David Bogle highlights some of the key changes that have occurred in PhDs (and more that are to come) and their particular resonances to management and business education
Do we need more PhDs? What are they for? How can we make them more valuable to the knowledge economy?

These are some of the questions that have been raised in recent years. And the answers have created considerable change in doctoral education in all fields and more is to come.

The number of PhDs that Europe produces has grown quite significantly in recent years. We tend to look for very strong motivation in applicants because it is a tough assignment over three to four years full time but there are many who seek to pursue this track.

It allows concentrated exploration of a topic that someone feels passionate about – and about making an original contribution with the potential for significant impact.

For much of the last century candidates pursued a PhD because they saw it as a route into an academic career. But with our knowledge society and the value placed on new ideas and approaches that fuel economic growth, society and the labour market have signalled a need for more researchers trained with a research qualification. The highest-level qualification to demonstrate this is the PhD.

Reform has been going on for some time and one key statement was the 10 Salzburg Principles of Doctoral Education articulated by the European Universities Association (EUA) and its members (EUA2007). A League of European Research Universities (LERU) report states that researchers are trained to be “creative, critical, autonomous intellectual risk takers pushing at the boundaries of frontier research” (LERU2010).

The modern doctorate is an interplay between original research and developing sophisticated skills useful in the workplace. It is no longer an academic apprenticeship. Some will enter academic careers but most will enter a wide range of careers (in the UK, France and Germany more than half of doctoral graduates immediately leave academia for careers outside). The Royal Society tells us that in the UK only 3.5% of PhD graduates end up in permanent academic positions (RoySoc2010).

There are many research opportunities in the public, private and charitable sectors, of course, and recruiters to non-research jobs often seek individuals who can marshal and sift large amounts of evidence for complex decision making. In our LERU report we highlighted a few examples of non-academic careers pursued by doctoral graduates using the transferable skills developed during their doctorate studies.

A key role of doctoral graduates as trained researchers is to generate and develop new ideas as drivers of innovation in knowledge-intensive societies. The European Commission (EC) has estimated that Europe needs around a million new researchers. Most developing countries are increasing the numbers of doctoral graduates both to help train new generations and to drive innovation and development.

The skills researchers need are very similar across all these roles both inside and outside academia:

- to come up with original ideas
- to plan how to verify these ideas and to effectively execute that plan, usually with others
- to communicate complex ideas and results to peers, stakeholders and, increasingly, to wider society

Clearly entrepreneurship is something we need to have in our doctoral training programmes.

3.5%
In the UK, France and Germany more than half of doctoral graduates immediately leave academia for careers outside. The Royal Society tells us that in the UK only 3.5% of PhD graduates end up in permanent academic positions.
A strong research environment is necessary for training researchers but now it is also necessary to provide explicit transferable skills training opportunities for all doctoral candidates – not just hoping that good supervisors will provide the training. We also believe that it is necessary to train our researchers to have international, interdisciplinary and inter-sectoral perspectives and experience.

The EC, aiming to provide further momentum to reform, has published seven principles of innovative doctoral training (EC 2011). They reinforce the need for a broad and consistent environment for doctoral education:

- research excellence
- attractive institutional environment
- interdisciplinary options
- exposure to non-academic environments
- international networking
- transferable skills training
- quality assurance

A recent EC survey found broad agreement with the principles and considerable progress towards their deployment. The area that proved weakest was working with non-academic sectors.

Schools of management and business should have the edge here. The disciplines are very much oriented towards business objectives. The research projects give space to reflect deeply on existing practices and formulating radically new ways of organising and working.

Research degrees offer many opportunities for joint working with business, and also giving doctoral candidates the chance to work through internships, to develop their ideas while embedded in the workplace, or to gain broader experience. This is becoming more common across all disciplines. EFMD itself attests to the international perspectives of research training along with collaborations well beyond Europe.

Interdisciplinarity also perhaps deserves attention to ensure that researchers explore ideas emanating from other disciplines within the social, natural and life sciences, and the humanities, which will bring fertile new ideas and perspectives. Of course much of this already goes on. It seems many, perhaps even most, new ideas come at the edges of currently recognised disciplines.

Our report *Good practice elements in doctoral training* (LERU2014) seeks to demonstrate some of the ways in which we, the 21 LERU universities, train our doctoral candidates to fulfil their potential in achieving these aims in their future careers: developing and driving new ideas and providing a rigorous critique of the status quo.

The report presents a selection of activities that our members are proud of in four sections:

- formal research training addressing a wide range of topics useful in research and research careers
- activities driven by doctoral candidates – developing independence and giving opportunities to practise it is a key tenet of doctoral training
- career development for both academic and non-academic jobs across a wide range of sectors
- a range of novel concepts and structures

Our report stresses the need for closer interaction with society in the research itself as well as in its dissemination and in future research careers.

We did not explicitly address the professional doctorate, of which the DBA is the most well-known example.
The professional doctorate has a range of forms but most commonly it includes a major research component anchored in professional practice. The thesis is usually considerably shorter and less comprehensive than a PhD thesis and is undertaken alongside other taught and practical elements. However, it still contains a major research project developed as part of training a researcher and so the principles outlined above still very much apply.

The need for originality and rigour will remain but perhaps the aspect of doctoral studies that is changing most quickly is the need to prepare people to engage more fully with society: to be able to discuss and defend ideas not just with peers but with the wider world.

This is both to enhance the impact of the research and also to ensure that the context, uncertainty and consequences are properly understood as widely as possible. This means becoming familiar with how to convey complex and nuanced messages clearly but succinctly through social media as well as traditional media.

Science (in the widest sense) is becoming more open – open access and open data are two key trends – along with involving the wider public in research through ‘citizen science’. Our doctoral graduates must engage and lead in this endeavour.

Many universities now have training opportunities for this but we still have a way to go to ensure that all our researchers are comfortable and properly prepared for the wider role society now expects.

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All the indicators say that we need more doctoral graduates to help drive innovation and to help tackle the challenges that face society. They need a range of sophisticated skills to face this challenge and our research-intensive universities across Europe – and beyond - have reformed doctoral education to better prepare doctoral graduates for this enhanced role.

We all want to prepare researchers for 21st century research challenges which we particularly see as needing approaches that are interdisciplinary, international and inter-sectoral.