Supporting the transition from doctorate to post doctoral employment: Developing and piloting a tool for personal development and training needs analysis

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Abstract

This project was funded by the University of Surrey to develop an evidence based, self assessment tool for PhD students to assess their training needs for planning a post doctoral career. It reflects current concern in the literature around the lack of support for PhDs and post graduate researchers in planning post doctoral research careers.

Using focus group interviews, the team collected data from PhDs in their write up period, as well as academics and senior academic supervisors, to identify the skills required to planning a successful post doctoral career. The team also developed an on-line survey questionnaire to be sent to local employers of Surrey PhDs based on data located within the University on employment of past PhDs. This was unsuccessful due to the poor quality of data kept on the employment destination of the University's PhD graduates.

Based on the evidence collected from the focus group interviews, the team analysed and developed an existing post graduate self assessment tool (PDTNA). They re-designed this tool and developed two new tools to reflect the academic pathways used by current students; one most useful to those in scientific careers and one most useful to those in practitioner careers.

These PDTNA-PD tools were then tested with PhD students and local employers were again contacted to evaluate the new tool. Only one local employer responded.

In conclusion, we argue that there may be some factors which the university needs to take account of in a generic sense in developing post doctoral career planning.

- The career possibilities the PhD offers for post doctorates could be more explicit and greater links made between future employers and the university. In particular, the university needs to track its doctoral candidates' employment and ask employers what skills they require if they are to recruit post doctoral candidates
- The post doctoral career planning structures that are flexible and creative could be operationalised across the university so that post doctoral career planning becomes a reality. At present the training and structures exist but they are not evident in everyday mentoring and supervision.
- PhD supervision was seen as key to how a post doctoral career might be planned across the disciplines involved in this project. Therefore, the university should invest in supervisor training which is inclusive of post doctoral career planning.

Chapter 1: Introduction and Summary of Project

Introduction and background

In 2001 the UK Research Councils in collaboration with UK GRAD, and the higher education sector more widely, developed the Joint Skills Statement Training Requirements of Post Graduates (JSS). This statement identified the competencies which a post graduate researcher should have developed during their PhD research programme. However, transitions, such as the one from doctoral student following a programme of study to post doctoral employment can be a troubling and difficult time (Meyer & Land, 2003). During any transitional period, existing certainties are challenged as previously acquired skills have to be integrated with the demands of the new position (Clouder, 2005). In making the transition from doctoral student to employment, individuals often have to develop or adapt new skills and develop the knowledge gained in their doctoral studies for new markets. For example, they may have to move from working relatively independently as a student to working collaboratively. Therefore in addition to developing teamwork skills, their existing skills need to be adapted to collaborative work.

Once in employment, the individual undergoes a transition from being a learner to becoming a leader who has to develop their own professional identity. This is equally important for academic staff as it is for those who are pursuing practice in fields such as business, health care, biomedical sciences, engineering and management who need to provide leadership at an advanced level. During the transitional period, additional training tailored to individual requirements is often required, but there is little formalised support for identifying the extra skills and training that are essential for post doctoral employment either within the local economy or the university itself. In addition, many students have difficulty recognising the skills they have already acquired during a PhD or taught doctorate, and need help in identifying and marketing their skills to potential employers.

One of the recommendations of the JSS was that students should be provided within their research programme with opportunities to self- assess their skills and knowledge against the competencies set out by the JSS. In addition, there should be encouragement and a requirement to complete a Personal Development Plan (PDP) and universities should map their provisions of these training requirements against the Roberts' recommendations following the JSS. The Code of Practice for the Assurance of Academic Quality and Standards in Higher Education was

published in 2004 and set out the QAA's requirements of universities in regard to post graduate training.

This study sought to support the transition from PhD/taught doctoral student to post doctoral employment by developing a tool for identifying existing skills and areas in which individuals need to build on their skills. Doctoral students across the university have diverse backgrounds: some having progressed to PhD study after completing a bachelor's or master's degree and some returning to PhD study following a successful career in business. Others will choose to study a taught or clinical doctorate while continuing in employment. Some doctoral students will pursue an academic career and some will either become or continue as practitioners. Because of this diversity it is essential that the tool is based on a comprehensive audit of the skills necessary for employment.

This study built on work already completed in the European Institute of Health and Medical Sciences, EIHMS (now the Division of Health and Social Care (DHSC) [1] to assist post-graduate students to make the transition from Master's(M) to Doctorate (D) level learning. To support this transition, the Personal Development and Training Needs Analysis Tool (PDTNA tool) was developed for use by doctoral students to identify areas of learning need. This work was completed by Professors Bryan and Faithfull. The PDTNA tool was based on key areas identified in the JSS for post-graduate students. The tool has been used to manage the transition from M level study to D level study and aims to identify transferable skills which students bring from other areas of their personal and work lives as well as fostering an awareness of their career development and personal learning needs at doctoral level. It also gives students a printed output of their skills assessment mapped against training courses to meet their training needs offered at the University of Surrey.

Aims and objectives

The overall aims of this project were to:

- Identify the key skills necessary for a successful transition from the doctorate to a career in academic, professional or business employment.

[1] Following restructuring in August 2007, the Management School became the Faculty of Management and Law; the School of Biomedical Sciences moved into the Faculty of Health and Medical Sciences; the European Institute of Health and Medical Sciences also moved into the Faculty of Health and Medical Sciences. However data collection for this project took place during the restructuring and we have retained the former names of the schools.

- Enable PhD and taught PhD students who are in the write-up period of their thesis to identify areas in which they need to develop their skills further and those areas in which they already have a high level of skill which can be transferred to building a post doctoral career.
- Enable post doctoral staff and graduates of the University who are now employed and who completed their PhD or taught PhD in the previous twelve months, to identify their skills and those areas in which they would like to develop their skills further.

We planned to achieve these aims by the following objectives:

1. Identify what key national and international employers in a range of business and professional environments understand are necessary skills for a successful transition from the PhD or taught doctorate to a career in post-doctoral employment.
2. Develop and pilot a personal development and training needs analysis tool for post doctorates (PDTNA-PD) which would:
    a. Identify doctoral skills that can facilitate the transfer to post doctoral employment
    b. Identify areas in which the students need to acquire these skills
    c. Identify appropriate training courses
    d. Build a portfolio of evidence that presents their strengths to potential employers
    e. Assist students to plan a career that builds on their doctoral work.

Project design

We used the following methods to complete data collection:

1. Literature review
2. Key stakeholders views: Focus group interviews across the former Schools of Biomedical Sciences, the School of Management and the European Institute of Health and Medical Sciences with:
    a. Doctoral students in the final year of their candidature
    b. Newly appointed academic staff and PhDs in employment who completed their PhD in the previous two years
    c. PhD supervisors/experienced academics
    d. Programme Directors
3. Employer survey
4. Development and piloting of the PDTNA-PD
5. Feedback from local employers on the PDTNA-PD.

Summary of key findings

There are five broad themes in the qualitative data which appear to facilitate or act as barriers to developing or building successful post doctoral careers. The themes are:

- The purpose of a PhD – this differed across disciplines because motivations for undertaking PhD studies and the stage in a career when the student would study for a PhD varied, with the more applied disciplines having older demographics than the biomedical sciences. The career possibilities the PhD offered for post doctorates were dictated by discipline.
- Post doctoral career pathways varied across disciplines - the health related post doctorates tended to become independent researchers in the post doctoral period albeit in an increasingly competitive and restrictive funding climate and the biomedical sciences tended to have a more structured post doctoral period of employment before independent researcher status was achieved.
- Barriers to post doctoral careers – again these varied across the disciplines but included the availability of research funding within disciplines, the lack of post doctoral roles in the world of work in the health disciplines, and how relevant academic research is to the world of work.
- PhD experiences were therefore diverse in how they shaped post doctoral career planning – again the health disciplines tended to have chosen to study for a PhD as part of a mature career pathway both inside and outside academia. The post doctoral period in the biomedical sciences occurred at an early career stage and career choices were not part of PhD supervision.
- PhD supervision was the vehicle whereby post doctoral careers were planned in the health disciplines whereas in biomedical sciences, supervision was focused much more on attaining the PhD.

One of the key differences between the three disciplines which assisted the development of the PDTNA-PD tool was that the incentive in biosciences came from a desire to research, a quest for knowledge for its own sake whereas in health and management the motivation appeared to come from problems in the world of work. This insight was central to the rationale for developing two self assessment pathways of the tool for the final stage of the project. We used these themes to re-write the existing PDTNA tool as an instrument for post doctorates (a PDTNA-PD tool) that aims to address the factors that appear to act as barriers to building a successful post doctoral

career. There are two versions of the tool based on two post doctoral career pathways identified in the findings from the focus groups which we have called 'practitioner' and 'scientific'.

The final stage of the project was to pilot and evaluate the amended tool. The results from the pilot of the PDTNA-PD tool suggest that it was well accepted by users in terms of how easy it was to use; for example, the interface was easy to use. The output was reported to be clear and useful for future planning. However, users had fairly low overall satisfaction with the tool. Analysis of responses to open ended questions suggested that users were not clear about the purpose of the tool and that they might be unfamiliar with the concept of a training needs analysis tool. Results suggested that some participants might be more comfortable with a standard test that assessed skill levels and yielded an overall score.

In conducting this study, it was difficult to engage potential participants' interest, both students and academics within the university and employers outside. Consequently our sample of participants in both the focus group interviews and the evaluation was low and only one employer responded.

Therefore, our recommendations are:

- Make the software more easily accessible
- For the University to support supervisors in developing skills in facilitating career planning for post doctorates during the PhD supervision process
- Incorporate formal training needs analysis into review processes for PhD students and post doctoral researchers
- Investigate the market for PhDs among local and national employers and identify for employers the advantages of employing PhDs.
- Track the post doctoral employment of PhDs
- Work with local and national employers to increase employment opportunities for future PhDs.

Chapter 2: Literature review

The training of post graduate researchers for academic careers is an area of concern worldwide which spans different disciplines (Bakken et al 2006; Hauser & McArthur 2006; Kaushansky & Shattil 2006; Polasek et al 2006; Stukart et al 2006; Sambunjak et al 2006; Weinburg 2006; Ley & Rosenburg 2005; de Meis et al 2003; Key & Nurcombe 2003; Robinson 2001 among others) and has been a concern for many years (Meleis et al 1980; Levine & Green 1981).

Summary

The literature review was undertaken to inform the qualitative data collection, the employers' survey and the adaptation of the on-line self assessment tool. The key strands in the literature are:

1. There is a lack of clarity over what the purpose of PhD is in the labour market and what the employer might expect in terms of leadership in employment. The PhD student may need preparation in leadership skills before assuming such as role.
2. What is the purpose of the PhD outside academia? There are questions over the nature of knowledge produced by the academy and the transferability of that knowledge and the skills developed in research to the world of work. There seems to be agreement that PhDs require role models, mentoring, sponsorship and even post doctoral curricula to allow them to develop successful post doctoral careers. Two other, related issues which are pertinent to nursing and to other disciplines: what is the position of practice based disciplines within the academy [how are they viewed by academic disciplines?] and how are PhDs perceived in the workplace [what is their value?]
3. Conditions for academics in health professions is a cause for concern in relation to: job satisfaction, career pathways and planning, lack of entrants and funding from the Department of Health to encourage early careers as well as the need to address post graduates' and PhDs' adult learner requirements.

Reports

It can be seen from the range of reports that there is national concern over how the economy and employers utilise post graduate research trained staff after completion of their PhD. The NHS, in particular, has attempted to address the lack of clinical academic career pathways. These were selected for review as part of a review of the grey literature.

Table 1. Key reports published in the UK and reviewed

Report	Year	Author	Key themes	Questions for future research and training
What do PhDs do?' A regional analysis of first destinations for PhD graduates	2006	UK GRAD	50% of PhD graduates move out of the region they were studying in.	Does this migration hinder or help regional development? Is mobile postgraduate population important for the UK? What role should universities play in this agenda?
The market failure of post graduate education: funding and financial related issues	2006	Quad Research for National Postgraduate Committee, Scotland	Examined funding availability and access to research careers for disadvantaged social groups	How do universities ensure there are equal opportunities among local and national populations for post graduate research careers?
Department of Health/Skills for Health	2006	Department of Health	Career framework for developing integrated careers for healthcare scientists in the NHS and partnership organisations	What can universities do to assist integrated scientific careers?
Department of Health	2006	Department of Health	Modernising Nursing Careers: Developing the Best Research Professionals	How does nursing and midwifery foster clinical academics and clinical academic careers?
Department of Health	2005	Department of Health	Modernising Medical Careers	How does medicine foster academic medical careers?

Published papers

We undertook a literature review using the following databases: Journals@ovid; BNI; CINAHL; Ovid medline; PsychBOOKS, Pubmed; IBSS using the key words: doctoral employment; post doctoral career; post doctoral work. We also reviewed the grey literature using relevant websites such as the Quality Assurance Agency, Research Councils UK and government sites dealing with professional education, general education, skills and training. We present an overview of this literature to inform the discussion and recommendations in this report. Of the papers reviewed, a large number were from professional disciplines such as psychology and nursing which had introduced professional doctorates. We present the reviewed papers in three sections according to the volume of papers retrieved: nursing and allied health; medicine; social sciences.

Nursing and allied health

Snarr & Krochalk (1996) examined the relationship between job satisfaction of nursing faculty and the organisational characteristics of the institutions and nursing programmes in which they teach. Nursing faculty tended to be satisfied with jobs but there was a weak correlation between job satisfaction and organisational characteristics. Sakalys et al (2001) in an analysis of one nursing doctoral programme in the US, examined the outcomes of career development, scholarly activity and professional leadership. Graduates reported that they began diverse career paths with the majority employed in academic institutions. A question they conclude with is: how does a practice based discipline foster academic, scholarly activity and knowledge production?

Roberts & Turnbull (2002) investigated Australian nurse academics' career pathways since moving to Higher Education (HE). Females were more likely than males to have increased qualifications and have been promoted. However, male nurse-academics have parity with female nurse-academics but not with male academics in the whole HE sector. They ask: how is nursing viewed within HE sector as a discipline?

Borbasi & Emden (2001) investigated the perceived discrepancy between employment skills required and skills acquired by doctorally-prepared nurses. There is a perception that there is a shortfall in current and future skills. A survey was conducted to ascertain the views of future employers of future PhDs who are likely to employ such graduates in order to ensure research training is adapted to the workplace. Results show there remains a discrepancy between the skills acquired at university and skills required in the workplace; in other words, there is a gap between

attitudes in the workplace and among employers in a practice discipline and those within academia.

Ellis (2005) mapped the developments of professional doctorates in the UK. She concluded that the value and perceived efficacy of doctorally-prepared nurses is not accepted in practice and in academia there is a lack of clarity over what a professional doctorate is.

To summarise these papers we quote from Jackson (2005:593) who comments that in looking at nursing [there is] 'less cause for optimism when considering the research culture and infrastructure supporting nurses engaged in research in both academic and clinical settings. Students should be able to identify attractive career pathway options which embrace clinical activity with research and scholarly activities as an early career choice'.

There were four papers on psychology doctorates (Stewart et al 2000; Cherry et al 2000; Denegeffe & Bishop 2004) which all concluded that different styles of training at doctoral level resulted in different employment outcomes and the amount of time PhDs spent actively engaged in research once in post doctoral employment. The highest amount of time spent in research was 28%; but they emphasised importance of role models for research during doctoral training. At present, academic psychologists' research but practicing psychologists by and large do not. And as a licence is needed to practice after PhD, then the emphasis post doctorally is on gaining the licence through working in client centred care not research. Bruce (2005) also found that in psychology, the doctorate is the beginning of specialist training which requires further study and post doctoral curricula.

Medicine

There is a general concern over the perceived decline in numbers of scientists with basic degrees wanting to enter a clinical academic career as well as the 'perceived' lack of funding for such research (Meis et al 2003; Key & Nurcombe 2003; Hauser & McArthur 2006; Bakken et al 2006). This is demonstrated in publications across Europe. For example, Bygdeman (1999) reported on clinician-scientist research careers in Sweden and Swedish success in fostering this role and clinical research as well as practice. However, persistent difficulties remained in negotiating time for research in clinical posts; the costs of clinician-scientists if laboratory work were involved; and there remains a need to make research attractive when the number of hours available to conduct research has reduced.

However, a US paper by Ley & Rosenberg (2005) suggests that recent programmes from the National Institute of Health to foster clinical scientists are showing encouraging trends in growth of such researchers. (Bradford et al [1996] also supports this as does Frieden & Fox [1991]). The NIH seemed to be the main influence. In the UK, perhaps a similar positive trend is Modernising Medical Careers and the launch of research networks across the NHS to centralise both research expertise and foster networking opportunities and support.

Kaushansky & Shattil (2006) use haematology as an example of how clinical science has forged links between research and practice in the development of clinically useful technologies. They argue that there is a need for a sound research evidence base 'should we fail [to research and apply] we risk returning to the former era in which clinical medicine all too often moved forward by reliance of serendipity rather than on the application of sound basic science principles'.

However, the decline in numbers of clinical academics is a concern. Stukart et al (2006) undertook a survey of doctoral dissertations over 15 years to see whether the number of physicians interested in a clinical academic career has declined. Over 50% continued to work in an academic setting after obtaining their degree.

Other papers concerned the skills needed for a research degree and the post doctoral career. For example, Robinson (2001) argued that such skills need to be identified to avoid floundering after graduation. Key people to assist in skills and training are the supervisor and this relationship should extend beyond the doctorate; examiners likewise should offer mentorship and partnership after the thesis. Polaek et al (2006) found that the key influence on neophyte researchers for beginning a publishing career were their mentors and again, in a Croation paper, Sambunjak et al (2006) found that key to professional growth and development in academic medicine were mentors.

Social Sciences

Wallgren et al (2005) found a theory practice gap between knowledge used in industry and that used/fostered in universities; companies varied in their traditions and propensity to engage with research. Three types of industry/enterprise emerged: research intense; engineering and consultancy. While students experienced tension arising from this theory-practice gap, other factors were the type of activity the research entailed; the difference in time perspective between companies and universities; the competencies of other employees; the character of the thesis project.

Miller et al's (2005) study into post doctoral career advancement found that research success was related to previous affiliations and career promotions. Women were more disadvantaged than men in these systems of accumulative advantage, sponsored promotion and contest mobility; accumulative advantage more predictive of movement and stability. But this advantage wanes in later years of career.

And in the third paper reviewed, Marron & Rayman (2002) argued that there is a need for redirecting career services in universities to meet the needs of the adult learner. Topics which need to be addressed for them include: adjustment to graduate school, employment opportunities, graduate student workload, role reversal and conflict, redirection for academic career paths and graduate students as temporary workers.

Conclusion

In the context of our study, what did these papers mean? There was a lack of research in this area and a general concern across academia, expressed in the JSS, about the lack of career planning and development for post doctoral researchers. There is a lack of clarity over what exactly a PhD might mean to employers and what skills are required to build a successful post doctoral career outside academia. Our project sought at a local level to address some of the questions raised in the literature.

Chapter 3: Project Activities

Key stakeholders' views on areas outlined in the interview schedule (see p.20)

Firstly, the views and needs of key stakeholder groups were sought using focus group interviews across three schools in the university: School of Biomedical Sciences (now part of the Faculty of Health and Medical Sciences), European Institute of Health and Medical Sciences (now Division of Health and Social Care, Faculty of Health and Medical Sciences) and the School of Management (now Faculty of Management & Law). We invited the following stakeholders to participate in focus groups to identify perceived training needs and activities around career planning:

a. Doctoral students in the final year of their candidature
b. Newly appointed academic staff and PhDs in employment who completed their PhD in the previous two years
c. PhD supervisors/experienced academics
d. Senior academics from each discipline

Employer survey

Secondly, we wished to elicit the views of local employers of post doctoral graduates in the three disciplines. We therefore developed a survey intended for employers who have recently recruited completed doctorates from the three schools.

An online questionnaire (see appendix 2) based loosely on the JSS document, was developed and refined to obtain information from employers on the position of PhD graduates within the organisation. The questionnaire sought data on three dimensions:

- *Organisational features* (location of the organisation within the economy; the type of work undertaken; numbers of doctorates employed; the average length of employment for doctorates; the ratio of doctorates to other staff; doctorates as a 'good investment')
- *Employment conditions* (entry wages for doctorates; relative wage of doctorates; type of contract; staff appraisal schemes; Continuing Professional Development opportunities)
- *Valued characteristics of doctorates* (leadership skills; knowledge transfer; analytical skills; literacy skills; independent working; ability to learn; creative thinking; open-mindedness; initiative; communication /presentational skills; net-working/team working skills; project management skills)

To gain contact details for relevant employers, lists of the employers of recently completed doctorates were requested from the three schools. It was expected that these records would generate the population for the employer survey and the project team had been assured that such lists existed prior to commencing the project.

Only two of the three schools/divisions responded. It appeared that information was not collected for any overseas doctorates and this reduced opportunities for a survey as overseas students were a prime source for one respondent school/division. In addition, the other respondent school/division had few recently completed doctorates. Unfortunately, therefore the sample of employers proved too small for meaningful analysis from the proposed online survey and hence this section was abandoned.

Development and piloting of the PDTNA-PD tool

The data from the focus groups indicated that further and different skill areas were required in the PDTNA tool for post doctorates. We developed the existing PDTNA tool for post doctorates – PDTNA-PD tool - and tested it with a sample of doctoral students in their final writing-up period of doctoral study

Feedback from local employers on the PDTNA-PD tool

To obtain the opinions of employers on the usefulness of the training needs analysis tool, a short evaluation questionnaire was compiled (see appendix 3). Open-ended questions asked for views on such factors as: the usefulness of the skills identified to their organisation; additions to and removals from the skills outlined; the skill levels described.

Eight employers were approached. Three pharmaceutical companies, two NHS Trusts and one employer from each of the three schools/divisions were invited to participate. The evaluation questionnaire was forwarded by email and a ten day period for completion was given. Reminder emails were sent.

See the flow chart below for a summary of project activities.

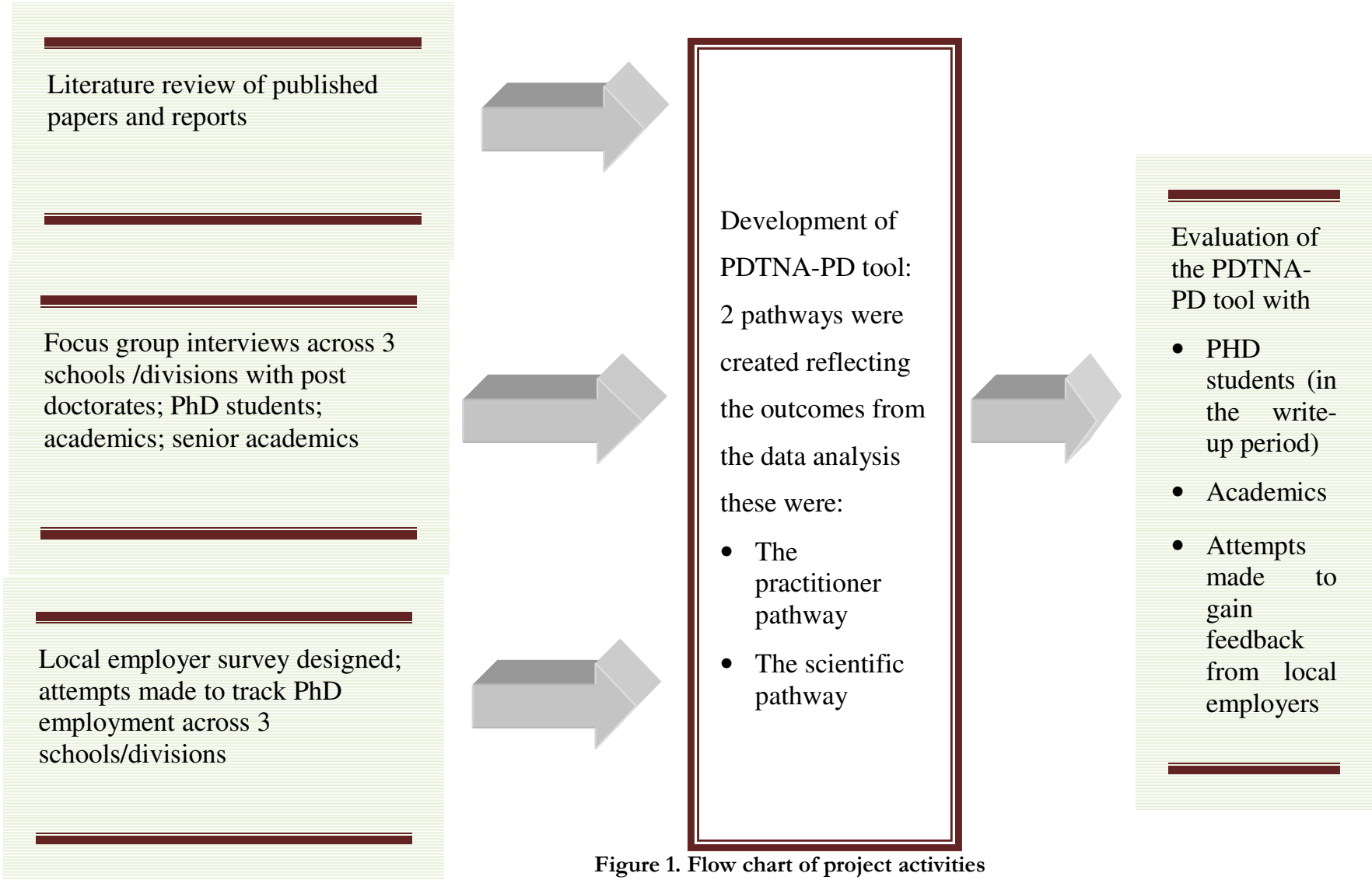


Figure 1. Flow chart of project activities

Focus group interview method

Focus groups are a recognised tool for elucidating rich personal data from participants using the 'explicit use of group interaction' to produce data and insights (Morgan 1988). Respondents are able to concur or disagree and develop themes introduced by other group members during the group discussion and interaction, there is no compulsion to reach consensus and additionally no participant is required to contribute. Perceived differences amongst participants can affect their willingness to discuss a topic together (Morgan 1988). Therefore we split the participants of focus group interviews carefully to avoid such issues of power and embarrassment. The themes introduced for discussion within a focus group are carefully predetermined. The sequence in which they are introduced may follow the order of the guide but have the flexibility to be discussed out of sequence if this is the natural flow of conversation within the group. Subsequent to the literature review, an interview schedule as set out below was developed for use during the interviews. The topics formed the basis for the subsequent analysis of the data.

Interview schedule

There were five areas of questions with prompts for each area:

1. Purpose of the PhD – why did you do it? What expectations do you have? What are the benefits of a PhD? What motivated you?
2. Supervision – did you discuss career planning with your supervisor? Or possible mentors in your post doctoral career? Did you have any say in the choice of your examiners? Over supervisors? Why did you come to this university?
3. What's missing from your PhD training to equip you for future employment? What are your employment prospects? What skills have you gained for future employment as a post doc? What skills do you still require? Can you work across disciplines?
4. Student support – geography? People? Publications? Presentation skills? Annual review? Personal Development Plans? Facilitators or barriers to developing your career?
5. Reflections – future plans? Confidence? Regrets? Value for money?

Ethics

Ethical approval was sought and obtained from the University of Surrey Ethics Committee. Confidentiality was maintained throughout the project in accordance with the Data Protection Act 1998. Participants were given information leaflets prior to interview by hospice staff. They were invited to ask the researchers questions prior to participating and were given the

opportunity to withdraw at any point including withdrawing their contribution subsequent to the interview. All participants gave both verbal and written consent.

Sample

Participants in this research project constituted a purposive, convenience sample from across the three schools. The sample size of groups 1 – 3 was smaller than intended despite pursuing recruitment strategies such as repeated telephone and email contact with potential participants; participation was disappointingly low. Four groups of participants were recruited from within each school although the majority of the participants came from within EIHMS (now DHSC in the Faculty of Health & Medical Sciences):

1. Current PhD students (n= **2** 1 Health; 1 Environmental Health**)**
2. Post doctoral academics within 3 years of PhD (n= **4** 1 Biosciences; 3 Health**)**
3. Academics within 10 years of PhD (n= **3** 1 Social Sciences; 1 Dietetics; 1 Health**)**
4. Senior academic supervisors PhDs (n= **4** 1 Management; 1 Biosciences; 2 Health**)**

Data analysis

The two researchers who moderated the focus group interviews and conducted the individual interviews undertook data analysis. As described by Fielding & Thomas (2001), qualitative data analysis consists of systematic consideration of the data in order to identify themes and concepts. An external clerical assistant transcribed the audio-taped interviews verbatim. In quotations the symbol '….' indicates material edited out to preserve confidentiality, **[ ]** indicates explanatory material included, block letters indicate interviewers questions. The researchers systematically read and coded the data; broad emergent themes were identified and agreed upon before subsequent coding of all the transcripts. Thematically similar segments of text both within and between interviews were then identified. Consideration was given to the internal consistency of responses, the frequency and extensiveness of participants' responses and also the specificity of responses.

Participants' quotes are used to illustrate data findings; the quotes which have been used are representative of general discussion unless noted not to be (often a contradictory or even single quote can be as interesting as the most common quote in qualitative data). At the end of each chapter a summary and discussion section examines the findings to further explicate recommendations of the report. Other literature is highlighted to support the perceived views of the respondents and the findings of the researchers.

Chapter 4: Findings from the focus groups

There are five broad themes in the qualitative data which appear to facilitate or act as barriers to developing or building successful post doctoral careers. Each broad theme contains several sub-themes and the themes are:

- The purpose of a PhD – this differed across disciplines because motivations for undertaking PhD studies and the stage in a career when the student would study for a PhD varied, with the more applied disciplines having older demographics than the biomedical sciences. The career possibilities the PhD offered for post doctorates were dictated by discipline.
- Post doctoral career pathways varied across disciplines - the health related post doctorates tended to become independent researchers in the post doctoral period albeit in an increasingly competitive and restrictive funding climate and the biomedical sciences tended to have a more structured post doctoral period of employment before independent researcher status was achieved.
- Barriers to post doctoral careers – again these varied across the disciplines but included the availability of research funding within disciplines, the lack of post doctoral roles in the world of work in the health disciplines, and how relevant academic research is to the world of work.
- PhD experiences were therefore diverse in how they shaped post doctoral career planning – again the health disciplines tended to have chosen to study for a PhD as part of a mature career pathway both inside and outside academia. The post doctoral period in the biomedical sciences occurred at an early career stage and career choices were not part of PhD supervision.
- PhD supervision was the vehicle whereby post doctoral careers were planned in the health disciplines whereas in biomedical sciences, supervision was focused much more on attaining the PhD.

One of the key differences between the three disciplines which assisted the development of the PDTNA-PD tool was that the incentive in biosciences came from a desire to research, a quest for knowledge for its own sake whereas in health and management the motivation appeared to come from problems in the world of work. This insight was central to the rationale for developing two self assessment pathways of the tool for the final stage of the project. We used these themes to re-write the existing PDTNA tool as an instrument for post doctorates (a PDTNA-PD tool) that

aims to address the factors that appear to act as barriers to building a successful post doctoral career. There are two versions of the tool based on two post doctoral career pathways identified in the findings from the focus groups which we have called 'practitioner' and 'scientific'. We present the findings from the focus group interviews in five sections with data extracts to illustrate the points made.

1. Purpose of PhD

As indicated in Chapter 1, transitions from being a doctoral student to a post doctoral position can be difficult and challenging with the need to integrate previously acquired skills from the PhD with the demands of a new post doctoral position. In our study, we found that in the post doctoral period there may be tensions in having to differentiate between post PhD activities and post doctoral career development; it varies depending on whether it is a grant funded post or not, the nature and maturity of the discipline and the competitiveness of the research environment in which they are employed within.

In our joint interview with two PhD students we explored their reasons for undertaking a PhD programme and what their expectations of the perceived benefits of a PhD might be. From the students' perspective, the PhD is 'the beginning of another journey' that leads them to another level within academia that offers them an opportunity to remove the 'safety net' that protects a PhD student:

> I want to make much more explicit the fact that PhD is not an arrival point, it's the beginning of another journey, it's like raising an opportunity to transition in whatever direction you choose that to be. Now it might as M [another participant]was just saying in her last comments, it might be well it's just taken me to another level within academia and research… but I want to be like a knowledge broker, someone who can actually help clinicians understand what's coming at them from academia and so for them to interpret it and be able to interpret how they might apply their concepts, ...not just pick it up and plop it into a clinical setting, but to be able to interpret some of the new merits of it. (PhD student B)

However, the transition to post doctoral work was also seen as challenging because the promise of the PhD does not always bear fruit in terms of a post doctoral career:

> But even their [funding sources] worry about the fact that, because of the lack of support and clear direction for people who've obtained their PhDs, is all this money to pay you full time funding and you disappear off the side of the edge again. You go back into teaching jobs, not because you want to but because there's mortgage to pay, and you think what an incredible waste of time and motivation and money, you invest in three years and then it just drops off the edge. (PhD student B)

These thoughts were validated in a joint discussion with two programme directors of post graduate studies indicated that there were differences between disciplines regarding a post doc, as explained by one participant from a science discipline:

> **Researcher (R): How would you define post doc?**
> Well in our area it's usually a two or three period where somebody goes or somebody who's just got their PhD goes often abroad, often usually to another lab but not always, basically to do purely research, absolutely pure, almost a certain pure research.
> **R: What's pure ?**
> They won't have any teaching commitments, they won't be any academic teaching commitments....health care the post doc, usually a senior person who is developing an independent research career, so applying for their own grants, funding and programme of work so it would be about building research in that sense. I mean our post docs are generally quite young. From a BSc, 3 years to 3 ½ years doing PhD, they're quite young, they're quite inexperienced. (Senior Academic Supervisor Biosciences)

And indeed there is in some cases more than one post doctoral appointment in science:

> Often the first post doc is slightly different area of research and often not on the area that you've done the PhD in. So it's almost still really considered part of the training and in America, in fact it is part of the training, they're still considered trainees, even sometimes second post docs, so it's completely different. (Senior Academic Supervisor Biosciences)

This difference is further reinforced by a post doc from a practice discipline:

> It's almost like a polarity, because in a way our sort of PhD students are usually clinicians or academics who are training to be researchers and so in terms of their post doc it's developing an academic career; whereas in a way yours is the other way round where you've already got the sciences there and they don't have the academic. (Senior Academic Supervisor Health)

The post doc experience is perceived by post docs as difficult due to the lack of career pathways and participants felt that the PhD's purpose was unclear. In this climate, those with PhDs tend to either take up academic positions or remain in research.

> But personally I found the post doc period quite difficult because there's lots of avenues you can go and because there's no clear post doc careers in nursing you either stay in academia and live with a low salary or you go back into clinical practice, but it's very difficult to do both, they're aren't joint positions so you can't be a clinical academic, you're either one or the other. So a lot of my friends who did PhDs with me have gone on to do further research; there's four nursing fellows who have been funded, there's only two of us remaining now in research, who've stayed in academic positions, the rest have either come unemployed, working as teachers, weren't able to get jobs. So it hasn't been that successful in terms of developing these [people]. (Senior Academic Supervisor Health)

The post doctoral academic experience for some, across the three disciplines, can be a lonely one depending on the stage of their academic career. It was suggested that junior academics would be

more likely to be assigned a 'senior colleague' to act as their mentor while those with a well established academic career would be left very much on their own to survive:

> Yes, I mean once you go into an academic post then its different because you're on your own, rug pulled straight from under completely. If you go in as a junior academic in some ways it's easier because you're always assigned a senior colleague who is supposed to act as a mentor, but if you come into academia higher up the ladder, which is my own personal experience then well, you're completely on your own, I was completely …as a reader. (Senior Academic Supervisor Biosciences)

Rudy and Grady (2005) argue that the recognition of doctoral research in nursing remains a problem due to the contested nature of nursing knowledge and discipline boundaries; however the tension between teaching and research occurred across the three disciplines. As indicated by the senior academic supervisors we interviewed who highlighted the difference in the way teaching and research are weighted across disciplines.

> And if you look at the professorial posts within nursing it's something like 9%, it's very small compared to 15% in normal, you know in biological departments, so if you say like look at most nursing schools and look at how many members of staff are research active, it's very small, it's about 15%, so it's not a huge number. (Senior Academic Supervisor Health)
> For us it's about 85-90%. (Senior Academic Supervisor Biosciences)
> It's very different. The education is weighted much more highly in terms of teaching than it is the research element. (Senior Academic Supervisor Health)

It was suggested that for some post docs getting a PhD was an anti-climax because of their own expectation that a PhD can make a difference:

> People talk about it opening doors; you hear this expression. But what you find is that a lot of it is a huge anti climax because you get to this huge goal and then find that actually it doesn't change anything, you personally have changed and you're maybe now in a job that you feel dissatisfied in the whole process. And often students want to change or do things differently and it's quite helpful to have someone to discuss that with and to actually think about okay what direction are you moving, are you going to go into research or are you going to stay in clinical, develop clinical research or are you going to go for a fellowship? They don't know what the options are. (Senior Academic Supervisor Health)

And what became apparent were the differences in structures and career advancement between health disciplines and more scientific disciplines:

> Just thinking in terms of, do we make a distinction when people are post doc? Do they get their PhDs as part of their academic development, but they're not necessarily called post docs as such… I only realised that there was that difference by applying for post doctoral type sort of roles and you know, we don't have these structures in place that people expect as routine. (Senior Academic Supervisor Health)

Is there necessarily a clear distinction? (Senior Academic Supervisor Biosciences)
Yeah, so if you had somebody in health doing a PhD, they would then be called a post doc in terms of when they've got their PhDs they carried on working. It doesn't usually happen though you see, it doesn't normally happen like that [in other schools].
R: Because they're not, they don't usually have an academic post.
No, they wouldn't get an academic post after PhD, it's very very rare. (Senior Academic Supervisor Biosciences)

A major difference between the three schools was in the expectations around whether post docs could apply for grants as grant holders i.e. as principal investigators as this discussion in the programme directors' focus group shows.

R: And have they put in for that funding themselves or are they working on funding that they're not the PI on?
I think it varies, but for the most part I think the School apply for the contract. I'd like you to see some of these people because they are very, very varied. (Senior Academic Supervisor Management)
R: Because that, again, was the big difference between SBMS and ourselves in that once you're, when you're in that post doc period you don't apply for funding yourself. Your professor of your lab applies for the funding.
And we expect them to and I think it's unrealistic in the current climate. (Senior Academic Supervisor Health)
R: So then once you've got the academic post, then you're applying for funding and you're got your reputation, as it were, established, having worked in that protected field.
So we're sort of missing that stage really. (Senior Academic Supervisor Health)

Issues arise when post docs employed on contract work for which they are not grant holders or leave to take up another post such as lectureship. This could result in contract work without a researcher:

Yes. But more and more people don't finish their contract work. Contracts are always left at the end without a researcher. (Senior Academic Supervisor Management)
R: Is it because they leave, because they're found a job?
Because another one comes along. They've found another contract, they've found a lectureship somewhere. They do something else. (Senior Academic Supervisor Management)
So we have had a similar situation. I think it's been more of the transition where they haven't been quite sure of where their career was going and their post doc period. The period of contract research if you like has offered them a period for reflection on that and then opportunities come up. (Senior Academic Supervisor Health)
The contract research coming in would also include PhD. We often take people on to do their PhD within the contract, if it's a big enough contract. (Senior Academic Supervisor Management)

Post docs also perceive that their post doc career development is influenced by the pressure of seeking huge grants and the length of their contracts:

> But I think pressure on funding also means that the academic staff who are obtaining the grants are finding it difficult to follow on. So they may have a very big grant. They may achieve very good quality research, all the outputs, but it's still very difficult for them to get follow-up funding, often with a hiatus and even if you want to hang on to the post doc they'll go because you can't sustain their salary. So I think that's also affecting post doc careers. (Senior Academic Supervisor Health)

This concern with grant holding was similar across the three schools as the following quote from the bioscience programme director shows:

> Well in biology a post doc tends to be short term contract, short term funded research post. They may be one after the other and they may all be in the same lab but when you're doing, you're on someone else's grant your a post doc basically and even if you have your own short term fellowship, if it's only 2/3 years then that you would consider yourself a post doc I think. If you get some of these longer term fellowships, like the Wellcome Trust offers five years or the career development fellowship, then you can call yourself a research fellow I think, which is slightly more inclined, it's more independent sort of thing. (Senior Academic Supervisor Biosciences)

The post doctoral experience is also perceived by students as a competitive research environment where kudos is associated with those who received huge research grants which they are highly protective of.

> People are really closed ... Some people are very secretive they don't want to share what they're doing. (PhD student A)

The other student agreed,

> You're right though it's a culture of competition and … there've been attempts to create collaborative networks and ...to work together on one project and it's proving that [people] can't work collaboratively, you know they've got to be connected to people but it's still people with the power of the kudos have the big grants, they've got the big names and they've got the money to control, they're still controlling all of it and they're still not giving any of it out to those that are part of that collaborative network and it's often ... I agree with you, it's a real barrier and it's almost assumed that you just kind of have to fly by the seat of your pants once your post doctoral. (PhD student B)

2. Post doctoral career pathways

Due to the differences in how each discipline defines post doctoral careers and posts, the structures which each school provide to support post doctoral career planning are different. As discussed above, one of the structures which has proved problematic within the health and management schools was the employment status of the new post doc. For some post docs, obtaining research funding is highly competitive and can potentially be a barrier in building successful post doctoral careers. This is coupled with the inherent temporariness of the post doc post itself.

The structures within an institution that allow the tracking of the employment of PhD students after completion of PhD could be a facilitative factor in helping to develop a successful post doc career. At present, there appears to be no follow through of PhD students following their completion to 'track' their employment although it was recognised that some who were part-time PhD students were already employed.

> Most of them are employed anyway. I mean, we don't have a single one at the moment … no, we have one who's not employed... And even our full-timers who are on sort of Government secondments but they've got a job to go back to … now, it would be very interesting to see whether their career takes off, changes, whatever. I guess we don't keep records (Senior Academic Supervisor Biosciences)
> All our part-time people have jobs. (Senior Academic Supervisor Management)

Another structure in place to plan post doc careers is the self assessment tool. This tool is made available for PhD students to rate their skills and with their supervisor plan short and medium term needs.

> We have an on-line tool[2] that students use which is adapted from the HEFCE seven key areas but within the context of healthcare, where students rate their skills and then discuss with their supervisor and plan out immediate needs, medium term needs and then perhaps needs towards the end, for example, a course on presentation of a thesis. Then they should regularly re-audit whether they are acquiring the skills that they need…
> When we introduced it [tool] we had problems, absolutely predictable, in that existing PhD students didn't see why they needed it, didn't really want to engage with it, but we've found that new students have been very enthusiastic about it. Often it's the student pushing the supervisor to be enthusiastic. (Senior Academic Supervisor Health)
> We don't go onto anything on-line because I wanted them to engage with the supervisor straight away about skills, but I'm not actually sure that actually worked, but I wanted the two to sit down and talk and fill out a form and then at least they're talking. (Senior Academic Supervisor Management)

Although students were encouraged to utilise the self assessment tool by at least one of the Post Graduate Programme Directors who participated in the focus group discussion, there were concerns about its validity since students either under-rate or exaggerate their skills. There was also debate about the usefulness of the Personal Development Plan (PDP) that is also in place for students to map out their own development

> That hasn't been as successful as I'd hoped it would. People always exaggerate… ours exaggerate their statistical skills. They always do. (Senior Academic Supervisor Management)
> Ours under-rate. (Senior Academic Supervisor Management)

> In the PDP, because I know that our tutors don't find the PDP helpful because the skills sets are not the skills sets you need for transitional research. So if you're using transitional research out there in practice those skills sets aren't going to – they're quite different, it doesn't necessarily fit with an applied research. PGFA

[2] This was an incorrect use of the term on-line as the tool was an excel file.

> I think it's too cumbersome by far, I think they would do it… there's too many tick boxes. PGFC

A clear difference between a biosciences and management/health post doctoral career pathway was in the structured provision of mentors in the experimental school compared to the lack of mentoring in the other two schools and in the unstructured period following promotion to the first academic post for the experimental school. Reflecting on their own experience while completing their own PhD, Senior Academic Supervisors in their focus group discussion also suggest that a structure is needed to help develop the post doctoral experience and career of their students. They considered the role of mentorship to ensure that doctoral students do not feel that they are working in isolation. This further supports the need to have a structure in place although the difference across disciplines may influence how the mentorship would work.

> I've just applied for a clinical fellowship… There are assumptions that we would have the same mentoring in post doctoral posts as you would say have in a medical faculty or in a biological genetics and of course without a lab based structure you don't have that mentoring structure that you would have within a laboratory setting. It was very interesting looking at what they were asking for because you couldn't assimilate it to healthcare or into clinical practice because you don't have a clear mentoring structure because you're normally working in isolation. (Senior Academic Supervisor Health)
> No because that's very different in SBMS, it's always very clear because usually you join a bigger group, you join a big group who has an established research track record, it will have one or more leaders who are established scientists and researchers probably academic and then they're will be a number of other PhD students and/or post docs in that group who all sort of work together to mentor, so it's a very different environment I think. (Senior Academic Supervisor Biosciences)

The role of the supervisor within the existing structure was thought to be key to developing the post doctoral experience and career of their students; although there was lack of clarity in whether the supervisory role should include career planning. However, postgraduate programme directors expressed concern regarding supervisor training. This concern relates to the lack of priority given by supervisors to attend training, the lack of resources in training them, the type of models in supervision, and the experience of the supervisor in the type of research.

> **R: And in terms of supervisor training, is that [career planning] part of the supervisor training then?**
> Well … in theory. (Senior Academic Supervisor Health)
> I think supervisor training is a huge issue. (Senior Academic Supervisor Management)
> Yes, I think it is. (Senior Academic Supervisor Health)
> It's a very, very big issue and reaching almost crisis point, I think, in some cases. We don't do enough of it. It's ad hoc and I think this is a huge area. (Senior Academic Supervisor Management)

3. Barriers to planning a career

From the doctoral students' perspective, there are barriers to identifying their career plans following doctoral studies because of the cultural factors in some disciplines; such as in nursing where nurses have to struggle to be recognised for their academic attainment by their peers such as the medical staff, and to demonstrate their 'connections' in the research world. This is illustrated in the quote below:

> I'm not recognised by medical peers for example so, ...[the] .way that I've approached my role, none of that is actually formalised, it's only through relationship building and I find that that's what a lot of nurses rely on, that personality and ability to network and actually build good friendships and relationships with a whole diverse range of people in order to get to where they want to get to. I feel that [where] I've got very good collaborative links with colleagues there's more official recognition of that in terms of access to power, influence and money which is what you need if you want to be able to conduct research…in that respect I find PhD, or I believe the PhD is a transition mechanism for me… but I'm not going to be recognised by the medical peers unless I've got that badge in terms of academic attainment and for research training comes I guess comes along with that. (PhD student B)

One student reported she had been examined by an expert in her field who did not know her work but who had turned out to be useful in giving her access to a network of useful people in the post doctoral transition period:

> **R: And in terms of your transition to post doc work then, has that been useful to be examined by this expert?**
> I self funded my PhD. I've been writing the grants and showing them the work that I'm doing now is a continuation, but I think because of knowing that person and getting to know other people I have good connections in the work that I've done....[it's] helped identify a funding source. (PhD student A)

For this student it was also the lack of clinical academic roles post PhD which would allow her to move between academia and practice which she found a barrier to building a career she actually wanted:

> Absolutely, like what I do doesn't make sense, because [the] traditional physician would be...laboratory, like do my urine cultures, my drug cultures, ...sort of thing, to do research as 50% of your job or something like that is really the odd sort of thing, it doesn't exist and they're like "What are you doing? That's not public health.' and I said 'Of course it is, because that's what my goal is, to prevent illness before it happens and if you don't have an understanding of what is going on...and going into your waterways and people are swimming, of course that's a public health issue' (PhD student A)

The difficulty in career planning may also be due to the lack of formal post doctoral training programmes, as reported by the Senior Academic Supervisors. Interestingly, this need for formal training to address early career issues was recognised by Gaugler in 2004.

R: In either of the programmes is there any formal career planning as such?
Not in our School. (Senior Academic Supervisor Management)
[Our students] know what they want to do, how it happens they discuss it amongst themselves, discuss it with their supervisor, it's rather informal, a little bit of career training. There's a sense that they're going out to get a job Most of them are looking for a post doc position so they know what to do, they know where they're going, they know where they're, all they just have to do is look for the type of research they want to do and they find the lab and again they'll discuss that with their colleagues and their supervisor. (Senior Academic Supervisor Biosciences)
I find with our students is that, partly because many of them are part time and they take a long time to finish, is that often it is their life's work and they don't know what they're going to do after it. They're working full time in a job so this is like a hobby alongside and when they come to the end it isn't so clear where you're going. (Senior Academic Supervisor Health)

These internal barriers to career planning may reflect a wider uncertainty as to the nature of PhDs and what they equip post docs to do in employment. One of the senior academic supervisors commented that careers outside academia and the demand for PhDs in industry was not well established:

> But I can see dual values … someone who wanted a managerial career, to get a PhD. I mean, there are some, only on some very selective areas where I see a value in that. It would have very little credence in the management except in consultancy. Outside that, one or two areas, IT companies maybe, … there's a huge diversity in there, but I don't see any great demands for PhDs in industry. They value … the things they look at, their Masters qualifications are important. They don't see the PhD as anything additional to a Masters in a sense, unless they are a research company because industry itself, there's so little research in management itself. So the people who value it are people in education and consultancy. (Senior Academic Supervisor Management)

And in healthcare, the view of the programme director was that a PhD was not seen as beneficial to a career:

> Whereas in healthcare at the moment, I would say [there is] a bit of anti intellectualism in that students feel that people don't value necessarily nurses doing PhDs because in practice obviously in research it's valued, but there isn't at the moment an academic clinical career structure [in healthcare] so if you have a PhD …it doesn't give you an extra salary or any particular route, unless you're a data manager or a data collector but that doesn't necessarily require a PhD. So at the moment there isn't a clear route through, it's very much related to nurse consultants and particularly academics I would say, doing PhDs. (Senior Academic Supervisor Health)

Whereas a PhD was seen as a necessity for a science career both inside and outside academia, there were no formal career planning or training structures:

> It used to be, years ago, that you could progress and have a really good career without a PhD but you can't anymore, because technician posts, well there are a few within the school but they're really a handful and you wouldn't make a career of it, put it like that. So really to have a career in scientific research or academia you absolutely have to have a PhD and I think to a large extent in industry to progress in companies and so on you

probably have to have a PhD as well, so I think for us its almost essential. (Senior Academic Supervisor Biosciences)

4. PhD experiences and how these may shape a future career

Several factors were found to be facilitative in the PhD experience to building a post doc career. These include the motivations and aspirations that led a person to pursue the programme of study, the stage of the individual's career, the clinical problem, and their peers. In our focussed group discussions with PhD students and post docs, we explored with them their reasons for pursuing a doctoral study. It was generally regarded that a PhD would offer them with opportunities for grant application, recognition by peers and other professionals, autonomy and the skills to work at a 'higher level' and 'to break beyond that restricted view of nursing'. For the PhD students the motivations to undertake their PhD were related to needing to be taken seriously in a wider academic and practice world:

I think that [it gives us] opportunities in applying for grants in collaboration with others to teach, if you want to do consultancy… Just first of all because I wanted to do it for personal reasons but I think you can get that, especially if you want large funding towards...they sort of expect you to have PhDs… people are more likely to listen to me, particularly non nurses if I have a PhD and if I've systematically conducted research in the field, but if I've just come in from a professional standpoint or an educational standpoint, so it's definitely also about mark of status (PhD student A)

I think in a way the PhD is a badge which allows you to operate on a more peer type relationship with non nurses, because you may be well respected… I can't say for public health I can only speak for cancer nursing, and the PhD is a way of breaking beyond that restricted view of nursing, now I've always operated beyond that view but I'm not recognised as doing so (PhD student B)

This ability of the PhD to open doors was also recognised by the senior academic supervisors in management and health:

My experience is the PhD, the doctor in front of their name, gives them an autonomy and an ability to actually work at a higher level in say, health care; at a same level as a medical doctor in a sense that they can then sort of jostle really in the hierarchy. So it gives them recognition for their work. (Senior Academic Supervisor Health)

People generally do them for career progression, they recognise that they can't progress in many different careers related to or even unrelated to science without a PhD. (Senior Academic Supervisor Management)

For the senior academic supervisor in biosciences the motivation came from a desire to research, a quest for knowledge for its own sake. This insight was very important in the decision to separate the two self assessments for the final stage of the project:

> In a sense they tend to be people who want to do research within the context of their existing job, rather than people who are looking to sort of move on in the way that you described in relation to the project. Often it's the research itself. It's the need to find out more about, the need to evaluate whatever it is that the research is about, so they're very, very highly committed to the research itself. (PGFB)

As indicated earlier regarding the PhD experience, the stage of career or clinical problem is perceived as one of the factors that can influence it. This again may vary across disciplines and location, as it has been found that different styles of training at doctoral level [in psychology for example] can result in different employment outcomes and the amount of time that PhDs spend in active research once in post doctoral employment (Stewart et al 2000; Cherry et al 2000; Denegeffe & Bishop 2004).

In science, the typical student came at an early stage in their career with no particular idea of what they wanted to research:

R: And are they generally from a particular background?

> They're all almost exclusively from a science background, and you wouldn't get many doing a PhD in science who hasn't got a full science background. Occasionally you get people swapping over perhaps at Masters level or something like that, they'll do Masters and move more sort of slightly change discipline…
>
> We do have quite a number that do PhDs part time collaboratively with industry. We have a large number, we have quite a few from overseas who have been lecturers in their own country because they often don't require a PhD to be a lecturer in their own country, for example Thailand, Saudi Arabia and they will either come here to do their PhD or they'll do it collaboratively, so yes there is a mixture. (Senior Academic Supervisor Biosciences)

Whereas for the schools of health and management, PhD students often choose to study after a career:

> Our students they're coming in from the workplace; so they're normally part time students. So you think the majority of them are doing it for different reasons: perhaps looking at going into full time research [or] they're looking at normally developing skill sets that they can use in clinical practice to prove the case in point or particularly a particular agenda. So they normally come in with a research interest in one area that they want to develop. So they're very different, they've often been in work for many years and about 90% of them are part time students, so very few of them come from a Bachelors degree in nursing, they've got Masters, would have been working for a few years. (Senior Academic Supervisor Health)

For some students, motivations to study for a PhD arise in practice or from problems in practice or the workplace:

> I had a particular area of clinical practice that was kind of perplexing me and … I felt that it really it was only through being able to conduct some funded research. And

> PhD research was kind of the obvious route for me that I would be able to begin to be able to explore that particular area from a nursing perspective. So the PhD for me was an opportunity really to answer a clinical problem that had been perplexing me for some time (PhD student B)

Indeed, at one point in the focus group interview with the four senior academic supervisors, the differences in the ages of the typical PhD students in their respective schools came as a shock:

> The average age of PhDs in nursing in the UK is about 46. (Senior Academic Supervisor Health)

Good Lord ! (Senior Academic Supervisor Biosciences)

Thinking back I would say the average age is 50… Some of them are coming up to retirement. (Senior Academic Supervisor Health)

Although there is little evidence in the literature that peer support can play a part in influencing the doctoral experience, peer support may help particularly in fostering sharing and scholarly activities and developing research skills. One of the students had organised the PhD support group and the interviewer asked:

> **R: I just wonder whether ..career planning came up within that group and whether it was student part of the support group?**
> Not to my knowledge, I've never had anybody ...or in a seminar or approach me about it. I think that's where the notion of career planning and development is kind of implicit rather than explicit. I mean, one imagines that the whole idea of running these seminars is meant to be it's a source of support and a source of interaction for students who are all studying at a distance. But also it's inherently trying to develop some of the key skills that you need to be successful in your chosen field of work, but I seriously doubt whether the majority of students give a second thought as to the value of those sorts of activities in terms of developing those core skills. Now for some of them …they didn't need that sort of development and they weren't there for that reason and there was maybe a third of them [in seminars] that I would say really needed that, whether they saw that just as a hoop to jump through or something that was generally beneficial to them I couldn't say. (PhD student B)

5. Supervision

Robinson (2001) recognised that skills are needed to avoid floundering after graduation. One of the key people involved is that of the PhD supervisor whose skills as role models are needed to foster successful research careers (Levine & Green 1981). Such a role in mentoring is particularly pivotal in fostering successful professional growth and development in academic medicine (Sambunjak et al 2006). In our focus group interviews, we explored with participants whether they saw career planning as part of the supervisory role:

> **R: Should career planning form part of PhD supervision?**
> Oh I think they'd have to. I don't really use my supervisors for that at all. I have a very clear direction. (PhD student B)

> I ask them, do you think I'm on target? You know, is there something else that you would suggest that I should do? It's not like I was brand new and I didn't know what I was doing sort of...I already had a plan, ...grant, I knew what I wanted to do. (PhD student A)

But the senior academic supervisors had a different perspective on this question of whether supervisors should help students plan careers and think for after the PhD:

> I think it [career planning] is an important aspect. In the case of our students it might be not really traditional career planning … I think one of the things that we found from the skills audit that we've developed is getting students who come with a lot of skills to think about those skills in relation to research, so you might have very good communication skills in terms of team working, in terms of communicating with patients and carers, but actually at the beginning you may be very poor in terms of presenting key rationale for your research, and so actually you do have this development need. So I think in that respect the supervisors are important.
> **R: In assessing development needs?**
> Yes, but also in advising the students about their new skills but also repackaging the skills that they've got in terms of demonstrating their research capability. (Senior Academic Supervisor Health)

Whereas the senior academic supervisor from Biosciences felt differently:

> The skills a student needs, a post doc needs are to do with research, then they will be provided; in terms of transferable skills and personal skills its entirely up to that individual to sort it out themselves really. (Senior Academic Supervisor Biosciences)

Transferable, core skills were achieved during the doctoral study and perceived by PhD students as useful in gaining credibility and respect; these skills included being able to take criticism, think broadly and network in a gender dominated world of research where male dominance in medicine, science and technology exists:

> It's a big issue in oncology and… in medical technologies and as M [participant] was saying it's certainly male medics that dominate both those fields in terms of numbers… It seems like it's male colleagues who are better well respected in the US I think, but it seems the sciences...men who traditionally...there's lots of ....to encourage women to be involved in sciences, women are minorities to go into sciences and especially to continue on. (PhD student B)

Taking criticism was a key skill identified by the PhD students:

> It depends on personality too, if someone can say I think all your work is rubbish and you turn all weepy, they're definitely not going to respect you. ...come up again these things to make people ...why don't you agree, there has to be some sort of valid reason not just my stuff is rubbish and mine is great and yours is crap, that sort of thing, because of who I am. (PhD student A)

The skills during the doctoral experience also included seeking and managing funding as well as developing their own publication portfolio:

> I think the traditional design help[ed] you to figure out what sort of... how do you find funding sources, what funding sources are appropriate, what sorts of funding sources would be interested in your project. [It's] something important that people need especially if you're going to continue on and do research because you create some sort of a CV that research and publishing has to be on-going so you have to at least have a publication every year, you have to have some sort of constant stream of funding, might be more or less, but you shouldn't have certain gaps. (PhD student A)

From the senior academic supervisors' viewpoint the skills required for post doctoral work were not always facilitated during PhD supervision:

> I mean in a good lab a lot of that sort of thing will be provided and in a good lab, the person who is their line manager, they're supervisor, supervisor in inverted commas by that stage, they're group leader if you like, in a good lab that group leader will discuss, will have regular meetings with that post doc, I mean that's what usually happens, they will have regular meetings and they will discuss things like that. But, I think the skills student needs, a post doc needs are to do with research then they will be provided, in terms of transferable skills and personal skills its entirely up to that individual to sort it out themselves really. (Senior Academics Supervisor Biosciences)

This view of what was lacking in the provision of skills for post doctoral working then stimulated the science senior academic supervisor to reconsider what skills were needed at post doctoral level and who should they be provided by:

> Part of my, the issue I have with some of these training provisions that we're sort of considering is that I'm a, I was trained as a scientist, you know I'm a researcher and that's what I'm really trained as. I've never been trained in teaching but I end up doing it – poor students, and I don't think it's right that a science faculty should be teaching its students management skills; and I think if the students want to know and understand, if they want to go into management, if they want to go into a company and they want to be a manager then it's up to that company to provide them with that training. I think we should be training them as scientists.
> But our post doc don't have to, when they go from a PhD to a post doc they've still got one project usually, it might be a different project but they've usually only got one project… it's usually only then when you move more and more senior, maybe after a 2nd post doc even, that you end up having to as you say juggle, keep all these balls in the air. (Senior Academics Supervisor Biosciences)

Conclusions after focus group interviews

After analysing the focus group interview data, it appeared that there were two broad pathways to a post doctoral career. We called these two pathways the "health or practitioner" and the "scientific or experimental" pathway; they are set out in the diagrams below.

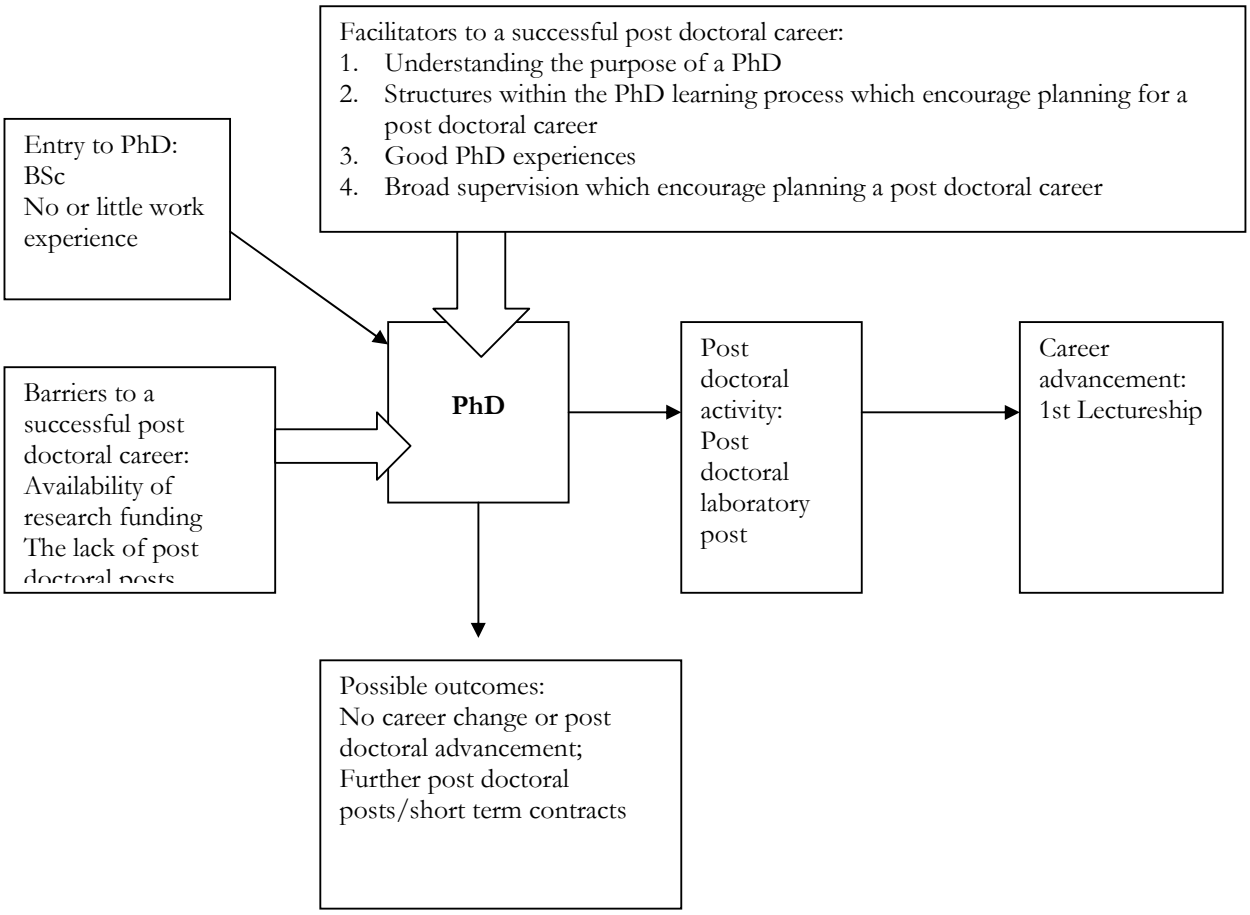


Figure 2. Scientific pathway to post doctoral career.

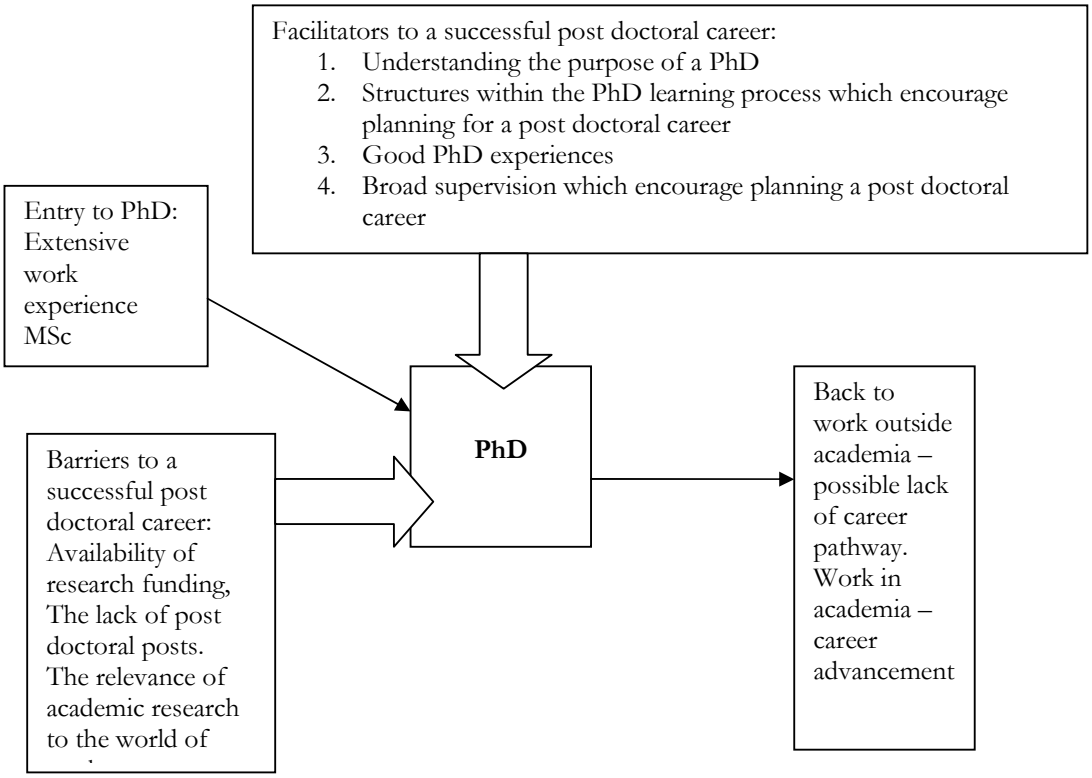


Figure 3. Health/management practitioner pathway to post doctoral career.

We concluded that the self assessment tool needed to be adapted to meet the specific disciplinary needs of the PhD student planning their post doctoral career. We used these themes to re-write the existing PDTNA tool but we decided to create two separate self assessment tools for:

- Practitioner careers (including health, management). This was written with a focus on practitioner concerns such as working with users outside academia, the transfer of knowledge outside academia, adapting methodologies to meet user research problems, responding to user research concerns. Broadly it was for applied research and uses language which is appropriate to this area of work.
- Scientific careers (including biomedicine). This focussed on less applied research where researchers do not necessarily work with users directly

Both self assessment tools were written specifically for post doctoral career planning and are intended for PhD students in their final period of writing up. The purpose of these new tools was to address the factors which appear to act as barriers to building a successful post doctoral career. They address the individual's skills and knowledge in the following areas which were felt to be lacking in the PDTNA tool:

- Funding applications
- Publications
- Governance
- How to manage others in research teams
- How to teach/ supervise students
- How to plan a career

The changes were made to the existing PDTNA tool and the two instruments were piloted as the PDTNA-PD tools in SPLASH by Dr. John Baxter with groups of PhD students across the three schools in the middle of November 2007 and again in January 2008.

Chapter 5: Results from evaluation of the PDTNA-PD tool

A small usability study was conducted to evaluate several aspects of the tool: usability and ease of use, the usefulness and relevance of the output and whether it would be used in the future. Participants were recruited via several email messages that were sent to all final year PhD students in the Faculty of Health and Medical Sciences and the Faculty of Management.

Five PhD students in the final year of their candidature participated in the evaluation. They attended a session in the library during which the tool and its rationale were explained to them and they were guided through the process of using the tool. They completed the training needs analysis using the tool, perused the output and completed a short online survey about their opinions of the tool. The whole session took approximately two and a half hours to complete.
This procedure was devised because, contrary to initial documentation about the tool which stated that it could be accessed online, the tool needed to be downloaded and installed onto the user's computer before being used. The research team found the download and installation process lengthy and difficult. None of the research team successfully installed it. We concluded that potential participants would be deterred from participating in the evaluation because of this. Therefore, it was decided that a group session would be conducted in which participants were guided through the installation process. Nevertheless, they still required their own laptop which they could bring to the session.

The participants were two males and three females in the final year of their PhD. Two were carrying out their research in healthcare, one in management, one in chemistry and one in biomedical sciences. Four were aged between 25 and 34 and one was aged between 35 and 44.
The online survey contained both open ended questions and a series of statements with which participants had to rate their agreement on a 5 point Likert scale. A rating of 1 indicated that they strongly agreed with the statement and a rating of 5 indicated strong disagreement with the statement. This was reversed when the data were analysed so that a high rating indicated strong agreement. Mean ratings for each question were calculated.

The first area that was assessed was the usability of the tool. We wanted to know whether it was easy to use, organised in an appropriate way, used appropriate language and had all the functions that were expected. Additional questions were asked specifically about whether the priority criteria were easy to understand and whether it was easy to identify whether the scientific or

practitioner version of the tool was the most appropriate. The mean ratings for these questions, together with the standard deviations (in brackets) are shown in Figure 4. Although on average participants agreed that the tool was easy to learn to use and the interface was easy to use, they did not agree that the organisation of the information was appropriate or that the tool had all the functions that they expected it to have.

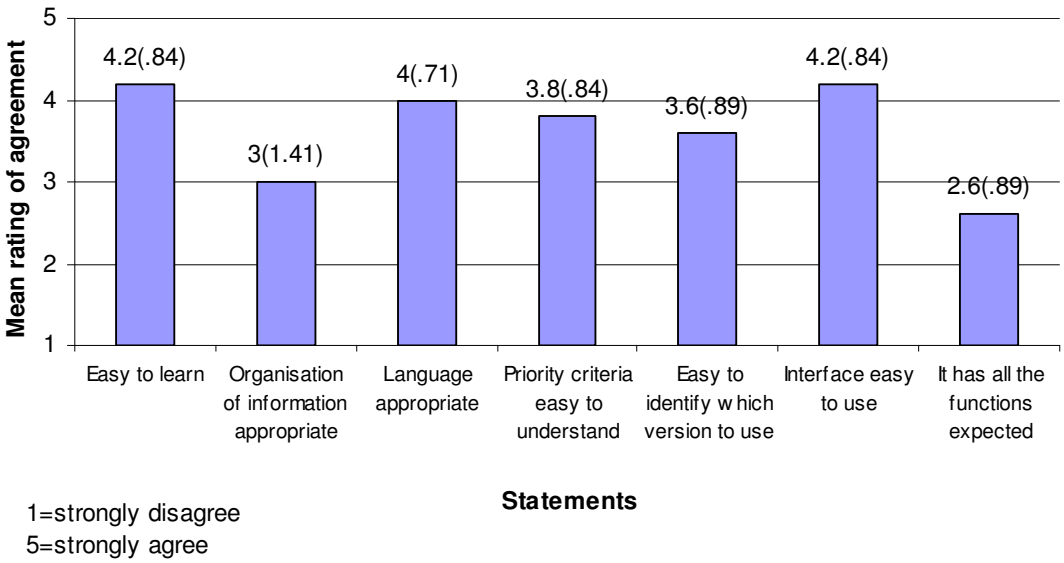


Figure 4. Usability of the tool

The usability of the output generated by the tool was also investigated. Participants were asked whether the output was clear and easy to interpret and whether it was useful for identifying training needs and for planning courses. The results are shown in Figure 5.

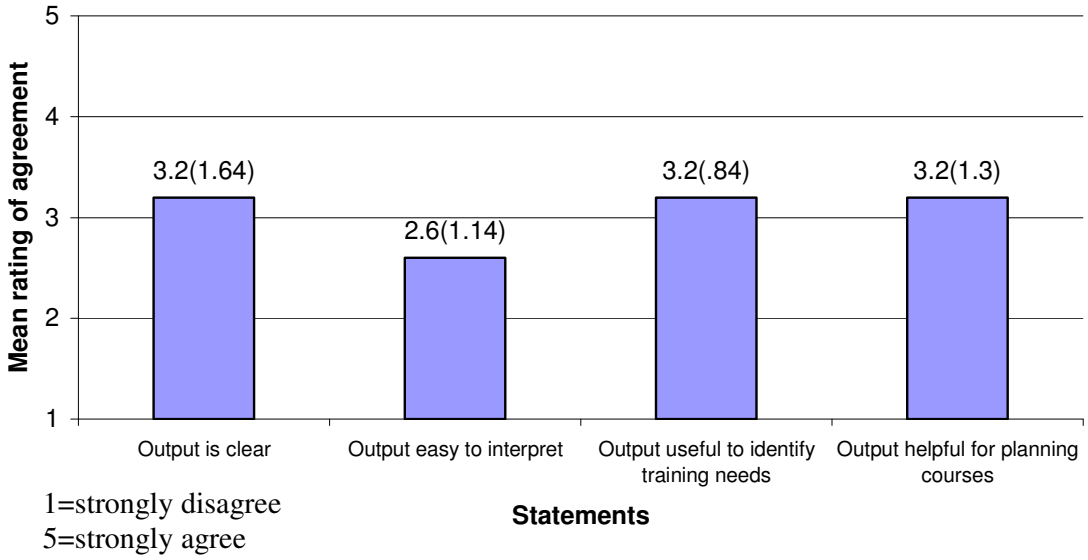


Figure 5. Usability of the output of the tool.

Participants' mean ratings for the usability of the output of the tool were relatively low with participants neither agreeing or disagreeing that the output was clear, useful in identifying training needs or helpful for planning courses. They also disagreed that the output was easy to interpret. Participants had several suggestions for making the output of the tool clearer. First, they were unclear about the meaning of the levels that are used in the output (levels 1 to 4). Did level 1 mean a high or low level of skill? This could be addressed easily by amending the documentation of the output. They were confused about the colours used in the output and wondered whether the colours indicated anything meaningful that could help in interpreting the results. One person also suggested that a total overall score would be useful to allow him and others to assess his skill level and development. Although this might not be appropriate for a training needs analysis tool, the rationale for not providing an overall score could be included in the user documentation.

Participants' thoughts about using the tool in the future were also of interest. They were asked whether they planned to use the tool in the future to identify training needs or plan their development. They were also asked whether the tool included all important and relevant skill areas. The results are shown below in Figure 6.

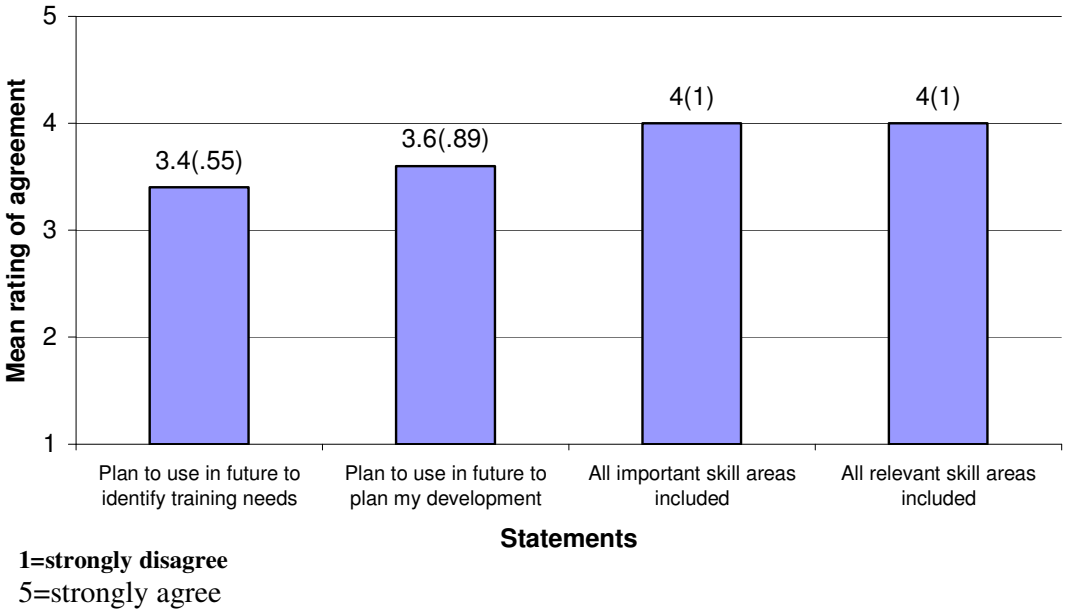
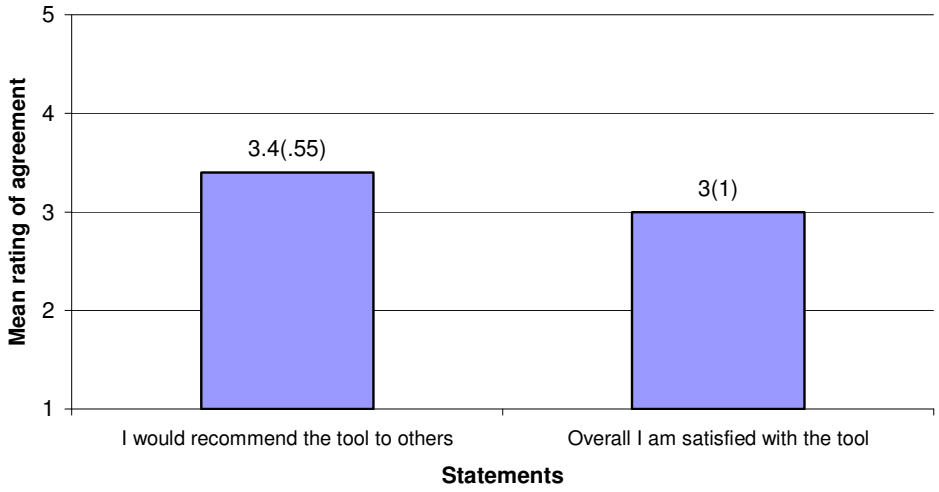


Figure 6. Future use of the tool.

Participants were not in clear agreement that they would use the tool in the future to identify their training needs or plan their development and did not agree strongly that all important and relevant skill areas were included. This might reflect the fact that as PhD students they would not know all the skills that they might need to employ in a future occupation. Two people commented that the tool would be better if it included suggestions for courses that could be undertaken to address the skill deficits identified. One person commented that it was useful for self analysis but also noted that it had no suggestions for training.

Overall satisfaction with the tool is shown in Figure 7. Participants' satisfaction with the tool was not high and they neither agreed nor disagreed that they would recommend the tool to others, as shown in the figure below.



1=strongly disagree
5=strongly agree

Figure 7. Overall satisfaction with the tool.

Responses to open ended questions.

Positive responses to open ended questions included the following responses:

- The language is clear
- The structure is really good
- The tool idea and structure are really useful and good

Participants also noted improvements that could be made to the tool:

- "Back buttons are needed" (noted by two respondents)
- "Allow descriptions of categories to appear alongside the priorities column. It is more helpful this way so that the researcher can look at the descriptions and decide what their priorities are."
- "Describe what Level 1 to 4 means. Level 1 could mean very good or very bad. I inferred its meaning when I proceeded to the second stage of the tool - when it said Level 1 of 4, where I understood that Level 4 was very good."

- "If some specific research skills courses are given as option, it would be better for the user as it helps the user to be more focused in specific skills."
- "To be able to save the data as I go along."

There were also comments that reflected on the purpose of the tool and how it could be used. These comments suggest that users were not completely aware of the aims of the tool and were using traditional notions of assessment practices to understand what the tool was providing:

- "The tool doesn't provide me with suggestions. I think it is more reflection to self thoughts and current educational / training needs."
- "My concern was the output report is really not clear for me. I mean, when you get the results you will have list of points that you selected such as; level 1, 2 or whatever. But how can the reader of the report know that this person is doing well or not in this particular area? Is it related to the colour? I thought I will have a total score for my skills?"

The following comments show the difficulty two participants had in selecting accurate responses for the skill areas:

- "The language could be clearer. Try not to include 'positive' and 'negative' notions in the same sentence. For example, "I'm good at this, but I'm not so good at something else." This makes choosing the limited options available very difficult." This comment appeared to be prompted by difficulty choosing a response when one part of the descriptor was accurate but the other part was not. This is a particular difficulty with the approach of using skill descriptors rather than clear and concise statements that describe competencies. Some thought should be given to whether this could be revised to make the descriptors even clearer.

- One participant also noted that blank spaces should be provided to allow open ended answers as needed. This comment appeared to be a response to the problems this person had with choosing the appropriate statement to reflect their skill level. However it is clear that this would require a completely different tool and would require great sophistication in scoring it.

Although it might be inappropriate to implement the suggestions made by these two participants, it is important to consider how their difficulties could be addressed in other ways. For example,

the documentation that orients users to the tool could more be more explicit about the philosophy, format and intended outcomes of the tool.

Conclusions

In conclusion, the tool was well accepted by users in terms of how easy it was to use. The interface was easy to use and learning to use it was easy. The output was reported to be clear and useful for future planning. However, users had fairly low overall satisfaction with the tool. Analysis of responses to open ended question suggested that users were not clear about the purpose of the tool and that they might be unfamiliar with the concept of a training needs analysis tool. Some participants might be more comfortable with a standard test that assessed skill levels and yielded an overall score.

In conducting this evaluation, it was difficult to engage potential participants' interest in this tool and consequently we had only a small group of people who attended the session. The current level of interest in training needs analysis in the academic community is not high. Therefore, careful consideration would need to be given to who the potential users of the tool are and how they can be facilitated to use it. Making the software more easily accessible is very important, but consideration could be given to incorporating formal training needs analysis into review processes for PhD students and post doctoral researchers.

Chapter 6: Feedback on the PDTNA-PD tool from local employers

All of the three pharmaceutical companies approached declined to participate. Two showed a non-response and the other suggested that they did not employ doctorates and also that staff workloads were such that comment would prove difficult. None of the employers within the three schools/divisions responded and only one offered apologies. Of the two NHS Trusts, only one provided any feedback. This was general and did not adhere to the prepared evaluation form. Comments made suggested that a type of training needs analysis may well be useful but that the Trust was unlikely to use the outputs from the PDTNA-PD at present.

Chapter 7: Summary of key findings

Our study showed that the nature of the discipline shapes what skills the PhD emerges with from their research training. To an equal extent the stage in their career at which they undertake a PhD is also shaped by the discipline. Therefore, how a discipline structures post doctoral career planning and development may be shaped separately by each discipline but we argue that there may also be some more general factors which the university needs to take account of in a generic sense in developing post doctoral career planning.

- The career possibilities the PhD offers for post doctorates need to be made explicit and greater links made between future employers and the university. In particular, the university needs to track its doctoral candidates' employment and ask employers what skills they need if they are to employ post doctoral candidates
- The post doctoral career planning structures which are flexible and creative need to be operationalised across the university so that post doctoral career planning becomes a reality. At present the training and structures exist but they are not evident in everyday mentoring and supervision.
- PhD supervision was seen as key to how a post doctoral career might be planned across the disciplines involved in this project. Therefore, the university needs to invest in supervisor training which is inclusive of post doctoral career planning.

There are clearly structures within the University which could facilitate a structured approach to the planning of post doctoral careers, e.g. Dr Baxter's programme for career skills as well as other activities across the Library and Human Resources. However, from our data and the process of completing this project, it is clear that interest in post doctoral careers among supervisors is low and needs to be given more priority in supervisor training.

Limitations:

A limitation of this project has been the lack of participation of PhD students and staff across the three schools. Participation in the pilot phase of the project, stage 2, when we emailed PhD students to pilot the adapted tools achieved slightly better participation rates than other phases of the research. This might be because each student was motivated to participate in order to receive a printed output with their personal training needs analysis. The overall lack of engagement in the university community might also have been a result of the internal restructuring which occurred at the same time as this project. It is also likely to reflect the lack of research activity and interest in the area of post doctoral careers.

An additional limitation has been the lack of participation from employers. As explained, this was partly due to the absence of tracking data within the university systems. It might also reflect the finding in the literature that there is a gap between employer expectation of employee skills and training/education and what the university offers at D level education. It may also be that the university needs to 'market' its PhDs and PhD skills in a wider employment market; in a sense, knowing what a PhD offers in terms of being a PhD rather than having a PhD needs to explained to employers.

Another limitation for the smooth running of the project was the format and development of the PDTNA tool which at the time this project started was available in an excel file format that was available to download from the university website. Subsequently it was changed to an Access database and associated software that needed to be obtained on cd, downloaded and installed on the user's computer. This meant that changes to the tool and learning how to operate the tool as well as generating outputs from the tool were difficult for the research team. A lot of time was spent by the research team with Dr John Baxter translating the findings into what was a complex IT development. In addition, once the difficult work of adapting the PDTNA-PD tool was completed, although students could identify and obtain a print out of their training needs, mapping a training provision to meet their needs was not possible at the time of the evaluation.

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Appendix 1: PDTNA-PD tool

Training Needs Assessment Tool For Post-Doctoral Professionals – Practitioner Pathway

A - RESEARCH SKILLS

A1.Demonstrating ability to research a clinical problem in collaboration with other practitioners

When researching clinical problems, I prefer to work on my own.

When researching clinical problems, I prefer to engage with others from my profession within my clinical environment.

When researching clinical problems, I prefer to engage with a range of practitioners in the field.

When researching clinical problems, I prefer to engage with a range of practitioners in the field and academic partners.

A2. Showing original, independent and critical thinking, and the ability to develop theory relevant for practice in collaboration with local/ national/international partners

I largely follow the directions and respond to suggestions of others (e.g. my research group/line manager). I tend to wrestle with the underlying theory.

I occasionally make good suggestions and understand the underpinning theory reasonably well.

I often contribute quite useful suggestions in my research and I am completely happy with underlying theory; I can sometimes see where the theory might be incomplete or incorrect.

My research is mostly or totally driven by my own suggestions. I frequently have insights that take the research forward. I have made notable conceptual or theoretical developments in my research.

A3. Showing knowledge of recent advances within one's field and related areas

I am slowly getting to grips with the most important, mostly older published material directly relevant to my research project.

I have a good general grasp of the mostly older, published material, both in my direct research field and in closely-related areas.

I know about the published material in detail and keep some track of recent advances, both in my research field and in the discipline more widely.

I am completely familiar with recent advances. I regularly consult the latest published and unpublished material.

A4. Showing understanding of relevant research methodologies and their application within research field

I follow a particular approach in my research and have never really thought about possible alternatives.

I realise that there are possible alternative approaches but have never really looked at them in great detail.

I am clear on the possible alternative approaches but I am not entirely sure why my particular approach works best for my research and find it difficult to communicate the relevance of particular approaches to colleagues in practice.

I completely understand the possible alternatives and have a clear, well-reasoned rationale in my own mind for my choice of approach and can communicate this with colleagues in practice.

A5. Showing ability to critically analyse and evaluate one's findings and those of others

Critical input on my work comes from my mentor and my line manager. I understand the key points of what others have done.

I try to look at my own work with a critical eye. I am very familiar with the work of others but have little time to evaluate their work.
I evaluate my own work from time to time and often revise / refine my research as a result. I consider the work of others in light of my own knowledge and findings.
My own work is subject to critical analysis and I take care to evaluate others' work.
A6. Shows ability to publish and an understanding of publishing strategy
I have not yet published in a peer reviewed journal and have no publishing strategy in place.
I have not published however have agreed a publishing strategy with colleagues for dissemination of my PhD work.
I have published in the occasional peer reviewed journals. I have a publishing strategy in place for dissemination of my work.
I have published in many peer reviewed journals and continually update my publishing strategy.
A7. Has a broad understanding of national / international context in which research takes place.
I am largely unaware of what goes on outside my research group, apart from what I gain from reading published material.
I have some idea of the developments in other areas of the health service that are closely related to my own research field.
I know how my research fits in with other academic research developments, nationally.
I am strongly aware of how my research fits in with other ongoing developments in the area nationally and internationally. ,
A8. Justify the principles and research techniques used in one's own research
I see no need to justify the principles and techniques of my research - I consider them to be self-evident.
I realise there are possible alternatives to the principles and techniques I use, but have not really considered if (and why) mine is most appropriate.
I can justify principles and techniques in my research work through examples of having tried alternatives and finding that they do not work as well as my current approach.
I can demonstrate a critical analysis of my own approach, principles and techniques, and show that they are more appropriate than possible alternatives, and why this is the case.
B – PROJECT/RESEARCH MANAGEMENT
B1. Awareness of issues relating to NHS research governance and the requirements of the Data Protection Act
I have never considered such issues. I do not believe they are relevant to me.
I am vaguely aware that these issues are important but have never really done anything specific to address these issues in my research work.
I am aware of these concepts and have taken some personal steps in my research to ensure they are handled, but have never seen fit to seek advice elsewhere on this.
I have an excellent understanding of concepts in this area and I feel comfortable approaching colleagues to discuss these issues.
B2. Appreciation of standards of good research practice in your institution and/or discipline

I have never really thought about this. I do not understand the concepts of 'good research practice'.
I am aware of the concepts of 'good practice' and have occasionally flicked through departmental, institutional or NHS guidance outlining the relevant standards.
I have discussed issues of 'good research practice' with my supervisor and am familiar with institutional and disciplinary standards.
I am fully aware of 'good research practice' and institutional and disciplinary standards for research. I actively ensure my research is compliant with them.
B3. Understand relevant health and safety issues and demonstrate responsible working practices
I attended the relevant health and safety course and have not thought about it since.
I am reasonably familiar with the concepts but have not considered them in much detail as my research work has progressed.
I would know how to modify plans or approaches to research when it became clear that health and safety / good working practice issues were evident.
I know how to anticipate health and safety / good working practice issues in planning my work.
B4. Understand the process of knowledge transfer between academia and the wider world.
I am not interested in these concepts and am unsure about their relevance to my practice.
I can see how my results could be useful to others in practice but have concentrated solely on obtaining results rather than trying to exploit them.
I have begun to consider how my research could result in actions that could benefit practice. I am keen to apply the results of research to practice but am unsure how to do so.
I have experience of making the results of my research of benefit to practice and I am able to apply other people's research findings to my practice.
B5. Apply effective project management through the setting of research goals, intermediate milestones and prioritisation of activities
The only time I ever think about goals and priorities is in six-monthly or annual meetings with my supervisor. The forms get filled in and then forgotten.
I realise that it is important to set goals and prioritise tasks but I find this difficult since I do not really know how to do it.
I know how to revise plans, re-set goals and look at priorities, but will only do so if and when things are clearly going wrong.
I use a range of tools to set priorities and review milestones. I schedule tasks carefully and frequently review / revise my plans as necessary.
B6 - Manage own workload effectively and be responsible for supervising another's workload
I have difficulty managing my own workload and am not responsible for another's workload.
I manage my own workload effectively, but am not responsible for another's workload.
I manage my own workload effectively but have a little difficulty managing another's workload.
I manage my workload effectively and have no difficulty in managing another's workload.

C – FUNDING
C1 – Identifying sources of potential funding
I have not considered which source is most likely to fund future post doctoral work and I have given no thought to independent applications
I expect funding will be from research council applications as I know of no other funding source.
I have consulted others (e.g. my supervisor) to identify local/national funding opportunities.
I have an established strategy of identifying future potential collaborators and funders for different types of research projects
C2 – Shows ability to write clear, coherent and concise funding proposals
I have not written a research proposal since my PhD application and am unclear how to start.
I have assisted in writing research proposals and know the general format but have not written a 1st draft.
I have written a research proposal for a small grant application and have received critical feedback so I know where I could improve.
I have written a research proposal for both small and large grant applications and have received critical feedback so I know where I could improve.
C3 – Understands costing research proposals
I have no idea how to cost research proposals.
I understand how to cost a research proposal but I have not undertaken such a task.
I have successfully costed a small grant application but do not know how to approach a large grant application.
I have successfully costed both small and large research proposals.
D - PERSONAL EFFECTIVENESS
D1. Demonstrates flexibility and open-mindedness
I know what needs to be done in my research and my primary aim is to just get on and do it without intervention from others.
I can appreciate alternate views on my research but these do not affect my approach at all.
I have a well-reasoned perspective on my research. It is unlikely that alternate views will influence my work.
I am fully prepared to challenge my own pre-conceptions in research when evaluating my work and welcome comments from others.
D2 Shows ability to receive and respond to criticism and critical feedback
I find critical feedback very difficult as I believe my work is of a very high standard.
I have one or two colleagues with whom I share critical feedback but I very rarely alter my work accordingly.
I have a range of colleagues with whom I share critical feedback and will alter my work sometimes.

I have a range of colleagues with whom I share critical feedback and find this procedure useful to develop my thinking and writing.
D3. Recognise boundaries and draw upon/use sources of support as appropriate
I tend to work on problems alone in my research as I am unsure where to obtain support.
I have some idea about help and support for problems in my research outside my immediate circle, but have never taken advantage of it.
I am broadly aware of various sources of support and have made occasional use when needed.
I am aware of various sources of support and have called upon them whenever necessary.
D4. Show initiative, work independently and be self-reliant
I rely strongly on others, such as my colleagues in practice, for direction in my research.
I work hard at initiating research ideas with colleagues and practitioners in my field
My ongoing research agenda develops in conjunction with my colleagues in the practice setting as appropriate and I sometimes try to take the lead.
I set, and revise, the agenda for my research work more or less independently; others involved adopt a primarily consultative role.
E - COMMUNICATION SKILLS
E1. Shows development of teaching and supervision skills
I do not feel confident in either teaching or supervising others.
I am confident in teaching but have difficulty formulating objectives for my teaching, designing delivery within a given time and assessment methods.
I am confident in my teaching, formulating teaching objectives, designing delivery within a given time and assessment methods but I do not understand how to introduce differing teaching methods.
I am confident in teaching and supervising using a range of methods.
E2. Construct coherent arguments and articulate ideas clearly to a range of audiences, informally and formally through a variety of techniques.
I find it difficult to engage in discussion and academic argument even in a one-to-one setting.
I am comfortable exchanging ideas and opinions on my research with people I know well but find other environments, such as formal presentations to people I do not know, rather intimidating.
I can usually make a contribution to academic discussions and debates informally and formally even with people I do not know, but I am not exactly comfortable in this situation.
I positively enjoy the processes of academic discussion and debate, and am equally comfortable in contributing to discussions in groups of any size both informally and formally.
E3. Constructively defend research outcomes at seminars and national and international conferences.

I have little or no experience of giving formal seminars and I do not relish the prospect of doing so.
I do not have much experience of formally presenting my work but am reasonably confident in my ability to do so.
I am generally comfortable in giving presentations and seminars but I dislike fielding questions.
I have given several formal presentations and seminars, and am willing and happy to defend my results and engage in discussion with those asking me questions.
E4. Contribute to promoting public understanding of one's research field
I do not believe my research can be understood by the general public in any way whatsoever and so have not promoted my research.
I sometimes think about the practical, 'real-world' implications of my research but have never really thought about how my research outcomes might be communicated in this way.
I understand how my research outcomes might be communicated in such a way as to improve general understanding but have not really considered doing so.
I have published or otherwise disseminated my research results in a format that enables wider general understanding of my research.
E5. Effectively support the learning of others when involved in teaching, mentoring or demonstrating activities
I have no experience in teaching or related activities and no knowledge of how others learn.
I have undertaken some teaching-related activities but have simply concentrated on conducting sessions as asked and have not particularly thought about how others learn.
I am aware that supporting learning is the primary aim of teaching-related activities and would like to find out more on how this can be done most effectively.
I have considerable experience in teaching-related activity and have actively considered questions of how others learn and how they might best be supported. I have gained specific help and support on this to improve my performance.
F - NETWORKING AND TEAMWORKING
F1. Develop and maintain co-operative networks and working relationships with supervisors, colleagues and peers, within the institution and the wider research community
I have few if any professional contacts beyond my immediate supervisory team and others in the immediate vicinity (e.g., members of a research group).
I have made occasional contact from time to time with others outside my immediate research environment, but almost by accident and never with a particular purpose.
I have met a number of useful contacts through conferences, meetings and informal opportunities such as speaker visits to my institution. My 'network' is in place but I do not necessarily take steps to maintain it.
I have built lasting effective working relationships with others within my institution and elsewhere, mostly as a result of my personal efforts.

F2. Understand one's behaviours and impact on others when working in and contributing to the success of formal and informal teams
I see my research as a more or less entirely individual activity and have little or no interest in contributing to a team effort.
I have worked in several teams and I am aware that people can contribute in different ways but I am not aware of my own style of working.
I am aware of my usual style of working in teams and how to best exploit my skills and abilities when working in a team situation.
When working in a team situation, I am able to adapt my style of working to fit the needs of the team.
F3. Listen, give and receive feedback and respond perceptively to others
I do not understand complex information in technical conversations and discussions - however I am reluctant to tell others that I did not understand what they were saying.
I generally understand what is going on in even quite complex technical discussions but find it difficult to respond to others' thoughts.
I am fairly competent in ensuring I have understood the other party although a little reluctant to contribute my own thoughts and perspectives.
I will ask questions and seek clarification whenever necessary for my understanding. I readily contribute my own understanding and feedback as appropriate.
G - CAREER MANAGEMENT
G1.Show commitment to continued professional development [CPD]
I have no real idea what 'continuing professional development' means.
I have a rough idea of CPD concepts but I do not believe them to be very relevant to me right now.
I am comfortable with the idea of CPD in principle and would be happy to do something practical in this area but am not sure how.
I am fully committed to CPD and am taking practical steps both to further my own development and to monitor my own progress.
G2. Take ownership for and manage one's own career progression, set realistic and achievable career goals, and identify and develop ways to improve employability
I do not have any real thoughts on my career goals or progression. I am concentrating on completing my studies first.
I have a rough idea of my career goals but will not really think about this in any detail until I am nearing the end of my studies.

My career goals are clear and I am beginning to think how things I do now will affect my employability and chosen career path.
I am clear on my career goals and I am taking active steps right now to ensure what I do (both research and other activities) is helping to further my career progression.
G3. Demonstrate an insight into the transferable nature of research skills to other work environments and the range of career opportunities within and outside academia
I am only considering a research career in academia and have never considered how my skills in research might eventually be used elsewhere.
I broadly realise that my research degree is equipping me with skills that will be of interest to employers but have not really thought much more about it.
I have a broad idea of possible career paths (inside and/or outside academia) following my research degree, and some knowledge of how skills I am developing now might be applicable.
I can think of specific examples where the skills I am developing in my research might be of interest to various employers; I am keeping tabs on prospective employers as a result.
G4. Present one's skills, personal attributes and experiences through effective CVs, applications and interviews
I have never prepared a CV for a 'professional' job and have little or no experience of interviews.
I have previously produced a basic CV but have never really got any feedback on it. I have no experience of interviews.
I am capable of producing a reasonably good CV, but the prospect of job interviews worries me as I have little experience of them.
I have been through the CV / application / interview process a number of times (for 'real' and/or for practice) and obtained feedback on my performance.
G5. Demonstrate self-awareness and the ability to identify own training needs
I do not think I have any training needs.
I have some idea of my weaknesses but do not really think about how I might correct them.
I am aware of areas in which I am strongest and those where I am less strong. I am aware of the existence of techniques and structures to identify training needs but don't know what they are in detail.
I am fully aware of structures and support in analysing training needs. I look at building on strengths as well as developing weaker areas. I consider priority, urgency and importance.

Training Needs Assessment Tool For Post-Doctoral Professionals – Scientific Pathway

A - RESEARCH SKILLS

A1. Showing original, independent and critical thinking, and the ability to develop theoretical concepts

I largely follow the directions and respond to suggestions of others (e.g. my supervisor). I tend to wrestle with the underlying theory.

I occasionally make good suggestions and understand the underpinning theory reasonably well.

I often contribute quite useful suggestions in my research and I am completely happy with underlying theory; I can sometimes see where the theory might be incomplete or incorrect.

My research is mostly or totally driven by my own suggestions. I frequently have insights that take the research forward. I have made notable conceptual or theoretical developments in my research.

A2. Showing knowledge of recent advances within one's field and related areas

I am slowly getting to grips with the most important, mostly older published material directly relevant to my research project.

I have a good general grasp of the mostly older, published material, both in my direct research field and in closely-related areas.

I know about the published material in detail and keep some track of recent advances, both in my research field and in the discipline more widely.

I am completely familiar with recent advances. I regularly consult the latest published material.

A3. Showing understanding of relevant research methodologies and their application within research field

I follow a particular approach in my research and have never really thought about possible alternatives.

I realise that there are possible alternative approaches but have never really looked at them in fine detail.

I am clear on the possible alternative approaches but I am not entirely sure why my particular approach works best for my research.

I completely understand the possible alternatives and have a clear, well-reasoned rationale in my own mind for my choice of approach.

A4. Showing ability to critically analyse and evaluate one's findings and those of others

Critical input on my work comes from my supervisor. I understand the key points of what others have done.

I try to look at my own work with a critical eye. I am very familiar with the work of others but tend to take what they have written at face value.
I evaluate my own work from time to time and often revise / refine my research as a result. I consider the work of others in light of my own knowledge and findings.
My own work is subject to critical analysis and I take care to appraise others' work.
A5. Shows ability to publish and an understanding of publishing strategy
I have not yet published in a peer reviewed journal and have no publishing strategy in place.
I have not published however have agreed a publishing strategy with colleagues and my supervisor to broaden the dissemination of my PhD work.
I have published in the occasional peer reviewed journals. I have a publishing strategy in place for dissemination of my work.
I have published in many peer reviewed journals and continually update my publishing strategy.
A6. A broad understanding of national / international context in which research takes place.
I am largely unaware of what goes on outside my research group, apart from what I gain from reading published material.
I have some idea of the developments in other academic departments in my University that are closely related to my own research field.
I know how my research fits in with other academic research developments nationally.
I am strongly aware of how my research fits in with other ongoing developments in the area nationally and internationally.
A7. Justify the principles and research techniques used in one's own research
I see no need to justify the principles and techniques of my research - I consider them to be self-evident.
I realise there are possible alternatives to the principles and techniques I use, but have not really considered if (and why) mine is most appropriate.
I can justify principles and techniques in my research work through examples of having tried alternatives and finding that they do not work as well as my current approach.
I can demonstrate a critical analysis of my own approach, principles and techniques, and show that they are more appropriate than possible alternatives, and why this is the case.
A8. Understand the process of academic or commercial exploitation of research results
I am not interested in these concepts and am unsure about their relevance to my research.
I can see how my results could be exploited but have concentrated solely on obtaining results rather than trying to exploit them.
I have advantaged myself through academic exploitation of results (e.g., collaborations, networking) but have never really considered the potential for commercial exploitation.
I have experience both of academic and commercial exploitation connected to my research work.
B –PROJECT/RESEARCH MANAGEMENT
B1. Awareness of issues relating to the rights of other researchers, of research subjects, and of others who may be affected by the research, e.g. confidentiality, ethical issues, attribution, copyright, malpractice, ownership of data and the requirements of the Data Protection Act
I have never considered the issues stated above. I don't believe they are relevant to me.
I am vaguely aware that these issues are important but have never really done anything specific to address these issues in my research work.

I am aware of these concepts and have taken some personal steps in my research to ensure they are handled, but have never seen fit to seek advice elsewhere on this.
I have an excellent understanding of concepts in this area and I feel comfortable approaching colleagues to discuss these issues.
B2. Appreciation of standards of good research practice in your institution and/or discipline
I have never really thought about this. I do not understand the concepts of 'good research practice'.
I am aware of the concepts of 'good research practice' and have occasionally flicked through departmental or institutional handbooks outlining the relevant standards.
I have discussed issues of 'good research practice' with my supervisor and am familiar with institutional and disciplinary standards.
I am fully aware of 'good research practice' and institutional and disciplinary standards for research. I actively ensure my research is compliant with them.
B3. Understand relevant health and safety issues and demonstrate responsible working practices
I attended the relevant health and safety course during my induction and have not thought about it since.
I am reasonably familiar with the concepts but have not considered them in much detail as my research work has progressed.
I would know how to modify plans or approaches to research when it became clear that health and safety / good working practice issues were evident.
I know how to anticipate health and safety / good working practice issues in planning my work.
B4. Apply effective project management through the setting of research goals, intermediate milestones and prioritisation of activities
The only time I ever think about goals and priorities is in six-monthly or annual meetings with my supervisor. The forms get filled in and then forgotten.
I realise that it is important to set goals and prioritise tasks but I find this difficult since I do not really know how to do it.
I know how to revise plans, re-set goals and look at priorities, but will only do if and when things are clearly going wrong.
I use a range of tools to set priorities and review milestones. I schedule tasks carefully and frequently review / revise my plans as necessary.
B5. Manage effectively own workload and be responsible for supervising another's workload
I have difficulty managing my own workload and am not responsible for another's workload
I manage my own workload effectively but am not responsible for another's workload.
I manage my own workload effectively but have a little difficulty managing another's workload.
I manage my workload effectively and have no difficulty in managing another's workload.
C – FUNDING
C1 – identifying sources of potential funding
I have not considered which source is most likely to fund future post doctoral work and have given no thought to independent applications.
I expect funding will be from research council applications as I know of no other funding source.
I have consulted others (e.g. my supervisor) to identify local/national funding opportunities.

I have an established strategy of identifying future potential collaborators and funders for differing types of research projects
C2 – shows ability to write clear, coherent and concise funding proposals
I have not written a research proposal since my PhD application and am unclear how to start.
I have assisted in writing research proposals and know the general format but have not written a 1st draft.
I have written a research proposal for a small grant application and have received critical feedback so I know where I could improve.
I have written a research proposal for both small and large grant applications and received critical feedback so I know where I could improve.
C3 – Understands costing research proposals and internal University costing procedures
I have no idea how to cost research proposals nor have knowledge on internal University procedures.
I have successfully costed a small grant application, but do not know how to approach a large grant application.
I have successfully costed small research proposals and have knowledge of internal University procedures.
I have successfully costed both small and large research proposals and have knowledge of internal University procedures.

D - PERSONAL EFFECTIVENESS
D1. Demonstrates flexibility and open-mindedness
I know what needs to be done in my research and my primary aim is to just get on and do it without intervention from others
I can appreciate alternate views on my research but these do not affect my approach at all.
I have a well-reasoned perspective on my research. It is unlikely that alternate views will influence my work.
I am fully prepared to challenge my own pre-conceptions in research when evaluating my work and welcome comments from others.
D2. Shows ability to receive and respond to criticism and critical feedback
I find critical feedback very difficult as I believe my work is of a very high standard.
I have one or two colleagues with whom I share critical feedback but I very rarely alter my work accordingly.
I have a range of colleagues with whom I share critical feedback and will alter my work sometimes .
I have a range of colleagues with whom I share critical feedback and find this procedure useful to develop my thinking and writing.
D3. Recognise boundaries and draw upon/use sources of support as appropriate
I tend to work on problems alone in my research as I am unsure where to obtain support.
I have some idea about help and support for problems in my research outside my immediate circle, but have never taken advantage of it.
I am broadly aware of various sources of support around the University, and have made occasional use when needed.
I am aware of various sources of support and have called upon them whenever necessary.
D4. Show initiative, work independently and be self-reliant
I work hard at my studies but largely or wholly in response to inputs from others (e.g., my supervisor).
I try and take the lead in pushing my research forward but still rely strongly on others, such as my supervisor, for direction.
My ongoing research agenda develops in conjunction with my supervisor and others as appropriate.
I set, and revise, the agenda for my research work more or less independently; others involved adopt a primarily consultative role.

E - COMMUNICATION SKILLS

E1. Shows development of teaching and supervision skills

I do not feel confident in either teaching or supervising others.

I am confident in teaching a class but have difficulty formulating objectives for my teaching, designing delivery within a given time and assessment methods.

I am confident in my teaching, formulating teaching objectives, designing delivery within a given time and assessment methods but I do not understand how to introduce differing teaching methods. .

I am confident in teaching and supervising using a range of methods**.**

E2. Construct coherent arguments and articulate ideas clearly to a range of audiences, informally and formally through a variety of techniques

I find it difficult to engage in discussion and academic argument, even with my supervisor in a one-to-one setting.

I am comfortable exchanging ideas and opinions on my research with people I know well (for example, my supervisor and peers) but find other environments, such as formal presentations to people I do not know, rather intimidating.

I can usually make a contribution to academic discussions and debates informally and formally even with people I do not know, but I am not exactly comfortable in this situation.

I positively enjoy the processes of academic discussion and debate, and am equally comfortable in contributing to discussions in groups of any size both informally and formally.

E3. Constructively defend research outcomes at seminars, national and international conferences

I have little or no experience of giving formal seminars and I do not relish the prospect of doing so.

I do not have much experience of formally presenting my work but am reasonably confident in my ability to do so.

I am generally comfortable in giving presentations and seminars but I dislike fielding questions.

I have given several formal presentations and seminars, and am willing and happy to defend my results and engage in discussion with those asking me questions.

E4. Contribute to promoting the public understanding of one's research field

I do not believe my research can be understood by the general public in any way whatsoever and so have not promoted my research.

I sometimes think about the practical, 'real-world' implications of my research but have never really thought about how my research outcomes might be communicated in this way.

I understand how my research outcomes might be communicated in such a way as to improve general understanding but have not really considered doing so.
I have published or otherwise disseminated my research results in a format that enables wider general understanding of my research.
E5. Effectively support the learning of others when involved in teaching, mentoring or demonstrating activities
I have no experience in teaching or related activities and no knowledge of how others learn.
I have undertaken some teaching-related activities but have simply concentrated on conducting sessions as asked and have not particularly thought about how others learn.
I am aware that supporting learning is the primary aim of teaching-related activities and would like to find out more on how this can be done most effectively.
I have considerable experience in teaching-related activity and have actively considered questions of how others learn and how they might best be supported. I have gained specific help and support on this to improve my performance.

F - NETWORKING AND TEAMWORKING
F1. Develop and maintain co-operative networks and working relationships with colleagues and peers in both academic and practice settings and with the wider research community
I have few if any professional contacts beyond my immediate supervisory team and others in the immediate vicinity (e.g., members of a research group/practice field).
I have made occasional contact from time to time with others outside my immediate research/practice environment, but almost by accident and never with a particular purpose.
I have met a number of useful contacts through conferences, meetings and informal opportunities such as speaker visits to my institution. My 'network' is in place but I do not necessarily take steps to maintain it.
I have built lasting effective working relationships with others within my institution and elsewhere, mostly as a result of my personal efforts.
F2. Understand one's behaviours and impact on others when working in and contributing to the success of formal and informal teams
I see my research as a more or less entirely individual activity and have little or no interest in contributing to a team effort.
I have worked in several teams and I am aware that people can contribute in different ways but I am not aware of my own style of working.

I am aware of my usual style of working in teams and how to best exploit my skills and abilities when working in a team situation.
When working in a team situation, I am able to adapt my style of working to fit the needs of the team.
F3. Listen, give and receive feedback and respond perceptively to others
I do not understand complex information in technical conversations and discussions - however I am reluctant to tell others that I did not understand what they were saying.
I generally understand what is going on in even quite complex technical discussions but find it difficult to respond to others' thoughts.
I am fairly competent in ensuring I have understood the other party although a little reluctant to contribute my own thoughts and perspectives.
I will ask questions and seek clarification whenever necessary for my understanding. I readily contribute my own understanding and feedback as appropriate.

G - CAREER MANAGEMENT
G1. Appreciate the need for and show commitment to continued professional development [CPD]
I have no real idea what 'continuing professional development' means.
I have a rough idea of CPD concepts but I do not believe them to be very relevant to me right now.
I am comfortable with the idea of CPD in principle and would be happy to do something practical in this area but am not sure how.
I am fully committed to CPD and am taking practical steps both to further my own development and to monitor my own progress.
G2. Take ownership for and manage one's own career progression, set realistic and achievable career goals, and identify and develop ways to improve employability
I do not have any real thoughts on my career goals or progression. I am concentrating on completing my studies first.
I have a rough idea of my career goals but will not really think about this in any detail until I am nearing the end of my studies.
My career goals are clear and I am beginning to think how things I do now will affect my employability and chosen career path.

I am clear on my career goals and I am taking active steps right now to ensure what I do (both research and other activities) is helping to further my career progression.
G3. Demonstrate an insight into the transferable nature of research skills to other work environments and the range of career opportunities within and outside academia
I am only considering a research career in academia and have never considered how my skills in research might eventually be used elsewhere.
I broadly realise that my research degree is equipping me with skills that will be of interest to employers but have not really thought much more about it.
I have a broad idea of possible career paths (inside and/or outside academia) following my research degree, and some knowledge of how skills I am developing now might be applicable.
I can think of specific examples where the skills I am developing in my research might be of interest to various employers; I am keeping tabs on prospective employers as a result.
G4. Present one's skills, personal attributes and experiences through effective CVs, applications and interviews
I have never prepared a CV for a 'professional' job and have little or no experience of interviews.
I have previously produced a basic CV but have never really got any feedback on it. I have no experience of interviews.
I am capable of producing a reasonably good CV, but the prospect of job interviews worries me as I have little experience of them.
I have been through the CV / application / interview process a number of times (for 'real' and/or for practice) and obtained feedback on my performance.
G5. Demonstrate self-awareness and the ability to identify own training needs
I do not think I have any training needs.
I have some idea of my weaknesses but do not really think about how I might correct them.
I am aware of areas in which I am strongest and those where I am less strong. I am aware of the existence of techniques and structures to identify training needs but don't know what they are in detail.
I am fully aware of structures and support in analysing training needs. I look at building on strengths as well as developing weaker areas. I consider priority, urgency and importance.

Postgraduate Skills Development Programme

Output Action Planning Tool for Researchers

Name :
Faculty :
Date :

This document was generated automatically using the Action Planer tool.

Output Action Plan, Part 1: Skills self-audit summary

This table shows a summary of your skills self-audit based on the competency areas within the Action Planning tool. Your current level of proficiency in each area is shown on a four-point scale.

Code	Skill Area	Proficiency
A1	Ability to research a clinical problem	Level 2
A2	Original / independent / critical thinking	Level 4
A3	Knowledge of recent advances	Level 2
A4	Understanding of methodology	Level 3
A5	Critical analysis and evaluation	Level 4
A6	Ability to publish	Level 1
A7	Understanding of research context	Level 3
A8	Justify principles / techniques	Level 4
A9	Understanding of knowledge transfer	Level 3
B1	Awareness of research governance	Level 3
B2	Appreciation of good research practice	Level 4
B3	Understand health / safety issues	Level 2
B4	Apply effective project management	Level 3
B5	Manage workloads effectively	Level 2
C1	Identify potential funding sources	Level 3
C2	Write clear research proposals	Level 1
C3	Understand costing of research	Level 2
D1	Flexibility and open-mindedness	Level 3
D2	Ability to receive feedback	Level 3
D3	Recognise boundaries, use support	Level 2
D4	Initiative / independence / self-reliance	Level 4
E1	Teaching and supervision skills	Level 1
E2	Construct arguments, articulate ideas	Level 2
E3	Defend research outcomes	Level 4
E4	Promote public understanding	Level 1
E5	Support learning of others	Level 2
F1	Develop co-operative networks	Level 1
F2	Understand impact on teams	Level 1
F3	Listen effectively, give feedback	Level 4
G1	Commitment to CPD	Level 4
G2	Ownership for career progression	Level 1
G3	Insight into transferable skills	Level 4
G4	Present skills effectively in applications	Level 4
G5	Self-awareness, identify training needs	Level 3

Output Action Plan, Part 2: Overall prioritisation

The action planning tool has computed an overall development priority for each skill area in the self-audit, based on the self-audit and priority data you have supplied. This is indicated here and each skill area is hence designated as a high, moderate or low overall priority.

Code	Skill Area	Factor	Priority
A3	Knowledge of recent advances	15.00	High
A4	Understanding of methodology	15.00	High
D2	Ability to receive feedback	15.00	High
G1	Commitment to CPD	15.00	High
G4	Present skills effectively in applications	15.00	High
G3	Insight into transferable skills	12.00	High
E3	Defend research outcomes	12.00	High
E4	Promote public understanding	12.00	High
F2	Understand impact on teams	12.00	High
B4	Apply effective project management	12.00	High
A2	Original / independent / critical thinking	10.00	Moderate
A9	Understanding of knowledge transfer	10.00	Moderate
C2	Write clear research proposals	10.00	Moderate
E2	Construct arguments, articulate ideas	10.00	Moderate
F1	Develop co-operative networks	10.00	Moderate
G2	Ownership for career progression	10.00	Moderate
G5	Self-awareness, identify training needs	10.00	Moderate
A5	Critical analysis and evaluation	8.00	Low
A7	Understanding of research context	8.00	Low
A8	Justify principles / techniques	8.00	Low
B1	Awareness of research governance	8.00	Low
B2	Appreciation of good research practice	8.00	Low
B3	Understand health / safety issues	8.00	Low
B5	Manage workloads effectively	8.00	Low
C1	Identify potential funding sources	8.00	Low
E1	Teaching and supervision skills	8.00	Low
E5	Support learning of others	8.00	Low
F3	Listen effectively, give feedback	8.00	Low
A1	Ability to research a clinical problem	5.00	Low
A6	Ability to publish	5.00	Low
C3	Understand costing of research	5.00	Low
D1	Flexibility and open-mindedness	5.00	Low
D3	Recognise boundaries, use support	5.00	Low
D4	Initiative / independence / self-reliance	5.00	Low

Output Action Plan, Part 3:
Detailed information for priority skill areas

Skill Code	A3
Description	A knowledge of recent advances within one's field and in related areas
Overall priority	High
Further information	You obviously need to know a lot about your research field. There are two main ways of going about this. The first is to read widely, remembering that you won't always know in advance where you will find really valuable information. The second way is to attend meetings and conferences, and interact with other researchers in your field. Whilst "research skills" are important here, interpersonal and transferable skills (effective reading, interacting with others) also strongly shape your development.
Resources	
Skill Code	A4
Description	An understanding of relevant research methodologies and techniques and their appropriate application within one's research field
Overall priority	High
Further information	To be truly competent in this area you need to operate at three quite different levels. First you need to understand the basic principles of the research methods you will use. Then, you need to consider how these methods might be applied. Equipped with this knowledge, you then create something essentially new – a strategy for applying particular research methods within your specific context. Research methods training will help for the first two levels, but development at the third level will depend strongly on practical experience.
Resources	
Skill Code	B4
Description	Apply effective project management through the setting of research goals, intermediate milestones and prioritisation of activities
Overall priority	High
Further information	One key to research success is good management of resources – the principal resource being your own time, effort and energy. The sort of activity that leads to effective project management is planning, prioritising, goal setting, and review. There are tools and techniques one can "learn" to improve one's project management, but it is also very much an issue of attitude and mindset. Both on-the-job experience and formal training will have a big part to play in developing your competence in this area. In considering and reflecting on this you should not lose sight of the "attitude and mindset" aspects. It is inevitably easier to concentrate on tools and techniques but effective project management depends very much on both.

Resources	
Skill Code	D2
Description	Shows ability to receive and respond to criticism and critical feedback
Overall priority	High
Further information	Receiving and responding to feedback even if it is not what you wish to hear is important. To be open to comments from others allows you to develop a critical mind and also facilitates your learning.
Resources	
Skill Code	E3
Description	Constructively defend research outcomes at seminars and national and international conferences
Overall priority	High
Further information	Presenting to a range of audiences is an absolutely routine activity for a researcher; it is certain you will engage with this. Some technical aspects of presentation can be addressed through formal training, but there is no substitute for practical experience. Many students are instinctively very nervous of presentation and shy away from opportunities to present. Try not to be one of these.
Resources	
Skill Code	E4
Description	Contribute to promoting the public understanding of one's research field
Overall priority	High
Further information	No matter how “abstract” and “academic” your research might seem, it will (or should) make some impact on the world and should, to some degree, be understandable to a wider audience. Admittedly this is more straightforward for some research topics than for others. It is worth thinking creatively about how your work might be presented or published in arenas other than the “obvious” academic journals or conferences you would routinely frequent. “Festivals of research” of one form or another are reasonably commonplace; these might present good opportunities. You will need to think about how to present your work and results in general language that any reasonably educated person should be able to understand. This in turn might help your own work – simple explanations are almost invariably more useful than more complicated ones.
Resources	
Skill Code	F2
Description	Understand one's behaviours and impact on others when working in and contributing to the success of formal and informal teams

Overall priority	High
Further information	This skill area relates to your self-awareness; here it is about awareness of your impact and effect on other people with whom you work. No matter how it may seem, research is ALWAYS a team effort. Training and resources on interpersonal skills can assist you in raising your self-awareness and giving you strategies to exploit this.
Resources	
Skill Code	G1
Description	Show commitment to continued professional development
Overall priority	High
Further information	The key word in CPD is “professional”. You should be regarding your research as your professional activity. CPD relates to the ongoing maintenance and improvement of your knowledge and skills, with a view to continually improving your performance. An essential component of this concept is that responsibility for it is almost entirely your own. CPD may include, but is not restricted to, formal training. Indeed, many skills can and are developed “on-the-job” within research; reflecting on how this occurs is a key part of CPD.
Resources	
Skill Code	G3
Description	Demonstrate an insight into the transferable nature of research skills to other work environments and the range of career opportunities within and outside academia
Overall priority	High
Further information	Many researchers have clear career aspirations in academia. For the most part, research is an essential gateway for an ongoing academic career. You may also like to consider a range of career options. Consider your development not just in terms of research success but also the range of skills and abilities the experience equips you with.
Resources	
Skill Code	G4
Description	Present one's skills, personal attributes and experiences through effective CVs, applications and interviews
Overall priority	High
Further information	Particularly outside the academic sector, prospective employers may have only the vaguest notion of what a research entails and the experience it gives. Relatively few employers automatically place a premium on research. It will be your job to convince them that the time you spent as a researcher was time well invested. You may never have applied for a job outside academia before – it is important you become familiar with the process and the procedures for developing your CV and undertaking applications. A range of training, help and support is available on this.

Resources	

Appendix 2: Employers: survey and feedback on training needs analysis tool

The title of the project

Welcome

Please use this form to tell us about your experience of employing staff with doctoral qualifications. Please be assured that ***all*** the information you give us will be kept confidential and anonymised and so your or your organisation's name will ***not*** be used in any reports. Please read the information sheet that is attached to this email before you answer the online questions. The questionnaire will take approximately 20 minutes to complete. Thank you for your participation.

Please submit the completed questionnaire ***by XXXXX***. If you have any questions please contact ***XXXXXXXXX***, University of Surrey
Telephone: 01483 68***XXXXX***
Email: ***XXXXXXX***

Part1: Organisational details

1. The economic sector in which my organisation is located in:
    - The private sector
    - The public sector
    - Charity/voluntary sector
    - Other – *please specify*

2. The focus of the work undertaken in my organisation is:
    - Research orientated
    - Charity
    - Engineering
    - Retail
    - Management consultancy
    - Finance
    - Health-related
    - Leisure & tourism
    - Pharmaceutical
    - Other – *please specify*

3. How many doctorates has your organisation employed in the two years to the end of XXXX?

    - Number (headcount: – those working part-time are counted as one)

4. *On average*, the number of doctorates in my organisation is :

    - Number (headcount: – those working part-time are counted as one)

5. *Currently,* the number of doctorates in my organisation is :

    - Number (headcount: – those working part-time are counted as one)

6. If there is a difference between your answer to Questions 4 and 5 above, please explain:

7. On average, what is the length of employment for doctorates in your organisation?

    - Years

8. How many doctorates have left your organisation in the two years to the end of XXXX?

    - Number (headcount: – those working part-time are counted as one)

9. How many doctorates has your organisation employed in the two years to the end of XXXX?

    - Number (headcount: – those working part-time are counted as one)

10. Does your organisation plan to employ a particular ratio of doctorates to all other staff?

    - Yes
    - No

11. If you answered 'Yes,' to Question 10 above, please indicate your organisation's ideal ratio of doctorates to all other staff:

    - % of doctorates to all other staff.

12. My organisation plans to recruit doctorates:
    - Every 2 years
    - Annually
    - Every 6 months
    - More than twice a year
    - No particular plan only when a suitable vacancy occurs naturally

13. My organisation considers employing doctorates as a good investment.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

14. If you answered 'Disagree' or 'Strongly disagree' to Question 13 above, please explain:

15 .My organisation will continue to employ doctorates when ever possible.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

16. If you answered 'Disagree' or 'Strongly disagree' to Question 15 above, please explain:

17. My organisation considers employing doctorates as non-essential to the business plan/focus?
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

Part 2: Employment conditions

18. Currently on average, doctorates entering my organisation earn:
    - £20,000 - £25,000 per annum
    - £25,001 - £30,000 per annum
    - £30,001 - £35,000 per annum
    - £35,001 - £40,000 per annum
    - £40,001 - £45,000 per annum
    - £45,001 - £50,000 per annum
    - £50,001 or more per annum

19. Do doctorates attract a higher wage than other staff because of their academic qualification?
    - Yes
    - No

20. Currently the numbers of doctorates in my organisation on permanent and short term contract are:
    - Numbers of *permanent* doctoral staff (headcount :- those working part-time are counted as one)
    - Numbers of doctoral staff on *short-term contracts* (headcount :- those working part-time are counted as one)

21. My organisation provides staff appraisals to doctorates :
    - Every 2 years
    - Annually
    - Every 6 months
    - More frequently

22. My organisation actively encourages doctorates to undertake further training.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

23. Currently, the number of full time and part time doctorates in my organisation is:
    - Number of full-time doctorates (headcount:- :- those working part-time are counted as one)
    - Number of part-time doctorates (headcount:- :- those working part-time are counted as one)

Part 3: Characteristics of doctorates

24. My organisation employs doctorates for their leadership skills.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

25. My organisation employs doctorates to obtain knowledge transfer from academia.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

26. My organisation employs doctorates for their analytical skills.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

27. My organisation employs doctorates for their literacy/writing skills.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

28. My organisation employs doctorates for their ability to work autonomously.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

29. My organisation employs doctorates for their willingness and ability to learn and acquire knowledge.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

30. My organisation employs doctorates for their creative thinking.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

31. My organisation employs doctorates because it raises the profile of our firm with our clients.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

32. My organisation employs doctorates because they demonstrate flexibility and open-mindedness.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

33. My organisation employs doctorates because they show initiative.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

34. My organisation employs doctorates for their communication skills.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

35. My organisation employs doctorates for their presentational skills.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

36. My organisation employs doctorates for their networking skills.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

37. My organisation employs doctorates for their team-working skills.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

38. My organisation employs doctorates for their time management skills.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

39. My organisation employs doctorates for their project management skills.
    - Strongly disagree
    - Disagree
    - Neither disagree nor agree
    - Agree
    - Strongly agree

THANK YOU FOR YOUR PARTICIPATION.

Appendix 3: Evaluation of training needs analysis tool – employers

Evaluation of training needs analysis tool

1. Do currently employ staff who have recently completed PhDs?

If not, please explain why.

2. Do you think that you will employ staff who have recently completed PhDs in the future?

If not, please explain why.

3. Do you think the skills identified in the training needs analysis tool would be useful in helping you to identify training needs for these staff?

If not, please explain why.

4. To what extent do you think that the skills identified in the Training needs analysis tool are appropriate for your organisation? Please give the reasons for your answer.

5. Which skills would you add or remove? Please give the reasons for your answer.

6. Do you think it is appropriate to have discrete areas within the skills levels? Please give reasons for your answer.