

100 Years of the PhD in the UK

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Here I have attempted to write a short history of the PhD in the UK. Much is based on the excellent book from 1983 by Renate Simpson and also visits to the University of London and UCL archives to get some more specific information about my own University which has produced a significant number of UK PhDs. I begin with some words about mediaeval 'doctorates' and the research doctorate developments in the German speaking world which were most significant. The UK story is divided into four periods leading into some comments about the future.

The origins of the doctorate

Precisely when the first doctorates were granted is not clear. Universities really became known as such when the 'Masters' came together to become a legal corporation and were recognised by the pope or emperor. The early mediaeval Universities such as the University of Paris awarded the title of 'Master' for someone who had passed their apprenticeship and were able to teach while in Bologna they were called 'Doctor' (Simpson). In some places the doctorate became the qualification for specialists to teach at a University in Law, Theology and Medicine. The University of Paris seems to have been the first in the early thirteenth century with Germanic states later such as Munich in 1473, Leiden 1580 and Utrecht 1644. The German states saw having a University as a status symbol hence their growth in the 16th - 18th Centuries. Here in England the creation of Universities was tightly controlled by the Church of England with just two ancient Universities, Oxford and Cambridge, until the foundation of the University of London in 1823. Scotland however had four.

The Research Doctorate

By the 18th Century the idea of a 'Master' as understood in the German speaking world had become debased and there was a need for a higher qualification with certain rights as a qualification to teach at a University (Clark). The idea of a written thesis to be presented together with a disputation appears in the 17th century. German Universities were granting doctorates in philosophy in the 16th century but they were not formally recognised by the various state authorities. In 1771 the Dr. phil. (PhD) was formally recognised in Prussia however this was not a research based degree but rather demonstrated mastery of the knowledge in a subject and erudition. They were rather

narrow and inward looking such as one in Leipzig in 1704 ‘On Scholars Who Hastened Their Deaths Through Overmuch Study, part 1: Histories’ (Clark).

Wilhelm von Humboldt proposed a new type of University based on research and teaching introducing the idea of ‘Lernfreiheit’- that scholars should be free to specialise. As Education Minister he was instrumental in the establishment of the University of Berlin (now the Humboldt University) in 1810. From the start they introduce a PhD (Dr. phil.) which was based on research and influenced the teaching at the University. Other Universities in the German speaking world soon followed. In France the Napoleonic reform of Higher Education also resulted in the introduction of the PhD in 1810 (see table for dates from various LERU Universities). The Netherlands introduced them legally in 1815 and the University of Zurich gave its first in 1833. Yale gave the first PhD in the USA in 1861. The dates of the first research based PhDs at some of the League of European Research Universities (LERU) are given in table 1 below.

University of Berlin	Introduced 1810
Université Pierre et Marie Curie (LERU) (then known as Faculté de Sciences)	Introduced 1810
Paris-Sorbonne	1811 (Mechanics and Astronomy)
Netherlands	Introduced 1815
Zurich (LERU)	1833 (medicine)
Geneva (LERU)	1875 (law)
University College London (University of London) (LERU)	1921
Trinity College Dublin (LERU)	1924

Table 1
First research PhDs introduced or granted at some LERU and other European Universities

The UK PhD

In the England the two ancient Universities had lost much of their scholarly capability during the 17th, 18th and 19th Centuries. Good graduates were given Oxbridge tutorial fellowships to teach with no time or inclination for research and with very broad teaching responsibilities. It was very difficult to specialise. In 1850 of 542 fellowships at Oxford only 22 were open with the rest tied to specific schools or parishes. The lack of an academic career ladder was ‘most singularly adapted for getting rid of the best men at the very age when they begin to be most useful’. There was ‘no inducement whatever to continue their exertions, beyond the mere fact of not having provided themselves with satisfactory permanent solutions in other quarters. Thus the Public Schools and other institutions have the pick of your best men...’ (Wratislaw, Simpson).

The Commissions of 1850 into Oxford and Cambridge were influenced by the development of research at German Universities but conservative elements prevented much change. It did make the recommendation that 'fellows should no longer be forced to resign when they came into property on the basis that this would improve the intellectual quality of fellows by 'enabling to employ capable persons though they are rich, rather than less capable persons because they are poor'. Diversity has come some way since then.

Some research degrees were introduced in the later 19th Century such as the BLitt at Oxford. The Devonshire Commission of 1871-75 recommended that Universities would do well to consider awarding doctorates. The University of London by then had a DSc by written examination and in 1881 allowed this degree on the basis of a thesis demonstrating original work. I looked at two of these DScs. One in Chemistry was 45 printed pages (A5 or near with large print) on a bunch of experiments on 'closed aromatic chains' (a series of compounds related to benzene). No data was given, just some reflections such as 'I did these experiments and noted xxx'. The other was on electricity and was a 4 page published paper in the Philosophical Magazine. They showed original work but not the big sweep we expect today.

The Allied Colonial Universities Conference of 1903 recommended the introduction of a research doctorate. This started to generate discussion. The Conference of Universities held on 18th May 1917 under the auspices of the Universities Bureau of the British Empire recommended the introduction of a 'lower' doctorate. One of the key motivations was that American scholars were preferring to go to Germany for their research because they were able to obtain a qualification, the PhD (Dr. phil.). The First World War added impetus to the case for introducing a PhD in order to gain ground in the post-war world.

First stage 1917-1945

Oxford was the first in line instituting its first research doctorate programme (DPhil) in 1917 with the first award in 1919. The Northern Universities (Manchester, Leeds, Liverpool and Sheffield) took steps to introduce them around this time too and was fairly quickly introduced at all Universities around the country.

In spite of a letter in Feb 1917 from the Vice Chancellor of Manchester to the Vice Chancellor of London about these plans (commenting that 'it was felt that the present doctorates are rather rewards for distinguished merit than incentives for postgraduate work') the University of London Academic Council agreed to take no action at its 12 March 1917 meeting. The Canadians in particular were keen that Britain introduce a PhD to encourage their students to go to Britain for graduate study rather than Germany or the USA. The Vice Chancellor of the University of Toronto wrote to the University of London on 12 March 1917 'that in order to strengthen the unity of the Empire the Universities of Great Britain should be urged to modify and enlarge their graduate

facilities to meet the needs of students from the Universities of this Dominion.’ This meant recognising qualifications, opening up fellowships and awarding PhDs.

This at least caused the committee to await a report from its Imperial Studies Committee. This was finally received on 10 December 1917 and was referred to Faculty committees. After further postponements of a decision the University Senate finally approved the introduction of the PhD on 22 Oct 1919. The minutes of the University College London Governing Committee of 7/1/1919 ratified the decision of the institution of the PhD degree by the Professorial Board of 17/12/1918.

The first one to be admitted at UCL was S.S. Bhatnagar in Chemistry in as noted in 4/11/19 minutes but the minute says ‘PhD or DSc’ so perhaps there was some doubt about its status. The next ones were in the minutes of 1/6/20 were for two in German, and one each in Philosophy, Psychology, English and History. The numbers grew fairly rapidly after that as can be seen in fig 1.

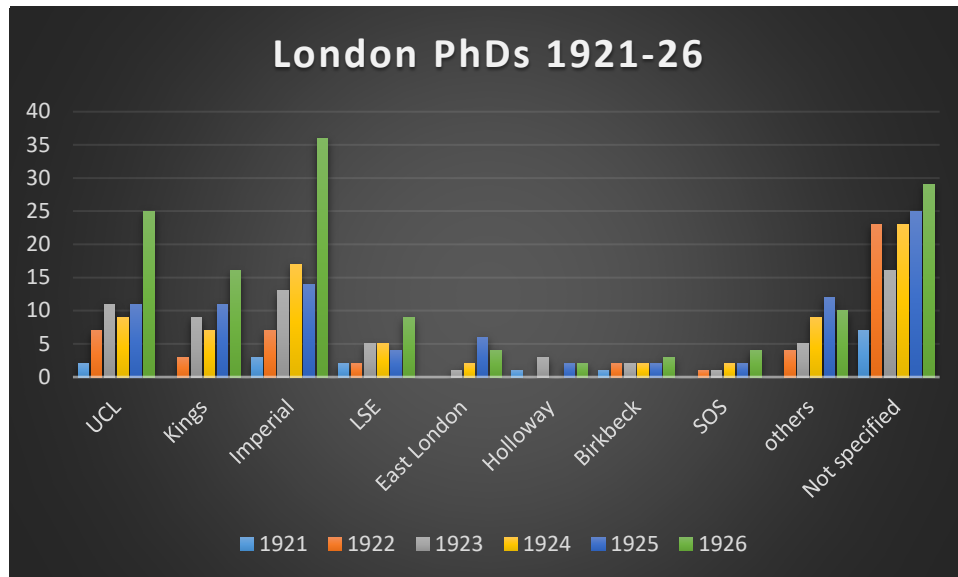


Figure 1.
PhDs granted by the University of London 1921-26

The numbers by Faculty can be seen in table 2 demonstrating the dominance of the Sciences.

	Economics	Engineering	Science	Arts	Divinity
1921	2	0	11	3	0
1922	3	0	32	12	2
1923	7	1	48	9	1
1924	5	2	54	13	2
1925	4	0	63	18	3
1926	11	2	90	34	1
21-26	32	5	298	89	9

Table 2.
PhDs granted by the University of London 1921-26 by Faculty

Across all UK Universities the numbers increased steadily throughout the decades as shown in table 3:

1920s	1930s	1940s	1950s
2345	4308	3069	15266

Table 3.
Doctorates granted at all UK Universities (Simpson)

The UCL College Calendars in the 1920s list a number of research training courses in the early days. Clearly the PhD involved attending formal training as well as undertaking supervised research.

From 1921 to 1959 the home/overseas split across all UK doctoral candidates was consistently between 35-37% (Simpson).

Throughout the period between the world wars German science continued to dominate in terms of reputation and outputs. However in the 1930s this began to be undermined by the imposition of rules by the Nazi government, particularly the removal of Jewish academics many of whom left for the UK and USA. The politicisation of some Universities meant that their processes for appointment and preferment became led by political choices rather than scholarly achievement.

Second stage 1945 – 1970s

Wartime saw many scientists diverted to the war effort. The numbers undertaking PhDs decreased during the war particularly in the sciences (Fig IIA-3 Simpson). The war devastated German research and its Universities which affected their status and reputation for decades following. At that time France dominated scholarship in the Social Sciences.

After the war the numbers undertaking PhDs grew rapidly. However during this period a PhD was not essential for academic positions. Some Universities considered that a research degree was not needed because their staff were 'smart enough without the need for further education'. However the focus on research was increasing along with a slow realisation that training would be valuable.

After the war the University Grants Committee (originally set up in 1903 as the University Colleges Committee of the Department of Science and Industrial Research) was given a greater role in planning the University sector which included funding for training of researchers.

Third stage 1970s – 2003

Numbers continued to grow steadily during this period. Table 4 shows the numbers of doctoral degrees (including latterly professional doctorates) granted at all UK Universities.

1975/6	1980-81	1994/5	2000/01	2011/12
4815	6199	7559	14115	24090

Table 4.
Doctorates granted at all UK Universities in selected years (HESA)

By the 1970s it was becoming essential to have a PhD to be recruited to an academic position, particularly in the Humanities and Natural and Social Sciences. In professional Faculties such as Law, Medicine, Engineering and Architecture professional practice was seen as just as important. I remember as an undergraduate at Imperial College in the late 1970s several of the staff did not have PhDs but all new recruits did unless they were bringing a specific professional competence such as design or safety. It is now almost inconceivable to recruit someone to an academic position in a research intensive University without a PhD.

The late 1980s brought in the idea of more formal training, particularly in the social sciences resulting in the 1+3 Economic and Social Research Council model (1 year MRes or MA with significant research methods training followed by 3 year PhD) introduced in the 1990s. There was also scrutiny of the time to completion. Up until then it was felt that a PhD took as much time as was necessary and many funded students did not even submit their thesis. Lord Rothschild undertook a review of the Social Science Research Council (which he recommended became the Economic and Social Research Council) and decided that there should be more scrutiny of completion times.

The government was concerned about consistency of research particularly with the growth in the number of Universities. All direct University funding was on the basis of total student numbers and any competitive research grants were given on the assumption of there being 'a well found laboratory'. The government introduced the first Research Assessment Exercise in 1985 which judged the quality of research in each discipline area. Its purpose was to guide funding decisions and direct money to where the research was judged to be the best. This has of course continued up to the present day with increasing effort and focused financial contribution to the higher scoring units of assessment. The RAE included within its assessment of environment the number of doctoral students and, for esteem the number awarded during the period. This had the effect of encouraging Universities to increase their research and their PhD student numbers.

Fourth stage from 2003 to the present

The next big change was catalyzed by Sir Gareth Roberts in 2002 who produced his report 'SET (Science Engineering and Technology) for Success'. He recognized that PhD graduates were an important part of the drive for more innovation and needed to be trained with this in mind. Graduating numbers meant that only a fraction could expect an academic career but their skills were needed to drive innovation.

He said that researchers needed opportunities to develop more broadly, particularly in terms of their generic skills, and persuaded the Government to give Universities an extra £800 a year per research student that they funded for skills development suitable for researchers. Recognizing their leadership role for research training, the Research Councils allowed Universities to use the money to develop a programme for all research students (not just those that they fund) which you will now find at all UK Universities with significant doctoral programmes. The skills courses also enable research students to work with others of very different disciplines enabling them to create wider cross-disciplinary networks and to share their experience. While the SET report was originally considering Science and Engineering students the conclusions quickly came to be seen as important for research students of all disciplines.

One of the continuing concerns about doctoral study is of isolation. I encourage you all to read pages 323-328 of Ahdaf Soueif's novel 'In the Eye of the Sun' to appreciate the bleakness of the experience of a new PhD student arriving in the UK in 1973 from Egypt. It is so vivid it must be autobiographical. Initially the EPSRC and now all Research Councils and some charities fund doctoral training through Centres for Doctoral Training (CDTs) which expect regular cohort based activities for training to help students avoid isolation, and to build networks to help with scholarly and personal issues while still allowing plenty of time for their individual research. CDTs typically have a mix of advanced technical training and some 'technical generic' training where appropriate (an example is biotechnology entrepreneurship which has specific industry considerations) to be taken along with generic skills provided for all research students. Increasingly Universities are organizing all doctoral study into tighter programmes with cohort based activities.

New types of doctorates have been introduced in the U.K. during this period such as the new route PhD and the Engineering doctorate (EngD). These typically have a thesis of the same style and length (up to 100,000 words) of a PhD but have extended training and/or internship requirements and are typically funded for four years (full time).

Professional Doctorates are also research degrees but the thesis element is much shorter (typically 45,000 words). They must take significant number of advanced courses and submit a professional portfolio demonstrating use of new methods. The research work is based in professional practice so the links with practice (industry, government, schools, healthcare etc.) are typically much stronger.

Recent International Developments

The U.K. has been in the forefront of PhD training developments but other parts of the world have been following a similar path. The European Union in particular has been broadening its PhD training with encouragement from the European Universities Association (EUA), the European Commission and University Associations such as the League of European Research Universities (LERU) whose Doctoral Studies Policy Group I chair.

With the University Community in 2005 the EUA developed the ten Salzburg Principles of Doctoral Education

http://eua.be/eua/jsp/en/upload/Salzburg_Report_final.1129817011146.pdf . This particularly highlighted the role of a doctorate as a preparation for both academic and non-academic careers and the need for transferable skills training. LERU produced a report in 2010

http://www.leru.org/files/publications/LERU_Doctoral_degrees_beyond_2010.pdf highlighting the range of skills that doctoral graduates develop, the range of careers that they take up, and that doctorates should have international, interdisciplinary and intersectoral elements (although not all need all three). The real product of the doctorate is the graduate with the thesis is the main piece of evidence - trained doctors

who are 'creative critical autonomous intellectual risk takers'. This was followed up in 2014 with examples of how this is achieved in LERU Universities
http://www.leru.org/files/publications/LERU_AP_15_Good_practice_elements_in_doctoral_training_2014.pdf

Many of these elements were taken up by the European Commission in its 2011 'Principles of Innovative Doctoral Training'
https://cdn5.euraxess.org/sites/default/files/policy_library/principles_for_innovative_doctoral_training.pdf which influenced their expectations of doctoral programmes funded through Marie-Sklodowska-Curie grants. I was a member of the European Research Area Human Resources and Mobility Working Group on Doctoral Education which reviewed progress on these principles across Europe. We found that major research Universities were giving interdisciplinary and international opportunities but that intersectoral opportunities were less well developed.

The rest of the world has been looking at European developments with great interest. Australia recently reviewed its research training system
<http://acola.org.au/wp/PDF/SAF13/SAF13%20RTS%20report.pdf> concluding that transferable skills training should be included in all research degree programmes and that Australia should be improving its collaboration between industry and academia, particularly in research degree programmes. The USA with its very vigorous research system also admits to a weakness in transferable skills training and in its time to completion for PhDs which average over seven years (not including predissertation courses).

The future

So what of the future?

Greater grouping of cohorts to give a more consistent and less isolated experience is likely to continue. Students should be admitted to recognized programmes which provide a cohort experience while allowing candidates to develop independence in their projects. There may be more use of joint projects but I doubt if this will grow particularly since in the end we are trying to train and assess independent original thinkers, albeit ones who can work with others. There will always need to be a way of identifying what are the ideas and the work of individuals.

An issue that will hit us soon is a closer look at our recruitment to ensure that we recruit from the full diversity of the population. We are already looking at this, gender for a long time and more recently ethnicity and disability, but it is likely that there will be greater external scrutiny and incentives. We know that diversity is an issue in University careers but also more broadly in professional careers (see the Milburn report 'Fair access to professional careers') so this applies to all our PhD programmes.

Greater links to the professional world are likely as we increasingly need to justify our role in society to continue to receive Government money. There should, and I believe will, always be space for researchers working on topics that have no obvious or medium term impact on society but the system can only support a few of these, not part of a mass Higher Education system that seeks to do research in all its parts. We will find more ways of working with the non-academic world through funding, internships or just simple advice and engagement. The need to demonstrate the impact of research has become very significant so it is vital that we train our PhD students to be able to discuss the potential impact of their work in a succinct and credible way – important for all in both academic and non-academic roles. It is likely that professional doctorates will increase. They have clear training benefits for candidates and employers while allowing some projects to take place within a professional setting potentially leading to concrete beneficial outcomes for all parties. There is clear scope for more engagement with SMEs who typically understand less about University research and how it works so Universities need to be more active in engaging with SMEs. This is difficult and time consuming but needs to be done.

A key change will be the embracing of Open Science. This will mean a new way of working. Open access publication is coming in but Open Science also means being much more transparent about our ways of working, our data, and how things get into the public domain. It is a changing landscape but we need to be preparing all researchers for this change as it will affect public and private sectors. It is clear that all our methods of communication are changing and to some extent so is scholarly communication. How can the format of the thesis be modified to retain its durability and links to the proliferation of information sources while retaining rigour? How do we use social media? To what extent will post-publication peer review affect the way we work? What does all this mean for doctoral candidates during their research as well as for the examination and subsequent career?

There are changing aspects of academic careers also. Only a small fraction will end up in academic tracks but it is beneficial for all to understand how academia works as those employed in non-academic roles are likely to be the ones with whom academics will most frequently collaborate. So it is certainly beneficial that all doctoral graduates understand how the academic and research system works. Major research institutes also typically have a cadre of senior scientists who manage work, people, equipment, and major reviews. They do exist in Universities but to a lesser extent and are often not well appreciated. As research groups and grants get larger it is likely that more of these positions will be required. Our PhD students need to be appropriately guided and prepared for positions both outside academic and also for the full range within academia: postdoctoral positions, fellowships, fixed-term academic appointments, staff scientist positions, teaching fellows and non-academic roles. All those remaining in academia need to be prepared for the radical changes in teaching and learning methods that are happening. Many of these are affecting the way that the non-academic world works too.

Perhaps the most important thing for us as a community is to spread the word about these changes. It is still common to hear people who don't employ PhD graduates because they think they don't have the generic skills and even 'that it is not possible to fail a PhD' which we know is not true. We need to get out and tell our collaborators and others how the PhD has changed and that they do have workplace skills, but they also have a very special skills set as 'creative, critical, autonomous intellectual risk takers' (LERU). Fortunately our PhD graduates are going out and showing exactly this.

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