8 Doctoral education and the impact gap

What we can learn from ‘Prof Docs’ and why it matters for early career researchers

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This chapter gives an overview of contemporary policy discourse around the doctorate, specifically looking at the question of impact in terms of the impact of education at a doctoral level on the knowledge economy. We start by providing an insight into policy drivers which have and continue to influence doctoral training programmes, models of doctorate, funder priorities and funding opportunities. We move on to explore the tension between policy and practice in doctoral education in the area of impact which stems from an aspiration in research and education policy to call for and evidence impact on the economy and a noticeable absence of data to prove it. We go on to summarise examples in the UK of initiatives that have been designed to enhance the impact of the ‘traditional’ PhD on business, industry and third sector and then focus on key developments in professional doctorates, exploring the lingering uncertainties and unresolved anxieties about definition, value and fit of the professional doctorate, and – by extension – the evolving PhD.

The chapter aims to support ECRs to gain an understanding of policy and practice in doctoral education. This will help you to think about how you (co)-develop and (co)-design impactful doctoral projects which lead to high-quality research with impact for publication. It will give you the necessary context to shape enhanced funding applications for doctoral studentships which more easily fit funders’ evolving agenda. It will also – hopefully – inspire you to challenge the current academic discourse which often struggles to define, locate and value newer evolutions of the traditional form of doctorates – such as the professional doctorate – where knowledge is more explicitly generated in the context of its application and impact is central to the research for supervisor and doctoral candidate.

Doctoral education, the knowledge economy and the impact gap

As ECRs, you will, no doubt, be thinking about trying to secure early experience on supervisory teams, building up your numbers of timely submissions and completions, undertaking supervisor training on a range of issues, from administrative paper trails and research degree regulations to the pedagogy of supervision and how best to support doctoral researchers to undertake one of the single most demanding projects of their life.

Ensuring that you are research active, and developing an excellent research track record, go without saying as effective ways to be invited onto supervisory teams and to have the opportunity to hone your supervisory skills and to learn from others with more experience. Depending upon your institution, there may be ringfenced funding for your own studentship, on a topic that is central to your research interests and expertise. You may also work in an area where you are able to attract high-quality self-funded doctoral candidates. However, despite these opportunities being available to some, for the majority of ECRs, securing a doctoral researcher (or more) is a necessary but challenging item on the to-do list. This is central to producing high-quality research outputs with impact for the Research Excellence Framework or the equivalent research audit exercise in your own national context.

An understanding of the changing policy landscape around the impact of education to a doctoral level, evolving funder expectations, emerging doctoral funding models and the challenges and opportunities of working closely with business, industry or third sector is

therefore an important part of income generation, effective doctoral project design and high-quality research with impact for publications.

This first section considers the question of the value of doctoral education as presented in UK and European policy discourse (education and skills and in research) and in the academic literature, alongside the case for impact from investment in doctoral training that is articulated by UK funders. In policy, through funders and within institutions we subscribe in many countries to the notion that graduate education 'builds on human capital to drive economic success' (RCUK 2014). The burden of proving this connection weighs heavy on higher education institutions, research funders and governments alike and has generated a body of policy documents, academic literature and a range of developments to the doctorate.

In the UK, doctoral education has been consistently tied into innovation and economic development at a national (Leitch 2006, p.68; Warry 2006; Smith et al. 2010), and supra-national (EC 2003, 2005a, OECD 2010) level in terms of education and skills. Although the connection between higher education and a country's economic output is not uncontested. Rizvi and Lingard (2006) relate this policy theme to functionalist assumptions made at an Organisation for Economic Cooperation and Development (OECD) level that manifest in the educational policies of OECD members. Servage (2009) questions the validity of this approach, particularly in relation to doctoral education. Nevertheless, doctoral researchers frequently feature as a mechanism for better knowledge exchange in the research and innovation policy canon (Lambert 2003; Sainsbury 2007; Wilson 2012; Witty 2013; BIS 2015).

The impact of education to a doctoral level on the economy, the environment and society remains – as suggested by DTZ (2010) in their report for the Engineering and Physical Sciences Research Council (EPSRC) – arguably difficult to identify. Publications which can demonstrate explicit economic impact of doctoral education are rare. EPSRC (2015) is a relatively recent exception which sets out to quantify a return on investment in doctoral training as a part of research. Publications addressing economic impacts of research investment up to this point (such as Department of Business, Innovation and Skills [BIS] 2010, pp. 19–20) tended to mention the impact of investment in doctoral training in passing, implying rather than evidencing impact within the broader portfolio of research activity.

RCUK (2014) takes a more detailed, case-study approach which looks at the impact of doctoral education through the lens of doctoral graduate employment – outside of the higher education sector – rather than in terms of industrial engagement either in higher-level training awards or technology transfer outputs from doctoral research. The flow of PhD-qualified individuals from universities to business, industry and the third sector does play a significant part in the narrative of the economic impact of doctoral education. It is well-documented that it is more likely for a doctoral graduate to leave academia than to take up an academic post. Vitae (2013) shows that 56% of doctoral graduate respondents to the HESA 'Longitudinal' Destinations of Leavers from Higher Education in the United Kingdom (L DLHE) survey in November 2008 and 2010 had left higher education, although the data show a differentiated picture according to discipline. The Royal Society (2010) report highlights a flow of scientifically trained people into other sectors at various transition points following a PhD. Although one acknowledged weakness in the data is that they do not map returners into higher education.

Curiously, PhDs that remain within academia or return to higher education are less a part of this narrative of economic impact. RCUK (2014) focuses on how doctoral graduates who leave higher education help to foster innovation through ongoing collaboration and engagement with universities, foregrounding the 75% of doctoral graduates responding to the RCUK survey that stated that they had been engaged in collaborative projects, promoting knowledge exchange between universities and industry in their careers outside of academia.

Whilst this approach is successful in illuminating the broader picture there is, however, no published, quantified evidence of the scale and extent of these interactions and the report does

not make a strong link back to doctoral-level education. To what extent, for example, are the skills and attributes identified by employers (problem-solving, creative thinking [RCUK 2014]) trained or developed as a result of doctoral education rather than common to a group of individuals who pursue a higher degree? There is also little acknowledgement of the impact of PhD-qualified people who choose to leave academia but stay in the higher education sector in leadership or management.

The challenge of maximising the impact of doctoral education and actualising the aspirations of policy rhetoric and theoretical conception has been the focus of another group of mainly UK-based reports which over the past decades have focused on locating the major blocks impeding the impact of doctoral students (exclusively traditional PhD) on mainly the economy but latterly also society at large. These include: lack of transferable skills training (Roberts 2002), which was also raised by the OECD as a challenge to governments and policy makers based on survey respondents from a number of European States, Canada, Australia, Korea, New Zealand and Turkey (OECD 2012); lack of mobility between university and industry (BIS 2015); graduates being unable to articulate their skills (Souter 2005); potential employers being ignorant of the skills doctoral students develop outside of specific technical skills in the sciences and engineering (CIHE 2010); and over-concentration of funding (Nurse 2015). In terms of research management and knowledge exchange more broadly the discourse has focused on a possible lack of capacity for business / industry in the UK to absorb new knowledge (RCUK 2014, p.5). The report cites the United Kingdom's comparatively weak performance in the Global Innovation Index findings on knowledge absorption. The 2018 Global Innovation Index shows the UK placed 4th overall but 30th for knowledge diffusion and 24th for knowledge absorption.

The impact gap in doctoral education is a key challenge for universities, businesses and policy-makers. We have traced the policy discourse which ties innovation and economic development to doctoral education and highlighted the lack of evidence which supports that in the UK context. Similar patterns of discourse can be identified in other developed national research environments which are outside the main focus of this chapter. Of note is the McGagh et al. (2016) review of Australia's research training system which highlights low levels of industry-university collaboration and foregrounds the important role that higher degree research training can play in addressing this challenge (through placements, industry-defined research problems, industry-based PhDs and industrial supervisors). The review also draws attention to the inadequate available data on the performance of the research training system and its value to Australia's economic and social wellbeing.

For ECRs, an awareness of this impact gap can give you a lens, as new supervisors, with which to view the broader doctoral training and development agenda and an understanding of the importance of development needs analysis for doctoral researchers, their attendance at both generic and research skills workshops, and their active participation in academic and non-academic placement opportunities, for example. It also offers food for thought when you are developing projects for doctoral research, with regard to finding the time and opportunity to work together with industry, business or third sector partners to co-create a project with impact embedded within the research design where possible.

Addressing the gap

Alongside the potential for individual supervisors to address the impact gap with their own practice, there have also been a variety of measures introduced in the UK over recent years at programme and funder level which have aimed to enhance and provide evidence for impact. It is useful for ECRs to be aware of these as examples of good practice and also potential avenues to find funding for doctoral candidates.

These initiatives have been largely focused on the PhD to-date. They have included: industry co-funded centres for doctoral training; mandatory placements for PhD students (PIP); industry-university partnerships to deliver staff training from continuing professional development to doctorate (ATP); national programmes of collaborative doctorates (CASE awards); and research council PhD funding awarded directly to industry (CTP). We might also consider recent smaller evolutions amongst some traditional PhDs on an individual or small-cohort basis which have included business, industry or third sector contribution to fees or stipend, representation on university steering groups or contribution to specialist workshops. In Europe, the Marie Curie European Industrial Doctorate Programme offers pan-European funding for collaborative doctorates between industry and universities.

Alongside this portfolio of activity in the UK to evolve the traditional PhD, the EPSRC has been the only research council to fund professional doctorates through its Engineering Doctorates (EngD) scheme. EPSRC-funded EngDs in industrial doctorate centres accounted for 18% of the doctoral training budget which it allocated to centres in 2012 (EPSRC 2012), building on early evidence of the 'major and beneficial effect on a wide range of companies and sectors' of this model (EPSRC 2007, p.1). Some business-facing universities, independently of EPSRC funding, have also developed or are currently developing a variety of professional doctorate programmes. This will be discussed in more detail later in the chapter.

Numbers of UK doctoral researchers who are undertaking a doctorate with an element of involvement from industry, business or third sector are difficult to ascertain as this is not recorded by the UK Higher Education Statistics Agency. However, it is clear that these are a small-scale (albeit growing) development compared to the national population of doctoral researchers.

Professional doctorates (of which Engineering Doctorates are a subset) are unusual within this range of initiatives in that arguably they have amongst the greatest potential to address many of the challenges thrown up by the imperative to tie innovation and economic development to doctoral education, yet they barely appear in UK policy documentation. For the ECR they may not be an obvious first option, however, there is evidence to suggest that they are a growing phenomenon in some parts of the sector; their structure and focus may have elements that could be incorporated into the more traditional doctorate, and an awareness of how professional doctorates have been received and discussed in the academic literature offers some interesting insight into the broader question of impact within doctoral education.

The professional doctorate

Professional doctorates emerged onto the scene in the UK in the late 1980s (Donn, Routh and Lunt 2000), around the same time as in Australia and significantly later than in the United States. They saw a rapid increase in programmes between 1990 and 2010 in the UK and in Australia. Mellors-Bourne et al. (2016) infer that this pattern of growth has continued at a steady rate from 2010 to 2015 within the UK, although the data are not directly comparable as the data used by Mellors-Bourne et al. excludes EngD programmes and focuses solely on English institutions, whilst the historical UKCGE surveys he compares with are UK-wide but only sent to member institutions (97% of total number documented by Universities UK). Response rates also differed significantly.

In terms of scale, these programmes are an emerging and evolving phenomenon. Mellors-Bourne et al. (2016) suggest a likely growth trajectory from 109 programmes in 1998 to 320 in 2016. The Higher Education Statistics Agency (HESA) data does not differentiate between professional doctorates and PhDs so it is not possible to gain a clearer picture through HESA data in the UK. In Australia, professional doctorate programmes have undergone a similar pattern of growth in the first decade: from one in 1990 to 131 in 2001 (Neumann 2005).

Maxwell (2011) uses a systematic analysis of the websites of all 39 Australian universities to demonstrate a continuation in the growth trajectory up to 2011 (202 programmes) and, although recent work suggests a retraction in Australia in overall population numbers (particularly in education) (Malloch 2016) Wallace et al. (2015) highlight an increase in enquiries in DBA which they pose as a rise in unmet demand. Wallace et al. (2015), like Servage (2009), specifically note signs of growth in professional doctorate programmes in less research-intensive institutions. This trend towards proliferation clustering in business-facing universities in the UK is also highlighted in Mellors-Bourne et al. (2016). Data recently collected as part of a project with a large UK university mission group of 19 business-facing universities indicated that the majority of universities intended to grow their professional doctorate provision; both programme numbers and candidate numbers. In terms of programme development, 13 out of 17 responding institutions (70.6%) reported that they intended to increase the number of professional doctorate programmes. Regarding growth in candidate numbers, 15 out of 17 responding institutions (88.2%) suggested their intentions to grow the number of total enrolments on professional doctorate awards.

Definition and location

Professional doctorates have been the locus of contemporary academic debate over the past twenty-five years in terms of their university-industry connections, transdisciplinarity and knowledge generation for the knowledge economy. The following section is a brief review of the academic literature based on a literature search which was carried out using Google Scholar and Scopus with the search terms 'professional doctorate' and publication dates between 2005 and 2017. After duplicates and irrelevant materials were excluded a corpus was developed of 68 English Language journal articles, policy documents and book chapters. This predominantly focused on the United Kingdom, North America (mainly the United States) and Australia. Despite some differences in evolution, profile of programmes and key drivers between the national contexts (see Kot & Hendel 2012) two major themes emerged from the literature. These are: definition of the professional doctorate (often in terms of equivalency to and comparison with the 'traditional' PhD); and the conceptual location of the professional doctorate within the discourse of knowledge generation. These will be addressed in turn here.

Definition

The question of what a professional doctorate is and how it compares to a more 'traditional' PhD has been addressed in the academic literature for almost as long as the professional doctorate has existed. Two often-cited definitions in the UK are from the Quality Assurance Agency (QAA) and the UK Council for Graduate Education (Fell, Flint & Haines 2011), although neither definition captures the evolution of the professional doctorate over time that is set out by Maxwell (2003).

QAA doctoral degree characteristics (QAA 2015) describes a professional doctorate as suited for career purposes to mid-career professionals and in a few cases for entry to a specific profession. It also acknowledges that some candidates may undertake a professional doctorate for reasons beyond their career. It sets out in some detail the key characteristics of professional and practice-based doctorates which normally include a supervised research project and 'structured elements' that are taught and are relevant to professional practice. Research projects are normally situated within the candidate's profession but rooted in an academic discipline. The thesis may be of a shorter length than for the PhD and is assessed by viva.

The UKCGE definition focuses only on the professional doctorate for professional groups: 'A programme of advanced study and research which, whilst satisfying the university criteria for the award of doctorate, is designed to meet the specific needs of a professional group external

to the university' (Hoddell 2002 cited in Fell et al. 2011, p.11). This works well for larger 'established brands' in England such as DBA, EngD and EdD but arguably the footprint of these programmes in reality is far smaller than one might expect if the professional doctorate is catering to a profession. This trend towards small-scale, responsive programmes will be discussed later. This definition also excludes two groups of candidates that have been identified as those seeking generic professional awards and those seeking niche awards (identified by Maxwell in an Australian context) – often associated with a specific interdisciplinary area such as biotech or sustainable agriculture.

Despite distinct definitions of the professional doctorate in its own right within the UK, Australian and North American contexts (Evans et al. 1998; Walker 2009; Fell et al. 2011) there is a sustained theme of benchmarking against the PhD, albeit predominantly from a 'separate but equal' (Salter 2013, p.1176) standpoint. Fink (2006) exemplifies the approach and provides a snapshot of the major distinctions drawn between professional doctorate and PhD. These are focused around entry / exit pathways and degrees and types of connectedness to 'university' and to 'industry'; intended outcomes of the doctorate and how these outcomes are disseminated; and how, where and for whom knowledge is produced. This common comparative approach provides some clarity but risks creating a series of false dichotomies between ideas of inside and outside of the university which are not well-defined in the literature. This echoes weaknesses inherent in a number of the reports we discussed in the opening section where economic impact of PhD graduates is presumed to be realised only when the individual goes outside of the university.

Fink admits that the distinctions he makes may blur as the PhD develops to address the challenges and demands of the knowledge economy. We might go one step further to question whether these hard distinctions have ever existed in reality, given natural differences between disciplines and the heterogeneous nature of most higher education sectors (incorporating specialist institutions, business-facing universities with a focus on applied research, research-intensive organisations, and many with a blend of some elements of all of these).

The inside-outside spaces that are created in defining professional doctorates within the literature are also explored in work that focuses on the kind of knowledge that professional doctorates set out to generate. This is the second theme that we will explore.

Location

The academic literature on professional doctorates frequently frames them as an effective conduit within the triple helix model of the knowledge economy. That is to say that this kind of doctorate is put forward as a mechanism by which the university can realise its potential, through close interaction with industry and government, to deliver innovation and economic development in a Knowledge Society. Lee, Green and Brennan (2000) and Gallagher (2000) both look positively at the professional doctorate's connection with practice; closer integration between university and professions; encouragement of university-industry partnerships; and opening up of the process of knowledge production within the knowledge economy. The knowledge created within a professional doctorate is generally set out in the literature as distinctly different, following Gibbons et al. (1994) conception of Mode 2 knowledge. It is characterised as knowledge 'produced in (the) context of application; transdisciplinary; heterogeneous; […] socially accountable and reflexive, including a wider and more temporary and heterogeneous set of practitioners, collaborating on problems defined in specific and localised context' (Lee, Green and Brennan 2000, p.124).

The extent to which types of knowledge can be neatly circumscribed is problematised in Neumann (2005, p.185): who points out that professional doctorate programmes are often developed and led by academics from a researcher perspective and they are undertaken inside

a prescribed academic framework by candidates who must do the translation into their own professional context. The knowledge generated within practice as part of the doctorate is potentially somehow pre-shaped or constrained by existing academic thinking and cannot arguably be classified distinctly. We could add to this that the lead (and usually exclusive) role played by the academic in the final examination process is an indication of how even if a distinct kind of knowledge was produced within the professional context it becomes measured and assessed within academic boundaries. Although professional doctorates can emerge in areas where the community of academics themselves have developed from a practitioner and / or professional base rather than a more traditional academic career route and so may be developing their own hybrid identities whilst supervising professional doctorate candidates.

The complex and liminal nature of the territory inhabited by the professional doctorate is a point which is not explicitly addressed within much of the literature, which consistently restates the inside-outside binary framework. We can see this in the way the question of identity in professional doctorate candidates is handled. This theme is interwoven across discussions of definition and knowledge generation in the literature. A number of publications characterise the professional doctorate candidate as hyphenated or paired individuals. Gregory (1997) in Wellington and Sikes (2006) sets out 'scholarly professionals' and 'professional scholars'. Bourner, Bowden and Laing (2001), Dreher and Montgomery (2009), Stew (2009) and Salter (2013) contrast the 'researching professional' (professional doctorate) with the 'professional researcher' (PhD). Dreher and Montgomery (2009) assert that most universities globally are still struggling to differentiate between the two. The CPed, Carnegie Foundation Initiative, in the United States, distinguishes the practitioner-scholar (professional doctorate), where scholarship and research are used to solve local problems in a way that is of value to fellow practitioners, from the practitioner-scholar (PhD) where 'generalizable knowledge is produced through research to inform the practice area'. What is interesting about these examples is that whilst each poses a fusion of some kind between research and its application they all restate a binary divide with an implied tipping point between one identity and the other; an inside space of the scholar or researcher and the outside space of the professional and the practitioner. The hyphen is, in these publications, a broadly unquestioned and unresolved space in between.

However, other publications explore and expand the practical challenges that link to this unresolved space. These are central to the critical discussion in the literature of whether professional doctorate programmes can in reality fulfil their ascribed impact potential in terms of delivering knowledge exchange, facilitating co-creation and producing applied research. They are also central to the question we posed regarding the professional doctorate's ability to address an impact gap in doctoral education more broadly or at least to provide better evidence than that currently available for it. The challenges cluster around three key themes: employer engagement, perceptions of relevance and esteem.

Burgess, Weller and Wellington (2011) suggest that the employer or sponsoring organisation to the professional doctorate are rarely acknowledged and remain under-utilised within the professional doctorate. Burgess et al. goes on to explore how employers are sometimes ill-equipped to be 'learning organisations', that to say, employers can be resistant to implementing the new knowledge and innovative products or practice that can arise from the work undertaken by the candidate in a professional doctorate. In Neumann's empirical study on doctoral education in Australian universities, with specific reference to education, law, management and the creative arts, employers are characterised as being passively aware of the research undertaken by the professional doctorate candidates they employ. Mellors-Bourne et al., in their 2016 report, make a speculative link between small cohort sizes and the short-lived nature of some programmes that they find evident in the 63 institutional survey responses from English universities and possible weak employer engagement with professional doctorate programmes in England. Lester and Costley (2010) and Burgess, Weller and Wellington (2011)

point to employers failing to grasp the relevance of the research to their organisation and professional doctorate candidates struggling to implement findings because of a perception that the research is rooted in or somehow belongs to the university. Research findings therefore have no direct connection to the workplace (even if the research question is rooted in it).

Whilst relevance can be questioned by employers there is also evidence of an ongoing lack of esteem accorded to professional doctorate programmes within the academic community. There are underlying suspicions which appear in the education press that the professional doctorate route is less rigorous than its conventional counterpart (Taylor 2008; Times Higher Education 2010; Grove 2017). We can add to this the theme of measuring the professional doctorate against the PhD in the literature already discussed.

In summary the academic literature on the professional doctorate reveals a hyphenated, qualified, interstitial space which tells us something of the challenges – practical and conceptual – of addressing the impact gap within doctoral education, either through a different award (professional doctorate) or through evolution within the traditional PhD.

Whether you are supervising, bid-writing or contributing to the training and development of doctoral researchers, be it related to the evolving PhD or the emerging professional doctorate, building close-working partnerships between university and business, industry and third sector is a challenge that you are likely to have to face. For ECRs in the UK, there are many reasons why you should consider taking risks, making opportunities, engaging with existing innovations and creating new ones in the doctoral space.

The doctorate has evolved much from its Humboldtian origins and it will arguably need to continue to alter as the shape of the research landscape, the profile of the doctoral population and the needs of the knowledge economy change. As ECRs and the next generation of research leaders, you would do well to take a moment to consider what role you might play in driving further evolutions, in particular through being part of developing new models of doctorate that do not seek equivalency with the 'traditional PhD', that generate a new mode of knowledge and create a new space and identity for doctoral candidates. To do this would be to address the ongoing and fundamental issues of the impact gap in doctoral education that are so clearly articulated in policy and so challenging to address in practice.

Learning points

- **Securing funding**: The changes in UK research and innovation funding brought about by the establishment of UKRI may see new funding streams and funded opportunities to develop new models of work-based learning at doctoral level which extend and enhance the current national apprenticeship schemes.
- **Attracting high-quality candidates**: The implementation of postgraduate doctoral loans may generate new and different self-funded doctoral candidates with different skill sets and experiences, looking to answer perhaps different kinds of (co-created?) research questions with clearer impact and closer links to research end-users.
- **Supervising highly motivated doctoral researchers**: Anecdotally, most candidates for a doctorate will tell you that they are there to change the world in some way. Bridging the impact gap could bring you focused, highly motivated researchers who stay on track and on time.
- **Scoring career points**: With the increase in impact weighting in the UK's Research Excellence Framework 2021 and the possibility of a future 'KEF' (Knowledge Excellence Framework) for English universities, there is a sense – at least for now – that your ability to lead impactful research is going to continue to be central to your work as a researcher.

- **Supporting diversity in the research community**: Diversifying the current and future community of researchers is a sector priority and new models of doctorate could open up new pathways into research for candidates from non-traditional backgrounds, tapping into new markets of more mature mid-career professionals and / or those who have not taken a direct route through education.

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