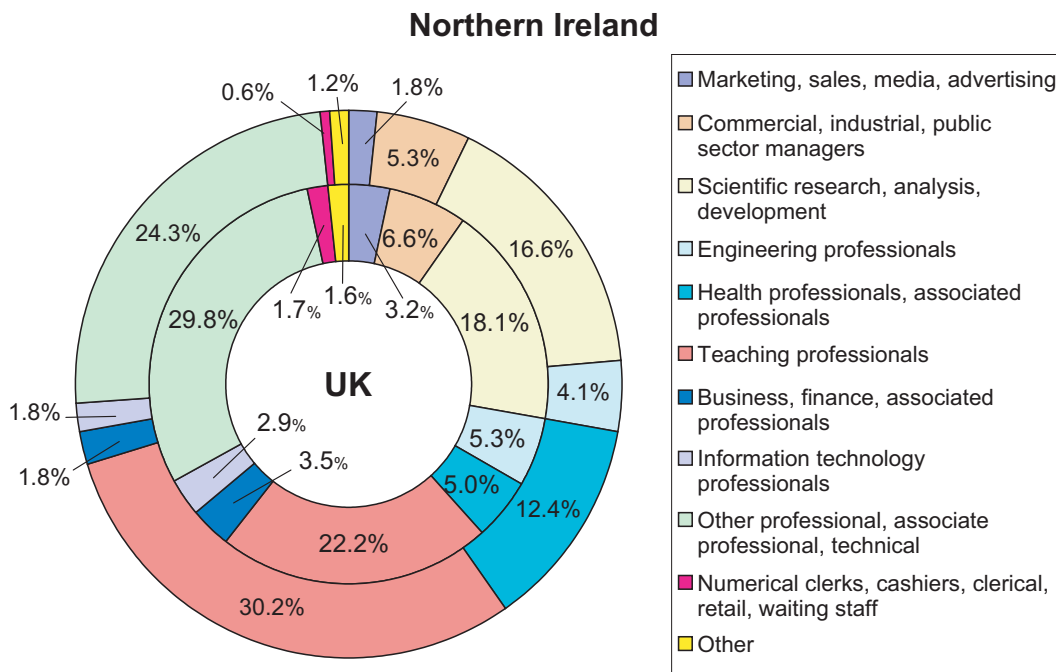


Figure Eight: Types of work entered by UK-domiciled PhD graduates employed in Scotland (outer ring) compared to all UK regions (inner ring), based on Standard Occupational Classifications returned in 2004 DLHE survey

¹⁴ The percentages quoted here should be treated with care due to the small sample size

¹⁵ 'What Do PhDs Do?' methodology describes the process of identifying postdoctoral researchers in universities www.grad.ac.uk/wdps

UK GRAD Programme

The UK GRAD Programme aims to promote and embed personal and professional development for researchers in research degree programmes. We do this through a number of national and regional activities:

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"The 'Just for Postgrads' section of the UK GRAD website was a real life-saver during my PhD: full of practical tips that really helped me manage my research"

National conference/events

UK GRAD runs an annual conference 'profiting from postgraduate talent' which takes place in September and brings together all those involved in influencing the postgraduate research environment.

For information on other national events including policy forums and good practice workshops, and for reports from previous conferences and events www.grad.ac.uk/eventsintro

"A meeting of minds in postgraduate education"

Regional Hubs

UK GRAD has a network of regional Hubs that are based in institutions to work on a regional basis to share good practice and facilitate networks to support the delivery of personal and professional development for researchers. Get in touch with your regional Hub (details on back cover) to explore support available in your region.

"Many thanks for all the information you sent me – the networking really works!"

Courses

UK GRAD run a national and local programme of courses called GRADschools designed especially for postgraduate researchers, as well as other shorter courses/workshops through universities and professional bodies.

"The course was absolutely essential to evaluating my own skills and opportunities and broadening my horizons. It significantly changed my life"

National reviews

The UK GRAD Programme undertakes a series of national reviews, including this publication 'What Do PhDs Do?' Check the website for latest information, including the final report from 'a national review of emerging practice on the use of Personal Development Planning for postgraduate researchers' undertaken in 2004.

To find out more about any aspect of UK GRAD's work, please call 01223 448510, or mail admin@grad.ac.uk, or contact your regional Hub.

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