

Evaluation of the 'Professional Internships for PhD Students' (PIPS) programme



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1. Executive summary

Introduction and aims

Within its Doctoral Training Partnership (DTP) programmes, BBSRC has introduced the requirement for doctoral students to undertake an external placement through the 'Professional Internships for PhD Students' (PIPS) scheme. This was introduced to develop students' transferable skills, improve their understanding of different employment cultures and increase awareness of the wide spectrum of career opportunities available to them.

CRAC was commissioned by BBSRC to evaluate the additionality brought to these doctoral training programmes by PIPS placements. To do so, the key aims were to investigate:

- Learning gains from PIPS placements in the form of changes to doctoral students' knowledge, skills, behaviours and values;
- Impacts of the placements on doctoral students' career thinking and intentions (and on any observed employment destinations); and
- Impacts of the placements on the doctoral students' research and any wider contributions to their academic teams and placement host organisations.

In addition, the evaluation considered whether the design and implementation of the scheme enable it to operate well in practice. A mixed-methods evaluation design was implemented, including a rapid evidence review of existing literature, review of existing scheme data, interviews with DTP directors (and staff), and surveys of current doctoral students and recent graduates, academic staff that supervise students in these DTP programmes and organisations that have hosted PIPS placements. This report presents the results and findings from this evaluative research.

Learning gains

Overall, evidence in the evaluation shows that many doctoral students undertaking a PIPS placement perceive substantive enhancement in a range of skills – perceptions that are largely reinforced by those of supervisors and host organisations. Most prominent were gains in business awareness, communication and collaboration skills, but substantial minorities perceived enhancements to their project management, self-organisation, innovation, adaptability, creativity and problem-solving skills.

These gains were investigated in more depth using students' reported confidence in each skill prior to and after the placement. The greatest relative increases post-placement were in relation to business awareness, innovation and a number of workplace-related skills such as managing people and projects, with distinct but weaker increases in leadership and creativity.

The results suggest strongly that PIPS placements are enhancing a range of students' skills that will be valuable in a career in any sector and likely to support their employability. Many also reported that several of the skills enhanced during the placement were also useful during the remainder of their doctoral study. This was the case especially for self-organisation, communications, and time and project management, with other evidence suggesting 80% of students felt the placement had been beneficial in this respect, giving better understanding of the context and relevance of their research, increased confidence and renewed motivation.

However, supervisors' views were much more mixed; while many were positive and recognised the additional motivation especially, many more worried about perceived adverse impacts such as added time pressure and interruption to research momentum.

Career-related outcomes

The evaluation found strong impacts on students' development of career thinking, as well as effects upon career intentions of students and destinations achieved by graduates. 60% of student/graduate survey respondents felt their career ideas had changed due to the placement, as they became more aware of career opportunities outside HE (and more willing to consider them) post-placement. A higher proportion reported an intention to work in industry or another sector outside academia than beforehand, and higher proportions to work in a role using research and/or undertaking some research, rather than exclusively research. Most supervisors and almost all hosts also believed the placement improved students' awareness of career options.

High proportions of students felt more confident about their employability, that their prospects had been enhanced and that they could better market themselves to future employers, resulting in higher confidence that they could obtain a satisfying job after their doctorate. Supervisors' views, again, were somewhat more equivocal, but 57% believed the placement did enhance student employability.

Views from doctoral graduates confirmed the shaping influence of the placement, including those now pursuing an academic career. Sample sizes were not sufficient to make a robust comparison of whether the profile of first career destinations achieved after a placement were distinct with counterparts without a placement or a strong benchmark. However, there was qualitative evidence that PIPS placements had indirectly and directly led to employment, and around one third of hosts had hired at least one student they had hosted for a PIPS placement.

Thus, the evidence suggests doctoral students undertaking a PIPS placement gain experience, insights and confidence that supports them in career decisions, even for many of those who have already set their mind on a certain career path.

Other impacts

The PIPS scheme is viewed as focusing on professional skills and career learning, not enhancing doctoral research performance. We did not find substantive evidence of widespread effects on the nature or direction of research undertaken by the doctoral students, as a result of the placement. Around one in 10 supervisors surveyed did, however, think their student's research direction was influenced by their placement, while one third of them saw wider impacts on the research team in which the student was located, in terms of the research done and the team's culture. There was consistent evidence for new research collaborations with hosts emerging from PIPS placement relationships. Meanwhile, host organisations acknowledged that their aims were being met, including the student's impact as additional resourcing, bringing in new ideas and helping them understand better what doctoral graduates could bring as employees and how to attract and recruit them.

Operation of the scheme

We found evidence suggesting that scheme intentions are very largely being achieved, with participation by almost all relevant students in three-month placements in a wide variety of sectors, during which the students undertake a wide range of professional projects or activities. Most commonly they take place in the third year of study although there is flexibility and most students are happy with the timing. PIPS is widely seen as a student-led programme, in which most students find their own placement. Varying extents of support are provided by institutions to find a placement and while on placement.

The vast majority of doctoral students/graduates who have undertaken a PIPS placement report it a positive experience and would recommend others to have a similar opportunity. Almost all host organisations we engaged too were very satisfied. Views from supervisors, on the other hand, included a substantial minority who were equivocal at best and some hostile to the idea and implementation of the scheme. Around one in five students indicated their supervisor had not been positive about them doing the placement. Key factors in that discontent – for supervisors and the very few students reporting a negative experience – were most commonly that the PIPS placement is mandatory and/or ‘professional’ in orientation. Those supervisors and students would like placements in the scheme to be optional and/or flexible in orientation so that they could align with the student’s doctoral research.

Operationally, there was widespread acceptance that the placement puts the student under increased time pressure. There were also many concerns about funding, with the current additional funding (£1000) falling short of the costs incurred by some for travel and especially short-term accommodation necessary during placement. Overall, however, the scheme appears to be working relatively well and our recommendations for improvement are only about relatively minor operational issues.

Recommendations

- Given the positive findings of this evaluation (that the PIPS scheme is achieving its aims and its model and implementation are largely effective), our foremost recommendation is that the scheme should continue;
- We recommend retaining the principles of mandatory participation in a placement for DTP students and the professional orientation of that placement, rather than being related to the student’s research;
- It would be valuable to communicate to doctoral supervisors in DTPs, and more widely, the benefits to doctoral students we found from PIPS participation, to increase further the proportion of supervisors who support their students and prospective students to take part;
- We recommend BBSRC provides DTPs with more guidance about best practice in the organisation of placements, as we have identified certain aspects where learning and best practice could be shared, including the role of supervisors during placements and approaches to post-placement reflection and support;

- There is evidence that the current amount of additional PIPS funding for students (£1000) does not cover costs for those who do not undertake a placement locally, so the extent of such support should be reviewed and potentially increased and/or made more flexible;
- We believe the use of the post-placement reports (to BBSRC) by participants should be reviewed so that they can be of wider value and avoid students duplicating effort in reporting;
- We recommend that BBSRC encourages DTP institutions to flag PIPS participants in their HESA Student Record data, so that the outcomes of these students can be tracked in Graduate Outcomes surveys in future.

2. The PIPS programme and its context

This is the final report of an evaluation of the Biotechnology and Biological Sciences Research Council (BBSRC) Professional Internships for PhD Students (PIPS) programme. This chapter provides context to the programme within the landscape of doctoral training in the UK, including description of the aims of the programme. It also provides context to evaluation of the programme, in terms of its distinctiveness as a placement/internship scheme and prior learning about how impacts of placement/internship activities can be assessed.

2.1 Doctoral training context

The UK Government recognises the importance of research and innovation to the economy, having a stated aim of increasing investment in research and development (R&D) to 2.4% of Gross Domestic Product by 2027 and published a 2020 'R&D Roadmap' setting out its vision.¹ There is a strong commitment to attract, train and retain diverse talent in the R&D workforce across the research and innovation system to build on the UK's strengths in research and meet future challenges.² Doctoral education is a critical aspect of the training of this workforce. In the last 20 years, UK doctoral education has been transformed with increasing numbers of comprehensive, cohort-based programmes of doctoral training, many involving staff from multiple higher education (HE) institutions and beyond.

The UKRI Statement of Expectations for Postgraduate Training³ outlines expectations on HE institutions (HEIs) to provide an excellent research training environment, as well as on doctoral students and partner organisations. While not prescriptive, it expects HE institutions to provide a needs-based, comprehensive development programme to enable doctoral students to complete a high-quality doctoral research project successfully, develop their competences to become independent researchers and prepare them to have a wider impact beyond academia.

More recently a 'New deal for postgraduate research' has been proposed,⁴ albeit in practice such a 'New deal' will build on a long-term programme of evaluation and change in doctoral training, led by UKRI, which has been designed to ensure that postgraduate research in the UK remains sustainable, open and attractive to a wide range of candidates (both from the UK and internationally), and delivers the highly qualified and skilled researchers and innovators the UK and global societies need. In its first consultation exercise, a quarter of all responses related to career learning, many suggesting that doctoral students were obtaining insufficient careers

¹ Department for Science, Innovation and Technology & Department for Business, Energy & Industrial Strategy. (2020). *UK research and development roadmap*. <https://www.gov.uk/government/publications/uk-research-and-development-roadmap>

² Department for Science, Innovation and Technology & Department for Business, Energy & Industrial Strategy. (2021). *Research and development (R&D) people and culture strategy*. <https://www.gov.uk/government/publications/research-and-development-rd-people-and-culture-strategy>

³ Research Councils UK, Wellcome, British Heart Foundation & Cancer Research UK. (2016). *Statement of expectations for postgraduate training*. <https://www.ukri.org/wp-content/uploads/2020/10/UKRI-211020-StatementOfExpectationsPostGradTraining-Sep2016v2.pdf>

⁴ UK Research and Innovation. (2023). *New deal for postgraduate research*. <https://www.ukri.org/what-we-do/developing-people-and-skills/new-deal-for-postgraduate-research/>

advice, with a large number also calling for them to have access to more professional development activities, including external placements, to enable them to build wider skills.⁵

These concerns reflect that the reality that the majority of UK doctoral students are employed outside HE after graduation (although this varies with discipline).⁶ As recent growth in doctoral student numbers in the UK has been faster than growth in the number of academic early-career positions, there is an increasing imperative for doctoral students to understand and consider their career options. Research by *Nature* with doctoral students in science revealed that two thirds believed they would pursue a career in academic research,⁷ despite evidence that well under half will be able to do so; this suggests differences between ambitions and likely outcomes.

2.2 BBSRC doctoral training and the PIPS programme

With this broader backdrop, in the biosciences, BBSRC has a vital role in providing high-quality bioscience research training. It seeks to attract and train diverse talented researchers to enter the highly-skilled workforce the UK aspires to, and who can thrive in research and innovation whether in HE or other industry sectors. BBSRC's doctoral training programmes are a critical mechanism in ensuring this supply of researchers.

BBSRC is the largest (but not the majority) funder of biosciences doctoral training in the UK, currently funding around 1 in 6 doctoral researchers in the biosciences in the UK, as well as smaller proportions in biomedical sciences and physical/engineering sciences. BBSRC's current funding portfolio includes Collaborative Training Partnerships (CTP), in which industry organisations partner with HE partners and host studentships, and Doctoral Training Partnerships (DTP). To date, there have been three DTP calls, DTP1 (October 2012-2014), DTP2 (October 2015-2019) and DTP3 (October 2020-2024). The most recent call, DTP3, comprises 14 consortia of institutions, and CTP with non-academic organisations, and provides financial support for 340 doctoral students per year.

DTP programmes offer a four-year PhD studentship, supporting a doctoral research project together with a range of professional development and training opportunities. They reflect the UKRI expectations mentioned earlier and emphasise a cohort-based approach to development of a wide range of skills relevant to research and related careers in diverse sectors. BBSRC overtly seeks to embed within these programmes seeds that will enhance future researcher mobility across sectors. A distinctive feature of BBSRC DTP programmes is the PIPS scheme, which is a mandatory element, through which doctoral students undertake a 'professional' internship in an external setting. Doctoral students are expected to work and/or conduct a project for a host that is unrelated to their doctoral research.

The central aims of the PIPS programme are to develop transferable skills, to improve students' understanding of different employment cultures and to increase awareness of the wide spectrum of career opportunities.

⁵ UK Research and Innovation. (2023). *A new deal for postgraduate research: Response to the call for input*. <https://www.ukri.org/wp-content/uploads/2023/09/UKRI-26092023-A-New-Deal-for-Postgraduate-Research-Response-to-the-Call-for-Input.pdf>

⁶ Vitae. (2022). *What do researchers do - doctoral graduate employment, activities & earnings*. Vitae.

⁷ Shift Learning. (2019). *Nature career survey*. <https://figshare.com/s/74a5ea79d76ad66a8af8>

PIPS placements currently comprise the majority of placements/internships within BBSRC's doctoral training programmes. Doctoral students on iCASE studentships and/or on CTP programmes undertake a wider range of periods of time on placement with their external host partner, but that time is spent on projects much more directly related to their doctoral research. The BBSRC strategy of an integrated placement within doctoral programmes results in the higher proportion of recent biosciences doctoral graduates who report they have done a placement, compared with other subject areas (and almost double the roughly 11% of all doctoral students in the UK who undertake a placement).⁸

2.3 Placements for doctoral students and evaluating their impact

We undertook a rapid evidence review centred on placements for doctoral students based in HE where the placement is undertaken outside HE. This differentiated the focus from knowledge about industry-based doctoral programmes. Overall, we found very limited literature relating specifically to placements for doctoral or other early-career researchers, and little attention within wider discussions about researcher training given to either experiential learning or placements in external (non-HE) contexts. This is perhaps surprising given the knowledge that most doctoral graduates work in non-HE and/or non-research roles and there is some evidence that researchers can struggle to transition to a non-HE based career.⁹ There were isolated examples of recognition of potential value of placements in research training, such as in Australia where a 2016 review recommended a national roll-out of internships for early-career researchers and funding provided to develop this.¹⁰ Literature based on the PIPS scheme itself was also quite prominent in this small corpus.¹¹ On the other hand, there is wide and established evidence on the benefits of work experience and placements in a range of other contexts including schools, taught HE and professional training in sectors such as medicine and teaching itself.

There is recognition of the value of placements in advancing career development in differing ways: a non-HE placement allows a different and wider range of skills to be developed than within a wholly academic research context, while it also exposes researchers to another context within which they can develop and use those skills.¹² Traditionally, internships have also linked the researcher directly to an employer which may decide it would like to hire them afterwards. These are all reported as contributing to enhancement of the researcher's employability in a variety of settings. What appears to be absent is evidence that undertaking a placement facilitates development of skills by the researcher that are valuable either to their research during the doctoral programme itself (post-placement) or within subsequent early-career academic research endeavour. In contrast, there is an extensive literature on the knowledge transfer benefits from

⁸ Vitae. (2022). *What do researchers do - doctoral graduate employment, activities & earnings*. Vitae.

⁹ Fernandez, R. & Sileryte, I. (2015). *The exchange of early career researchers between universities and businesses in the UK*. NCUB. <https://www.ncub.co.uk/wp-content/uploads/2015/12/The-Exchange-of-Early-Career-Researchers-between-Universities-and-Businesses-in-the-UK.pdf>

¹⁰ Valencia-Forrester, F. (2019). Internships and the PhD: Is this the future direction of work-integrated learning in Australia? *International Journal of Work-Integrated Learning*, 20(4), 389-400.

¹¹ E.g. Jones, H. M., & Warnock, L. J. (2015). When a PhD is not enough: A case study of a UK internship programme to enhance the employability of doctoral researchers. *Higher Education, Skills and Work-Based Learning*, 5(3), 212-227. <https://doi.org/10.1108/HESWBL-05-2014-0013>

¹² Mellors-Bourne, R. et al. (2022) *Doctoral training in the arts and humanities: Engagement, review and future options*, CRAC report for AHRC.

periods of time that researchers spend in industry, including some suggesting that placements aid development of mobility or ‘porosity’ within the research and innovation system.¹³

Although some stakeholders struggle to imagine how to integrate placements into research degrees as they see doctoral research as being simultaneously all-encompassing and highly specific, there is a growing body of practice showing it can be done. Table 2.1 illustrates features of such placements (some drawn from the sources already cited here).

Table 2.1. Design features of doctoral placements

Feature	Parameters
Participants	Doctoral students and other early career researchers
Initiated by	The researcher <i>or</i> the university
Length	Varies from 1 months to 2 years (with a more typical length being 3 months to a year). More rarely there are examples of multiple, shorter placements. ¹⁴
Career stage	The placement can be integrated at any time during the PhD or at a later stage post PhD.
Location	Domestic <i>and</i> overseas. Not necessarily near the university.
Support	Meetings and events before and after placements, mentoring, opportunities for reflection on learning.
Partners	Universities and employers. Employers are understood broadly and can include industry, government and third sector organisations. In some cases, a third-party broker is also involved, which can be the university’s careers service, placement office or other brokerage department or an external provider of brokerage services. ¹⁵
Connection to discipline	Closely aligned <i>or</i> broader ‘professional’ placements (as in PIPS).
Wider context	Placements can be delivered as a programme in their own right, or embedded in a broader framework of academic/industry partnership (sometimes branded as an industrial PhD) or, in the UK, linked to a DTP. ¹⁶

A key distinction is between discipline-aligned placements, which relate closely to either the researcher’s subject specialism or even more specifically to their research project, and broader ‘professional’ placements which are not closely aligned. The PIPS scheme is the only example of the latter we found discussed in the literature, although some other placement schemes take

¹³ Melin, G., et al. (2019). *Analysis of intersectoral mobility*. Technopolis.

¹⁴ Hodgson, E., Potter, T., & Walchli, J. (2013). Making it work: piloting co-operative education for English PhD students at UBC. *ESC: English Studies in Canada*, 39(4), 9-12.

¹⁵ McNeil, A. (2013). Co-op and career centres and faculty collaborating to support graduate students' career success. *ESC: English Studies in Canada*, 39(4), 13-16.

¹⁶ Tazzyman, S., et al. (2020). *Review of the PhD in social sciences*. CFE Research.

researchers into non-research contexts (e.g. UKRI's policy internships¹⁷). The wider literature on placement design also highlights that the experience (the placement) is not enough on its own, but that it is important to scaffold the learning that takes place in the placement through preparation, reflection, debriefing and support.¹⁸

It is worth noting the kind of model of placement discussed here largely presupposes that researchers are engaged in full-time PhD study and have progressed straight from prior HE study into postgraduate research. In such cases, the opportunity for exposure to a non-HE context offers considerable added value, but it remains an open question as to whether students with prior working experience, and/or on part-time programmes (who may simultaneously be working), will benefit in the same way. Other issues of design are access and engagement. Not all placement opportunities will be located close to the doctoral student's university, so they may need to be geographically mobile and have funds for accommodation and travel, which raises a range of issues of equity. A particular issue raised in this evaluation is whether access to placements for international doctoral students is limited due to restrictions on their right to work; we did not find any prior literature on this issue.

A key challenge reported has been getting students to engage in placements. BBSRC's 2013 evaluation of its Industrial CASE scheme reported that only 62% of students engaged in the placement built into the studentship, while research from Australia has also found doctoral students to be lukewarm in enthusiasm for placements or work-integrated learning.¹⁹ There is a substantial literature on engaging HE students at undergraduate level in placement activity. The PIPS scheme appears distinctive in the doctoral context in being mandatory.

Some research has found students and supervisors reluctant to support a placement, especially where the student is not making good progress (with their research project). One response could be for a placement of shorter duration, but this can result in much of the time on placement being focused on transitions into and out of it.²⁰ This could require universities and funders to think more flexibly. There are also more fundamental concerns from some academics that placements may reduce the quality of the research degree by diluting it or reducing the focus of the student, although this may be mitigated by greater involvement of the academics in the placements.²¹

The literature suggests a range of impacts and outcomes from doctoral placement programmes, with a wide range of stakeholders reporting broad satisfaction with placements including students, employers and supervisors. Key benefits identified include:

¹⁷ UK Research and Innovation. (2023). *UK policy internships scheme*. <https://www.ukri.org/what-we-do/developing-people-and-skills/find-studentships-and-doctoral-training/get-training-and-development-to-support-your-doctorate/ukri-policy-internships/>

¹⁸ Baxter, J., & Burden, P. (2008). Redefining doctoral programmes as work-integrated learning experiences. *WACE/ACEN Asia Pacific Conference 2008 E-Proceedings*, pp.28-34.

¹⁹ O'Connor, M.D., Denejkina, A., & Arvanitakis, J. (2023). Preparing doctoral candidates for employment: Delivering research and employability skills training in the PhD via work-integrated learning. *International Journal of Work-Integrated Learning*, 24(1), 19-42.

²⁰ Bos, D., et al. (2017). Reflections on the ESRC internship scheme for postgraduates, *Journal of Geography in Higher Education*, 41(1), 106-118. <https://doi.org/10.1080/03098265.2016.1260099>

²¹ Garza, T.G., & Jones, H.M. (2017). *The impact of the internship experience on returning doctoral students*. University of Sheffield. <https://www.asetonline.org/wp-content/uploads/2017/07/Sheffield-Report.pdf>

- Increased motivation and purpose following the placement and some evidence suggesting that it also increased students' focus and time management.²¹
- Development of interpersonal skills, writing skills and technical skills.²² Engagement in a new environment supports researchers to gain career insights, broaden their horizons and develop their career decision-making capability.²⁰ One study suggested insights into different kinds of careers and the skills needed to succeed in them might be heightened in 'professional', non-cognate, placements like PIPS.²³
- For the university, new collaborations and strengthened links with industry, which can lead to further industrial funding, new opportunities for research dissemination and impact²⁰ and new ideas and fresh perspectives on research.²²

There is informal evidence for increased employability and employment rates, from knowledge that some host organisations subsequently employ the researcher they host on placement. However, HESA's Graduate Outcomes survey does not yet provide robust evidence for this in the UK, and the question it first used about placement experiences by doctoral graduates was not sufficiently specific for this (but has since been adjusted).

Overall, the quality of impact evidence around doctoral placements remains emergent at best, with a paucity of studies at this level. The limited evidence on impact of such placements that does exist is either qualitative or based on small samples, with no counterfactual, and tends to rely on self-reporting by stakeholders. This suggests a need for more robust impact studies, but at the moment we believe these should be explorative rather than summative, considering the nature of the placements and the experiences of the stakeholders involved in them, as well as developing tentative hypotheses about what works in terms of impact. This may be helpful framing for our evaluation of the PIPS programme.

²² Easen, N., Hardwick, R., & Pope, C. (2015). *Professional Internships for PhD Students: an integral part of doctoral training*. Presentation to Vitae Conference, 2015.

²³ Jones, H. M., & Warnock, L. J. (2015). When a PhD is not enough: A case study of a UK internship programme to enhance the employability of doctoral researchers. *Higher Education, Skills and Work-Based Learning*, 5(3), 212-227. <https://doi.org/10.1108/HESWBL-05-2014-0013>

3. Evaluation aims and methodology

3.1 Aims and objectives

The high-level aim of this project was to evaluate the additionality brought to BBSRC's doctoral training programmes by the presence of a mandatory integrated placement within the PIPS programme. To assess that additionality, the three main objectives were to investigate:

1. The learning gains from PIPS placements in the form of changes to doctoral students' knowledge, skills, behaviours and values;
2. Impacts of PIPS placements on doctoral students' career thinking and plans and on first employment destinations after completion of their programme; and
3. Impacts of PIPS placements on doctoral students' research performance and wider contributions to their academic teams and placement host organisations.

At the heart of the study was the aim to understand whether and how the first two learning-related impacts for the student, from PIPS participation, differ from learning students typically gain in doctoral degrees without a placement.

Key research themes and topics

To pursue those objectives, we identified a series of research topics and key research questions:

Learning outcomes:

- What additional knowledge, skills, behaviours and values did participating students develop through PIPS beyond what they learned in the remainder of their doctoral programme?
- To what extent and how did they use knowledge and skills gained in their doctoral study during their placements?
- To what extent and how did they apply what they additionally learned during their placement once they returned to their doctoral programme?

Impacts on career thinking and choices:

- What were the effects on their career intentions and longer-term career plans?
- What were the effects of PIPS placements on students' immediate post-doctoral employment destinations or other next steps?

Impacts on research performance and contributions:

- What other benefits or impacts were gained from placement participation by the students?
- What benefits or impacts were obtained by the placement host organisations?
- What post-placement benefits were obtained by the academic research teams within which the doctoral students were located, following the placement?
- What other, broader benefits accrued for stakeholders (such as improved collaborations)?

In addition, overall:

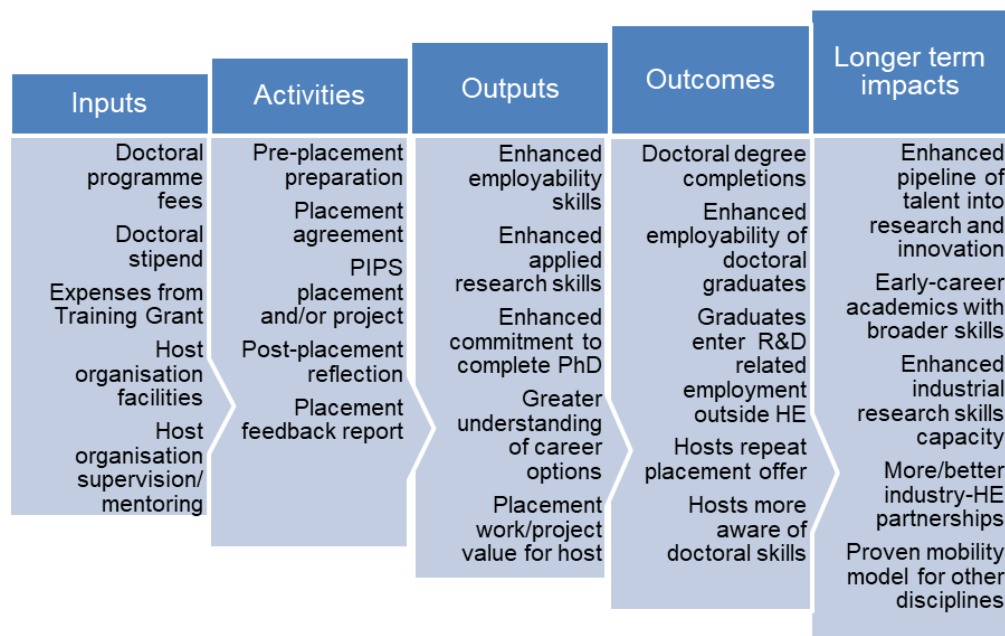
- How well is the PIPS scheme operating and could it work better?
- Are stakeholders (students, DTP directors, supervisors, hosts) satisfied with the scheme?
- To what extent can international doctoral students participate, given potential visa restrictions upon their right to work?

3.2 A theory of change for PIPS

Establishing a theory of change (ToC) can be helpful to understand how and why expected and intended changes come about as a result of a programme or an intervention. It illuminates how different stakeholders contribute to the context for the desired changes, the activities or actions which deliver the changes, the immediate outputs produced from those activities, as well as outcomes of the changes over different periods, and the ultimate intended impacts upon different stakeholders. This is often a useful framing for an evaluation as it helps to clarify what could be and needs to be measured not only as impacts but also to assess progress towards achievement of those impacts.

A potential ToC was developed for PIPS (Figure 3.1), in which the programme aims can be identified as outcomes or impacts. With this framing, the focus of this evaluation was largely on the activities, outputs and outcomes, as few of the longer-term impacts suggested are directly measurable in practice, within the specific evaluation period. Assessment of outcomes that are measurable and align with progress towards achievement of those impacts is a more practical approach than attempting to assess long-term impacts directly.

Figure 3.1 A theory of change for the PIPS scheme

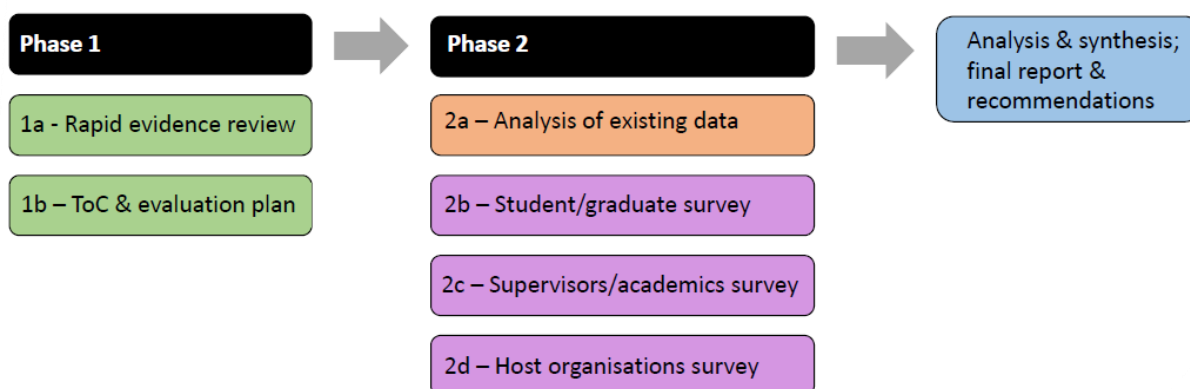


3.3 Approach and methodologies

Our approach to this evaluation project can be described as a mixed-methods design, as we used a combination of primary research strands (both quantitative and qualitative) with a range of stakeholders, to build upon prior desk research and analysis of pre-existing data and information. The approach drew on Guskey's (2002) evaluation model, which examines the impacts of interventions across five levels (reaction, learning, organisational support/change, use of knowledge/skills, learning/skills outcomes)²⁴ to which we added a sixth level (career outcomes).

Our implementation of the evaluation is depicted in Figure 3.2, comprising two main, sequential phases, prior to analysis of the data gathered and its synthesis in a final report with evaluative judgements and recommendations. The first phase aimed to create a full understanding of the context of the programme and design and planning of the evaluation, while the second was its practical implementation.

Figure 3.2 Diagrammatic illustration of the evaluation project



Phase 1 – Understanding the context and designing the evaluation

In this first phase, we undertook a rapid evidence review of existing literature and other knowledge about placements and their impact, focused on those within doctoral programmes but extending out to other settings, as well as other opportunities for work-related learning within doctoral programmes. While the primary area of focus was the biosciences, as there was in practice so little evidence specifically in these disciplines the scope was expanded to the full range of research disciplines. This rapid review aimed to refresh and enhance the knowledge held by our evaluation team in relation to what is known about placements and related schemes within doctoral programmes, and gain any insights as to how their impact can be assessed. A short review document was produced for internal purposes and shared with BBSRC and its content informed the previous context sections in this report. One immediate finding was to confirm our suspicion that there is very little literature which addresses placements in doctoral programmes

²⁴ Guskey, T.R. (2002). Does it make a difference? Evaluating professional development. *Educational Leadership*, 59(6), 45–51.

and even less about assessing their impact. This suggests that the findings of this project could have a wider value in contributing to that sparse evidence base. The other outcomes from this phase were the theory of change illustrated in this chapter and a practical plan for implementation of the evaluation project.

Phase 2 – Analysis of existing data and primary research (including samples achieved)

The second phase of primary research consisted of a series of four primary research strands which engaged a range of stakeholders, to provide rich information in addition to what could be learned from analysis of existing data held by BBSRC about the scheme and its operation. Sources of information for that secondary data analysis included scheme documentation, placement final report data and also results from small-scale surveys with hosts and supervisors that BBSRC had conducted. In addition to giving us a fuller understanding of how the scheme operated in practice, the placement reports provided some quantitative data about participation, although these data were dominantly from students on DTP2 programmes.

Within the primary research, a key strand was interviews with directors (and/or managers) of the BBSRC DTPs in which the PIPS scheme has recently operated. We conducted 13 such interviews, to gather perspectives on the operation of the scheme and any local insights into experiences and impacts. They also provided some more statistical information about operations and participation, requested by us, through a written submission. The interviews were also a means to obtain the DTPs' support practically as they provided a critical channel for the distribution of invitations to our surveys.

At the heart of the evaluation was an online survey we developed for current doctoral students and recent graduates in the DTPs and on other programmes in the biosciences. Invitations were sent by BBSRC directly to students and graduates who had taken part in a PIPS placement (and provided consent for re-contact) and more widely by DTPs to their current and recent students as well as to students on other programmes in similar disciplines. The survey was open between late June and early August 2023 and obtained a total of 734 useable responses, including students/graduates in all current DTP programmes (that have or have had students). The survey was designed to investigate students/graduates perceptions about impact of the placement on their skills and career thinking, as well as broader experiences of the scheme. Inclusion of DTP students prior to placement, and other biosciences students, was designed to provide the possibility of some comparative results.

In parallel, we developed and deployed a survey of academic staff that supervise doctoral students within these DTP programmes, circulated by the DTPs. This obtained 176 valid responses from PhD supervisors who either had supervised and/or were currently supervising doctoral students within 11 of the DTPs. This survey sought their insights into student participation in the scheme, perceptions of benefits and reflections on its operation.

Finally, we designed an online survey for organisations that have hosted one or more PIPS placements, which was implemented at roughly the same time. Again, we had to rely on DTPs to identify relevant host organisations and issue survey invitations to relevant contacts in those organisations, as there was no other feasible way to target them. This survey aimed to elicit information about the operation of the scheme directly from the hosts' angle, the type of activity undertaken during placement and perceptions of benefits. We received a total of 72 useable

responses from current and former PIPS hosts, who had provided placement opportunities to students in 11 of the DTPs.

Analysis and synthesis

The Phase 2 research activities gathered both quantitative and qualitative data which required a variety of approaches to analysis. The 13 DTP interviews were transcribed using the MS Teams transcription option and the resultant information analysed thematically, based on a coding framework we developed from reading and initial coding the first few interviews. The same analytical approach was used for responses to open-ended questions in the surveys.

Analysis of student/graduate survey data included a limited amount of analysis of the entire response sample to generate descriptive statistics but was mostly through cross-tabulation analysis in order to isolate results for key sub-groups of respondents. These included those who had completed a PIPS placement (both current students and graduates, $N=277$, around two thirds of whom were DTP2 students and one third DTP3), those currently on a PIPS placement ($N=30$) and those waiting to do one ($N=341$). As potential comparator populations, there were also responses from doctoral students who had completed other types of placement, but also students and graduates who had not undertaken any kind of placement and students who were not expecting to. However, none of these respondent groups were large enough to support robust comparisons. Our analysis of impact and outcomes emerging from PIPS therefore draws mostly on 'pre- and post' (PIPS) comparisons, rather than comparison with other groups (because none of those potential counterfactual groups was large enough). Where relevant, we also drew in students' placement report data and/or combined emerging results from surveys with insights from the DTP interviews to add weight to insights.

Results from the supervisor survey and host survey are mostly from analysis of the overall response samples, as those sample sizes were insufficient for robust comparisons between potential sub-groups. In the supervisor survey, there was a high representation of staff at professor level and/or those who had supervised 10 or more doctoral students in the sample, so the results may be more reflective of the views of more experienced supervisors rather than those who have only recently become doctoral supervisors.

While the scheme uses the term 'internship' (when the student is with the host organisation), in this report we mostly refer to this as their 'placement'. In the wider education and employment context, despite these terms had different meanings originally, more recently many now consider them to be largely interchangeable.

4. Operation of the scheme

To provide some context to the subsequent chapters considering key impacts from the scheme, and some formative assessment of how well it works operationally, this chapter describes a number of aspects of the operation of the PIPS scheme. Thus, we discuss issues such as uptake, timing, duration and location, the nature of work during the placement, and support offered to the students, as well as various stakeholders' perceptions about the scheme.

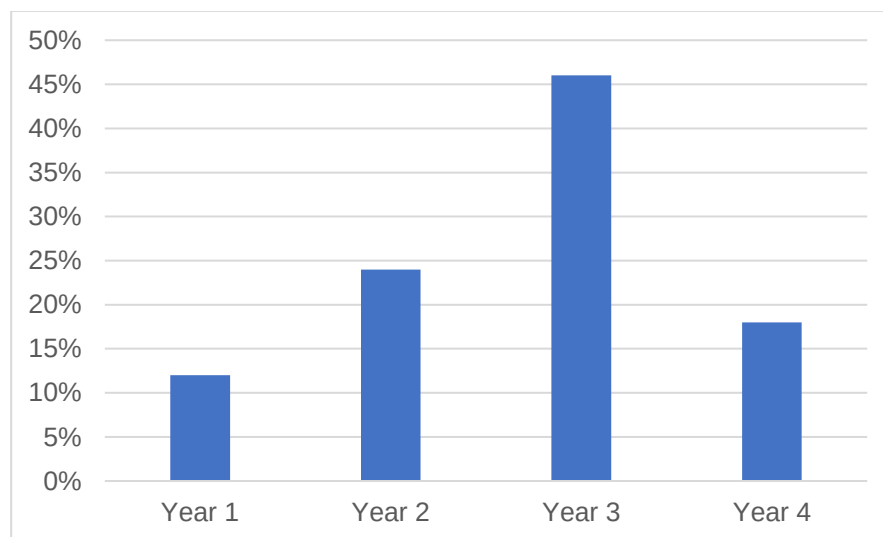
4.1 Nature of placements

Extent of participation, placement timing and duration

A key feature of the PIPS scheme is that it is intended to be a mandatory and integrated part of the DTP programme. Interviews and scheme information indicated that the DTPs aim to ensure all doctoral students in the programme complete a PIPS placement at some point prior to graduation. Exemptions were reported to be given only in rare circumstances. According to background information gathered from the DTPs in parallel with our interviews, in total around 40 doctoral students had not participated and/or been given an exemption during and since the DTP 2 programme (suggesting over 95% participation). The most common reason for such exemptions were interruptions caused by the COVID-19 pandemic, although in a few cases mental ill-health factors were involved. It should be noted, however, that a significant minority of supervisors in our survey (more than one in ten of those made open-ended comments) did not think the scheme should be mandatory, although this tended to be linked also to their perceptions about the orientation of the placement, i.e. whether it should be more closely aligned with their research.

Based on data from placement reports provided by BBSRC, around half of doctoral students (46%) undertook their placement during their third year of study, while 24% did so in their second year, and lower proportions in other years (Figure 4.1).

Figure 4.1. Timing of placement in doctoral programme, from BBSRC scheme data (N= 685)



Despite that range of timings, based on the same scheme data, most doctoral students reported that they felt they had done the placement at the right time for them. Over 90% of those who did their placement during their first and second year of studies felt it had been the right time, while this was 79% of those who did it in year three. A much lower proportion (56%) of those who did it in year four felt that the timing was right; almost all who did not feel the timing was right for them suggested that it was too late in their programme.

The best timing for the placement was also questioned in our survey of supervisors. Half of the respondents (51%) felt that it depended on the student and their (research) project, which potentially reflects the widely positive student response data. However, amongst the remainder, more (21% in total) felt it should be in year two than year three (8%), while one in ten felt that having the placement after thesis submission would be ideal. One DTP director noted in an interview that while a PIPS placement could be seen as a good stepping stone to employment in industry, and therefore would ideally be undertaken late in the programme, the fourth year is stressful for many students and therefore not good timing.

In terms of placement duration, results from the doctoral student/graduate survey confirmed that the vast majority of PIPS placements lasted three months and were undertaken on a full-time basis (92%), with 4% undertaken part-time over a longer time to be an equivalent duration, while 4% were shorter. Only one was reported to be longer (it had been extended to six months). This aligned with scheme information submitted to BBRSC by the DTPs.

Although there were few comments from students in the student/graduate survey about duration, there were many in the supervisor survey about the challenge of integrating a three-month placement into the doctoral programme, even where the latter was four years in duration. These included concerns about the placement reducing the time spent on doctoral research and adding pressure to the student (especially given the timing of most of them in the second half of the programme). It was also pointed out that while the majority of placements are for three months, in practice other time is involved to organise the placement (e.g., finding a suitable host, organising travel and finding accommodation) which requires attention from doctoral students, while a period of re-orientation after the placement is also required (which some supervisors see as 'further delays' [to progress with the doctoral research]). A few supervisors commented that a shorter external experience would be preferable although, interestingly, one third (32%) of host survey respondents felt that a longer placement of six months would be ideal (the remaining two thirds thinking that three months was right).

Location

Another practical aspect of placement logistics is its location. Based on student/graduate survey data, 57% were entirely undertaken in-person at the host premises and 24% were 'hybrid' in format (i.e. partly at the host premises, and partly remote) whilst 19% were wholly online/remote. The COVID-19 backdrop clearly had effect on this, as around half of respondents who had undertaken a placement did so during the pandemic-affected period.

43% of the respondents undertaking a placement that was either wholly in-person or hybrid reported that it had been 'local' (i.e. close to the respondent's DTP/university), and 57%

elsewhere (i.e. a location to which they could not commute, essentially). Closer analysis suggested some evidence for more of the international students doing their placement locally.

While not all respondents experiencing an entirely remote placement reported its location, amongst those who did ($N=47$) the split between local and distant hosts was similar to the balance for in-person placements. The proportion that were distant might be expected to be higher for online/remote placements, as a wider range of hosts becomes possible, so it could be that some of these placements had been intended to be in-person but due to the pandemic were switched to online.

Scheme guidance indicates that placements outside the UK are permitted, and from the survey 14% of placements were undertaken abroad. This was somewhat higher for students from EU countries (21%) than UK-domiciled students (13%), although none of the few ($N=12$) respondents from countries outside the EU did their placement abroad.

Orientation – sector and type of work

The guidance from BBSRC for DTPs and doctoral students is that a PIPS placement needs to be “non-academic work experience”. Results from the doctoral student and graduate survey indicated that placements took place in host organisations in a wide variety of industrial sectors (Table 4.1). The most popular sector was pharmaceuticals and biotechnology (24%), with roughly one in ten placements taking place in each of the public, third and education sectors. The relatively large category of ‘other’ included a variety of organisations ranging from scientific bodies and research institutes to private sector multi-nationals. The sector breakdown used in data provided by BBSRC based on students’ placement final reports was different from ours, but revealed that one in four students reported their placement to have been within the science and research sector and one in five within biotechnology, medical and pharmaceuticals.

Table 4.1 Sector of PIPS placement host (doctoral student/graduate survey respondents who had completed or were currently doing placement: $N=307$)

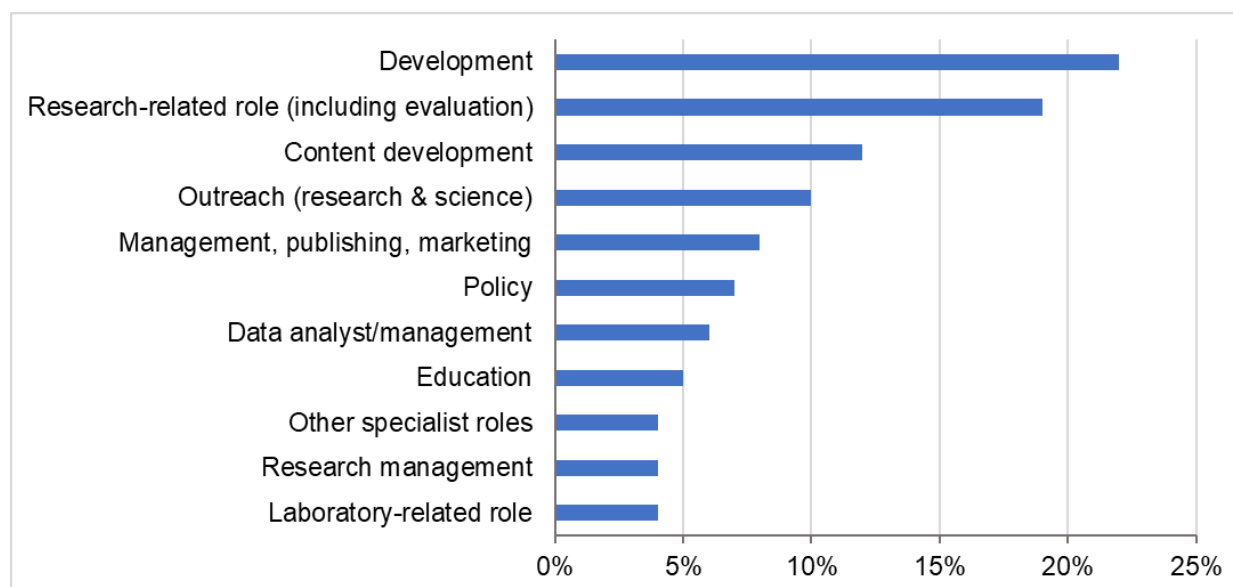
Pharmaceuticals and biotech	24%
Other	15%
Third sector (charity)	11%
Government / public sector	10%
Education and training	10%
Health and social care	6%
Agriculture	6%
Advertising, PR, media, publishing	5%
Environmental	4%
Chemicals and manufacturing	3%
IT and communications	2%
Business services and finance (accountancy, banking)	2%
Creative arts and cultural	2%
Engineering, construction, energy and utilities	2%

Students and graduates who had completed a PIPS placement provided a brief role description in their survey response. Coding these descriptions revealed that over one in five had been engaged in development work (on processes or products) and nearly a similar proportion in research and evaluation work (Figure 4.2). The latter included a wide range of knowledge-based activities from gathering data, desk research, analysing survey data or disseminating findings. Smaller proportions of respondents (around one in ten) were involved in content development in some way and in outreach-type activities.

Separate data was available from the host organisations survey, from which analysis of placement role descriptions suggested about one in three hosts had offered their placement student (intern) a research-related role and about one in five a role in development work. Again, this broadly suggests that around 40% of placements have been in research or R&D.

While there were isolated references in both the student/graduate and supervisor surveys, and in DTP interviews, to 'low quality' roles being undertaken by placement students, these results show that most roles were not like that but rather were 'professional', with many relating to research, science or R&D in some way.

Figure 4.2 Type of role undertaken during PIPS placement (analysis of 285 descriptions given by students/graduates who had completed a placement, in the survey)



4.2 Support for the placement

BBRSC does not issue formal guidance to DTPs about the support that should underpin PIPS placements (other than in relation to financial arrangements). One of the themes that emerged from the interviews with DTP directors was that many viewed PIPS as a student-centred programme. In framing it this way, they considered that placements should, ideally, meet the doctoral student's individual training needs/goals and this applied also to support. Hence, approaches to support were intended to be individualised, because not all doctoral students need

the same amount or type of support. That said, experiences of support and perceptions of supervisors in relation to support were both topics in our surveys.

Finding the placement

Based on the DTP interviews, a typical approach to supporting doctoral students approaching their placement is a combination of cohort events providing information and/or training sessions focused on relevant skills (such as on applications) and individual support to handle specific questions and/or discuss specific needs. 42% of supervisors in our survey reported that workshops about finding a placement took place. Some DTPs had a specific placement coordinator within the DTP itself, while others provided this support through its development team. Based on student/graduate survey data, over half the respondents had found their placement opportunity themselves (59%), with just under one in five (18%) being informed about the specific opportunity by DTP staff and one in ten by their supervisor (Table 4.2). DTP interviews indicated that all the DTPs maintained records of previous placement hosts which could be made available to current doctoral students. In addition, institutional career services or student placement units could also play a part, to link doctoral students with local hosts or provide additional contacts or support.

Table 4.2 Source of placement opportunity (student/graduate survey respondents with experience of a PIPS placement, N= 308)

University placement office (or careers service)	7%
DTP staff	18%
Supervisor	10%
Student found it for themselves	59%
Other	6%

The DTP interviews suggested that students were usually required to submit a proposal for their placement, including details of the host and the project or work to be undertaken, and a budget for approval. These enabled the DTP staff to ensure the proposed placement met the broad scheme criteria, which were summarised as the placement having to take place in outside academia and the work or project not to be close to the doctoral student's research project.

Once agreed (by the DTP), a placement agreement was drawn up, to describe the purpose and outline for the placement work/project, define potential learning outcomes for doctoral student and identify the responsible contact person(s) and/or mentors at the host organisation. Responses to our host survey suggested that such agreements were common but not universal, as a few hosts (4%) had no formal agreement with the DTP and/or student (and around one in ten host respondents did not know whether there had been one). Good practice in placements at other levels in HE firmly encourages such an agreement, to be signed by all three parties (including the student) so that their respective responsibilities are fully understood.

We did not find consistent evidence for other pre-placement support (i.e. other than in relation to finding and formalising the placement), although some supervisors reported that other

preparatory workshop or other sessions were run. In some other placement scenarios, it is recommended that students are provided with some pre-placement opportunity to reflect on what they might experience and the best way to get the most out of their experience.²⁵

Support during placement

Our interviews with DTP directors suggested that most of them (seven of the ten reporting this) required the academic institution to have regular email contact and/or other check-ins with doctoral students during the placement, while a small number did not proactively pursue such contact but encouraged students to contact the DTP if an issue arose. These contacts could be between the scheme placement co-ordinator (or other DTP staff) and the student, whereas in other cases supervisors were the designated contact for the student. Interestingly, 40% of supervisors said they did not know what support was given to students by the DTP in relation to the placements.

It was also clear from supervisor survey responses that some respondents deliberately refrained from contacting their student during the placement to give them time away from their doctoral research. On the other hand, others said that they did that they tried to support their doctoral students by being available should the student wish to contact them. There is clearly a wide range of practice in this respect.

Post-placement support

The extent and nature of post-placement support – and requirements on students after the placement – also varied considerably. Every DTP engaged with doctoral students after completion of their placement to some extent to gain feedback. According to our interviews, seven of the DTPs asked students to write a report, a testimonial and/or a case study about their placement. By doing so, the aim was to provide students with the opportunity to reflect on what they had experienced and especially the skills and learning gained. At one DTP, a reflective statement of this type was included as an appendix to their doctoral thesis. Another DTP involved a specialist doctoral careers adviser in its post-placement debriefing session, to encourage students to consider the impact of the placement on their career thinking. DTPs also reported that they gathered feedback from the host too, chiefly to understand better whether the host wished to repeat their offer and be included on their list of potential placements hosts.

Again, supervisor perceptions were somewhat less positive, with very few (13%) respondents recognising that post-placement support was provided. Some of the comments made in open-ended responses were quite revealing, as a minority did not recognise the concept of post-placement support at all (or assumed it was purely to accelerate their re-orientation back into their research project).

These results refer to post-placement activities or support in or from the DTP. BBSRC also requires a placement ‘final report’ to be submitted by the student (to BBSRC), which contains some feedback questions (data from which we have quoted in places here). Several DTP directors commented that they were not clear how these placement reports were used and would like to have access to them or a summary of results for students in their DTP from BBSRC. As

²⁵ ASET. (2023). *ASET Good Practice Guides*. <https://www.asetonline.org/aset-good-practice-guides/#>

the reports are not currently shared with DTPs, the requirement by more than half the DTPs for their students to write a separate post-placement report was seen as duplicating effort for the student, causing additional time pressure.

4.3 Funding the placement

One of the major concerns emerging across the DTP interviews was the funding of additional placement-related costs for students. In addition to the student stipend that continues during the placement, BBSRC provides DTPs with £1000 per doctoral student which can be allocated to the student to cover travel and accommodation costs while on placement. A consensus in the DTP interviews was that this level of additional funding was not adequate in the current economic circumstances, especially for students who undertook placements that were not local. In order to increase the potential for additional funding, some DTPs encouraged their PIPS placement hosts to contribute towards students' costs and/or their doctoral students to apply for additional grants and schemes within the institution or elsewhere.

Results from the student/graduate survey showed that a quarter of those who had completed or were currently undertaking a PIPS placement had not sought additional funding. Although some of these were (they stated) because their placement had been online, one in five of those with an in-person placement did not seek additional funding (almost all of which were local placements).

Amongst those who did require additional funding, 80% had received the additional allowance from their DTP, 26% additional funding from their host and 21% had been supported by their family and/or their own savings, according to survey responses. Very few reported that they had obtained funding from other institutional sources. Analysis of open-ended responses showed that around two thirds used the funding for travel costs and just over half to contribute to accommodation costs.

The issue of insufficient funding was also brought up by organisations responding to our hosts survey. One respondent commented that hosts in certain sectors (such as charities or start-ups) were less well positioned to contribute towards placement costs, while another perceived variances in the extent to which different DTPs covered travel costs. This begged the question of whether DTPs are fully aligned in their approaches to providing additional funding or covering travel costs.

In the DTP interviews, the cost of short-term accommodation was highlighted as one of the main causes for financial strain during placements, particularly because students are not in a position to give up their regular accommodation at their place of study for the three months they are away on placement (if they do not obtain a local placement). Those not doing their placement locally had to pay two sets of accommodation costs unless they are able to stay with family or friends. This raised concerns about potential disparities between doctoral students, as these costs could be more problematic for doctoral students from less-advantaged backgrounds.

4.4 Visa restrictions for international students

A specific concern raised by BBSRC at the outset of the evaluation was whether restrictions on working within student visa conditions prevented international doctoral students from taking part in PIPS placements. It was feared that requiring doctoral students to work in industry during their

placement could violate Student Visa conditions which restrict students to a maximum of 20 hours of work per week during term time.

DTP directors reported to us that their partner institutions with current international students had found solutions to this potential problem, such as overtly mentioning the placement in the acceptance letter and framing it as part of degree requirements, while some others encouraged international students to do placements 'closer' to their research project or a part-time placement. However, there was sensitivity about the issue and some hoped BBSRC could provide further guidance or facilitate sharing of learning between DTPs on responses. That said, in the student/graduate survey, there were only three comments from international student respondents who either not been able to do a PIPS placement in industry or had to do it part-time due to the visa restrictions, whereas over 80 international student respondents had completed one.

Another visa-related concern arose for some students who wanted to do their placement abroad, as internships in some jurisdictions require a working visa, irrespective of whether the doctoral funding is supporting it. As DTPs were not in a position to advise students on visa issues, this issue could cause additional work or delays for those students involved.

5. Perceptions of the scheme and its impact

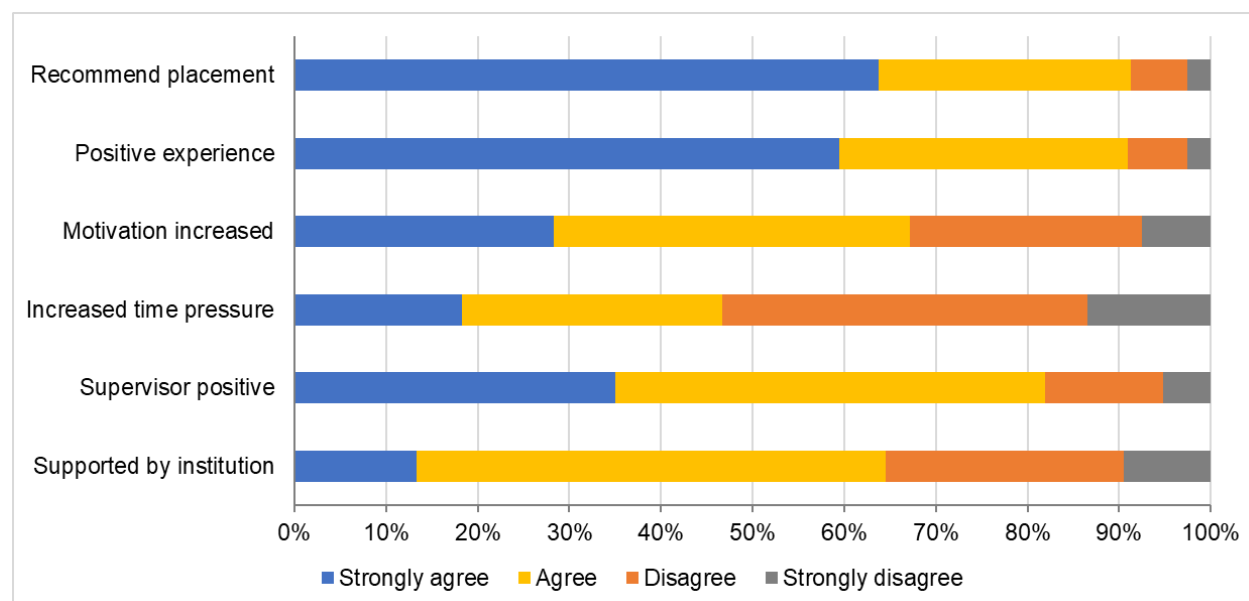
In this chapter we focus on overall experiences of PIPS placements and perceptions of stakeholders about the scheme, including some perceptions about its impact. In the next two chapters, the focus shifts to assessment of impact in relation to the scheme's main aims of developing skills and career thinking.

5.1 Views of the scheme and students' outcomes

Based on student/graduate survey responses, 91% of doctoral students and graduates who had completed a PIPS placement felt that, overall, it had been a positive experience (Figure 5.1). 92% of these respondents said they would recommend participating in a placement to other doctoral students. These were similar levels to those that have been reported in PIPS placement final reports submitted by students (in which 96% reported a positive overall experience).

Although the intended main impacts from a PIPS placement are expected to relate to skills and career learning, 67% of these respondents felt that their motivation to complete their doctorate had increased after their placement. In parallel, 52% of students in their placement final report said that they felt more confident about their doctoral research, post-placement. This was supported by some comments in the DTP interviews, upon how some doctoral students return to their thesis research invigorated after the placement and/or that the placement allowed doctoral students to have a break in an otherwise intense doctoral training programme. Views from hosts were more positive still – with over 90% believing that students came across as highly motivated to complete their doctorate. However, only 42% of supervisors in our survey whose student/s had undertaken a PIPS placement felt that the students were additionally motivated by the placement.

Figure 5.1 Extent of agreement with a range of statements in relation to experiences of participating in a PIPS placement (student/graduate survey respondents who have completed a PIPS placement: N=275)



On the other hand, nearly half (47%) of these student/graduate respondents agreed that the placement had led to increased pressure on their time. Although quantitative data were not obtained in the supervisor survey about this specific perception, one in ten of the open-ended comments made by supervisors related to the time pressure, demands or disruption for the student through undertaking a placement. A number felt the placement caused delays to progress in, and to developing outputs from, the doctoral research project and could have a negative impact on pursuit of an academic career. In a few cases there were specific problems relating to a need for continuity in lab-based research, which the placement interrupted. It was also clear that these pressures were more keenly felt in the second half of the doctoral programme, when the majority of placements take place but at the same time that research momentum has been built up. One respondent felt that while the placement could be beneficial for students who were well-organised and pro-active, for others it could take enthusiasm away from their research or be particularly stressful if their research project had not gone according to plan.

Some of these supervisors further commented that the scheme should be optional, so that those intending an academic career could opt out, or at least that they should have the option for a placement oriented towards an academic research career. A quarter of the supervisor survey respondents felt that a professional placement was less useful to their students than one that was aligned with their research.

While more than nine out of ten students or graduates who had undertaken a PIPS placement were positive about the experience, there were survey respondents who felt that their placement had not been valuable and/or a waste of their time. Based on their open-ended comments, almost all these respondents indicated that they wanted to pursue an academic career and hence they did not see a mandatory industry placement as relevant for their career progression (and, if anything, it was the reverse). Such respondents felt that the time spent on placement would have been better spent in the lab.

Views from supervisors were, again, less positive, with 60% of those in the survey saying that they would recommend doctoral students undertake a placement but 40% disagreeing (including 13% strongly disagreeing). 55% of them felt a supervisor should encourage their students to undertake a placement (and 45% disagreed), while 52% disagreed with the notion that all doctoral funders should encourage funded students to undertake a placement during their programme. Amongst the substantial minority of supervisors who held negative views about the PIPS scheme, and the concept of a 'professional' placement, there was a range from a few individuals who made extremely negative comments to rather more who had a more nuanced view, suggesting that the value of the placement differed for each student. Many of the latter would prefer a placement scheme that was not mandatory and enabled students to undertake a placement that was research-oriented and/or aligned to their doctoral research.

5.2 Perceptions of scheme operations and support

Two of the perceptions reported from student/graduate survey respondents in Figure 5.1 relate to support. Just under two thirds (65%) of students and graduates who had completed their placement felt that they had been provided with support for their placement by their institution, but 35% felt they had not. Views of the extent to which supervisors, in particular, had supported their student were somewhat more positive, however, with 82% feeling that they had been

supported, although does mean that one in six students did not perceive they had had that support. In practice, negativity from a supervisor could create additional problems for students when setting up their placement:

“PIPS appears under-rated by some PIs. I heard several refer to it as ‘the dreaded PIPS’ and belittle the idea that being outside academia was valuable. They are wrong.”

Doctoral student post-placement

“I think that any PI that accepts a DTP student with a PIPS requirement should sign a form saying they understand what a PIPS entails and will support their student in carrying it out. I know a lot of students that had to fight their PIs to make it happen, and that’s not a good situation for a student-supervisor relationship.”

Doctoral graduate

Results reported from the small sample of students currently on placement when surveyed were slightly more positive, with three quarters feeling supported generally and four out of five believing their supervisor was supportive. A higher proportion still (87%) of those waiting to start their placement felt that they were being supported at that stage. These more positive results could indicate that levels of support are higher currently than they were when the graduates surveyed had undertaken their placements, or could reflect changes in an individual’s perceptions over time (i.e. with hindsight).

All parties suggested that the way the scheme has operated has broadly been good, with only small minorities reporting problems or difficult experiences. The most common of these, within comments in the student/graduate survey, related to the additional time and stress incurred setting up the placement. Isolated difficulties reported included difficulties obtaining an offer of a placement (one student reporting they had sent multiple applications without any success, which had been a cause of stress), while a few others referred to practical difficulties finding suitable accommodation during the placement or insufficient funding. However, overall, most of these appeared to be relatively minor or individual issues.

Results emerging from the hosts survey were positive in relation to the scheme, with all but two respondents rating their participation as beneficial or very beneficial for their organisation (and the two that gave other ratings were neutral views, not negative). Similarly, all but three said they would be prepared to host further PIPS placements, with only one saying they would not. All of them would recommend other employers to take part and host placements.

In relation to potential improvements, it was interesting to note their responses to some prompts we made in the survey, which revealed that only about one in six would prefer to host virtual placements (the majority strongly preferring in-person placements), and only two respondents suggested that if placements were virtual they could host more. However, one area they identified for potential improvement related to the advertising of placement opportunities. While some hosts indicated that they had strong relationships with their local DTP/s, some of the hosts would like to be able to advertise their placement opportunity across all the DTPs, and the only way they could see to do this was to approach all of them individually, which would entail a lot of work.

One DTP director raised concerns about perceived increasing rigidity with which doctoral student progress is assessed by the graduate school or university. As a PIPS placement takes place in

industry and not an academic context, a student cannot from the placement period provide the sorts of outputs or evidence of progress in their studies required in their progress reports. In such cases, the doctoral student must submit additional documentation, for special consideration, to explain why their doctoral studies have not progressed as expected. This was felt inappropriate given that the PIPS placement is an integral and mandatory part of the DTP programme. While this is essentially an issue for the particular university or graduate school, it could be wise for BBSRC to highlight this as a potential issue to consider for institutions proposing to establish any new BBSRC DTPs. We noted, in complete contrast, the situation in one provider where a PIPS placement final report is appended to the doctoral thesis as evidence of outputs from the doctoral programme.

6. Outcomes and impact for doctoral students: skills

One of the purposes of the PIPS programme is to provide doctoral students with an opportunity to enhance their skills. Thus, this evaluation aims to assess the learning outcomes in terms of the additional knowledge, skills and behaviours that participating students develop through their placement, including any extent to which they use those additional skills in the remainder of their doctoral study. In the subsequent analysis, we draw predominantly on responses to the student/graduate survey, with some triangulation through views from supervisors and host organisations. Enhancements to career thinking and career-related learning are considered in the next chapter.

6.1 Skills developed during the placement

One of the expectations doctoral students have for their PIPS placement is some gain in skills. Coding and analysis of responses to an open-ended question in the survey of students/graduates about the expectations of students awaiting their placement ($N=166$) suggested one in five expected to gain new skills.

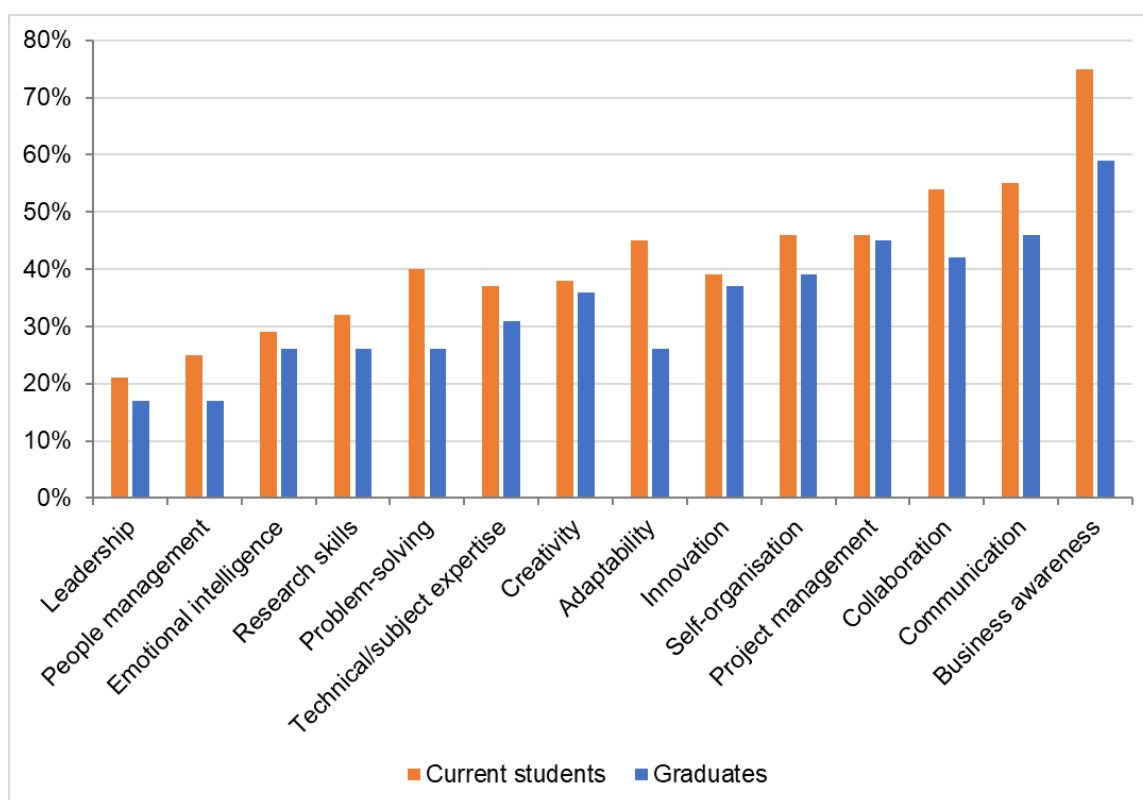
In the doctoral student/graduate survey, respondents who had completed a PIPS placement were asked whether they believed they had developed certain skills during their placement. There was some difference on the results of these self-evaluations between current students and graduates, so results for both are shown in Figure 6.1.

Three quarters of student respondents felt their placement experience had developed their business awareness, and over half reported that their communication skills and collaboration skills had been improved. Between one third and one half of these students perceived enhancements to project management, self-organisation, innovation, adaptability, creativity and problem-solving, as well as technical expertise. For all the skills, slightly lower proportions of the doctoral graduate respondents identified that there had been enhancement of these skills during the placement (with the largest relative difference being adaptability). This suggests some moderation of the perceived extent of skill enhancement during the placement once the respondents had entered the workplace.

These results largely re-confirm inputs that BBSRC has received from PIPS placement students in their final placement reports, within which over 90% felt the placement had been beneficial or very beneficial in terms of skill development. 60% of the students indicated that they now understood more about commercial issues and 76% more understanding of how organisations worked in commercial/business terms. 70% said that they had had a significant opportunity to develop cognitive and problem-solving skills, and 65% their creativity, while this applied to 79% in terms of their self-organisation skills and 58% their communications.

Further analysis of these data revealed that 88% of students or graduates who had completed a placement felt that they had gained in at least one skill area, and 52% that they had gained in at least five skills areas.

Figure 6.1 Proportion of students and graduates who had completed a PIPS placement believing they developed skills during the placement (student/graduate survey responses: current doctoral students N=182, graduates N=95)



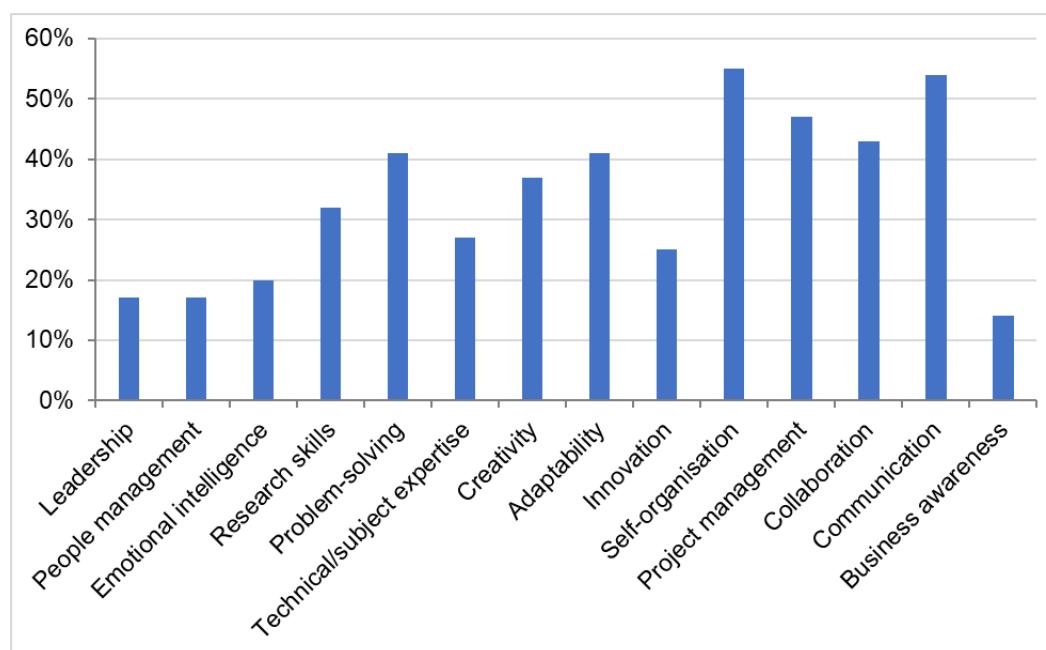
When asked specifically about skills they had gained during the placement that they had found beneficial in the completion of their doctorate, results from current students and graduates were far more similar (with the latter proportions only fractionally below the former) and are shown combined in Figure 6.2, which retains the same ordering of the skills. For the majority of the skills, the results were similar to those in Figure 6.1, suggesting that most of the skills they enhanced were useful during their doctorate. This included over half the respondents reported they gained self-organisation (55%) and communication (54%) skills, and only slightly fewer project management skills (47%). However, for certain skills – most notably business awareness, but also innovation and technical skills – the results were comparatively lower than overall. This, presumably, reflected that only a small proportion of those who enhanced their business awareness or gained particular technical skills could use these during their doctorate.

Overall, 80% of students or graduates completing a placement felt they had gained in at least one skill area valuable to completing their doctorate, and 48% that they had gained in five or more skills areas for that purpose.

Again, there was some resonance with results from student placement final reports, within which 38% felt the placement had been beneficial for their doctoral research project and 42% somewhat beneficial, with 56% suggesting that their time management had been improved. An impressive 86% of them felt they were now more confident interacting with different people and in different

work situations and 48% had more understanding of the relevance of their doctoral research in relation to ‘real-world’ applications.

Figure 6.2 Proportion of students and graduates who had completed a PIPS placement believing they developed skills during the placement that were useful in their doctorate (student/graduate survey responses: N=277)

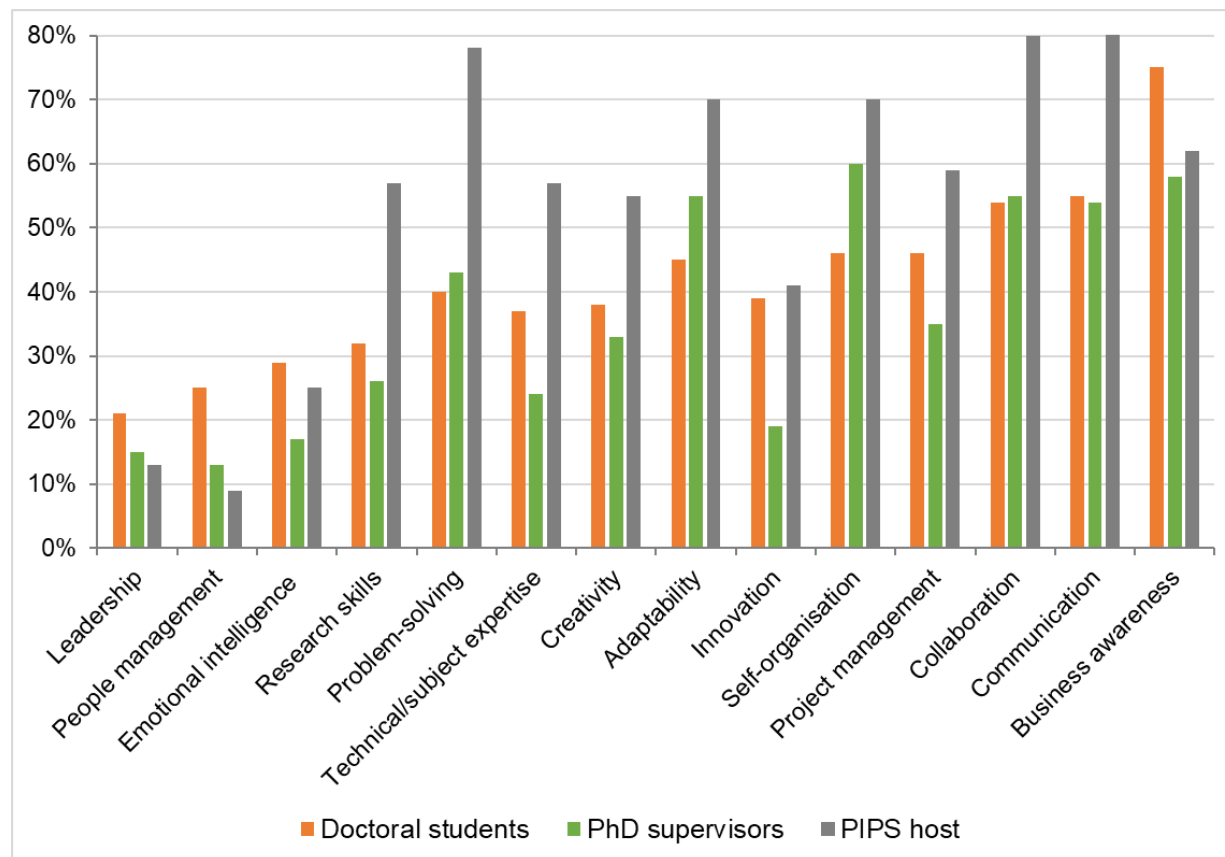


Supervisors and hosts were also asked about their perceptions of the skills gained by doctoral students during placement, the results for whom are compared with the doctoral students’ self-evaluations in Figure 6.3. The skills are again listed in the same order in the chart, with the doctoral student proportions shown in orange. The pattern of supervisors’ views was broadly similar to those of the students although for most skills fewer supervisors identified that the students had gained enhancement. However, more of them recognised better self-organisation and adaptability, than the students themselves, and the perceptions were similar for communication and collaboration. Interestingly, these were amongst the skills that students had rated most useful when completing their studies. A parallel analysis to that conducted for the students showed that 85% of supervisors felt their student had gained at least one skill, and 56% that they had gained in five or more skills areas (a higher proportion than amongst the students themselves).

Views from respondents to the host survey were, for most skills, more positive, with higher proportion believing the skills to be gained by placement students, and in some cases much higher (such as for problem-solving and research or technical skills). The prominent exceptions were in relation to managing people, leadership and business awareness – although for the latter the proportion of hosts believing there was enhancement was still high at 62%. Every host responding to the survey felt that their students had gained at least one skill, and over 80% that they had gained in five or more areas.

Collectively these results suggest that a range of stakeholders in the PIPS programme believe that substantial proportions of the students who undertake placements develop multiple skills by doing so, of which the majority (which are relevant to that context) are useful when completing their doctoral study.

Figure 6.3 Proportions of survey respondents believing that skills were enhanced during the placement (doctoral students having completed a placement: N=182; supervisors: N=144, host organisations N=69)



6.2 Extent of perceived learning gains

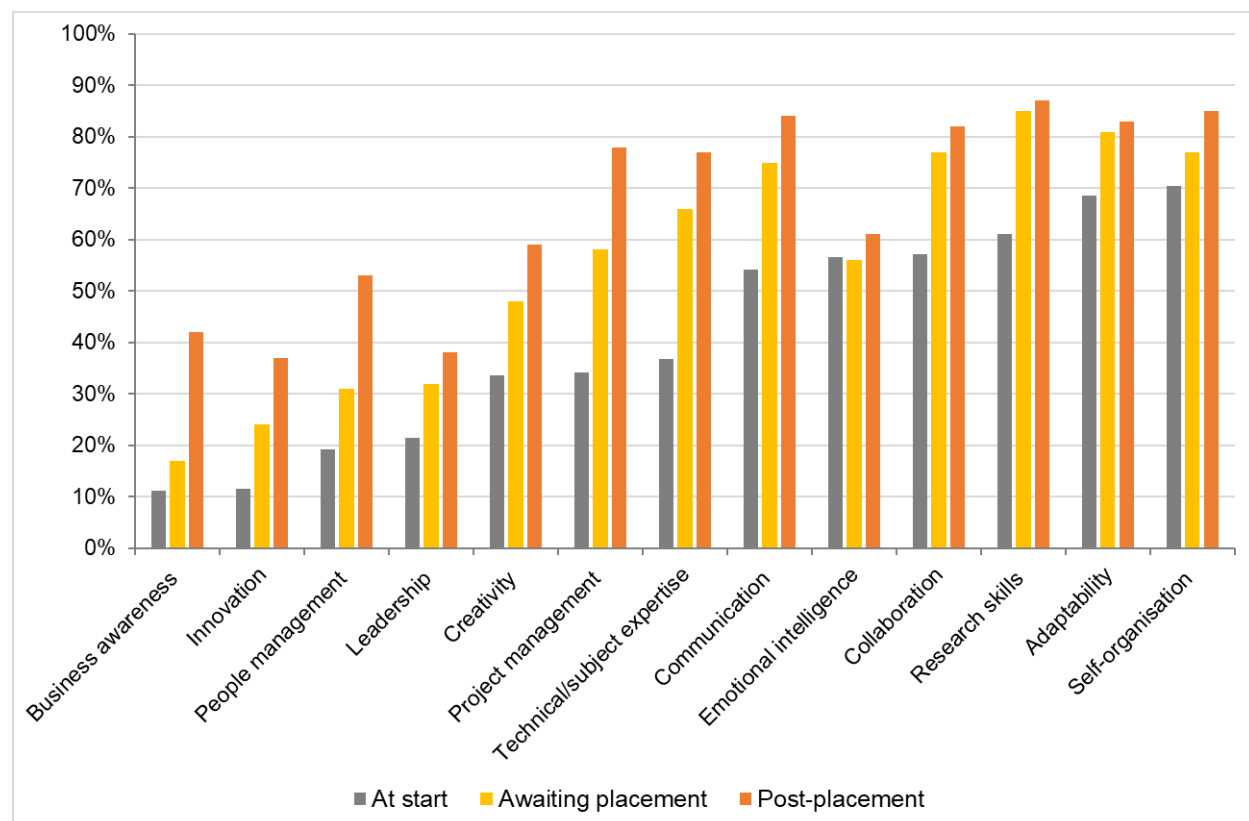
As learning gains for doctoral students in terms of skills, knowledge and behaviours are such a key ambition for the PIPS programme, we tried to assess the extent of these learning gains through a different approach. Using the same range of skills as in the previous section, student/graduate survey respondents were asked to indicate whether they were confident in each of these specific skills when they started their doctoral programme and how they would assess themselves at the time of survey. Comparison of the two results would give a perception of the extent of gain in each skill.

In our analysis, we were able to draw upon the current skills perceptions of several respondent sub-populations to shed further light on this, including students who had completed their PIPS

placement and those who were waiting for their placement. This enabled more refined analysis, i.e. isolating the changes in perceived skills for those just before and just after placement. To ensure that the analysis focused on placement-induced impacts on skills, results from doctoral graduate PIPS alumni were not included, as most had entered employment and hence the 'current' assessment for them would most likely be influenced also by their experiences during that employment.

Figure 6.4 shows the proportion of respondents believing they were confident in the range of skills listed, for three sub-populations. The bars in grey represent the views of respondents when they started their doctoral programme, displaying a range from about 11% of respondents believing they felt competent in relation to business awareness at that time, up to 70% who felt that about their self-organisation. The bars in yellow illustrate similar perceptions of doctoral student respondents waiting for their placement, at the time of survey. In general these were slightly higher for all the skills than prior to the doctoral programme, suggesting that during the early part of the doctoral programme that these skills had been enhanced to some extent.

Figure 6.4 Proportions of student/graduate survey respondents expressing confidence in a range of skills at different times in their doctoral trajectory (students prior to start of programme: N=546; students awaiting placement: N=337; students who have completed their PIPS placement: N=182)



The orange bars represent the proportions of doctoral students who had completed a placement, who felt confident about each skill at the time of survey. These were in turn higher than for either of the former groups, although comparison with those awaiting placement is the better comparator as it most closely provides a 'before placement' baseline. The differences for each skill between the post-placement and pre-placement populations are the basis for our assessment of the effect of the PIPS placement on learning or skills gains.

Thus, the greatest relative increases post-placement were seen in relation to business awareness, people management, innovation and project management, and there were also distinct but less strong increases in relation to leadership and creativity. The additional skills gain due to the placement was much smaller, relatively, for the other skills queried, many of which were skills in which far higher proportions had been more confident in the first place. Taken together with the evidence presented in the first section, this provides further insight that the placement experience is resulting in enhancement of business awareness, especially, innovation and a number of workplace-related skills such as managing other people and managing projects which would be valuable in any sector.

"My placement helped me identify existing skills and apply them in a new context. It gave me confidence that I can adapt to new situations and enjoy meeting new people. It helped me understand the kinds of team I enjoy working in and that I am able and enjoy leading teams. I learnt a lot about how to "get things done" effectively and with resilience [...] this helped me complete my PhD."

Doctoral graduate

"As I work in industry now and regularly work with people from or still in academia, it is clear that people who have spent time outside of academia are generally more adaptable and competent in diverse and challenging situations."

Doctoral graduate

7. Impacts for students: career thinking and outcomes

One of the stated purposes of the PIPS programme is to increase doctoral students' awareness of the wide spectrum of career opportunities open to them, and this aim is particularly key for the PIPS programme given its professional orientation. In the evaluation aims we set out clearly that we sought to investigate the extent of impact on doctoral students' career thinking and their career plans but also, if possible, on first employment destinations achieved after completion of their doctoral programme. The last of these can also be seen as connected to the skills gain impacts, as some of those skills contribute to the employability of the doctoral graduate.

Much of the evidence in this chapter is derived from results of our survey with doctoral students and graduates. We have chosen to present some different results and analyses for these two groups, separately. This is partly because we could probe actual career decisions and destinations, after completion of the doctoral programme, for the doctoral graduate respondents, whereas for respondents who were post-placement doctoral students we could only probe career thinking and intentions. This also enabled us to attempt to isolate some of the effects of other factors upon career choices, which may be different for students and graduates.

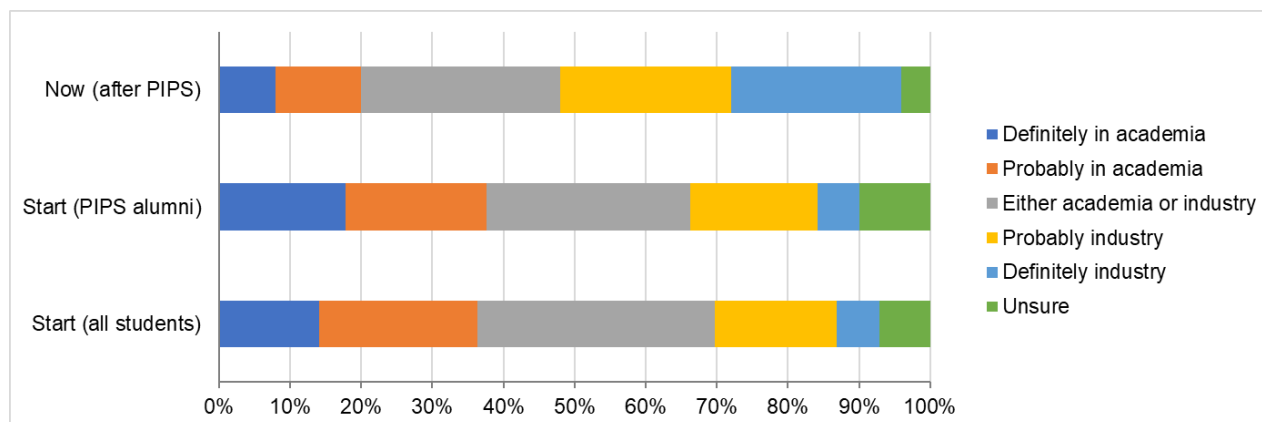
7.1 Impacts upon students' career thinking

It may be valuable as pretext to note that over one third of the open-ended comments made by doctoral students waiting to undertake a PIPS placement revolved around career, work and job themes (36% of the 166 comments), when invited to indicate what they particularly wanted from the placement. These included instances of students seeking experience in a certain career field, testing a type of job or hoping to gain work experience in a specific context, which are all indicative of having some kind of career plan. Other comments attested to students who were unsure of their future direction and hoped that some experience in another sector, away from their research project, would be a helpful stimulus to their career considerations.

Based on the doctoral student and graduate survey, 63% of students and 57% of doctoral graduates who had undertaken a PIPS placement felt that their career ideas had changed based on their placement. Some of the potential key factors to assess for this evaluation were the extent to which students' intentions in terms of broad career sector and type of role, and in their confidence in obtaining the sort of job they wanted, changed as a result of the placement.

First, in relation to desired broad career direction, Figure 7.1 shows that following their PIPS placement, significantly more of the student survey respondents indicated that they wanted probably or definitely to work in industry or another sector (48%), than they reported had been the case at the outset of their doctorate (24%). One of the results emerging from the doctoral student and graduate survey is the changes in terms of whether the respondent is considering a career in academia or industry after completing their doctorate. The proportion intending definitely or probably to pursue an academic career was lower (20%, compared with 38% prior to doctorate), and fewer were uncertain. Figure 7.1 also shows the prior intentions of all BBRSC DTP students, showing that the PIPS 'alumni' did not state markedly unusual prior intentions retrospectively.

Figure 7.1 Sector in which student survey respondents wanted to work, prior to doctorate and at time of survey. (Ns: Start (all students): N=552; Start (PIPS post-placement) N=182; After PIPS N=182)



These results re-confirm findings from the final placement reports collected by BBSRC, within which 85% of students said they were more aware of career opportunities outside HE and 77% that they were more willing to consider them, post-placement. 52% said they were more likely to consider a career in industry and 35% a career in government or the public sector.

Some caution is required in interpreting these results, as we know from a previous study that doctoral students' enthusiasm to pursue an academic research career tends to decrease somewhat during the first years of a doctorate, overall, even without a placement.²⁶ That study suggested around one third of biological sciences doctoral students sought an academic career, overall, which is close to the proportion at start of doctorate in our survey. A second and more recent potential benchmark is from the US Survey of Earned Doctorates, which in 2022 suggested that 48% of biological and biomedical sciences new doctoral graduates intended to enter academia.²⁷

The magnitude of the difference in intentions from the PIPS programme students within our survey suggests that the PIPS experience has been a factor in their changing intentions. BBSRC scheme data reinforce this, with 76% of doctoral students submitted their PIPS final report noting that they were more willing to look beyond HE when looking for a career than before placement.

A similar analysis was applied to student survey respondents' intentions in relation to whether the job they wanted after completing their doctorate was research-focused. Figure 7.2 shows that prior to starting their doctorate, just under half of the student respondents in the survey said they would seek a research role after completing their doctorate and 42% one working with research. Results for the students who had completed a PIPS placement were almost identical before they started their doctorate. However, following their PIPS placement, this had shifted somewhat, with

²⁶ Vitae. (2012). *What do researchers want to do? The career intentions of doctoral graduates*.

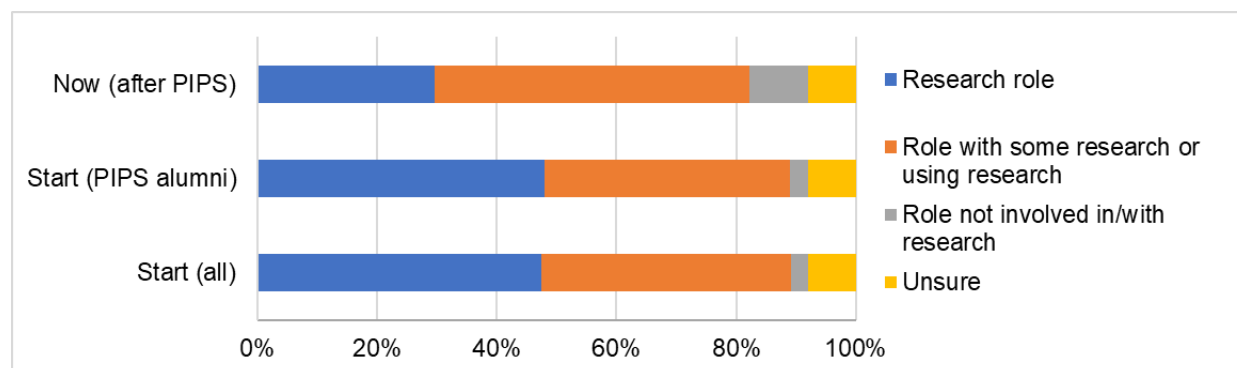
<https://www.vitae.ac.uk/vitae-publications/reports/wdrwtd-the-career-intentions-of-doctoral-graduates-feb12.pdf/view>

²⁷ National Centre for Science and Engineering Statistics. (2022). *Survey of earned doctorates*. NCSES.

<https://nces.nsf.gov/surveys/earned-doctorates/2022>

a lower proportion (30%) wanting a research role and more of them (53%) to work with research or do some research. The minority seeking a role unrelated to research was also higher, although only 10%.

Figure 7.2 Type of role in which student survey respondents wanted to work, prior to doctorate and at time of survey. (Ns: Start (all students): N=552; Start (PIPS post-placement) N=182; After PIPS N=182)



In parallel with the apparent changes to career sector intentions, these results seem to suggest that doctoral students are more open to a wider range of career roles, including more that make use of research, than prior to placement. Findings from post-placement final reports also suggested that students were more confident about their employability, with 89% thinking their prospects had been enhanced and 85% that they were better able to market themselves to future employers.

Likewise, amongst our survey of supervisors of students who had undertaken a PIPS placement, 83% felt the placement had improved the student's awareness of career options. Their views about its effect on employability were less certain, however, with 57% believing the placement did enhance student employability, 23% unsure and 20% that it did not. Interestingly, only one in five supervisor respondents thought a PIPS placement encouraged the student not to pursue an academic career.

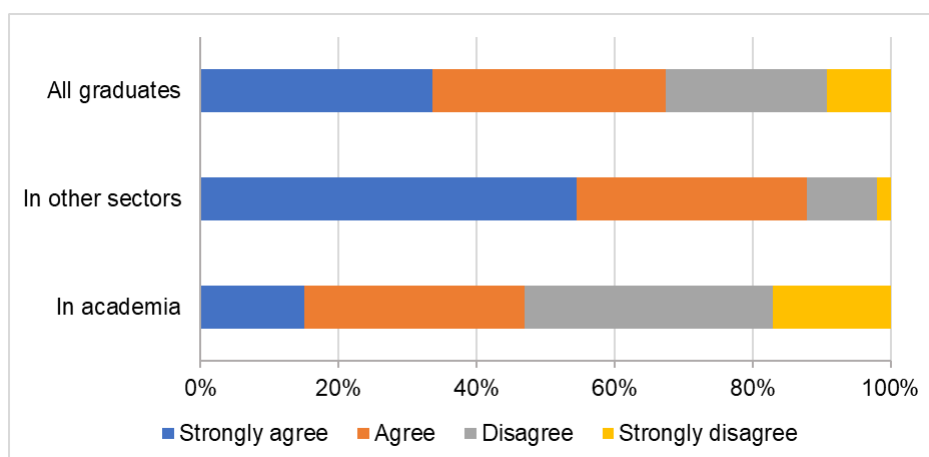
There was also some evidence from hosts' perceptions, with 87% of survey respondents who had hosted students on a PIPS placement believing that the student had developed clearer ideas about their future career, and a similar proportion that the student appeared to have greater confidence that they would get the sort of job they wanted. Views from the student survey itself, however, were more equivocal in relation to its effect on confidence. While 78% of students were very confident or confident that they would obtain a satisfying job after completing their doctorate, this was slightly lower than the proportions with these levels of confidence remembered prior to starting their doctorate. It is possible this simply reflects greater awareness of the realities of the labour market following placement, or that many students had simply been very optimistic before they started their doctorate.

7.2 Impact on careers: doctoral graduates' outcomes

Influence upon career direction

Amongst doctoral student and graduate survey respondents, 66% of doctoral graduates who had completed a PIPS placement reported that their subsequent career had been shaped by their placement (33% strongly agreeing and 33% agreeing this was the case, Figure 7.3). Interestingly, when this was analysed by the sector they now worked in, the PIPS placement experience was reported as a strong influence by far more of those who now worked outside academia. 88% of the latter felt it had shaped their career, including 54% strongly agreeing this was the case, whereas amongst those in academic employment 47% felt it had had effect (15% strongly agreed and 32% agreed).

Figure 7.3 Extent to which subsequent career has been shaped by the PIPS placement, for graduates who had completed placement (from student/graduate survey, N=95)



This difference presumably relates to the requirement for the placement to be 'external' to the doctoral students' academic setting, i.e. it offers learning about other employment sectors and cultures, rather than deeper insights into academic careers. However, responses to an open-ended question about the influence of the placement included supporting a decision to pursue a job in a different sector (not always the sector in which the placement took place) and some in cases reinforcing a decision to pursue an academic career:

"My current career is in the same field as my placement. The internship was a really good opportunity for me to find out whether it was really what I wanted to do and gain experience which helped me get my first job after completing my doctorate"

Doctoral graduate working in third sector

"I went on to work in science communication and public engagement. My placement gave me experience of this and the confidence to realise that research wasn't for me"

Doctoral graduate working in science communications

“I was considering a career in policy after my PhD, as I had some previous interest / experience in this, but the placement helped me to realise that the reality of a career in policy lacked some of the things that I really enjoyed in research”

Doctoral graduate working in pharma/biotech sector

“The placement gave me a valuable experience of non-academia related research. Giving me confidence that my skills are valuable and applicable to other fields. It also gave insight into the much healthier work/life balance outside of academia and how other research careers can have a far more direct and positive impact”

Doctoral graduate working in agricultural sector

“My placement made me more aware of roles within academia that were not research-focused. It was key in my decision to follow a teaching-focused academic path following the completion of my PhD”

Doctoral graduate working in HE

“What has changed is where I would like to do research, i.e., I think I would rather do research in academia as there is more flexibility about where a project can progress”

Doctoral graduate working in HE

“Whilst my career path remained the same, my attitudes and appreciation of different aspects of the work have changed. I also gained a lot of perspective from my PIPS in terms of the head space it gave me before a critical part of my PhD. Without that time away, I'm not sure that I would have completed my PhD”

“I was exposed to a whole new avenue in my specialism (computational physics) where I could now employ programming and math-literacy to solving scientific problems”

Doctoral graduate working in HE

Early-career destinations

In terms of achieved early-career outcomes, all the doctoral graduates in the survey who had completed a PIPS placement were in employment, almost evenly split between academia (49%) and a wide range of other sectors (51%, Table 7.1). However, the two most common sectors other than academia were bioscience-related. Deeper analysis of these results indicated that around half of the respondents outside academia were now working in the sector in which they undertook their PIPS placement.

Table 7.1 Sector in which employed currently (N=95 doctoral graduates who had completed a PIPS placement; percentages have been rounded)

Academia	49%
Pharmaceuticals and biotech	16%
Agriculture	7%
Third sector (charity)	5%
Government / public sector	4%
Business services and finance (accountancy, banking)	4%

Education and training	3%
Advertising, PR, media (including publishing)	3%
IT and communications	2%
Health and social care	2%
Engineering, energy and utilities	2%
Other	1%

There was some qualitative evidence from doctoral graduate survey respondents that their PIPS placement had had an effect on the employment they subsequently gained, through connections made and/or development of employability or other skills during the placement:

“I have now secured a Post-doc Fellowship [in USA] after completion of my PhD, and the experience I gained during my placement, the connections I made and the outputs that came from it made my application much more attractive”

Doctoral graduate working in HE

“I now work in publishing, and I’m not sure I would have had access to the same opportunities without the placement”

Doctoral graduate working in publishing

“The experience gained on the placement directly led to me being able to attend a Data Science X Biosciences crossover event which has led onto my current role as a data scientist”

Doctoral graduate working in data science

In the host organisation survey, 31% of respondents reported that their organisation had hired a graduate whom they had hosted for a PIPS placement, confirming that some participants directly obtained employment as a result of their placement while others gained experience, confidence and contacts which were beneficial when they applied for employment outside academia.

The number of survey responses from doctoral graduates who had not experienced a placement was too small for comparison with these sector outcomes post-placement (i.e. as a potential counterfactual). The even balance between those entering work in academia and other sectors amongst PIPS graduate alumni is very similar to the pattern seen for UK doctoral graduates in biological science subjects (also 49% in HE jobs), from Graduate Outcomes survey data.²⁸ Future collection of data on employment for a much larger sample of PIPS graduate alumni could enable a more robust benchmarking exercise to be done, as the results above are based on only 95 survey respondents.

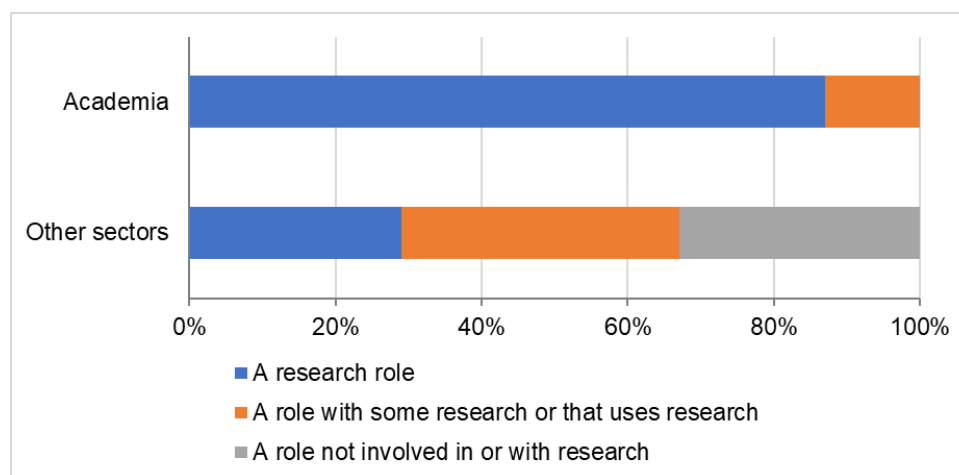
Early-career roles

Some indications of job roles entered, after completion of doctorate, were given in responses to the doctoral student/graduate survey. All those working in academia were undertaking at least some research or using research, with the vast majority working as researchers. Amongst the other half of respondents, who were working in other sectors, as Figure 7.4 shows these were roughly evenly split between doing research, doing some or using research, and unrelated to

²⁸ Vitae. (2022). *What do researchers do - doctoral graduate employment, activities & earnings*. Vitae.

research. This is broadly in line with various results for biological sciences doctoral graduates more generally, which suggest 71% of those working outside academia were in roles conducting or using research a year after graduation²⁹ and (in a separate study) 66% in a research-related role three and a half years after graduation.³⁰

Figure 7.4 Type of role in employment after completion of doctorate (from student/graduate survey respondents: N=95, graduates who had completed PIPS placement)



Thus, in terms of doctoral graduates who had experienced a PIPS placement and moved into employment, there is no particular evidence yet to suggest that these graduates' destinations are distinctive (compared with, for example, biological sciences doctoral graduates as a whole), although the sample was of modest size. There is certainly no suggestion that fewer of them are entering research or related roles, despite the professional orientation of the placement.

²⁹ Vitae unpublished analysis of HESA Graduate Outcomes data for 2018/19 doctoral graduates

³⁰ Hancock, S. (2020). *The employment of PhD graduates in the UK: what do we know?*

<https://www.hepi.ac.uk/2020/02/17/the-employment-of-phd-graduates-in-the-uk-what-do-we-know/>

8. Impacts for research teams and hosts

Within the third main evaluation aim was the intention to assess outcomes of doctoral students undertaking PIPS placements in terms of wider contributions to the academic research teams in which the students undertake their programme and also outcomes for the placement host organisations. The existing literature suggested that doctoral placement programmes can lead to new collaborations (between academic institution and placement host), new ideas and fresh perspectives on research in the institution, and new opportunities for its dissemination. In this chapter we consider evidence arising within the evaluation that illuminates any outcomes or impacts from the placements on the DTPs (and/or the institutions comprising a DTP partnership) and PIPS placement hosts.

8.1 Impacts and outcomes on DTPs and partners

From the interviews with DTP directors and staff it was clear that the PIPS programme is viewed as a scheme that focuses on doctoral students' professional skills and broadening their career options, not enhancing their doctoral research performance or contributions. Thus, it was not expected that PIPS placements would necessarily lead to more industry-relevant research and/or outputs, nor have impacts on the academic research team in which the student was hosted.

Nonetheless, results from the supervisor survey suggested that they perceived some wider impacts, with around one third of supervisors with experience of a student having a PIPS placement believing that there was some wider impact on the research and the research team, and a similar proportion impact on its research culture. This was despite only 9% of supervisor respondents believing that the direction of the student's own research project had been influenced by their placement.

In the DTP director interviews, there were anecdotal references to new research collaborations with hosts and even spin-outs occasionally emerging from PIPS placement relationships. Several interviewees felt that the PIPS scheme allowed DTPs to attract new industry partners as participation by a host does not require it to make a monetary investment. One in six supervisors felt that the placements led to new research collaborations, and 20% that ongoing collaborations resulted. Over a quarter of the supervisors in the survey felt that the placement scheme generally contributed to their institution building closer relationships with industry.

As the DTPs keep records of current and former PIPS placement hosts, they could inform their network of hosts about events and/or other opportunities that might lead to further collaboration. One interviewee had observed that the PIPS scheme helped the DTP enhance its profile locally, and a talented student on placement could enhance the DTP's credibility with the host.

There were also reports of instances where doctoral students had brought new techniques or skills back to their research team from their host activities. However, DTPs did not retain records of the project activities and/or other outcomes emerging from placements and so they had no systematic insight into those types of outcome.

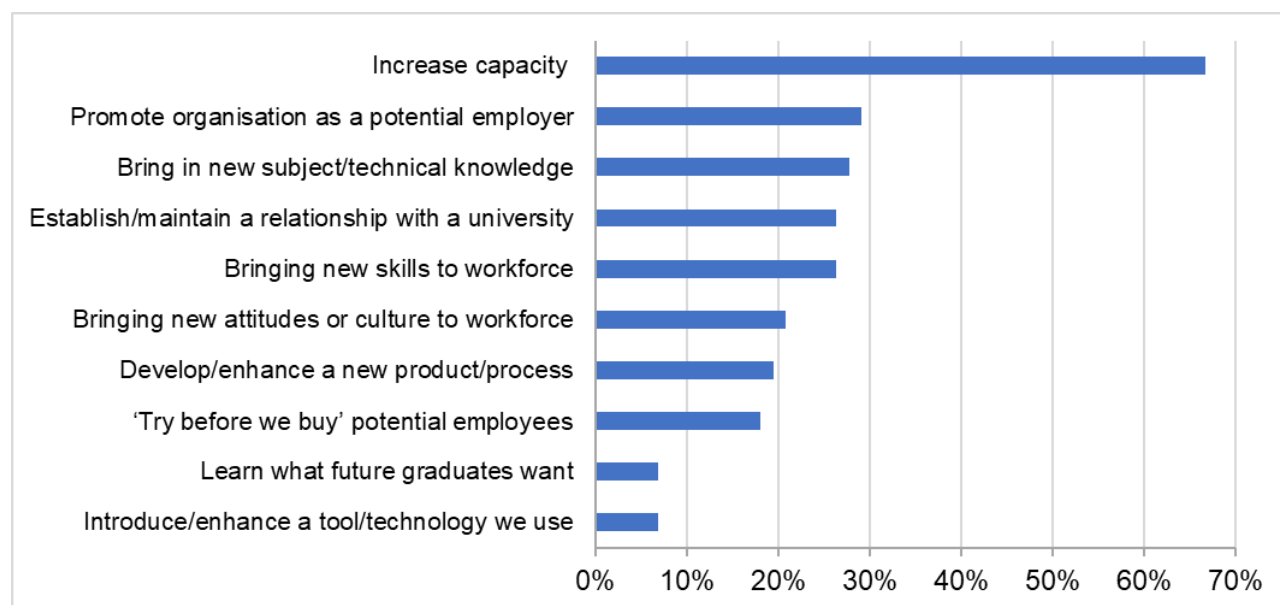
A further outcome from the scheme could be DTP graduate alumni returning to PIPS events either to talk about their PIPS experience and/or to recruit students to PIPS placements for their current employer. This was seen as very positive as it enhanced alumni relations as well as networking

opportunities for current doctoral student cohorts. In the PIPS host survey, there was a comment from a respondent who had done a PIPS placement and was now engaged with current placements at their employer.

8.2 Impacts and outcomes for hosts

Host survey responses revealed that the most important objective for organisations to participate in the scheme as a host was most commonly to increase their resourcing capacity (67%), while many also cited bringing new or up-to-date subject/technical knowledge into the organisation (28%) or new skills into their workforce (26%), Figure 8.1. Additional motivations were to promote the organisation as a potential employer (29%) and/or to establish or maintain a relationship with the university (26%).

Figure 8.1 Most important objectives for host organisation in participating in the PIPS programme (host survey respondents: N=72; for up to three objectives)



The survey asked PIPS hosts about the extent to which the objectives they set for the placement had been met, through an open question. Only three (of the 71) comments suggested that their objectives had not been met, and many reflected very positively about the value of the placement:

“Fully met. I find that the PIPS placements come to us as very skilled individuals, capable of grasping ideas quickly, working independently and following initiative. They have each achieved far more than I had originally planned for the project.”

Placement host in creative arts and cultural sector

“Having a project student has allowed us to explore alternative/supplementary research paths that we would not otherwise have the resources for. To this end, having a placement student has allowed us to scope out the long-term feasibility of such projects.”

Placement host in pharmaceuticals and biotech sector

In terms of other outcomes, 31% of respondents in the hosts survey reported that they had gone on to hire their PIPS placement student as an employee. 78% of respondents went as far as saying that they generally would like to hire the students that they have hosted on placements, and nearly three quarters (72%) felt they now had a better idea of what a doctoral graduate, as an employee, would bring to their business. 87% of them said they were now more confident that they knew how to attract and recruit doctoral graduates.

9. Overall findings and recommendations

9.1 Summary of findings

The high-level aim of this project was to evaluate the additionality brought to BBSRC's DTP programme by the presence of the mandatory integrated PIPS placement. To assess that, the three main objectives were to investigate:

- Learning gains from PIPS placements in the form of changes to doctoral students' knowledge, skills, behaviours and values;
- Impacts of the placements on doctoral students' career thinking and intentions (and on any observed employment destinations); and
- Impacts of the placements on the doctoral students' research and any wider contributions to their academic teams and placement host organisations.

The key summative aspects of the evaluation were to assess whether the PIPS programme results in the first two learning-related impacts for the student, which would not arise typically in a doctoral programme without a placement. The sections that follow indicate strong evidence that this is the case, while there is some evidence also for certain wider impacts.

Learning gains

Overall, our evidence shows that many doctoral students undertaking a PIPS placement report perceptions of substantial enhancement to a range of their skills and attributes, and these perceptions are largely reinforced by the perceptions of supervisors and host organisations.

The most commonly perceived enhancement was to business awareness (for three quarters of students in our survey), with over half reporting improved communication and collaboration skills. Substantial minorities perceived enhancements to their project management, self-organisation, innovation, adaptability, creativity and problem-solving abilities.

In the absence of sufficient responses from students who had not undertaken a PIPS placement, which could provide a potential counterfactual sample, we instead assessed the extent of skill enhancement using students' reported confidence in each of a range of skills prior and after their placement. The greatest relative increases post-placement were seen in relation to business awareness, innovation and a number of workplace-related skills such as managing people and projects, while there were also distinct but less strong increases in leadership and creativity.

Taken together, these results suggest strongly that PIPS placements are resulting for many students in enhancement of a range of skills that will be valuable in a career in any sector and are likely to support their employability.

Interestingly, many students also reported that several of the skills they enhanced during their placement were also useful during the remainder of their doctoral study. The majority believed this was the case for skills including self-organisation, communications and, only slightly fewer, for project management. These results complemented data from students' post-placement reports submitted to BBSRC, in which 80% felt the placement had been at least somewhat beneficial for their doctoral research project, with over half reporting it improved their time

management and a similar proportion that it gave them a better understanding of the context and relevance of their research.

We also noted that two thirds of student/graduate survey respondents felt their motivation to complete their doctorate increased after their placement. Over half of the doctoral students submitting a placement final report to BBSRC said they felt more confident about their doctoral research, post-placement. These perceptions were supported by comments in the DTP interviews, about students returning re-invigorated about their doctoral research, after the placement. However, fewer supervisors in our survey were so positive, with 42% believing their students were additionally motivated by the placement, and many more worried about perceived adverse impacts (discussed in a section below).

Career-related outcomes

The evaluation found a range of evidence confirming strong impacts on students' development of career thinking, with effects upon career intentions of students and destinations achieved by those who had graduated.

The majority of our student/graduate respondents who had undertaken a PIPS placement (around 60%) felt their career ideas had changed based on that experience. Most indicated that they were more aware of career opportunities outside HE and more willing to consider them, post-placement. Around half suggested that they now wanted (probably or definitely) to work in industry or another sector outside academia (48%), which was a higher proportion than had felt this at the outset of their doctorate (24%), and fewer were uncertain about their future direction. Most supervisors and almost all hosts also perceived that the placement had improved students' awareness of career options.

In terms of the sorts of role our student respondents would consider for future employment, following their PIPS placement, a lower proportion (30%) wanted a specific research role and more of them (53%) a role in which they worked with research and/or did some research, compared with beforehand (when over half had desired an exclusively research role). One in five supervisor respondents thought a PIPS placement encouraged a student not to pursue an academic career.

In their final reports immediately after placement, high proportions of students (over 80%) felt more confident about their employability, thinking their prospects had been enhanced and that they were better able to market themselves to future employers. Results from our student survey were slightly less strong, but 78% of students were confident (or very) of obtaining a satisfying job after completing their doctorate. Supervisors' views, again, were somewhat more equivocal, but 57% believed the placement did enhance student employability.

Views from doctoral graduates, who had completed their doctoral programme including a PIPS placement, were very similar, strongly indicating that the placement had an influence on their career thinking and decisions in practice. This was especially the case for those now working outside academia, of whom 88% felt the placement had shaped their early career. Interestingly, almost half of those in academic employment also felt that it had had an effect for them too. Open-ended responses clarified that placement experiences could enhance the desirability of working in a particular sector or reinforce a student's pre-existing ideas that they did not wish to.

The sample size of doctoral graduates who had undertaken a PIPS placement and were now in employment was modest and did not suggest an employment profile that was distinctive from what is known about biosciences doctoral graduates in general. However, analysis suggested that around half these respondents who were working outside academia were employed in the sector in which they undertook their PIPS placement. There was qualitative evidence that PIPS placements had indirectly or directly led to employment, through connections made and/or development of employability or other skills during the placement, or being hired by the placement host. Around one third of host organisations had hired a graduate whom they had hosted for a PIPS placement, within our survey.

Thus, the evidence suggests that doctoral students undertaking a PIPS placement gain experience, insights and confidence that supports them in career decisions, even for many of those who have already set their mind on a certain career path.

Other impacts

From the interviews with DTP directors and staff it was clear that the PIPS programme is viewed as focusing on doctoral students' professional skills and broadening their career options, not enhancing their doctoral research performance. They did not expect placements to result in more industry-relevant research and/or outputs, nor have many impacts on the academic research team in which the student was based. We did not find substantive evidence of widespread effects on the research undertaken by the doctoral students, although their performance could be impacted by the rises in commitment to doctoral study, understanding of relevance of their research, and in a range of skills that they could apply during the remainder of their doctoral programme, that were quite widely reported.

Although under one in 10 supervisors in our survey agreed that the student's research direction was influenced by their placement, more of them (one third) believed PIPS placements had some wider impacts on the research being done, on the research team and its culture. From several stakeholders there were also common references to new research collaborations with hosts emerging from PIPS placement relationships, which could be sustained long after the placement.

Host survey responses suggested that many of their objectives in hosting a student on placement were being met, in terms of providing additional resourcing as well as enhancing relationships with academic partners. Many also reported on how placement students brought new ideas into their organisation. The majority also felt that they had a better idea of what doctoral graduates could bring to their business as employees and were more confident that they knew how to attract and recruit them.

9.2 The operation of the PIPS scheme

While the foregoing presents clear evidence of positive impacts from the scheme, here we focus on more formative aspects of the evaluation. To what extent does the scheme appear to be working as planned and well or is there evidence that it could be improved. These findings are set in the context of the scheme's very distinct positioning in terms of being mandatory in BBSRC DTP programmes and its 'professional' orientation (i.e. placement activity is deliberately disconnected from the student's research).

The evidence we found suggests that scheme intentions are very largely being achieved, with participation by almost all relevant students in three-month placements in a wide variety of sectors, during which the students undertake a wide range of projects or activities. Our judgement is that most are 'professional' in nature, and in many cases involve work that is related to research and take place in organisations and sectors connected with the biosciences. This seems highly appropriate for biosciences doctoral students unless the aspiration of the scheme is specifically to provide experience of an entirely different environment.

Most commonly placements are undertaken in the third year of doctoral study although there is flexibility and most students are happy with when theirs took place. There was a variety of evidence suggesting that the final year was the least convenient timing (although, in principle, positioning a career-focused placement right at the end of a doctoral programme, post-thesis, could also have merit, as an alternative, if achievable).

In practice, PIPS is widely seen as a student-led programme, in which most doctoral students find their own placement and have to seek approval for it from their institution. Varying extents of support were provided by institutions to students in finding a placement and also during placement. Wider best practice in placements for HE students suggests that more could be done to optimise the effect of the placement afterwards, and the current procedure of students submitting a report to BBSRC separate from anything they report (or not) to their DTP has scope for improvement.

Overall, based on our evidence, the vast majority of doctoral students/graduates who undertook a PIPS placement found it a positive experience and would recommend others to have a similar opportunity. The same views were held by almost all the placement host organisations we engaged. A small minority of students (under one in 10) did not have a positive experience. However, views from supervisors were far more mixed, with a substantial minority equivocal at best about, and some hostile to, the PIPS scheme concept and its implementation. Around one in five students indicated that their supervisor was not positive about them doing the placement.

The key factors in that discontent – for supervisors and also most of the minority of students who perceived the experience as negative – were that the PIPS placement is mandatory and/or its 'professional' orientation. Most of these supervisors believed that doctoral students undertaking a placement that did not directly relate to and support their research was a waste of time and effort. A number of them said they would forgive its mandatory nature if placements could be 'academic' in orientation, i.e. aligned to support the doctoral research, although being optional and with flexibility in orientation would be better still. Most of the students reflecting negatively were fixed on an academic career, and felt the placement was a distraction from that (although a very few did have genuinely difficult personal experiences unrelated to this).

We did observe some issues with implementation of placements in the scheme. There was widespread acceptance (from up to half of students, and from many supervisors) that it put them under increased time pressure, noting that the placement impacted on more than its three month duration, as time was needed to find and set it up beforehand and some time to re-orient back into their research project afterwards. However, this needs to be set in the context that so many students found the experience positive and around half reported increased commitment, confidence and energy for their research afterwards. That said, for those who undertake certain

types of lab- and experiment-based doctoral research, a more flexible placement structure (rather than three months full-time) could be beneficial.

Considerable concerns about funding also emerged, with the current additional funding available (£1000) falling a long way short of the costs incurred during many of the placements that require either travel and/or especially short-term accommodation (as long-term accommodation costs continue in parallel). Encouraging students to attempt to raise funds from elsewhere, while seen by some as an additional developmental opportunity, has downsides in terms of potential additional stress and time spent by the student prior to their placement. There is also a chance that insufficient funding could cause particular issues of access for students from less-advantaged backgrounds, in the context of the placement being mandatory.

From the hosts' point of view, almost all we engaged wanted to remain in the scheme, but some expressed desire for more consistency in policies (particularly in relation to how costs were covered) between DTPs and whether it was possible for some central brokerage so that they did not have to reach out to multiple DTPs separately to promote their opportunities.

Overall, however, our appraisal of the evidence is that the scheme is working relatively well and our recommendations for improvement relate only to relatively minor operational issues.

9.3 Recommendations

- Given the positive findings of this evaluation (that the PIPS scheme is achieving its aims and its model and implementation are largely effective), our foremost recommendation is that the scheme should continue;
- We recommend retaining the principles of mandatory participation in a placement for DTP students and the professional orientation of that placement, rather than being related to the student's research;
- It would be valuable to communicate to doctoral supervisors in DTPs, and more widely, the benefits to doctoral students we found from PIPS participation, to increase further the proportion of supervisors who support their students and prospective students to take part;
- We recommend BBSRC provides DTPs with more guidance about best practice in the organisation of placements, as we have identified certain aspects where learning and best practice could be shared, including the role of supervisors during placements and approaches to post-placement reflection and support;
- There is evidence that the current amount of additional PIPS funding for students (£1000) does not cover costs for those who do not undertake a placement locally, so the extent of such support should be reviewed and potentially increased and/or made more flexible;
- We believe the use of the post-placement reports (to BBSRC) by participants should be reviewed so that they can be of wider value and avoid students duplicating effort in reporting;
- We recommend that BBSRC encourages DTP institutions to flag PIPS participants in their HESA Student Record data, so that the outcomes of these students can be tracked in Graduate Outcomes surveys in future.