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C2: 'Work wisdom' and the PhD: exploring the benefits of doctoral internships

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- **C5: The mentoring pipeline: institutional perspectives on mentoring as a development tool**
- **D2: BaFL: Business as a Foreign Language: How should we speak to PGRs from the Arts and Humanities in order to encourage engagement with enterprise and entrepreneurship education and training?**

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'Work wisdom' and the PhD: exploring the benefits of doctoral internships

Introduction

The desirable output of the modern UK doctorate is to cultivate well trained researchers with the ability to work in both academic and business arenas and help to both develop knowledge and drive forward the 'knowledge economy' (Universities UK 2014: 4). Thematically within this 'knowledge economy' context, in 2012, the UK Biotechnology and Biological Sciences Research Council (BBSRC) became the first research council to require all of the PhD students to undertake a three-month funded doctoral internship programmes (developed as the professional internships for PhD students PIPS scheme) in an area outside of academic research. The aim of the study reported here was to systematically investigate PhD students' reaction to the PIPS scheme and examine their attitudes, knowledge and skills developed during their internship and whether this activity influenced career plans and aspirations, within this 'knowledge economy' context.

This article draws on research data from 65 postgraduate researchers from the East of Scotland Doctoral Training Partnership programme who carried out a doctoral internship as part of their doctoral training between 2013 and 2016. The research provides confirmation for what may be recognised anecdotally of the tangible behavioural outputs and outcomes from a doctoral internship programme. What is presented is what postgraduate researchers view as the emerging benefits of doctoral internships to Universities, employers and society. This paper contributes to the, as yet limited literature concerning doctoral internships and demonstrates its utility in preparing postgraduate researchers for their multifaceted professional futures.

Background: the origins of internships within doctoral education

Over the past decade reforms to doctoral education have become a worldwide phenomenon. These changes are set against the backdrop of knowledge production becoming a strategic resource in knowledge economies. A new goal has emerged for higher education, to make doctoral education more attractive and more competitive in a globalising world (Kehm, 2007). This increasing importance of researchers to the global economy has led to debate internationally in Europe, the United States, and Australia about the purpose and "fitness" of the doctorate (Gilbert, 2004; Park, 2005; Taylor, 2011; Choy, 2015). New European approaches led to changes in doctoral training from its origins in the apprenticeship model to the current emphasis on incorporating innovative learning practices that offer international networking, interdisciplinary research options, increased exposure to non-academic sectors, and transferrable skills training (SGHRM, 2014; European Research and Innovation Steering Group on Human Resources and Mobility 2014: 5).

In this article the focus is on recent innovations within doctoral education in the UK where the 'Roberts'¹ model of researcher development aimed to ensure that the STEM doctorate adequately prepared postgraduate researchers (PGRs) for their increasingly diverse professional futures (reviewed by Hancock & Walsh, 2016). The Wilson Review drew attention to the fact that "there is a distinct disconnect between the aspirations of research students and the reality of their future career pathways". It noted that PGRs are perceived to lack "work wisdom", commercial awareness, understanding of the market and work experience as well as being seen to be overspecialised with unrealistic expectations of the world of work; this creates barriers to employers looking to recruiting PhD graduates" (Wilson, 2012: 62). A recommendation was made that "Universities should reflect on

¹The recommendations of the [2002] report of Professor Sir Gareth Roberts to UK Government, 'SET for success; the supply of people with science, technology, engineering and mathematical skills' led to increased funding being provided to UK institutions with UK Research Council funded researchers, for their personal and professional development http://webarchive.nationalarchives.gov.uk/http://www.hm-treasury.gov.uk/d/robertsreview_introch1.pdf (Accessed 30th March 2017)

the opportunities that are provided for students to develop employability skills through formal learning methodologies used within the university” (Wilson, 2012: 10). In addition there are growing expectations that UK Universities respond to policy calls highlighting the needs of industry and the wider economy by playing a significant role in engaging with business communities to stimulate innovation (BIS 2010a, b, 2011, 2012; Smith and Beasley, 2011).

Opportunities for work based learning, via internships and work placements, have been part of the undergraduate arena for many years in most disciplines and have recently expanded into some postgraduate level programmes (Curtis et al., 2009; McCall, 2009; Hurst et al., 2010; Paisey C and Paisey, 2010; Pegg et al., 2012; Rupande and Bukaliya, 2013). Generally, an internship consists of an exchange of services for experience, between the student and an organisation (Jones and Warnock, 2014). Numerous studies have illustrated the potential benefits provided by work based learning to multiple stakeholders (AAC&U, 2008; Kuh, 2009; reviewed by the European Training Foundation, 2013: 6). The primary gains for learners, employers, and society at large include personal impact, interpersonal impact, academic impact, employment impact, civic engagement impact, and civic awareness impact (Jackel, 2011; Smith et al., 2015).

For undergraduate learners there is emerging evidence that work placements helped them to develop the appropriate transferrable skills including their interpersonal and employment skills; increased their readiness for the world of work; enhanced their academic performance and provided insights into career areas (CIPD, 2009, 2012; Duignan, 2003; Harvey et al., 1998; Smith, 2010; Spradlin, 2009). Bioscience undergraduates who have completed a work placement are known to enhance their academic performance (Gomez et al., 2004). However, the lack of standardisation and oversight leaves the purpose and gains from internships open to broad interpretation.

The Confederation of British Industry’s ‘Future Fit’ report summarised the benefits to employers, stating that *‘placements can provide industry with a cost-effective labour pool and develop a pipeline of motivated and competent future employees’* (CBI, 2009: 14). Indeed US employers endorse these “high-impact educational practices” recognising the significant benefit to their business² (Gault et al., 2010). However, there is debate over the place of experiential learning in higher education with some arguing that this types of learning experience does not belong in the university (Moore, 2010). The fact that internships and work placements have a high degree of variability across fields in terms of their learning opportunities and outcomes is also relevant to this debate (reviewed by Narayanan et al., 2010; O’ Neill, 2010).

To ensure that the UK publically funded STEM doctorate for Biosciences is “fit for purpose” the Biotechnology and Biological Sciences Research Council (BBSRC) introduced a structured doctoral programme in 2012 (Park, 2007). This set an innovative direction for skills development in doctoral training by requiring all of the PGRs funded by their Doctoral Training Partnership (DTP) programme to undertake mandatory three-month doctoral internships (developed as the Professional Internship for PhD Students or PIPS scheme) in an area outside of academic research (BBSRC PIPS, 2012). This has been developed to support improvements in employability outcomes. Similar opportunities exist for PGRs funded via the German government excellence initiative which is supporting new strategies for PGR training, which include internships (Schiermeier, 2012). The Graduate Student Internships for Career Exploration Programme of the University of California, San Francisco also includes a mandatory three-month internship in an area outside of doctoral research (Mascarelli, 2012).

The BBSRC’s learning objectives for their doctoral internships were:

² (for a full report on employer findings, see:
http://www.aacu.org/sites/default/files/files/LEAP/leap_vision_summary.pdf;

- To ensure internships are student led and not related to their PhD projects to help early career researchers understand the *context* of their research.
- To expose PGRs to the range of career opportunities available to them after graduation.

BBSRCs PIPS Internships can be in any field or sector but internship projects must be unrelated to the PGRs' doctoral research topic and have no academic credit. Since the introduction of the BBSRC PIPS scheme for Bioscientists, other UK funders have introduced optional opportunities to undertake internships in various forms as part of their doctoral education. There are questions as to whether other non-research council funded programmes in the UK and elsewhere, potentially should follow suit.

Relatively little is known about the educational benefits of doctoral internships and some scepticism prevails. Furthermore there are genuine concerns that initiatives such as the new UK BBSRC PIPS scheme may damage the quality of the doctoral experience, and jeopardise PGRs ability to compete in the global labour market (Smith McGloin and Wright, 2013). Therefore it is imperative that robust academic research exploring the educational gains is generated. However the educational research in this area supports the view that assessing the impacts of innovative pedagogical practices is not straightforward (Higher Education Academy, 2016). Zolas et al., measured the link between employment and earnings outcomes for PhD recipients in the US showing large differences across fields in placement outcomes (2015). The first report collecting feedback on doctoral internships for UK Bioscientists was published recently by Jones and Warnock (2015). Although a very limited pilot study, it documented a subset of the early benefits from three-month doctoral internships. The internship programme studied in this article is the 'East of Scotland Doctoral Training Partnership' in biological sciences (EASTBIO). The research explores the experience of PGRs from the EASTBIO DTP Programme who had completed their internship since the BBSRC doctoral internship programme (PIPS scheme) began in 2012 (78 in total). 65 participants recorded their individual outcomes, outputs, achievements and wider perceived potential benefits from their self-selected doctoral internship. This was deemed desirable to promote a culture of development and reflection on all aspects of academic practice as an accepted component of an emerging career (McCulloch and Loeser, 2016).

Background: The East of Scotland Doctoral Training Partnership (EASTBIO) internship programme

EASTBIO is a BBSRC UK Research Council funded PIPS doctoral internship programme across four geographically dispersed research intensive Scottish Universities. EASTBIO recognised that planning and undertaking a paid, full-time doctoral internship is an unfamiliar PhD learning experience and thus adopted a new model to maximise the learning potential by funding a dedicated PIPS coordinator. Rothman (2007) reported research that showed student satisfaction was correlated with internships that offered challenging work, regular feedback from mentor, clear, objective assignment of task, broad exposure to a number of departments or units, and respect from employee staff and mentors at the business. Therefore, the EASTBIO PIPS coordinator prepares PGRs undertaking internships between PhD months 12 and 36, by providing face to face training, resources and ongoing guidance to employers and PGRs. Each internship experience is tailored to the motivations of individual PGRs to maximise chances of success.

To promote a culture of delivering high quality fruitful internships, EASTBIO requires its PGRs to obtain approval of their internship. This is only granted if the PGR has demonstrated in their 'PIPS Internship Agreement' that the internship provides a professional environment that is out with the academic research environment, the host organisation provides mentorship and the internship offers opportunities to gain professional skills and experience appropriate to a PhD. In order to be clear

about the level of skills development required at PhD level it is stipulated that during internships PGRs must have opportunities to gain professional skills and experience such as being customer focused, influencing others, leading, developing and managing people, managing finances and resources, planning and organising, problem-solving and decision making, pursuing professional excellence in a particular non-academic environment, thinking and acting strategically, and gaining commercial awareness. The intention is that this leads to realistic expectations for both PGRs and employers and higher levels of satisfaction.

Internship Evaluation Methodology

A mixed methods approach was selected for this study to account for the diversity of environments that nurtured PGRs' development during individually tailored doctoral internships. *The Rugby Team Impact Framework* (RTIF) ³ was applied to evaluate PGRs perceptions of the impact of doctoral internships. This provides a structured, coherent way of evaluating the impact of any educational intervention (Bromley, 2013). The methodology makes a connection between activity and 'behaviour, action or change' which occur as a result of a training activity (Bromley and Metcalfe, 2012). It also distinguishes evaluation, which indicates reaction to a training activity, from impact, which refers to learning or changes in behaviour. The levels of impact which can result from a training activity are shown in Table 1.

RTIF Level 1	Reaction of participants
RTIF Level 2	Extent to which participants change their attitudes, improve knowledge, and /or increase skill
RTIF Level 3	Behaviour change
RTIF Level 4	Final results of the training activity

Table 1 *The Rugby Team Impact Framework* (RTIF) Levels of impact which can result from a training activity. [After Kirkpatrick and Kirkpatrick 2006]

The survey

Both qualitative and quantitative data were collected by emailing a link to an online EASTBIO post internship evaluation survey tool (Appendix 1). Given that the internship had cohorts with different start dates, respondent views were therefore gathered between one and 22 months following internship completion. The 83% response rate was relatively high permitting a 95% confidence level that the data represents the entire relevant EASTBIO student population and the figures reported are accurate to a confidence interval of plus-or-minus 5%. Each of the 16 questions asked aligned with assessing the 4 levels of 'impact'. The first part of the survey gathered practical details about the internship: what organisations, sector details and the main responsibilities (Q1, Q2). To analyse Impact Level 1 – Reaction, we used data from the survey. A Likert scale was used to measure PGRs reactions to the PIPS scheme in their doctoral training (Q3). For the less tangible learning outcomes PGRs were encouraged to engage in critical self-reflection by asking them to describe the less tangible learning and personal development outcomes / outputs from their PIPS. For instance PGRs were probed to share their views about what they particularly enjoyed, found surprising or challenging or deemed negative (Q4, Q5). To assess Impact Level 2 questions were asked to ascertain the extent to which the

³The *Rugby Team Impact Framework* was a methodology used by the UK researcher development sector. The methodology combines themes from Kirkpatrick, critiques of Kirkpatrick such as Kearns and the realist evaluation principles Pawson and Tilley

PIPS learning experience changed participants' attitudes, improved knowledge and experience and /or increased skill (Q6, Q7, Q8).

Gathering data which supports evidence that Impact Level 3 – Behaviour changes and Impact Level 4 – Outcomes is being achieved is more difficult. The less tangible impact on the specific aspects of individual behaviour of participants was studied by inviting PGRs to rate the benefits such as changes in career aspirations, how the doctoral internship programme would inform their future employment decisions, and whether they had applied any of their internship learning on their subsequent return to their PhD research studies (Q10, Q12). By enquiring about individual achievements, information was captured as to the importance of development activity that could be shared with future employers (Q9, Q11). The questionnaire also gathered views on the perceived benefits for employers from doctoral internship activities and how their participation in the PIPS scheme benefitted or impacted on their department or University (Q13, Q14). PGRs also described in one sentence if they expected there to be any wider, longer term benefits, such as socio-political or technical benefits, from undertaking a doctoral internship (Q15). The final open ended question allowed for other free flowing data to be obtained which could provide important feedback for the PIPS scheme (Q16).

Findings

Firstly acknowledging the limitations of surveys of this nature, whilst the respondent group (65) is an acceptable sample size for statistical analysis in respect of 78 potential participants, the relatively small number of respondents obviously limits the wider applicability of the results in respect of internships in general, and any conclusions drawn must therefore be provisional. Nevertheless, the sample size permits an analysis at the level of different individual perceptions to be undertaken, thus beneficially capturing the complex and multifaceted views of PGRs. This was in keeping with the notion of “responsible metrics” proposed by the recent UK Wilsdon review which recognised that quantitative evaluation should support – but not supplant – qualitative assessment (Wilsdon, 2015: 7). It is also important to note that the study is based on reported behaviour rather than observed or directly measurable change. Despite this, it is argued that the data obtained represent the best reported data to date in aiding insight and understanding of internships for postgraduate researchers.

Value of doctoral internships: the PGRs' perspective:

In the EASTBIO PIPS scheme, 67% of PGRs engaged with employers locally, while 22.5% sourced their internships elsewhere in the UK and 10.5% internationally (Australia, Austria, Canada, India, Malawi, Netherlands, Spain) (Appendix 1 Q1). There is preliminary evidence that doctoral internships increased promotion of movement across sectors. In exchange for their labour, PGRs had an authentic experience of situations in the workplace of their choice where the emphasis on real world problems was paramount. Figure 1 represents the range of sectors chosen by PGRs (65 in total) for their internship and shows the wide-ranging and varied work experience undertaken within the charity, public and private sectors, in different organisations and locations (Appendix 1 Q1). This diversity of sectors along with the motivations expressed by PGRs in their PIPS approval paperwork allow the conclusion to be drawn that decisions about where to pursue their doctoral internship were driven by the PGRs' own clear purposes in terms of current learning needs and future career plans.

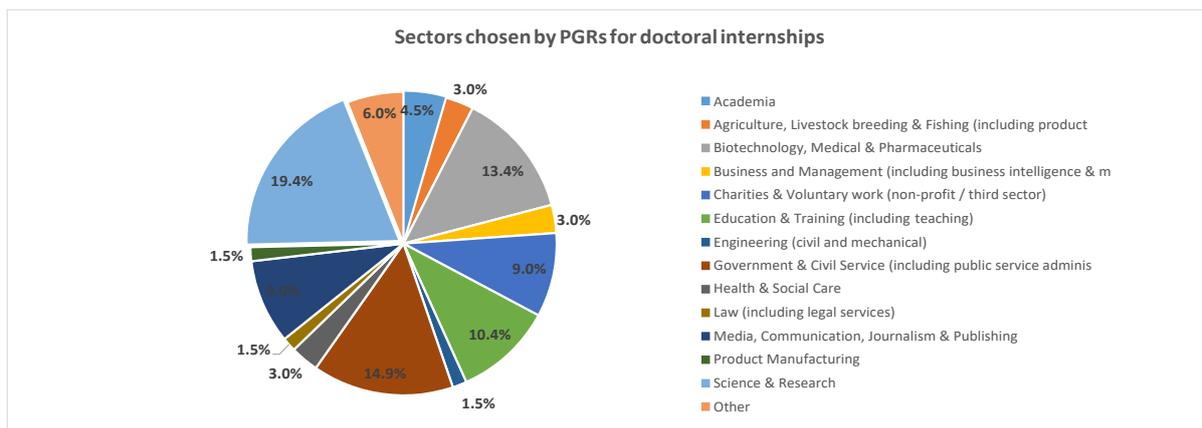


Figure 1 Pie chart representing the sectors chosen by PGRs for their PIPS. RTIF Level 1 data gathered by asking PGRs the question “In what sector did you do your PIPS placement?”

Evaluating PGRs’ reaction to doctoral internships:

Figure 2 shows *The Rugby Team Impact Framework* (RTIF) Level 1 evaluation of the reaction of PGRs to their internship experience. This was gathered by asking them to rate their overall experience of undertaking internships as part of their doctoral training (Appendix 1 Q3). ‘Very positive’ experiences were reported by 60% of PGRs, with another 36.9% asserting that they had a ‘somewhat positive’ experience. The freedom of choice enjoyed by PGRs is reflected in this positive response. One PGR commented that “I cannot recommend the PIPS program enough, having the opportunity has had a significant impact on me as a PhD student, a researcher and a person”.

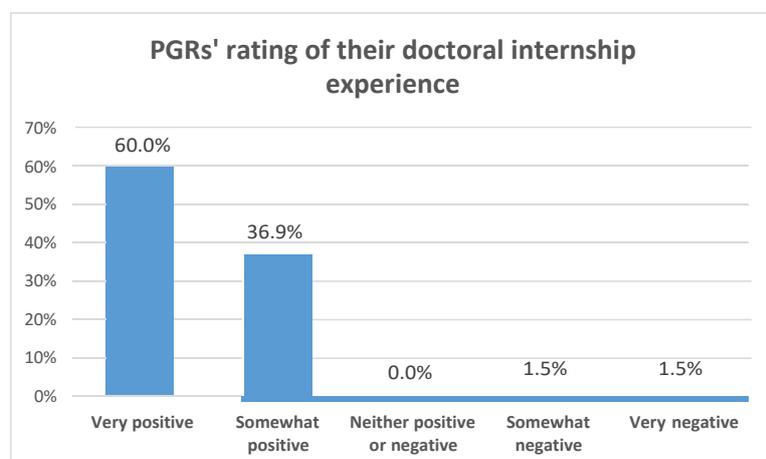


Figure 2 Satisfaction results. PGRs’ rating of their overall experience of participation in the PIPS scheme. Evidence of RTIF Level 1 was gathered by asking PGRs the question “Overall how would you rate your PIPS placement experience?”

While the majority of PGRs enjoyed working in a completely different professional environment out with academia, two PGRs (3%) described negative internship experiences. The reasons cited by one was the perception that “the workplace was not very well managed and the workload I was expected to do was, at times, not challenging enough” (PIPS in a charity setting) and the other explained “I was only working for the last three weeks on what was actually advertised. My work had not much to do with the normal working day of an editor and they failed several times to include me more into the editorial process” (PIPS in a publishing setting). It is worth noting that in both cases the PGR had

chosen a pre negotiated doctoral internship sourced by the PIPS coordinator and perhaps PGR's expectations differed from what the PIPS offered. However analysis of the quantitative data for these individuals is an example of perceived negative experience being accompanied by evidence of measurable gains in skills and there were tangible outputs reported to 'sell' to future employers from PIPS activities. Both agreed with the statements "I am more confident conducting my PhD research" and "I am better able to explore the job market".

PGRs were asked what they particularly enjoyed, found surprising or challenging about their doctoral internship (Appendix 1 Q5). Some talked about "the time it takes out of research" and missing "seminars". One PGR stated they shared their learning "through discussions with other students". Future PGRs were advised "a good mentor and support network within the host organisation made my placement a great success and is something I think is vital" and "I would recommend going abroad." "Although the PIPS was disruptive to my PhD project it has made me aware how valuable the skills are which I am developing". Whereas another "was pleasantly surprised at how applicable and useful the skills I have acquired in my PhD were to a less academic position". Others remarked that doctoral internships "are a good way of making scientists more approachable", "are an invaluable way to create connections and communication lines between sectors which can complement each other but often work in parallel for lack of communication" and "should make PhD students more useful to society".

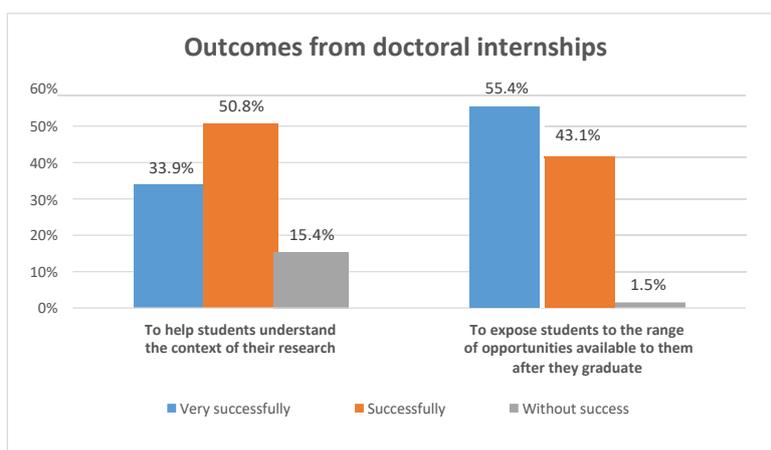


Figure 3 Desired learning outcomes set by the BBSRC are being achieved by the PIPS scheme. RTIF Level 2 Learning outcomes assessed by asking PGRs to "Please indicate to what extent your PIPS placement met the expected learning outcomes for the BBSRC PIPS placement scheme".

Outcomes and opportunities for PGRs

Study findings shown in Figures 3, 4 and Table 2 (Appendix 1 Qs 6, 7 & 8) evaluate Level 2 Learning. Results confirm that the PIPS scheme is meeting the vision set by the BBSRC as nearly 85% of PGRs indicated that the doctoral internship helped them to extend their understanding of the context of their research within the larger economy and society (Figure 3). Internships very successfully helped with this key learning outcome for 33.9% PGRs and also 50.8% agreed it successfully did so. All, but one PGR agreed that the experience better prepared them for their future careers by exposing them to a range of opportunities after they graduated. However there is a need to carry out future research to substantiate the claim that this exposure is serving to demystify non-academic careers and challenge the stigma often linked to leaving university science (Delamont and Atkinson, 2001).

Undertaking this educational evaluation allowed us to capture authentic experiences of a particular sector, role or work culture as evidence that PGRs are indeed taking ownership of the internship learning experience e.g., "confirmation of my teaching abilities". Feedback highlighted personal views such as "It is important for people to gain an understanding of what is involved in different sectors of

society so as to build bridges between different work environments and develop interdisciplinary relationships. I had the chance to get experience in the process by which science is translated into policy. This helped me value the role of science in society and realise the importance and the impact that scientific knowledge makes towards improving people’s lives”. The data, however, revealed that ten PGRs felt their PIPS was not successful in helping them understand the context of their research. The reasons given were: “the placement did not relate to my research at all, but rather put the skills which I gained undertaking my project into context in a broader sense (in terms of employment)”; “not really related to my (PhD) research”; “I don’t think my (PhD) research had any kind of relevance / application within the organisation”; “the PIPS was very successful in helping me to understand the context of my research generally but not of my specific (PhD) research”.

The doctoral internship programme enabled some PGRs to have a very different perspective on science. In one case the internship was undertaken within a clinical trial team. This PGR said “I really enjoyed seeing research being undertaken in a different context. Working in a study with over 60 multidisciplinary research staff across three geographical locations in India. Seeing research scale up this way was not only eye opening but allowed me to see the possibilities for research outside the academic setting”. Another thought “This project helped me understand how academia overlaps with the publishing industry, the relationship between these sectors and how each can benefit from the other”. “Working in an industrial environment was rather different from the academic setting I was used to. This was enjoyable as it was more immediately obvious what practical applications my work had. However, getting used to the extra stringency required for Good Manufacturing Practice was tedious at first”. An internship within the government health service “was very successful in helping me to understand the context of research generally. I enjoyed working closer to the practical application of research”.

Knowledge and intellectual abilities	Significant	Reasonable	No opportunity
Creativity	56.9%	40%	3.1%
Cognitive abilities	55.4%	43.1%	1.5%
Knowledge base	52.3%	44.6%	3.1%
Personal effectiveness			
Professional and career development	50.8%	47.7%	1.5%
Self management	70.8%	24.6%	4.6%
Personal qualities	72.3%	26.2%	1.5%
Research, governance and organisation			
Finance, funding and resources	15.4%	40%	44.6%
Research management	43.1%	40%	16.9%
Professional conduct	52.3%	38.5%	9.2%
Engagement, influence and impact			
Engagement and impact	49.2%	27.7%	23.1%
Communication and dissemination	53.8%	30.8%	15.4%
Working with others	70.8%	27.7%	1.5%

Table 2 Learning gains reported by PGRs directly attributable to their doctoral internship training and development experience. For RTIF Level 2 the question “What skills did you learn on PIPS placement?” was asked to collect data for the four main areas the ‘VITAE’ Researcher Development Framework (1)

Knowledge and intellectual abilities, (2) Personal effectiveness, (3) Research governance and organisation, (4) Engagement, influence and impact (<http://www.vitae.ac.uk/rdf>). This is intended to help early career professionals plan and support their personal, professional and career development. 'Vitae' are a national UK organisation funded by RCUK with extensive activity supporting the personal and professional development of researchers.

PGRs self-evaluated the "learning gains" directly attributable to their doctoral internship experience. The results shown in Table 2 reveal that after completing the internship PGRs identified improvements in a range of skills in four domain areas ⁴ (1) Knowledge and intellectual abilities, (2) Personal effectiveness, (3) Research governance and organisation, (4) Engagement, influence and impact. There was rich opportunity for individuals to advance their 'knowledge and intellectual abilities' in a specialist capacity. For example within this domain PGRs had significant opportunity to increase their 'knowledge base' in 52.3% cases, 55.4% reported significant gains in their cognitive abilities and 56.9% had opportunities to develop their creativity. There were reasonable gains for most others. For example the internship was an ideal chance for one PGR who choose to learn from experts and build discipline specialist technical skills. "I developed my ability to upscale my work from bench top to fully automated screens ... techniques which I would not have had a chance to learn in my PhD project". As expected all PGRs identified enhancement in their 'Personal effectiveness with 72.3% reporting significant gains in 'personal qualities', 70.8% 'self-management' and 50.8% 'professional and career development' directly attributable to their internship experience.

It is worth noting that doctoral internships differed across sectors and generally provided opportunities to develop skills in some but not all areas. For instance, in the domain area of 'Research, governance and organisation' only a small subset of PGRs (15.4%) reported significant skills development in the area of 'Finance, funding and resources' while approximately half improved their 'Professional conduct' (52.3%) and 'Research management' (43.1%) during the internship. Examples cited by PGRs who developed their high level capabilities in a new context include internships where the PGR produced "background research [] crucial for the development of the Research Strategy that will now guide money spent by the charity for research projects for the next five years". Another "found it very useful to plan/organise the wildlife survey; especially the grant application process was beneficial to my career". PGRs can draw on individual examples such as these in future job interviews.

For almost half of doctoral internships produced significant learning in the areas of 'Engagement, influence and impact'. Specifically 70.8% developed their abilities 'Working with others', 53.8% reported gains in 'Communication and dissemination' while 49.2% told us they had occasions to improve their 'Engagement and impact'. Approximately one third of PGRs reported reasonable gains in these skills directly attributable to their internship experience. "My Public engagement internship helped me gain more confidence in getting up and speaking in front of an audience."

Evidence of gains in business and customer awareness directly attributable to their internship experience are shown in Figure 4 (Appendix 1 Q8). Importantly, 87.7% learned about the way the sector operates, its competitors and the broader environment in which it operates. High numbers (76.9%) of PGRs gained an understanding of how the sector or organisation finds / makes money and how they judge how well it is being used. Many (78.5%) advanced their understanding of the strategic issues and why this organisation is successful or not. Half of PGRs had the chance to discuss commercial issues and one third were able to focus on their customer care skills.

⁴These are the four domains of the Vitae Researcher Development Framework (RDF). The RDF, '*...describes the knowledge, behaviour and attributes of successful researchers.*' www.vitae.ac.uk/rdf (Accessed 12/05/17)

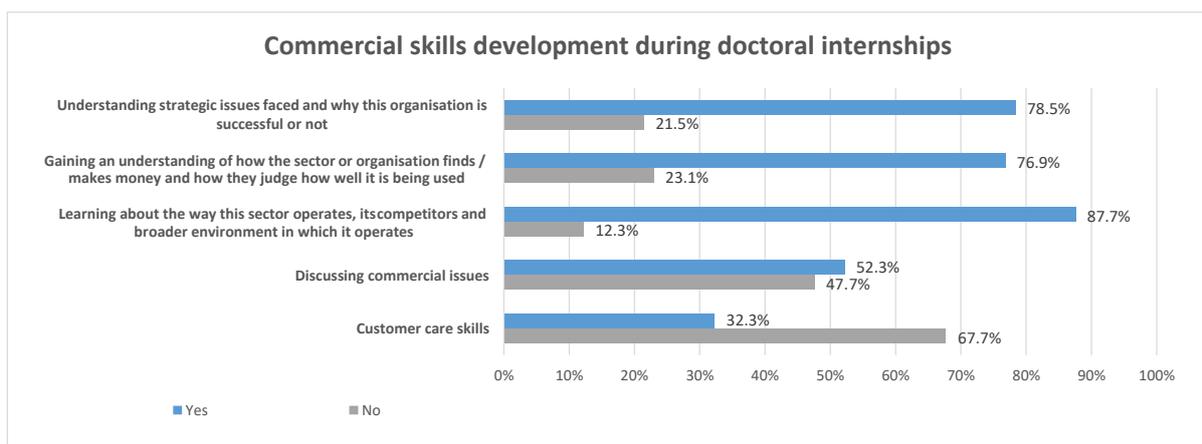


Figure 4 To assess whether there was RTIF Level 2 Learning PGRs self-evaluated commercial skills development by responding to the question “Did your PIPS placement help you to gain business and customer awareness by focusing on any of the following?”

The findings of this research pointed to the value of real world experience to learner employability (Appendix 1 Q10) over two thirds agreed with the statement that they were better able to explore the job market and employer expectations (62.9%) (data not shown) with the remaining one third saying there was no change or disagreeing with this statement. As a result of the doctoral internship experience “I better understand the work possibilities in data analysis”. Another PGR gave a description of how involvement in the PIPS scheme better equipped them to succeed in crafting a fulfilling future career “I have seen which kind of skills set this industry is interested in and I am planning to spend more time to develop those skills in order to improve my chances to get a job in this sector”.

As anticipated almost all PGRs said they were better able to market themselves to future employers (86.2%). PGRs who proactively sought doctoral internships overseas described additional benefits “I found it challenging to expose myself to a completely new field of knowledge. I had no awareness of the chemical engineering process before undertaking the placement and now I am better cited to engage in discussion on such matters. I also learnt a lot of Spanish”.

For some PGRs undertaking internships in their doctoral degree had a measurable impact on their career aspirations. PGRs provided feedback “Having spent time in a secondary school, I think I have moved away from the idea of working in a school as a teacher”. While another response suggested that PGRs are thinking more broadly about their future careers “I now have aspirations to work with agriculturally orientated programmes in developing countries, either after or during my journey through academia” (internship in Malawi). Many (63%) agreed that they are more willing to look beyond higher education for their next job. A subset of PGRs realized that their talents and interests lay outside academia. PGRs told us that they are more likely to consider a career in industry (43.7%) but this needs further examination because of the small sample size (27 internships within an industry setting). The overwhelming majority (93.8%) agreed with the statement that PIPS enhanced their potential future employment possibilities. Still to be explored is the interesting question of whether undertaking internships during doctoral education will influence post-graduation careers PGRs seek.

The doctoral internship programme provided an ideal means for PGRs to network with industry professionals. A significant majority of PGRs (81.5%) agreed that it enhanced their professional

networks for their future careers. “My PIPS with [company name] who specialise in intellectual property will help me when applying to jobs in this sector, and has already helped me meet a number of individuals in the sector”. As a result of the PIPS scheme some employers are seeing the potential of PGRs as future employees “I have a job waiting at [company name] if I want it”.

Performance of returning PGRs

Finding proof of Impact Level 3 which looks at impacts related to the learning – Behaviour changes and Impact Level 4 – Outcomes as a result of doctoral internships is tougher because of the difficulty of proving a link between development opportunity and outcomes. The surveys were reviewed for quotes which support the less tangible evidence that impact at these levels is being achieved. Table 3 shows the results of how PGRs put their internship learning into effect when back doing their academic doctoral research role. PGRs were aware of noticeable changes in their activity. Nearly half reported they were ‘more confident conducting their PhD research’ (44.6%) (Appendix 1 Q10) and were ‘managing my PhD and time better’ while the other half saw no change (50.8%). Significantly, 76.9% agreed that their doctoral internship increased their confidence interacting with different people and in different work situations and 61.5% said that they were more open to new ideas and activities.

The qualitative data contained comments illustrating how participation in the PIPS scheme benefitted or impacted on themselves, their research project or the University. “It has enabled me to be more certain of my research and hence need less reassurance / close supervision”. “PIPS encouraged me to be more open minded, especially towards working within a large team”. It remains to be determined whether undertaking internships as part of doctoral studies will translate back into benefits for the PhD thesis.

Performance of returning PGRs	Agree	No change	Disagree
I am more confident interacting with different people in different work situations	76.9%	23.1%	0%
I am more open to new ideas and activities	61.5%	38.5%	0%
I am managing my PhD project and time better	46.2%	50.8%	3.1%
I am more confident conducting my PhD research	44.6%	52.3%	3.1%

Table 3 To explore RTIF Level 3 examples of behaviour changes PGRs shared their views on the perceived benefits to them of doing PIPS during their doctoral degree by answering the question “What were the benefits to you of doing a PIPS placement in your doctoral degree?”

Outputs for employers from doctoral internship activities and what PGRs’ view as the wider benefits for Universities and society.

During the doctoral internship programme, PGRs turned their leading scientific training into commercial and other wider diverse benefits for employers and society. The post internship evaluation survey data highlighted that the PIPS scheme provided a particularly effective method for policy makers to work together more closely with the PhD student knowledge base (with a word of caution that this comment is based on a very small sample size of nine policy placements and will require increased numbers to confirm this sector specific learning). It is excellent to capture exciting results from involving talented PGRs to assist with local and global issues. A tangible output is the research briefing on ‘Obesity in Scotland’ for use by ministers to inform the decision making process http://www.scottish.parliament.uk/ResearchBriefingsAndFactsheets/S4/SB_15_01_Obesity_in_Scotland.pdf. The report written about tobacco use among adolescents was generated during an internship and received exciting news coverage on the BBC website <http://www.bbc.co.uk/news/uk-scotland-35475441>.

The qualitative evidence suggests that organisations involved in policy making profited from having a capable PGR as a temporary resource to assist with a strategic project. A UK government organisation “were better able to see whether their policies on biodiversity were backed up by strong scientific evidence and were able to identify areas where more research may need to be funded”. A UK research council internship “was able to make a real contribution to policies affecting the academic training provided in the UK for Agriculture and Food related subjects”. Tangible outputs such as these suggest the potential for longer term impacts on government and legislation.

The data presented in this paper captures a flavour of the colourful landscape conveyed by PGRs. During doctoral internships PGRs inspired discussions about the wider questions in science while developing a better understanding of public engagement activities. The PGR based within a public engagement team created a scientific workshop, called ‘Bugs and Bones’ for primary school children and liaised with schools to organise visits. This individual remarked “I hope that my workshop made a lasting positive impact on children’s fascination for science”. Another PGR “independently organised and managed a major public engagement event which involved thousands of interactions with members of the public”. Examples such as these endorse the view that internship project activities contribute to a wider impact on society’s perspective of science.

Doctoral internships enabled employers to get energy and fresh insights to a particular business area; a different perspective on problems; a new motivated member of the team; enhanced their organisations success and performance “the results of my PIPS are a good indicator of what to change if they want to increase the Impact Factor of their Journal” (Appendix 1 Q15). Internships offered a safe space to trial ideas free of charge with one PGR considered “opportunities for areas of outreach development in the longer term” at the scientific society. One employer profited from the new resource to undertake smaller projects that might have been on hold or would not otherwise have been done. “I was able to generate data sets and develop practical protocols that staff were currently too busy to take on. Knowing that the work I have done here will be of benefit to teachers (of the new Scottish Higher Biology course and pupils) has been incredibly rewarding”. For an internship based within a museum the PGR “was able to make a collection⁵ available for research which was previously unregistered.... This was unable to be achieved without my placement due to pre-existing time constraints” We quantified what PGRs’ perceived as the benefits to employers from their PIPS scheme activities.

⁵ <http://blog.nms.ac.uk/2015/09/08/tiny-giants-island-mammals-from-britain/>. (Accessed 12/05/17)

Benefits from doctoral internship activities	Yes	No
Subsequent funding application	18.8%	81.3%
Increased skills of the workforce	39.1%	60.9%
Enhanced market knowledge / contacts	37.5%	62.5%
Knowledge exchange	65.6%	34.4%
Transfer of technology	7.8%	92.2%
New Intellectual Property	10.9%	89.1%
Licensing of new production process	1.6%	98.4%
Licensing of new product	3.1%	96.9%
Enhancing of existing tools or technology	37.5%	62.5%
Development of new tools or technology	23.4%	76.6%
Enhancement of existing production process	28.1%	71.9%
Development of new production processes	10.9%	89.1%
Enhancement of existing product or policy	46.9%	53.1%
Development of new product or policy	34.9%	65.1%
Established / maintained relationship with University	60.9%	39.1%

Table 4 To collect impact data up to RTIF Level 4 outcomes PGRs were asked “Did you PIPS project contribute any of the following benefits to the host organisation?”

In order to collect data as to whether participation in the doctoral internships is achieving Impact Level 4 – Outcomes PGRs were asked to provide specific evidence of how their doctoral internship activities benefitted or impacted on employers (Appendix 1 Q14). Results shown in Table 4 confirmed that PGRs can help to bring about new products, processes, tools and technologies. Internships can also lead to subsequent funding applications, new intellectual property and promoted knowledge exchange. PGRs said they were involved in the ‘enhancement of existing product or policy’ (46.9%) and 37.5% the ‘enhancement of existing tools or technologies. Nearly two-thirds of PGRs recognised that their internship provided a novel vehicle for encouraging employers to take advantage of this easy way to establish links with Universities or make stronger connections with an existing University relationship (60.9%) (Appendix 1 Q14). One PGR anticipated that their internship “can create a link between the company I worked with and my University”. ‘Knowledge exchange’ happened during a significant proportion (65.6%) of internships. While the PGR “was able to discuss my opinions as someone new to the charity. I think it was good for them to see a young scientist working particularly as my lab had funding from the charity at the time”. Another “brought specialised knowledge in bioinformatics analysis to the organisation which they can build on”. Feedback from a PGR who partnered with a company specialising in compound management for drug discovery projects highlighted that during their internship they were “able to talk to individuals with a wealth of knowledge gleaned from years of experience working within the field. This advice has proved invaluable back in the (University) lab. Through my placement we gained a highly profitable collaboration ... and are now undertaking a large scale drug screening program using their in-house compound library”. Importantly, this is evidence that internships can benefit the academic research team as a whole as in this instance it led to further financial benefits as was true in 18.8% cases.

Thirty seven and a half per cent of PGRs indicated that internship activities ‘enhanced market knowledge and contacts’ (Appendix 1 Q14). “I helped devise a new method to improve the manufacturing process of a product. I have been able to improve a product’s reliability, thus improving customer experience and so hopefully enhancing the company’s reputation”. The following comment illustrates how a PGR “gave the organisation the opportunity to get an outside view on how to market themselves and use some of the outputs of the internship as part of a research project to develop new products”. Another PGR commented “I feel very lucky to have had this opportunity and it is one of the main reasons I was attracted to the EASTBIO Doctoral Training Partnership.” This feedback suggests that participation in a doctoral internship programme could change the culture of doctoral learning by helping to attract high calibre PGRs. This also suggests that there may indeed be tangible paybacks to Universities from PGRs spending time in non-academic environments which indicates that the doctoral internship programme may be classed as reaching Impact Level 4 - Outcomes.

Discussion and conclusion

This is the first research evidence drawn from PGRs short term experience of participation in a UK doctoral internship programme within a non-academic setting as part of their doctoral education. The richness of the data gathered suggest that PGRs developed self-awareness and ability to critically evaluate personal, social and professional capabilities, skills and attributes. It is anticipated that this may help PGRs view their internship learning in a more holistic way, with broader skills development, complementing learning provided within the University. However, the results demonstrate the need for further studies to be carried out on a larger scale in order for more widely applicable conclusions to be drawn, whilst still being able to understand the views of individual PGRs where necessary.

Overall, the data provides a ‘sneak preview’ of the dynamic additional force participating in an internship is creating within UK doctoral training. For the majority, undertaking the internships was a rewarding experience. Evidence gathered in this research study shows that PGRs discovered the great diversity of sectors and employers available for internships which suitably mirrors the multitude of career paths that exist for Bioscientists. These were highlighted at the Royal Society’s 2016 celebration of innovation and entrepreneurship – ‘Lab to Riches’⁶.

The 2014 Naturejobs Career Expo workshop ‘Developing an Effective Job Search Strategy’⁷ emphasised that the goal should be to find your niche: the particular microenvironment in the professional ecosystem where your skills, knowledge and personality traits will allow you to succeed and grow. The survey responses suggest that doctoral internships are making a real difference by helping some PGRs to further broaden their horizons particularly in relation to employment beyond the University, identifying potential career paths, thinking about where individual true passion lies, gaining relevant personal and professional development experience and developing the “global perspectives” described by Choy et al., (2015). All of which have the potential to lead to more fruitful future careers.

Analysis of the data generally demonstrates that doctoral internships offered similar benefits for all PGRs. However, individual survey responses suggest that PIPS produced personalised educational gains. While carrying out their internship the challenges encountered created unexpected learning for some. “I found it challenging to change the way I thought from a scientific/research view to a government policy making view”. “A lot of my work involved getting members of different

⁶ <https://royalsociety.org/events/2016/03/labs-to-riches/> (Accessed 12/05/17)

⁷ <http://blogs.nature.com/naturejobs/2014/06/11/how-to-develop-an-effective-job-search-strategy/> (Accessed 12/05/17)

organisations to communicate with each other and I was surprised at how difficult this is". Importantly, the development of soft skills such as communication, relationship building and team skills (vital to work effectively with others, network, negotiate and collaborate with professionals) are seen as fundamental skills that PGRs will need to practice and develop as effective preparation for their careers. A 2014 Harvard Business Review⁸ cited these among the top list of skills leaders needed at every level. It has been suggested by Hancock & Walsh (2016) that "encouraging PGRs to develop the confidence to bring judgement upon normative issues, and ask appropriate questions of the agendas that vested interests bring to science, is essential in order to maintain trust in science". It is our view that that incorporating internships within contemporary doctoral education is an effective way of doing this.

Both quantitative and qualitative evidence was found of the benefits of PGRs and employers working together in partnership as a result of doctoral internships. The impressive diversity of outputs and achievements from doctoral internship activities captured provide convincing evidence of the insights PGRs acquired as to the potential impact of their research and training on the wider economy and society. PGRs changed their attitudes, improved knowledge, and /or increased skill' resulting from the internship training activity. The reported gains in PGRs skills indicators as a result of PGRs self-evaluation post internship are presented in Figures 4 and Table 2. Some PGRs identified gains in the area of research governance and organisation during their internship. However, there was an obvious shortage of skills development opportunities in the area of finance, funding and resources with only 10 out of 65 PGRs (15.4%) reporting significant improvement the area of income and funding generation, managing budgets, infrastructure and resources. This may be due to the short 3 months' timeframe available for internship projects coupled with a lack of appetite on the part of PGRs negotiating internship activities which limits experience gained of income and funding generation, managing budgets, infrastructure and resources.

Personal growth and behavioural change

One PGR remarked "I was denied the luxury of taking my work home. I found this to be a positive influence on my work life balance, which I tried to maintain on return to my PhD" suggested an increase in awareness of change in behaviour by the individual PGR which is a first step towards but not actual evidence of Impact Level 3 behaviour change. Preliminary pilot research suggests that academic PhD supervisors who's PGRs had undertaken a mixed pool of doctoral internships, reported greater maturity, improved research skills and more efficient working practices than previously (Garza and Jones, 2015). To verify the self-reported benefits to PGRs presented in this study would require a systematic in depth survey of the views of their respective academic PhD supervisors' and employers who hosted their internships to gather evidence of their perceptions of changes observed in behaviour and PGRs' learning as a result of carrying out the PIPS scheme.

In keeping with research investigating the relationship between work placements and employability (Edwards, 2014), participants undertaking doctoral internships demonstrated a positive impact on PGRs' self-belief, especially in relation to their confidence conducting their research on return, their ability to interact with different people and in different work situations and their being more open to new ideas and activities (Table 3). PGRs described cultivating a spirit of exploring / experimentation while seeking out / engaging in and investing in their own development, thus helping PGRs to foster the desired mindset described by Sir Gareth Roberts "The product that the PhD researcher created is not the thesis – vital though that is to their subject knowledge, - no the product of their study is the development of themselves" (RCUK and AHRB, 2001). This is in keeping with the knowledge economy agenda and the interdisciplinary knowledge creation required for the solution to complex global issues (Hagoel and Kalekin-Fishman; 2002). It is imperative to recognise that the impact of the PIPS scheme may be immediate, during the internship, or it may be felt many years later. There may be tangible

⁸ (<https://hbr.org/2014/07/the-skills-leaders-need-at-every-level>). (Accessed 12/05/17)

effects or consequences for PGRs undertaking doctoral internships that may emerge over time which promote citizenship with participants using the skills and attributes developed during their internship to enable them to make decisions within political, economic, social and cultural contexts in their lives that could be difficult to quantify and articulate.

The evidence presented in this research illustrates that transferability of PhD skills into non-academic environments brings about beneficial cross pollination of ideas and enables a diversity of outputs and imagined outcomes by PGRs as a consequence of internship activities (Table 4). This is important given today's uncertain economic research funding environment where it is essential to cultivate opportunities for new ways of thinking and sharing knowledge among sectors to produce greater strategic impact from increased researchers' exposure to non-academic sectors. A pilot assessment has been carried out of the employer's perspective of the benefits of hosting doctoral internships. The unpublished results support those recounted in this paper. An economic impact study of a larger UK population of employers who have hosted internships must be undertaken to substantiate the impact of the PIPS scheme. The increased movement across sectors delivered by doctoral internships holds within it the promise of delivering a flexible capacity for future innovation by equipping this generation of PGRs with new ways of collaborating and ability to tap into the optimum use of new technologies. This study findings include actual examples which sign post the hidden value from doctoral internship activities for Universities, government, economy, society, technology, and legislation etc.

The data provides a snapshot of the promising areas for further investigation about whether doctoral internships leads to improved PGR employability and success outcomes for employers linked to impacts on University reputation and revenue. However, one of the limitations of this study evaluating the impact of this innovation in UK doctoral education and most studies in this area is that the strength of the evidence demonstrating the quality of PGRs' educational learning gains and broader effects can be argued to be weak. This is due to the limited time frame, capacity and resource available for this study. The challenge for future work will be to utilize a combination of multiple methods to track outcomes over time and have comparative cases evaluating the wider impacts of doctoral internship programmes on learners, employers, and society at large. Additional collaborative research could assist wider comparisons to be drawn across different types of programmes both nationally and worldwide. Nevertheless this evaluation may be valuable in helping to focus new activity as it did capture promising evidence demonstrating positive impacts on student learning experience ensuring that the PGR voice informs the debate about development of 'excellence' in global doctoral education. Thus the outcomes emerging from this study are relevant to the international higher education sector as a whole. The BBSRC doctoral internship programme (PIPS scheme) provides an innovative model of skills development for PGRs beyond the University. In addition, the project findings contribute valuable insights into the wider impact of such initiatives for funding bodies who are increasingly expected to demonstrate value added by public investments in doctoral research and training (Powell and Green 2007, 233). This permits a cautious suggestion that there is real hope that over time, involvement with intelligent doctoral minds will bring reciprocal benefits to the stakeholders involved. By progressing this as a strategic priority, it could maximise the impact from academic research and bring about desirable benefits for the UK economy and society.

This article studies the perceptions of 65 PGRs' about the value gained from doctoral internships publically funded as part of the BBSRC EASTBIO programme but the issues explored are understood as global phenomena. As work based learning moves from the margins to the mainstream, an opportunity is opening up to gather and actively share evidence to address assumptions and practices where necessary (Shaw, 2011).

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Appendix 1

EASTBIO PIPS Evaluation Survey	
Q1	Figure 1
* What organisation did you do your PIPS placement with?	
Organisation name	<input type="text"/>
City/Country	<input type="text"/>
Organisation website	<input type="text"/>
* In what sector did you do your PIPS placement	
<input type="text"/>	
Q2	
* In one sentence, please list 3 of your main duties during your PIPS placement.	
Duty 1	<input type="text"/>
Duty 2	<input type="text"/>
Duty 3	<input type="text"/>
Figure 2 Rugby Team Impact Framework: Level 1	

Q3

* Overall, how would you rate your PIPS placement experience?

Very positive Somewhat positive Neither positive or negative Somewhat negative Very negative

Q4

Rugby Team Impact Framework: Level 1

* Please explain why your placement was negative.

Q5

Rugby Team Impact Framework: Level 1

* Please describe anything that you particularly enjoyed, found surprising or challenging during your PIPS placement?

Q6

Figure 3 Rugby Team Impact Framework: Level 2

* Please indicate to what extent your PIPS placement met the expected learning outcomes for the BBSRC PIPS placement scheme.

	Very successfully	Successfully	Without success
To help students understand the context of their research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To expose students to the range of opportunities available to them after they graduate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

If you selected 'without success' for either of the above options, please tell us why below.

Q7

Table 2 Rugby Team Impact Framework: Level 2

What skills did you learn on PIPS placement?

Has your participation in the PIPS placement provided you with opportunities to further develop or broaden your experience of applying your skills in different work situations.

Please note that placements differ across career/sectors and may not provide opportunities to develop skills in all areas

* Knowledge and Intellectual Abilities

	Significant opportunity	Reasonable opportunity	No opportunity
Knowledge base (Subject knowledge, research methods theoretical knowledge or practical application, information seeking, information literacy and management, languages, academic literacy and numeracy)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cognitive abilities (Analysing, synthesising, critical thinking, evaluating, problem solving)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creativity (Inquiring mind, intellectual insight, innovation, argument construction, intellectual risk)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* Personal Effectiveness

	Significant opportunity	Reasonable opportunity	No opportunity
Personal qualities (enthusiasm, perseverance, integrity, self-confidence, self-reflection, responsibility)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Self-management (preparation and prioritization, commitment to research, time management, responsiveness to change, work-life balance)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professional and career development (career management, continuing professional development, responsiveness to opportunities, networking, reputation and esteem)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* Research, Governance and Organisation

	Significant opportunity	Reasonable opportunity	No opportunity
Professional conduct (Health and safety, ethics, principles and sustainability, legal requirements, Intellectual Property Rights and copyright, respect and confidentiality, attribution and co-authorship, appropriate practice)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research management (Research strategy, project planning and delivery, risk management)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Finance, funding and resources (Income and funding generation, financial management, infrastructure and resources)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* Engagement, Influence and Impact

	Significant opportunity	Reasonable opportunity	No opportunity
Working with others (Collegiality, team working, people management, supervision, mentoring, influence and leadership, collaboration, equality and diversity)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication and dissemination (Communication methods, media, publication)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Engagement and impact (Teaching, public engagement, enterprise, policy, society and culture, global citizenship)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8

Figure 4 Rugby Team Impact Framework: Level 2

* Did your PIPS placement help you to gain business and customer awareness by focusing on any of the following?

	Yes	No
Customer care skills	<input type="radio"/>	<input type="radio"/>
Discussing commercial issues	<input type="radio"/>	<input type="radio"/>
Learning about the way this sector operates, its competitors and broader environment in which it operates	<input type="radio"/>	<input type="radio"/>
Gaining an understanding of how the sector or organisation finds / makes money and how they judge how well it is being used	<input type="radio"/>	<input type="radio"/>
Understanding strategic issues faced and why this organisation is successful or not	<input type="radio"/>	<input type="radio"/>

Q9

Rugby Team Impact Framework: Level 3 and Level 4

* In a sentence, describe one output or achievement from your PIPS placement, that can be shared with future employers.

* In a sentence explain why this output/achievement is important.

Table 3 Rugby Team Impact Framework: Level 3

Q10

* What were the benefits to you of doing a PIPS placement in your doctoral degree?

	Agree	No change	Disagree
I am more confident conducting my PhD research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am managing my PhD project and time better	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am more open to new ideas and activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am more confident interacting with different people and in different work situations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am better able to explore the job market and employer expectations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am better able to market myself to future employers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enhanced my professional networks for my future career	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I increased my understanding of the relevance of my PhD research through real-world applications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am more aware of career options outside of higher education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am more willing to look beyond higher education for my next job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My employment prospects are enhanced	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Table 3 Rugby Team Impact Framework: Level 3

Q11

* Tell us how else your participation in the PIPS placement benefitted or impacted on you, your research project or future career aspirations.

Rugby Team Impact Framework: Level 3

Q12

* To what extent has your PIPS placement changed your career aspirations?

	Agree	No change	Less likely
I am more likely to consider a career in the higher education sector	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am more likely to consider a career in industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q13

Rugby Team Impact Framework: Level 4

* In a sentence, describe how your participation in the PIPS placement benefitted or impacted or your department or the University?

Q14

Table 4 Rugby Team Impact Framework: Level 4

* Did your PIPS project contribute any of the following benefits to the host organisation?

	Yes	No
Established / maintained relationship with the University	<input type="radio"/>	<input type="radio"/>
Development of new product / policy	<input type="radio"/>	<input type="radio"/>
Enhancement of existing product or policy	<input type="radio"/>	<input type="radio"/>
Development of new production process	<input type="radio"/>	<input type="radio"/>
Enhancement of existing production process	<input type="radio"/>	<input type="radio"/>
Development of new tools or technologies	<input type="radio"/>	<input type="radio"/>
Enhancement of existing tools or technologies	<input type="radio"/>	<input type="radio"/>
Licensing of new product	<input type="radio"/>	<input type="radio"/>
Licensing of new production process	<input type="radio"/>	<input type="radio"/>
New Intellectual Property	<input type="radio"/>	<input type="radio"/>
Transfer of technology	<input type="radio"/>	<input type="radio"/>
Knowledge exchange	<input type="radio"/>	<input type="radio"/>
Enhanced market knowledge / contacts	<input type="radio"/>	<input type="radio"/>
Increased skills of workforce	<input type="radio"/>	<input type="radio"/>
Subsequent funding application	<input type="radio"/>	<input type="radio"/>

In a sentence, tell us how else has your participation in the PIPS placement benefitted or impacted or your host organisation?

Rugby Team Impact Framework: Level 4

Q15

If you expect there to be any wider, long term benefits from PIPS placements (these may include impacts on government, economic, social, technology, legislation etc) please describe them in a sentence.

Q16

Is there anything else that feels important about the PIPS experience that you would like to add?