Support, belonging and access: Examining Funded Doctoral Centres and the Postgraduate Student Experience

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Abstract

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This thesis presents research on Centres for Doctoral Training (CDTs) and Doctoral Training Partnerships (DTPs) in the UK. Whilst other studies have focussed on a single research council or the impact on access for students, this research provides a holistic view.

The research examined the UK funding landscape and the provision of funding across institutions and disciplines. The research was conducted using mixed methods, incorporating the perspectives of staff and students, via a survey of 209 students and 11 staff interviews.

Using the Community of Practice framework and supporting theories, key aspects of the student experience are presented, including peer support, student wellbeing and access to opportunities. These are examined in the context of benefits and disadvantages to students within the centres and those outside the system. Issues of inequalities are explored, considering funding allocations across UK Research and Innovation, and an exploration of a two-tier system is presented. Positive benefits of centres were identified, which could be replicated in HEIs where significant external investment is absent.

The research is grounded in the interest of the researcher, who worked as a manager, and tutor, of students within a CDT for three years during the research. Therefore, the positionality of the researcher is considered throughout, illustrated through a reflection of insider-outsider standpoints.

The thesis provides recommendations on how the UK's doctoral landscape could be shaped and funded to achieve a more positive and equitable student experience. It is situated in a landscape undergoing significant changes with an increased focus on research culture, higher education funding and the introduction of doctoral loans as a pathway into study.

Findings and recommendations from the research were submitted into UKRI reviews into doctoral environments and will be disseminated as policy briefings.

Glossary

Abbreviation	Meaning
CDT	Centre for Doctoral Training
DTC	Doctoral Training Centre
DTP	Doctoral Training Partnership
UKRI	UK Research and Innovation, previously Research Councils UK (RCUK)
EPSRC	Engineering and Physical Sciences Research Council
AHRC	Arts and Humanities Research Council
ESRC	Economic and Social Sciences Research Council
NERC	Natural Environment Research Council
STFC	Science and Technology Facilities Research Council
MRC	Medical Research Council

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Chapter 1. Introduction - Context and Scene Setting

This thesis presents research into the rise of UK Research and Innovation (UKRI) funding for postgraduate research in the UK, primarily through Centres for Doctoral Training (CDT) and Doctoral Training Partnerships (DTP). These funding models have risen in prominence and investment levels since 2010, following the recommendations of the Smith (2010) report and priority setting of the UK Research Councils (UKRI).

This work examines the UK funding landscape and the provision of funding across institutions and disciplines. The research was conducted from a pragmatic standpoint, as a mixed methods study. It incorporated the perspectives of staff and students from within doctoral centres.

The research explores aspects of the student experience, including issues of support, student wellbeing and progress, and access to opportunities. These are examined in the context of benefits and disadvantages to students within the centres and those studying outside of this. Issues of inequalities are explored, considering funding allocations across the research councils within UKRI, and an exploration of a two-tier system is presented.

The thesis reviews challenges relating to political and physical structures surrounding the delivery of CDTs and DTPs. Can the structure supplied by a physical environment be replicated in distributed cohorts, such as those in Doctoral Training Partnerships across multiple institutions? The research provides comparisons across student groups, from co-located students to those separated from their peers. In addition, challenges of distributed cohorts, space and physical access to resources were explored through interviews with CDT staff who outlined issues relating to infrastructure within their institution.

It also aimed to identify key positive benefits of funded centres, which could potentially be replicated and delivered across HEIs where there is little or no UKRI investment in funded centres.

The research is grounded in my interest as the researcher, having had the role of both a manager and tutor within a CDT for two years during the research. Therefore, my positionality as the researcher is considered throughout, with several points of reflection undertaken and illustrated via a pathway of insider-outsider standpoints.

Whilst individual studies have focussed on, for example, a single research council or the impact on access for students, no single large-scale study takes a holistic approach to examine the key aspects of CDTs and DTPs. This study, therefore, contributes to a gap in the research in the UK, echoed by previous explorations of higher education and postgraduate access in the UK, e.g., Pásztor & Wakeling (2017). The research is considered through the theoretical lens of the community of practice framework (Wenger, 1999), with the role of centre staff within communities of practice also considered.

The thesis provides recommendations on how the UK's doctoral landscape could be shaped and funded to achieve a more positive and equitable student experience, for a larger proportion of the student population. It is situated in a landscape undergoing significant changes following the UK's exit from the European Union and a focus on research culture, higher education funding and the introduction of doctoral loans as an alternative pathway into study. The research focuses on the student peer support element and how this creates an environment for students to feel engaged with the research environment.

1.1. The Research Opportunity

The benefits of students studying within a cohort are well recognised, but there is a limited exploration of the doctoral landscape in the UK using mixed methods. Previous studies focus on developing self (Ford & Vaughn, 2011), student perspectives on the benefits of traditional and non-traditional doctoral models (Oetjen & Oetjen, 2007), and the dynamics of group learning (Scribner & Donaldson, 2001). Others take a retrospective look at a single discipline (Bista & Cox, 2014), whilst (Holmes et al., 2010) consider the effects of the cohort model on completion. Cohort research has its roots in constructivist approaches, with qualitative methodologies dominating, e.g., Holmes et al. (2010). Even within mixed methods studies (Scribner and Donaldson, 2001) case study methodology which involves

using a variety of qualitative methods (focus groups, interviews, and document analysis) is employed.

This thesis takes a holistic approach to incorporate the perspectives of a range of stakeholders, contributing to the research literature and providing practical recommendations to policymakers and higher education institutions.

1.1.1. *Role of CDTs, DTPs and DTCs in Supporting the Student Experience*

This research presents findings demonstrating overall support for the cohort model of doctoral training, with evidence suggesting that co-location, peer networks and institutional support provide a supportive learning environment for students. It also explores how the community of practice model could be used as a framework to shape centres and the potential limitations of imposing this model.

The survey results also revealed that students self-organised various activities, particularly pertaining to wellbeing, peer support and informal research events. Such activities could be replicated at low cost within institutions without significant funding and could address issues of social isolation and student satisfaction with their research environment.

1.1.2. *Postgraduate Research Experience Survey Themes and Comparison*

The Postgraduate Research Experience Survey (PRES) is a national survey conducted by Advance HE (formerly the Higher Education Academy) to gauge student satisfaction across the postgraduate research community. I reviewed the overarching PRES survey reports from 2017-2021 to identify key themes and for comparison to my study results. I also reviewed the raw data for PRES 2017, which was openly available for analysis. This enabled me to identify key trends and changing priorities within the student population over time, including issues such as wellbeing, student interaction with their peers, and satisfaction with research environments. Whilst my study represents a small sample of a much larger population, I was able to draw comparisons and analyse similarities and differences between students in CDTs and DTPs and the wider post-graduate research population. For example, the 2017 PRES data showed that students within arts and humanities were least

satisfied with their opportunities to discuss research with other students. In contrast, the highest satisfaction occurred among students in biology. This drew my attention to the potential cohort effect being present where students were lab-based and potentially working on joint projects or within closely related work.

1.1.3. *Opportunities; Learning and Career Development*

The data revealed that a wide range of learning and researcher development opportunities were available to students, with additional student-led activities taking place within many centres. The opportunities presented to students did not appear to be stratified by age, except for career-focused activities, where older age groups reported that they had not participated in some career-building activities. Gender was not found to play a significant role in access to opportunities.

1.1.4. *Community Building and Cohort Activities*

The findings demonstrated that in the majority of cases, students were provided opportunities to engage with their student peer groups, with activities provided by centres. This yielded a range of student benefits, particularly pertaining to belonging, wellbeing, community building and friendship forming. A further benefit was related to shared learning, with students articulating various educational benefits, including problem-solving, method sharing, and support with progressing research ideas.

However, the centre model was not appropriate for all students. Some cited a lack of tailored activities and repetition of previous learning, particularly where students had previously been active members of the workforce before commencing doctoral study. This represents an important finding for potential lifelong learning approaches in centres.

1.1.5. *Involvement of External Partners*

All doctoral centres are required to engage external partners via a variety of methods, including full and partial sponsorship of students, the offering of research topics, internships and involvement in teaching and governance of the centres.

During the research interviews, this theme was explored and uncovered both challenges and opportunities for institutions and students alike. Challenges included issues of ownership and expectations around research timescales. Positive aspects included the opportunity for future employment and internships and research being applicable outside of the academic setting in which it took place.

Key differences in the importance placed on industrial partnerships differed across sectors, with some participants viewing this as a key value of the CDT model, stating that without this, CDTs would offer little additional value over standard PhD programmes. However, student survey results also revealed that some students did not perceive their centres to provide events for industry engagement. This was not reflected in free text responses, with students identifying this as a beneficial factor. This is explored further in the discussion, alongside a reflection on the use of language within data collection, with some centres perhaps having partners from a range of sectors and organisations. Therefore, students might not recognise this as industrial engagement.

1.1.6. *Issues in Student Cohorts – Comparison and Competition*

At the outset of the research, providing a balanced analysis was critical to delivering a holistic exploration of the student experience. Although it was hypothesised that, in general, CDTs, DTPs and DTCs provided a supportive environment for students, some issues were highlighted. Two key themes, which arose in both interviews with staff and during the thematic analysis of the student survey, were competition and comparison. Students who were co-located with their cohorts revealed that there were times when the atmosphere led to students comparing themselves with others, leading to anxiety. However, the comparison also led some students to view this more positively, knowing others were experiencing similar issues. This is explored in more detail during the discussion.

1.2. Outputs

The following outputs have been produced during the study period. These include peer-reviewed papers, conference presentations, a co-authored blog, and a guide to writing for policy makers.

- Initial work based on the teaching experiences in a CDT, with particular reference to skills development: McGee, O., Forshaw, M., Hodgson, B., & Caughey, S. (2016). *Out of the Comfort Zone: Embedding Entrepreneurship in a Cohort of Computer Science Doctoral Students* Proceedings of the 2016 ACM Conference on Innovation and Technology in Computer Science Education, Arequipa, Peru.
- McGee, O., (2020). *Support, belonging and competition - Can Centres for Doctoral Training transform the postgraduate student experience?* UKCGE 2020 Annual Conference, Resilience in Postgraduate Education
- McGee, O., Hetherington, R. (2021) Doctoral Training Partnerships & Centres and how they influence the formative development of researchers, 6 May 2021, https://blogs.ncl.ac.uk/richardhetherington/2021/05/06/doctoral-training-partnerships-centres-and-how-they-influence-the-formative-development-of-researchers/
- Hetherington, R., McGee, O. (2021) Partnerships and Centres: can changes in doctoral research funding support equality in provision? Vitae Connections Week (2021) https://eprints.ncl.ac.uk/274994

Policy Guide output

- Antonopoulou, V., Chadwick, P., McGee, O., Sniehotta, F., Lorencatto, F., Meyer, C., O'Donnell, A., Lecouturier, J., Kelly, M.P., Michie, S. (2021, October 11). Research Engagement with Policy Makers: a practical guide to writing policy briefs. https://osf.io/m25qp/

1.3. Thesis Structure

Chapter 1 described the background and provided an overview of the findings and the motivation for the research study, justifying the gap in the current research landscape.

Chapter 2 provides an overview of the relevant literature, including a review of the UK's funding landscape for doctoral education.

Chapter 3 describes the methodological approach for the study. This includes a consideration of research paradigms and the rationale for the selection of mixed methods. It further reflects on the role of insider researchers, describing the process to mitigate potential ethical challenges related to this. As the work is intended to inform future decision making, a dissemination plan is provided.

Chapter 4 presents the findings, comparing student survey data with the Postgraduate Research Experience Survey trends and data from a survey of 209 students. These are grouped to explore topics including the benefits of the centres, opportunities provided to students and the benefits and disadvantages of funded doctoral centres, each of which are examined in Chapter 7.

Chapter 5 explores the results of staff interviews (n=11) with centre directors and operational management staff in centres.

Chapter 6 considers the research findings in the context of Wenger's (1999) Community of Practice framework. The findings are analysed to assess whether funded centres fit this framework or whether an expanded model would be more appropriate.

Chapter 7 presents an analysis of the key findings with respect to the research questions. The analysis is grouped into themes based on the student survey findings, staff interviews, funder reviews and current funding calls. The discussion results in a series of recommendations.

Chapter 8 provides recommendations for policy makers and higher education institutions pertaining to the distribution of funding and the creation of enriching and supportive environments for students. These are grouped into the following themes, drawn from the discussion chapter: additional funding to under-funded areas, distribution of funding to support non-funded students, and creating activities to support student wellbeing.

Chapter 9 summarises the conclusions of the thesis and outlines future research directions.

Chapter 2. Literature Review

The following chapter provides a holistic review of the literature relevant to the study, including any grey literature published concerning changes in policy reviews conducted by - and on behalf of - research funders.

2.1. Introduction

This literature review is grounded in a constructivist narrative, encompassing a thematic and historical analysis of the existing literature regarding the main themes of the research: postgraduate student experience and cohort development within funded doctoral centres, both distributed and those located in a single institution. Whilst a thematic and critical approach allowed for the exploration of historical discourse in my subject area, I acknowledge that this approach is susceptible to bias, as this can enable the researcher to omit papers which do not support their hypothesis (Rosenthal & DiMatteo, 2001). This review examines the social, economic, and political context of the UK higher education landscape in relation to doctoral funding. The research also includes a brief exploration of the results of the Advance HE Postgraduate Research Experience Survey (PRES) (Advance HE, 2022) to enable a cross-examination of arising issues in relation to the research topic.

Whilst this work is not intended to be transformative or advocative, it is situated in a fluctuating funding landscape, where changes to fee structures and the availability of opportunity may directly impact particular communities of learners. This demonstrates the need for a more exhaustive literature analysis, broadening the scope beyond academic publications. Drawing on examples from academic literature, UK policy briefings and learned societies' responses to doctoral funding reviews, this literature review, and research, address pragmatic and disciplinary issues surrounding the postgraduate student experience.

As the research progressed, commonalities with Communities of Practice (Wenger, 1999) were observed within the student data. This is examined in both this literature review and discussion.

The following literature review is structured into thematic sections addressing the core topic of the research and underlying constructs upon which the foundations of the study rest. These include issues around student support and wellbeing, the role of peers, the concept of belonging and how this relates to doctoral students, the UK doctoral funding landscape and communities of practice. I begin by considering the critique of educational research, the purpose of the doctorate in a landscape driven by economic and political decision making and the importance of research in context and policy / practice-based research.

The following sections provide the context for the current landscape of postgraduate education in the UK, taking into consideration previous reviews of doctoral provision from 2010 onwards. Whilst work conducted before 2010, including the Roberts (Roberts, 2002) report on skills, provided an underpinning context, this research covers the period from 2010 onwards.

2.2. Methodology

Cohen et al. (2011) state that a literature review should *'establish a theoretical framework'* for research. (Cohen et al., 2011:121). Therefore, conducting a thorough review, providing context, and including key historical texts, is critical to my research and mixed methods approach. To do this effectively, I considered both qualitative and quantitative research studies. As the rigid parameters - linked to the positivist approach, including the use of quantitative methods and systematic reviews - are limiting for my methodology, I have selected a critical analysis approach to develop my thematic narrative.

2.3. Information Sources and Search Parameters

I undertook a thorough literature search using Newcastle University's library system (Newcastle University, 2023), Google Scholar and Scopus. Whilst the majority of my literature search arose from peer-reviewed academic journals, I also used government sources, the UK Research and Innovation (UKRI) website (UKRI, 2023) and Google search to identify any relevant reports and grey literature relating to the evaluation of current funding of doctoral schemes in the UK. This included responses to reports and reviews and the details of prior funding and portfolio reviews carried out by UKRI. This also included

reference to Research Councils UK, the previous name for UKRI. I employed various methods, including Boolean searches with AND/OR, to ensure the incorporation of a variety of articles. I also used truncated versions of words to identify related themes where alternative versions of the word may have been used.

As my study incorporates Centres for Doctoral Training and Doctoral Training Partnerships, it was necessary to consider searches on each of these areas. The primary focus was on CDTs as these are the dominant structure funded in the UK and those which receive the highest level of investment, both currently and historically. Furthermore, they are often located in single institutions, with targeted topic areas and students collocated, enabling the exploration of cohort development. I also considered papers with the words PhD, Cohort and doctoral combined with student & experience.

The searches were categorised into themes to ensure that all areas of my research were covered. As the research themes emerged during the analysis, additional areas were introduced. These included peer learning, belonging, community of practice, social isolation, industry-focussed doctoral programmes, and the general doctoral student experience.

2.4. Filing and Categorisation

I began organising my literature using Newcastle University's e-shelf system to gather and categorise articles and moved to an EndNote library to collate my literature and enable more systematic searching and auto referencing.

2.5. Context

To investigate my research questions and situate my work within the context of the UK's higher education landscape, I supported my review of academic literature with a review of 'grey literature'. This included government reports, mid-term review outcomes by funders and responses to reviews by learned societies and professional organisations.

Firstly, Centres for Doctoral Training and Doctoral Partnerships are defined, with an overview of the differing structures that exist across centres. An overview of Higher

Education policy in relation to doctoral provision is then provided, followed by a brief exploration of previous funding reviews that have taken place by UK Research and Innovation and the responses to these. This is followed by a synthesis of the literature, including the purpose of the doctorate in a UK context, student experience, the role of peer interactions, notions of belonging and the formation and function of cohorts in doctoral settings.

The chapter concludes with an introduction to the chosen theoretical grounding for the research, the Community of Practice framework (Wenger 1999) and the current literature on the use of this model within doctoral environments.

2.6. Higher Education Funding Policy in the UK

The UK higher education landscape has seen a significant shift since 2010, with high levels of investment being made in doctoral provision. Approximately 20% of all UK-based postgraduate researchers are supported by UKRI (UKRI, 2022a), and there have been several rounds of funding to support the setup of DTCs (2010), CDTs and DTPs, through the component parts of UKRI. However, there is a disparity in the allocation of funding across the councils within UKRI, a topic explored in further detail within this chapter.
The funding agency UK Research and Innovation (UKRI), across its various research disciplines, provides more than £600 million of funding to Centres for Doctoral training. This is distributed through a variety of schemes, including DTPs, CDTs, and the National Productivity Investment Fund (Department for Business, Energy and Industrial Strategy (BEIS) (2018).

In addition, following the UK's exit from the European Union (EU) from 2021/22, the awards now enable institutions to designate up to 30% of studentships to international students, a change from a previous model of a fees-only studentship being awarded to students from the EU and European Economic Area (EEA) and no UKRI funding being available to international students. This section includes a review of UK policy in this area, including government and independent reviews, the changes in higher education funding and the allocation of funding across geographical and disciplinary areas.

2.6.1. *Funding for Postgraduate Research Students post-2010*

Whilst the UK research councils (see Glossary for full list) had already invested in doctoral training centres prior to 2010, the UK government commissioned the Smith review to review all aspects of postgraduate research training in the UK. The following section provides an overview of the findings and recommendations to set the context for the future direction of postgraduate research student funding. A comprehensive review of the postgraduate research funding landscape (Smith et al., 2010) was undertaken in 2010. The review made a series of recommendations for both the research councils and the higher education sector in relation to funding, duration of doctoral studies and structure of future training. This led to significant changes across the sector, although not all recommendations were actioned, and some variations occurred. Relevant findings and recommendations are considered in brief, in light of my own study, with further explorations provided within the discussion, where themes were echoed within my findings.

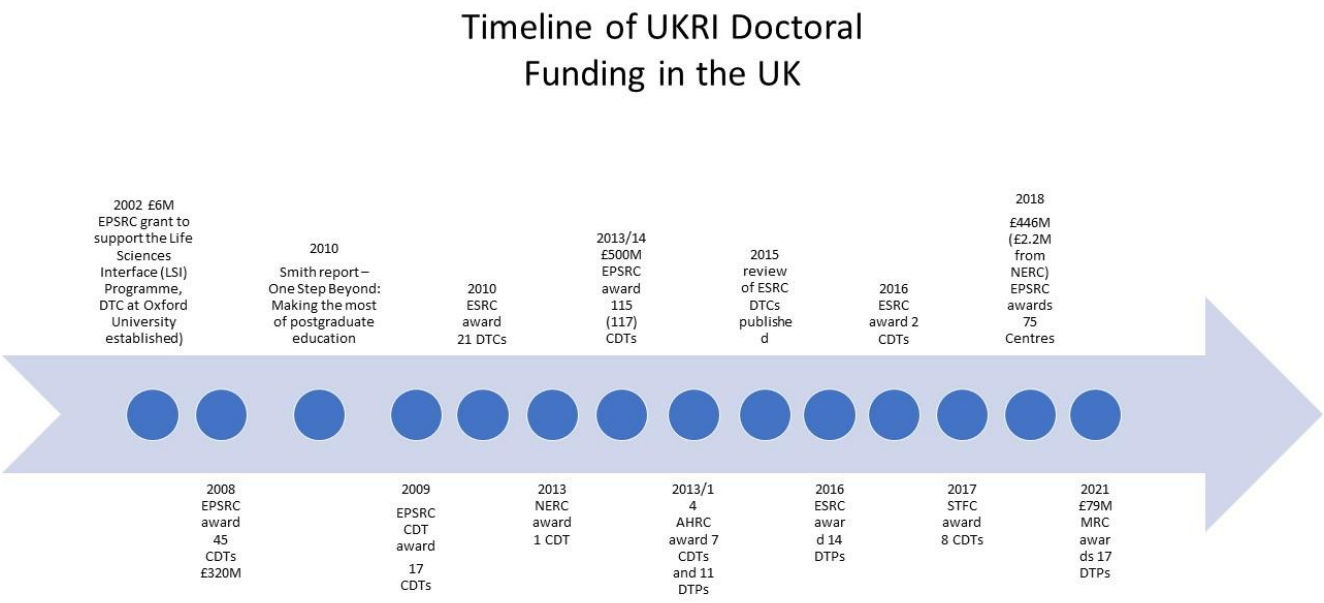

Figure 1 – Timeline of UKRI doctoral funding

The timeline of UKRI doctoral funding from 2002 to 2021 is shown in Figure 1 as an illustration of the movement towards a cohort-based student funding model.

2.6.1.1. Further Investment

The Smith (2010) review recommended further investment into doctoral training in the UK, including further funding for centres with a critical mass of students: *'HEIs should work together with the Research Councils to develop more multi-disciplinary Doctoral Training Centres.'* (Smith et al., 2010:82)

Following the report's recommendations, there has been further significant investment across the research councils into Centres for Doctoral Training and Doctoral Training Partnerships.

Although many doctoral centres are multi-disciplinary, there are relatively few cross-council initiatives. It could be argued that a continued need to meet the changing demands of government priority areas, and for centres to demonstrate a niche area of research expertise, could lead to a narrowed research focus within centres, neglecting the value of multidisciplinary working or the contributions of graduates from a range of disciplines. The continued assessment of research categorised by topic area in the Research Excellence Framework (Research England, 2019), the primary assessment model for research in the UK, potentially also acts as a barrier to developing truly multi-disciplinary work of benefit to all parties and disciplines. Further, some argue that CDTs aren't able to meet the requirements for a multi-disciplinary experience required for the modern workplace. (Hancock & Walsh, 2016)

Although the investments are a positive step forward in supporting research development in the UK, they also highlight issues of equity across scientific disciplines. The increased focus on Science, Technology, Engineering and Mathematics (STEM) subjects has led to a further disparity in funding between the Social Sciences, Humanities and the Arts for People and the Economy/Environment (SHAPE) and STEM subjects, as evidenced by the distribution of funding provided to the EPSRC CDTs versus the AHRC and ESRC centres. There have also been positive examples of cross-council, multi-disciplinary doctoral centres, including the RCUK (now UKRI) Digital Economy Programme. A further targeted call (led by UKRI in 2018) in the priority area of Artificial Intelligence resulted in a further 17 doctoral centres being

awarded; a total of £100M of UKRI funding, supported by an additional £100M funding from partner organisations. (EPSRC, 2022a) These centres covered a wide range of application areas with a multi-disciplinary focus, including speech and language therapy. However, many centres focussed on STEM disciplines and building technical and mathematical capacity.

2.6.1.2. Employment beyond Postgraduate Study

In addition, the Smith et al. (2010) report recommended that: *'HEIs need to be more pro-active in providing postgraduates with the opportunity to develop the core competencies they need to succeed in a competitive job market'* (Smith et al., 2010:43).

Graduate employability across the higher education sector is a key area of focus, and skills development as a core component of CDTs and DTPs is prominent and a feature of call outline documents for centres (ESRC, 2022; EPSRC, 2022b). However, a sustained focus on markets and employment could contribute to the widening disparity in funding supplied to Arts and Humanities or those areas which, to some, might not be associated with high value to the economy despite the significant contribution they make. Whilst it is important that these centres provide students with the relevant training to succeed beyond research, the focus on employment needs to be accompanied by an original contribution to knowledge.

In an examination of the grey literature, including funding websites and recruiting doctoral centres, there is an increased emphasis on the value of the doctorate to the economy. Perhaps this also reflects the increased marketisation of higher education and the potential role of graduates' participation in the wider labour market, though the data on this is limited (Hancock, 2021).

2.6.1.3. Duration of Study

Doctoral programmes in the UK are often shorter (typically 3-4 years full-time, 6-7 part-time) than those in other nations around the world and whilst this can make them an attractive option, the Smith et al. (2010) report suggests that institutions should be able to use discretion to allow longer periods of study where required: *'HEIs should use the*

flexibility afforded in funding from the higher education funding bodies and the Research Councils, to offer longer periods of postgraduate research funding and training where appropriate' (Smith, 2010:6). This was also reflected in commentaries relating to the ESRC review of Doctoral training centres in 2015 (ESRC, 2015b), where it was identified that particular disciplines, for example, economics, require a longer time period to complete research. Initially, this recommendation was not realised across the sector, with average funding for studentships being 3-4 years and a requirement for full-time students to submit within a four-year timeframe. However, this recommendation was further reiterated in the most recent review of ESRC (ESRC, 2021) doctoral provision and has now been implemented in the most recent ESRC funding call, recognising the value of longer time frames and the need to integrate additional experiences for students in the shape of placements and internships outside of their core research area.

2.6.1.4. Social Isolation

The Smith review (2010) recognised the issue of social isolation among doctoral students and suggested that the creation of centres for doctoral training could provide a solution to this issue. Indeed, this is a continuing theme in the literature, with several authors providing experience reports and observations on this topic with various methods proposed to mitigate this (Butterwick et al., 2012; Janta et al., 2014; Hutchings, 2017). This topic was a recurring theme within my research, as students repeatedly referred to their centre reducing isolation and providing support, alongside the value their cohort peers added to their overall experience.

Staff also referred to this within interviews, highlighting the value and uniqueness of the friendships developed within centres and peer support as a key facet of centres. This is further explored using the community of practice theory and situating interpersonal relationships within this framework, arguing that it is a key factor in the development and success of the formation of communities of practice in the doctoral training environment.

2.6.1.5. Transferable Training

Whilst it could be argued that the purpose of the doctorate is to enable individuals to undertake independent research, contribute to the research landscape and make a unique contribution to knowledge, this has been widely discussed and contested in the last two decades. Furthermore, the concentration of political will in developing employability in graduates has led to increased politicisation of the doctorate, linked to labour market outcomes. It was, therefore, unsurprising to see a focus on this in the Smith report, but it is important to note and reflect on the change of government which followed this, which also provides some context as to the focus on developing graduates and their contribution to the economy.

However, the argument for providing students with a range of transferable skills is compelling *'HEIs should ensure that transferable skills training is embedded as standard in the funding and design of all postgraduate research programmes.'* (Smith et al., 2010:6) This recommendation has been embedded across the higher education landscape, with the introduction of the Vitae Researcher Development Framework (Vitae, 2015) (and associated resources) and individual programmes across HEIs. This is particularly relevant for CDTs, DTPs and DTCs, where additional resource is available to support student development. During my analysis of the sector, I noted that a considerable proportion of the centres provide a taught year combined with additional skills training throughout the duration of the doctoral programme. My student survey and subsequent interviews with staff identified that formal training is often supplemented by writing retreats, industry engagement events and other activities, alongside student-organised events such as reading groups and internal seminars. To what extent these supplementary events can be replicated by institutions without significant funding is explored further in the discussion. However, the move across the sector to provide students with additional learning opportunities is undoubtedly positive.

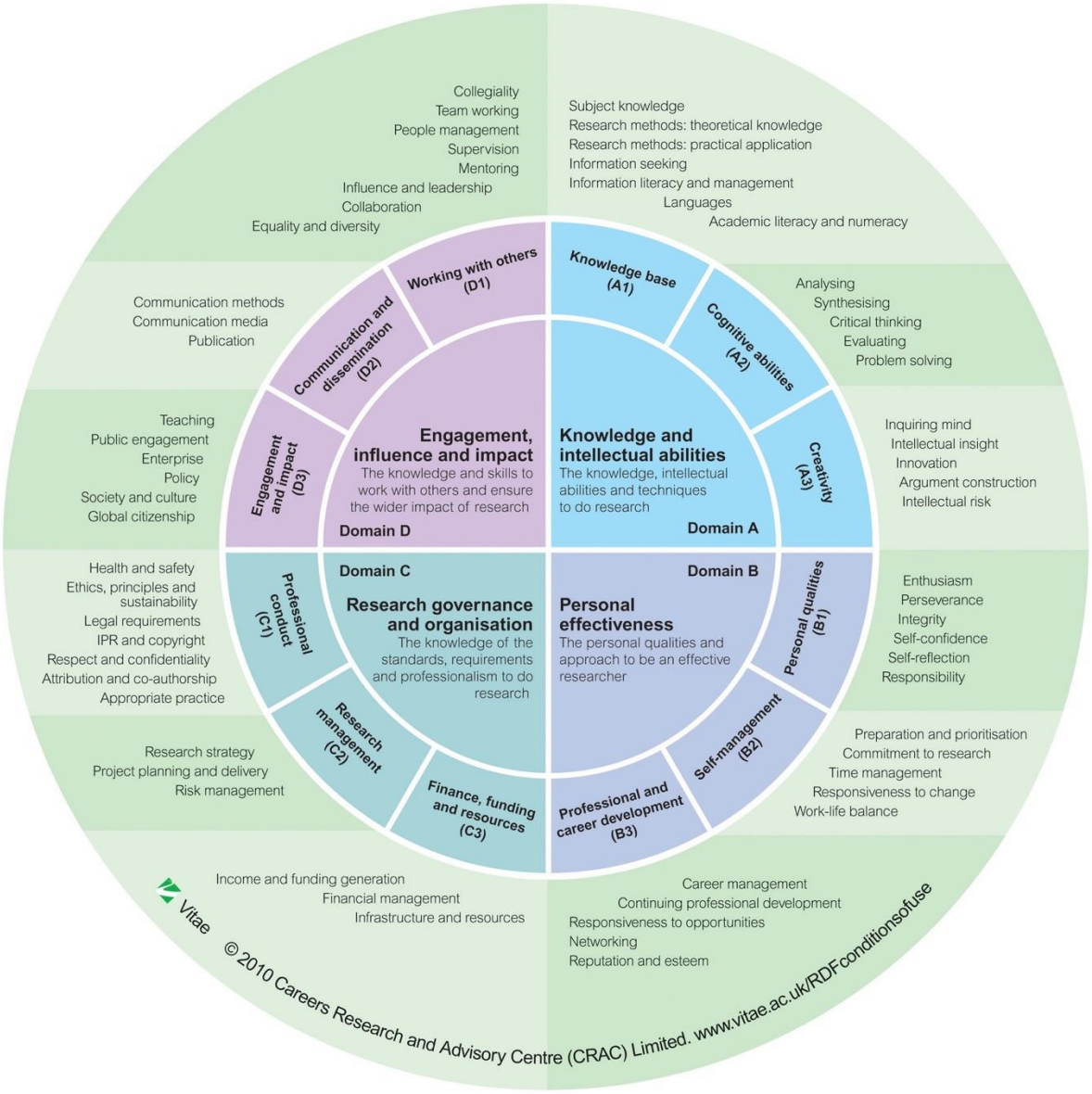

Figure 2 – Vitae Researcher Development Framework (RDF) - (Vitae, 2015)

2.6.2. *Postgraduate Doctoral Loans*

Following the creation of postgraduate loans, the Department for Education (2017) launched a consultation into the creation of loans for doctoral students. However, there is scant evidence in the literature as to the impact this had on the current doctoral landscape. Evidence from the postgraduate loan scheme for Masters students showed a positive move towards narrowing the inequalities gap in education (Mateos-González & Wakeling, 2020). However, the extent to which this has translated to postgraduate research students is yet to be researched. Whilst there was an increase in the number of enrolments following the introduction of doctoral loans, a survey carried out with students (Bennett, 2020) showed

that students in the arts and humanities were more likely to take out these loans. However, they also reported the funding levels as being insufficient to support the cost of living and a large number planned to continue working throughout (Bennett, 2020). This also points to the wider significance of the funding available through doctoral centres.

2.6.3. *Centres for Doctoral Training, Doctoral Training Partnerships and Doctoral Training Centre Structures*

Whilst the number of CDTs/DTPs is rising, the structure and design of the centres are largely defined by individual institutions. This has led to a wide range of structures, course provision, differing levels of initial qualifications and training and the level of funding received by students to undertake additional activities. Below, an overview is provided of two current schemes as an example of differences across two funders within UKRI: ESRC and ESPRC.

In general, research councils have afforded institutions autonomy on their training structures within CDTs and DTPs, with many opting for the 1+3 model or a variation on this, where students undertook formal assessed learning in the first year of their programme. They then moved on to their PhD studies in year two, with approximately three years allocated to the research study. This model was also used in ESRC DTPs, though the institutions in receipt of funding had to ensure that their programmes met a range of training outcomes in relation to the ESRC's 2015 guidelines including a stipulation that *'A rigorous annual training needs analysis (TNA) must be undertaken for all ESRC-funded students'* (ESRC, 2015a:4). The ESRC also state an expectation of a minimum standard on research methods for students, though acknowledge that each student would require a tailored approach appropriate to the discipline they are studying. They further state that: *'When undertaking assurance checks we will be monitoring students against these requirements and ROs* [research organisations] *will be expected to provide the evidence on which they have robustly assessed the students' prior training'* (ESRC, 2015:8)

Following the review of the PhD in the Social Sciences in 2021 (ESRC, 2021), ESRC significantly reviewed their guidance, with a renewed set of guidelines in 2022 which

included the addition of a research in practice component and changes recognising skills gaps in current provision for social science students. The new guidelines recognise the *'importance of 'Research in Practice' as a core component of the doctoral experience for all ESRC funded students, including the need for placement opportunities for all'* (ESRC, 2022:4) The language around training needs analysis was also adapted to *'development needs analysis'* (ESRC, 2022:5) to reflect a shift to a broader holistic understanding of the needs of students. It is important to note here that each research council within UKRI stipulates different expectations on their funded centres though all expect a minimum level of training, with EPSRC's guidance in the latest call for CDTs stating: *'a formal, assessable programme of taught coursework, which should develop and enhance, for example, technical disciplinary and interdisciplinary knowledge, as well as broadening skills including entrepreneurship, commercialisation, responsible innovation and environmental sustainability. EPSRC has no specific guidance on what constitutes a formal assessable programme, and research organisations can design these in line with their existing policies and practices'* (EPSRC, 2022c:1). However, EPSRC do make an explicit reference to the involvement of partners in the co-creation and delivery of the centres, suggesting a strong emphasis on partnership working beyond the expectations of cash and in-kind contributions: *'a significant commitment to and support for the training environment by the hosts and partners including appropriate co-creation and co-delivery of the centre'* (EPSRC, 2022c:1). Whilst ESRC also acknowledges the importance of these partnerships, particularly in the introduction of the *'research in practice'* scheme (ESRC, 2022), there is no expectation of partners to be involved in the co-design of centres, though this is implied, *'Partnerships are also encouraged to: consider the strengths of regional partners to build connections in local communities and to support them to deliver the ESRC objectives.'* (ESRC, 2022:1) in addition to the continuation of collaborative studentship opportunities.

As well as differing their structure and design, there is also a difference in the level of funding allocated by each research council to doctoral training programmes, outlined in the following section.

2.6.4. *Allocation of Funding by Research Council – Priority Areas and Disparities*

Whilst exploring the topic of this research, I examined the funding provided across the research councils in the UK (formerly RCUK, now UKRI) and the differences across the funding councils within UKRI. Funding for postgraduate students is also provided by other organisations such as the Wellcome Trust (Wellcome Trust, 2023) and the Leverhulme (Leverhulme Trust, 2023) (£13.5M in 2020). However, as they do not fund centres, they are introduced for context but not considered in depth in the analysis.

Whilst disciplines and subject areas within the remit of the Engineering and Physical Sciences Research Council (EPSRC) have seen investments of approximately £950 million, (EPSRC, 2019) other disciplines have only a fraction of this funding leading to disparities across the post-doctoral landscape. In addition, whilst some research councils provide awards of three years (e.g., EPSRC), others support students for 3.5 years (for example ESRC), furthering the disparity across the sector. This is also echoed by the Wellcome Trust, which provides three years of funding for Humanities and Social Science doctoral studentships and 4 years of funding for science doctoral programmes, running contrary to reports on longer funding required for social sciences (Wellcome Trust, 2023). In contrast, Leverhulme (Leverhulme Trust, 2023) offers four years of funding but with a fixed amount of £90,000 for the award per student.

Within the UKRI research councils, whilst the Engineering and Physical Research Council (EPSRC) have focussed on the CDT model, other funders have favoured DTPs, with Biotechnology and Biological Sciences Research Council's (BBSRC) offering almost entirely focused in this area until 2017. BBSRC's focus for their DTPs is to *'deliver skills for impact across the UK economy'* (UKRI, 2023a, para. 5). ESRC confirmed that from 2017 onwards, their studentship funding would be delivered via CDTs and DTPs.

Alongside Doctoral Training Partnerships, BBSRC were also allocated additional studentships from the government's National Productivity Investment Fund (NPIF) (UKRI, 2023a). This enabled funding for a further 105 studentships aligned to areas of the Industrial Strategy (UK Government, 2017). The initial projects funded in 2017 were partnerships between

academia and industry. Studentships awarded in 2018 were linked to the priority area of Artificial Intelligence (AI) and Data-Driven Economy, with a minimum of 10 of 31 studentships to be allocated to AI.

Alongside awarding CDTs and DTPs, the AHRC also offered smaller awards to UK Cultural institutions via the Collaborative Doctoral Partnership (CDP) scheme, which *'gives non-HEI (non-higher education institutions) partners with a proven track record in postgraduate research the opportunity to apply for a cohort of a minimum of three studentships per year over a three-year period'* (AHRC, 2022). The awards aim to build research capacity in non-HEI organisations and strengthen collaborations across the cultural sector.

The Economic and Social Research Council (ESRC) have been funding doctoral centres since 2010, when they launched a network of 21 doctoral training centres and have gradually moved towards a focus on DTPs and a small number of collaborative CDTs with EPSRC.

2.6.5. *Exploration of Government Priority Areas and Impact on Different Disciplines*

As well as a range of benefits already offered by holding a UKRI studentship, there are also additional external opportunities only available to students with UKRI studentships. These include UK Parliamentary Office for Science and Technology (POST) policy internships (2022) which require students to have full funding and support from their centre, thus limiting opportunities for external engagement for self-funded and non-UKRI funded students. Additionally, opportunities for internal exchange programmes and fellowships are also offered to students with existing funding. This creates a further disparity for students in some scientific disciplines, where funding is less readily available in an already competitive funding landscape.

2.6.6. *Funding allocation by Higher Education Institute – barriers to participation?*

The allocation of funding for doctoral training from UKRI has seen elite universities and those within the Russell Group disproportionately advantaged through previous CDT funding calls; in one round of funding, 75% of the allocation was awarded to Russell Group Institutions (figures calculated from EPSRC funding announcements). The Russell Group is an

organisation which represents *'24 leading UK universities'* (Russell Group, 2023). Institutions within the group are classed as research intensive and *'world-class'* and *'produce 68% of the UK's world-leading research (worth £34bn a year)'* (Russell Group, 2023). This is further compounded by the ratio calculations used to award quality-related (QR) funding following the Research Excellence Framework (REF) exercise. Whilst there is the argument that these institutions also provide a world-leading research environment, they could potentially provide a barrier to participation for students from disadvantaged backgrounds. (Wakeling & Laurison, 2017; Pásztor & Wakeling, 2018). This was further highlighted as a concern by the British Sociological Association (2014) *'the disproportionate exclusion of post-1992 universities from the DTC arrangements contributes to making it less likely that high-achieving students from such universities will be attracted to postgraduate study or that the few who are so attracted will get advice and support in making applications'* (British Sociological Association, 2014:4).

This is not only evident with DTCs but is perpetuated in the funding awards for EPSRC CDTs, where 61 of 75 were awarded to Russell Group Institutions (figures calculated from openly available data). Whilst DTPs often comprise a large consortium of universities, all partners do not necessarily have the opportunity to participate fully and may not be awarded any students during the lifetime of the DTP. This can therefore lead to some institutions being unable to realise the value of a DTP partnership and increase their research capacity.

A report by Harrison et al. (2015) also highlighted how existing relationships between senior figures in Russell Group institutions and those with global high rankings further served to discriminate against institutions outside of this closed group. This was with particular reference to regional clusters of activity used to gain large amounts of research council funding, for structures including doctoral training partnerships and centres for doctoral training. They found that: *'Pre-1992 universities dominate research and equipment-sharing consortia, and Doctoral Training Centres and Doctoral Training Partnerships.'* (Harrison et al., 2015: 9). However, it could be argued that such structures - whilst limiting participation and access - enabled the investment of funding into new geographies outside of London, Oxford, and Cambridge. Harrison et al. (2015) also use maps as a visual presentation of

funding allocations, by the range of existing alliances that exist across higher education institutions (HEIs). This is followed by a discussion highlighting that due to the timescales of funding competitions, that many higher education institutions are 'locked out' for at least five years. Further compounding this exclusion, is that it is challenging to then develop a relationship with a long-standing group of collaborators.

This issue of access and exclusion of some institutions was also recognised as a key area of concern in the 2015 review of ESRC funding allocations, due to a change in the threshold for institutions holding these awards. *'We are concerned that the new structure which has actually emerged is a very strongly two-tier one with relatively impermeable boundaries and that these boundaries are likely to become even more fixed over time as existing DTCs develop and consolidate their roles. For those institutions outside the DTC network, the barriers to entry now appear very formidable and discouraging' and recommended that DTCs should be evaluated on 'Measures of access and participation by disadvantaged and students following nonstandard routes into postgraduate study.'* (ESRC, 2015b)

This is also reflected in other equity, diversity, and inclusion measures, particularly related to ethnic background. A 2022 report showed that '*Ethnic diversity is still significantly higher as a percentage of the PGR population at universities outside of the Russell Group. These universities have also seen a higher percentage increase in representation from racialised groups since the last report, although overall PGR population numbers are much smaller*.' (Smith McGloin & Wynne, 2022:7) This could support a move to further distribution of funds across a wider group of higher education institutions to support the development of their research environments, thus enabling students access to a wider group of research peers.

2.7. Existing Reviews of CDTs, DTPs and DTCs

Within individual research councils and UK funders, there have been several reviews of doctoral provision; however, these reviews have not specifically focussed on the benefits of the cohort environment. In addition, some large-scale reviews relied entirely on self-reported data and assigning scores / ranking to individual centres, without speaking to students. The following section provides an overview of reviews undertaken from 2013-

2022 but omits reviews still in progress. The reviews are structured by research council area with common themes identified in the concluding section.

2.7.1. *AHRC Review 2021*

The Arts and Humanities Research Council commissioned an independent review of doctoral training in the arts and humanities in 2021, which was delivered by Vitae and the Careers Research and Advisory Centre (CRAC). This differed from other reviews in that AHRC has requested that the report should *'provide options for AHRC's future investment in terms of support for A&H doctoral provision'* (AHRC, 2013:47). It therefore provided a range of scenarios from the non-continuation of AHRC-funded doctoral provision to moving towards a studentship and fees only for studentships without a wraparound centre structure around this, for example a CDT or DTP. The study encompassed a range of data collection methods including scoping interviews, roundtables, and institutional surveys. The resulting report demonstrated support for AHRC to continue to fund doctoral provision directly. '*In providing support for fully-funded studentships, many expressed the view that this meant that some PGRs were able to undertake doctoral research who would not otherwise have been able to do so, which could enhance the total diversity of PGRs*.' (AHRC, 2023a:16). With regards to widening access routes it was also noted that: *'Where a DTP had discretionary funding for Masters, this was seen as an important mechanism to increase diversity'* (ESRC, 2022:19). However, the report acknowledged challenges of diversity, access, and two-tier systems, both for students and institutions in relation to the allocation of funding and suggested the involvement of a wider group of institutions providing there was equity in the model.

The study also found that there was resistance to the mandatory introduction of student placements, citing that many students already had significant work experience and that placements were limited by the geographical location of students, for example for those outside of London or the South East of England (AHRC, 2013:40). Furthermore, AHRC currently funds Collaborative Doctoral Partnerships with external organisations, where students are based within external organisation and *'these students have the benefit of full immersion in an 'external' (i.e. non-HE) culture which gives them a stronger understanding*

of such cultures and enhanced employability skills.' (AHRC, 2013:47). This model was seen as sector-leading, and the report recommended that further funding is invested into this.
In relation to the benefits of a cohort environment this was viewed as positive but that a critical mass of students was required to make this a beneficial experience for students. Suggestions were made on increasing the number and types of activity, alternating between in-person and online events.

Further recommendations resulted from the report including the suggestion of widening access of CDT/DTP provision to all students in arts and humanities disciplines. Selected here are those of significant relevance to this research: *'• All AHRC-funded doctoral training would be through cohort-based models;*
•All AHRC-funded doctoral models would incorporate collaboration – so that doctoral students can experience a range of academic and other environments; Wherever possible, those models would include active participation of non-academic partners so the doctoral student can benefit from as much 'external' exposure as possible (through external supervision, working with an external partner, undertaking a placement, training/development opportunities etc.)' (AHRC, 2023a:43)
The above recommendations would ensure that future provision provides environments for students that value peer support, cross-learning, and the opportunity to access external opportunities whilst maintaining their discipline-specific expertise. Further recommendations also considered access to doctoral funding with a specific focus on flexibility of provision for part-time learners and explicit steps to increasing diversity of doctoral cohorts. AHRC are currently considering the outcomes of the report (AHRC, 2023b) and until recently (April 2023) have not provided further details on how the recommendations will be embedded in future provision. However, the AHRC Chair Christopher Smith outlined the AHRC's future approach in a blog post in February 2023:
'Informed by the engagement with the sector through the CRAC/Vitae report, the principles we will hold to as we design and deliver future doctoral provision are as follows:
•widening opportunities and welcoming innovative and diverse routes to doctoral training enabling collaborative learning and peer support

•*enabling professional development and expanded skills capacity for the UK's future workforce*

•*reducing bureaucracy*

•*supporting and advocating for arts and humanities doctoral students within UKRI's Collective TalentFund to deliver doctoral training in accordance with the AHRC vision'* (UKRI, 2023b)

Whilst these commitments are positive, they also have implications for the current models, namely that AHRC participation in DTPs would decrease but that this investment would go towards Collaborative Doctoral Partnerships and CDTs, details of which are still to be finalised. The AHRC's report and recommendations also have wider impact on the sector, and the focus on EDI and widening access both featured in the ESRC and EPSRC reviews, as detailed in the following sections.

2.7.2. *ESRC reviews (2015-2022)*

The ESRC conducted a review of their doctoral training provision in 2013. A further external review was conducted in 2015, and the most recent review was in 2021. Each review outlined a series of challenges and highlights of doctorates within the social sciences.

The 2013 review received widespread attention from academic and learned societies who were critical of the review process. This was potentially partly due to a 12% reduction in ESRC funds from 2010 onwards, which led to an overall reduction in the amount of funding available for doctoral scholarships. This supports my assertions that particular disciplines and funding councils, within UKRI (formerly RCUK) being negatively impacted by political thinking and perceived attribution of value to more 'scientific' disciplines.

Whilst the ESRC assessment did not make reference to evaluating the cohort model or the beneficial impact of this on students, students were included in their evaluation and asked to provide oral evidence. Notably, the perspectives of students were not explicitly included in the EPSRC mid-term review of 2016. However, there was an opening question on cohort development. This was further supplemented by the inclusion of requested case studies and

questions on how student feedback was incorporated, but no direct interaction with students and the report relied on the leaders of the centres to report on this.

However, the following quote does identify the benefits of cohorts as a theme:
'Student led activities, especially the national first year and final year conferences, are also a very encouraging development which is doing much to enhance the student experience, strengthen their commitment, promote a greater exchange of knowledge, and help build a strong sense of being part of a national cohort of new social scientists. One DTC commented that there was nothing like this in place before and the conferences were helping to build a community of postgraduates across the UK to network and receive advice and guidance.'
(ESRC, 2013)

However, a further review in 2015 (ESRC, 2015) did not include cohort and peer learning as a key recommendation in the assessment of DTCs, though this has since been included in future calls for centres. In 2020 ESRC commissioned a further independent review into the PhD in the Social Sciences, the outcome of which was published in 2021 with a series of recommendations. ESR responded to these by outlining a focus on four key areas they would address: research skills; employability skills (introducing a research in practice / placement component in all DTPS / CDTs); duration and form of the PHD (increasing this to 3.5 years as standard); equality, diversity and inclusion with particular relevance to widening participation in recruitment and ringfencing studentships for students from under-represented groups. The ESRC response is important in a number of ways, as it demonstrates a shift in funded social science PhDs towards a focus on employability outcomes and integrations with external partners. However, the report notes that *'current DTP and CDT targets for engagement with collaborative activity are relatively low, with a target of 30 per cent collaboration for each cohort.'* (ESRC, 2021:32) This will therefore require a significant change in operations and strategy for CDTs and DTPs, though this is widely encouraged in CDTs funded through EPSRC and therefore cross-funder learning will be crucial. Furthermore, the recognition of a lack of diversity in student cohorts and putting in steps to mitigate this represents a crucial move towards bridging the gap in access to funded doctoral places, where learning could be drawn from a wide range of initiatives such

as the Leading Routes project, Yorkshire Consortium for Equity in Doctoral Education and other jointly funded initiatives established to address the gap. Further learning could be built upon from relevant literature, for example, Wakeling and Laurison (2017) whose research found that social inequalities continue to exist at postgraduate level and have *'widened over time'* (Wakeling and Laurison, 2017:552). This existing work could be supplemented by case studies and examples from long-standing widening participation initiatives in undergraduate and postgraduate taught education.

2.7.3. *EPSRC Reviews (2016-2021)*

EPSRC CDT Mid-term review 2016

The Engineering and Physical Sciences Research Council (EPSRC) undertook a large-scale review of their CDTs in 2016, during which they assessed the success of individual centres via a survey sent to CDT directors. This followed a similar structure to previous reviews, however a resulting Freedom of Information Act request led to the scores of each centre becoming publicly available, alongside the evaluation framework (EPSRC 2016).

The evaluation covered a wide range of questions designed to assess centres against the ordinal aims and objectives stated in their application and against criteria set by EPSRC. However, whilst this survey included some questions on the student experience, students were not involved in the assessment of centres. Although several questions were asked on this topic, this relied on self-reporting from centres.

'1.2.1 In particular comment on the added value of the cohort based approach at your CDT? How have you built a coherent cohort with core and incorporated students? '

1.3.2 How have you used student representation and student feedback to shape the running of the CDT?

1.3.3 Describe your process for incorporating student feedback into the running of the CDT and any benefits that have been realised?' (EPSRC, 2016:1)

Institutions were also asked to supply case studies relating to students' work. Given the focus on cohort activities, a student survey accompanying mid-term reviews would have provided a more-rounded perspective on the centres. This thesis demonstrates the importance of incorporating student feedback into future funding reviews. As the recipients of funding and learning they are key stakeholders, and their feedback could be used to

improve the student experience both within and outside funded centres. A further in-depth review and consultation exercise was undertaken by EPSRC in 2020, detailed below.

EPSRC review 2020

EPSRC undertook a comprehensive review of their funded doctoral education in 2020, with final report published in 2021. The review including the perspectives of students, industry partners, universities, and other stakeholders to draw together a holistic picture of the environment as it related to their funded provision through Doctoral Training Partnerships (DTPs); Centres for Doctoral Training (CDTs); and Industrial Collaboration Awards (ICASE). The review culminated in a set of 18 recommendations, several of which echo those within the ESRC and AHRCs reviews relating to widening access to external opportunities (including public engagement) and ensuring diversity of access for students applying for EPSRC studentships.

Summary

Each of the funder reviews, although different in scope and focus and distributed across several years, emphasised the importance of the cohort model in doctoral education. Each also recognised the pressing issue of increasing diversity and widening access to funded doctoral opportunities. The following section provides an overview of the background to doctoral education funding in the UK.

2.8. Higher Education Doctoral Funding in the UK and Development

The funding for doctoral education has been evolving over the last two decades with the introduction of doctoral training centres, some of which pre-dated the recommendations of the Smith (2010) report, as covered in Chapter 1. However, there was a large growth in funding following this point, with ESRC establishing 21 Doctoral Training Centres in 2010 (UKRI, 2022a). At this stage individual studentships were also available through a range of schemes and embedded within larger research grants. This large block grant funding was implemented across the research councils and referenced in submissions to 2010 spending review and research council priorities in 2010 (UKParliament, 2010) including in the setting out of ESRC's strategic aims which stated the council would *'concentrate its PhD training in*

the most excellent centres. This will include targeting some students towards key strategic areas' (ESRC, 2010). Whilst this signalled the move towards further investment, the largest investment was made by EPSRC over the following decade. Alongside the additional investment a joint statement was made around the expectations for doctoral training, including programmes with joint industry funding (Vitae, 2013).

These investments marked a larger shift in the structure of doctoral education in the UK, with an increased focus on both the development of skills and employability. Whilst this move also led to the development of a framework to support postgraduate researcher development, arguably it also moved the emphasis away from the traditional purpose of the doctorate.

2.9. Purpose of the Doctorate

To situate my findings in the wider context of doctoral education it is necessary to firstly consider the literature on the purpose of the doctorate, with particular reference to the increased emphasis now placed on skills development doctoral training programmes.
As this research focusses on the attributes of doctoral training centres and considers the additional opportunities provided, this section also discusses the purpose of the doctorate in light of the focus on employability within higher education.

The purpose of the doctorate has shifted with the advent of the knowledge economy and the acknowledgment of doctoral graduates' importance to the economy and research base (Department for Education, 2017) although the central tenet of producing high quality research remains (EPSRC, 2022b). It is the focus on skills development (Vitae, 2015) and employability where the largest shift has taken place. Furthermore, postgraduate education is not immune to global forces and actors (Nerad & Heggelund, 2008) with some arguing for new methods of assessment (Spronken-Smith, 2018) that take into consideration prior experience of learners. However, the model has not shifted significantly; *'While talk of different kinds of professional doctorates still exists, most doctorates remain unclearly differentiated from the traditional PhD*.' (McAlpine, 2017:69). It could be argued that CDTs and DTPs have the opportunity to prepare graduates for wide range of careers, both within

and outside of academic institutions. This could be realised through their specialised programmes, focus on external engagement and the funding provided, that affords additional opportunities for students.

The shift to increasing doctoral programmes with integrated skills-based curricula has been slowly developing over the last twenty years, though this previously focused on research skills development in some disciplinary areas, for example the development of ESRC's expectations.

In the last decade, political will has driven higher education towards a focus on employability, with the continued expectation of rigorous and high-quality research outputs. Could this lead to a potential mismatch across education and industry? A British Academy report published in 2020 noted *'Even within sectors and businesses, many roles are likely to evolve rapidly as specific tasks are affected by technological and other changes, including the introduction of more flexible, virtual and open workspaces'* (Morgan Jones et al., 2020a:24).

A recent rapid evidence assessment of the literature conducted by Stevenson et al. (2021) related to doctoral education in science and engineering found that there was *'mixed evidence on the potential added value to employers when hiring doctoral graduates compared to graduates with an undergraduate degree'* (Stevenson et al., 2021:4). However, the review was limited by the number of studies situated in the UK and recognised this as a challenge, suggesting further longitudinal data on graduate outcomes in this sector would be valuable.

As centres for doctoral training and their counterparts, doctoral training partnerships and doctoral training centres, are all expected to have an integrated (and in some cases formally assessed) programme of training, we would expect this to have an impact on the PhD programme itself. Yet many still retain the same research project and thesis, with examination by viva, and a trajectory with little movement towards a new model of assessment despite the increased focus on industry-ready graduates. One notable exception

is the EPSRC doctoral mobility pilots with a focus on a combined model of thesis and modular based study (University of Southampton, 2023). However, due to early stages of this funding there are no current published evaluations of the programmes. To compound this further in the UK, we do not have sufficient data on doctoral student outcomes and employment trajectories to track the impact of the programmes effectively (Hancock, 2021). *'Interestingly, evaluation of the effect of transversal skills training has been minimal, though a recent study (Jackson and Michelson, 2015) suggests scant evidence of its influence with regards to career success'* (McAlpine, 2017:69)

Furthermore, there has been little research on the perspective of students and the shift to focus on doctoral graduates as future leaders or active contributors to the economy, despite their integral role in the stated aims of centres, funders, and industry partners.

2.10. Student Experience

The student experience has been a topic which has risen in prominence over the last decade, perhaps partially driven by the marketisation of higher education and the need to provide a perceived 'value', but also the acknowledgment of student mental health and wellbeing. The introduction of the Teaching Excellence Framework (TEF) and focus on student experience, has also brought this into sharp focus for institutions as TEF's guidelines include: '*The student experience aspect, which focuses on the extent to which teaching, learning assessment and the educational environment deliver an excellent educational experience for the provider's students.'* (Office for students, 2023:30) However, the consideration of student experience extends beyond TEF requirements and intersects with a wide range of factors across a student's journey through higher education. A systematic review by Tan et al. (2016) highlighted that whilst there was no one definition of the student experience, it incorporated elements of activities beyond the boundaries of the classroom and includes both academic and non- academic experiences. This is an important consideration with CDTs and DTPs where student will be engaged in a range of extra activities including placements and interactions outside of their research project or core curriculum and training activities.

The experience of students was further brought to the fore by the COVID-19 pandemic, and the impact this had on both the postgraduate student experience (Goldstone and Zhang, 2022) and across higher education more generally, with some focus on UK students from underrepresented groups (Sanderson et al., 2021). It is key to note here that many recent articles (2020-2023) with reference to the pandemic focus on the specific topic of online, virtual, and remote learning rather than the broader student experience.

The term student experience can encompass a wide range of parameters and measures, all relevant for students within funded doctoral centres. These include wellbeing, peer interaction, belonging and the concept of community.

Of particular relevance is the role that doctoral training centre environments could play in improving key elements of a student's experience or journey through their doctoral journey. Each of these aspects is considered in the following section.

2.11. Wellbeing and Student Experience

There is a long-recognised challenge pertaining to wellbeing and mental health in postgraduate research students, with increasing focus on this across the higher education sector (Beasy et al., 2021). In the UK, increased funding has been directed towards this from 2018 (UKRI, 2022a). Large scale evaluations of these schemes concluding that PGR mental health should be prioritised within institutions. The resulting evaluation report of the schemes recommended that staff should act as role models with reference to work life balance and that professional staff '*should consider how they can develop and sustain PGRs' peer support networks'* (UKRI, 2020:4) and that wellbeing activities should be included in workload models and other internal processes.

A large-scale review of the literature conducted by (Sverdlik et al., 2018) analysed 163 articles and considered what factors can influence wellbeing and completion of doctoral students. These included the role of supervisors; interpersonal relationships and the institutional support provided. They noted the importance of internal departments in inducting students and providing opportunities for peer engagement.

Additionally, in 2019 a Nature article (Woolston, 2019) described the findings of an international survey of 6,000 PhD students, in which 36% of students communicated that they had sought help for mental health related issues linked to their studies (Woolston, 2019).

Whilst staff in funded doctoral centres are likely to have pastoral support as a key part of their remit (it is a funder requirement to develop cohort activities), increasing peer support activity across institutions could have a significant negative impact on workload and requires funding to operationalise these activities. Peer interaction and the potential impact of this within educational environments is considered in the following section.

2.12. Interaction with Peers and Peer Learning

Doctoral study is traditionally quoted as being a 'lonely journey' with some accounts reporting *'Education and research typically focus on individual achievements. Students achieve a PhD on the basis of their unique contributions to their field and discipline; there are no PhD awards for group effort.'* (Tan, 2022:1)

However, communities of peers and institutional contacts do have the ability to challenge this discourse and change the isolating environment for students. In their exploration of the hidden curriculum in doctoral education, Elliot et al. (2020) argue that '*Supervisors, peers, academic friends, and the wider social network of family and friends serve as doctoral researchers' co-travellers in intellectually challenging and emotionally charged journeys.*' (Elliot et al., 2020:129).

Although there are numerous positive benefits of supportive peer environments, negativity within these can also spread and proliferate if not managed effectively (Mantai, 2019). This is particularly challenging in cohort environments if there is an expectation for students to remain in these and could lead to potential disengagement in the cohort.

The role of informal peer learning has not been extensively researched in doctoral environments. There is an opportunity to explore this further in the context of funded doctoral centres, drawing on the co-located cohort activities and shared learning spaces. Funded doctoral centres, where students and staff are situated together, could provide the opportunity for the cognitive apprenticeship model to be implemented. The aim of cognitive apprenticeship is to make explicit the logic and strategies that experienced practitioners use when they apply their knowledge to complex, real-world tasks (Collins et al., 1991). However, there is little evidence that this practice currently takes place in centres. Doctoral centres can provide an environment for this due to the nature of the structured training and activities and in some instances the use of mentoring across cohorts alongside formal research supervision models.

Several articles have explored the role of cognitive apprenticeship in doctoral learning settings though not in the specific context of UKRI funded centres, nor situated in the UK. (Raineri, 2015; Tolman et al., 2019; West et al., 2016; Zhang & Hyland, 2021). Raineri (2015) provided a critical perspective on the role of established academic scholars in perpetuating the environment surrounding outputs and assessment in postgraduate research environments, though the learning from this article is applicable to doctoral centres in relation to the development of programmes which provided a holistic educational experience for students.

Whilst Zhang and Hyland (2021) primarily focussed on cognitive apprenticeship for the development of writing skills, West et al. (2016) focused on the role of coaching in doctoral student development and the role of peers and academic staff in this.

Whilst the cognitive apprenticeship model could be used to explore the deliberate and structured learning activities, and the informal peer learning in centres, there was little evidence that this was a conscious process. However, there are similarities which appear in both peer learning and cognitive apprenticeship approaches; the notion of learning from others and being active participants in learning, also supported within the community of practice framework (Wenger, 1999). The community of practice framework as a model for

doctoral cohorts is further explored in Section 2.15, following a consideration of the role of belonging in relation to the doctoral student experience and the creation of communities.

2.13. Belonging in Higher Education

Drawing on the Community of Practice model and literature on cohorts within education, the notion of belonging features as a core facet of each model. Belonging has long been considered a key component in several overall wellbeing and personal measures, including in Maslow's Hierarchy of Needs (Maslow, 1954). Specific benefits of belonging include creating a sense of identity as an academic scholar, (Ennals et al., 2016); reducing burnout in students (Puranitee et al., 2022), creating wellbeing (Morris, 2021) and student retention (Pedler et al., 2022).

However, *'there is no single agreed definition of belonging in higher education'* (Kelly & Mulrooney, 2019:1) though several studies have considered what factors and environments can support belonging and looked at interventions to encourage this within higher education (Hausmann et al., 2007). Belonging in higher education can be characterised in a number of ways. Thomas (2012) reported on the findings of a series of 'What Works? Student Retention & Success programme' projects which found that belonging in higher education was linked to several factors including: *'supportive peer relations; meaningful interaction between staff and students; developing knowledge, confidence and identity as successful HE learners'* (Thomas 2012:14). The impact of those social interactions on belonging is also key for CDTs and DTPs given their emphasis on cohort-centred activities and collaborative learning environments.

Others have considered issues such as student access, social class, and local commuter students (Ahn and Davis, 2021) and the notion of belonging to specific communities, but not the wider academic environment in which they are situated. Ahn and Davis (2020) conceptualised four domains of belonging in higher education: academic; social; surroundings and personal space. Their research also highlighted the importance of friendship and interpersonal relationships as a key word featured in student responses. This supports an earlier report by Thomas (2012) which concluded that 'f*acilitating social*

integration in the academic sphere is particularly important as it develops cohort identify and belonging to the programme' (Thomas 2012:50) Furthermore, a sense of belonging can be attributed to other wellbeing measures in education settings (Morris, 2021), this is of particular relevance for students in doctoral environments such as CDTs and DTPs and the potential disparities that exist for students outside of these boundaries and structured networks.

However, belonging in the context of higher education is often also considered in light of student retention figures and framed within the context of metrics surrounding this, including measures used in external assessment and validation exercises such as the Teaching Excellence Framework (Office for Students, 2022). Whilst this is an important focus for higher education, it could be argued that the less tangible benefits relating to student wellbeing described above are more valuable to the overall student experience. This has particular relevance given the context of recent years where students were often separated from their peers during the pandemic, with a recent study (Sanderson et al., 2021) suggesting that feelings of connection were lost by students during this time. Morán-Soto et al. (2022) also found that students reported a poor sense of belonging during the pandemic which impacted on their learning. that institutions should address this as failure to do could result in students disengaged from their programmes.

Belonging has also been linked to wider discourse on student engagement. Thomas (2012) concludes that there is *'powerful evidence of the importance of student engagement and belonging to improve student retention and success'.* (Thomas, 2012:10) Morieson et al. (2013) explored how belonging could underpin interventions to increase student engagement, in light of increasing cohorts of students in higher education institutions in Australia. This change also required an internal culture shift for staff involved in programmes, which has parallels with staff engaged in CDTs, where staff may be engaged in various additional activities beyond the supervisor-student model. Whilst outside the UK context, the findings from the study and the development of a '*Belonging Narrative Model'* (Morieson et al., 2013:88) provide a valuable lens through which to view further consider belonging in higher education.

Morris (2021) examines belonging in relation to postgraduate students' mental health and wellbeing in universities across the UK. Whilst a comprehensive qualitative study comprising narrative interviews and case studies, it however only considers students from *'social sciences, humanities, arts and professional disciplines'* (Morris 2021:131). However, the study offers insight into the impact of belonging on wellbeing, citing that belonging was found to be *'a significant contributing factor to wellbeing with further implications for engagement and progression of postgraduate learners.*' (Morris 2021:141). A further study (Hale et al., 2019) looked at wellbeing of medical residents and identified that whilst a community already existed around these professionals during their training, specific interventions could improve overall feelings of belonging *'residency programs can prioritize wellness by proactively nurturing companionship and collegiality'*. (Hale et al., 2019:112). However, Wilcox et al.'s (2005) study on undergraduate students found that the friendships formed outside of the course, for example in student accommodation, played a large part in students' sense of belonging, and was related to retention. This also corresponds to findings in the Pearson and WonkHE (Capper & McVitty, 2022) study on belonging in higher education.

Alongside building and cultivating social relationships, extracurricular activities can be used to engage students and foster a sense of belonging, though some students may find these challenging to access and therefore a range of opportunities should be presented (Winston et al., 2022). As CDTs and DTPs purport to provide significant additional opportunities outside of the curriculum this is an important consideration to ensure equity across their offerings, particularly as these students are already potentially a privileged group given their funded status in an often 'high ranking' institution.

Creating belonging in educational spaces is also considered by Bliss, Brooks and Huq (2021) in the context of online delivery and social justice pedagogy. Using personal accounts of design and delivering education programmes, they argue that the creation of feelings of belonging needs to be part of a deliberate and intentional design and practice. They frame this in the context of diversity and inclusion practices, stating that all students should be

enabled to participate equally and advocating for the use of democratic participation. This is also relevant to the notion of student engagement within the learning environments in which postgraduate research students are situated, where significant elements of study are self-directed, distinct from undergraduate programmes.

Furthermore, a number of studies have examined belonging at undergraduate level with a focus on key characteristics of the student population, for example by gender, ethnicity, access routes into education and students studying abroad. Others consider the intersectionality of these characteristics, for example gender and race (Shefer, Clowes and Ngabaza, 2019). They consider the interplay between existing structural inequality, in this example in South African universities, and physical campus spaces and the impact this has on students' sense of belonging. They draw upon data collected by students, using photography as a method through which to explore feelings of safety and community. Shefer, Clowes and Ngabaza, (2019) explore issues of safety and belonging, and the study provides important broader considerations for the role of higher education institutions in creating spaces where belonging can be cultivated. However, the contextual setting also shines a light on historical and cultural factors unique to the environment in South Africa.

Thomas (2015) also argues that belonging can be particularly challenging for students returning to education or those with external responsibilities who are managing multiple roles and responsibilities. This is key for CDTs and DTPs to consider in the design and delivery of activities in centres and how these multiple life roles intersect with the identify of being a study and part of a community of learners.

Taff and Clifton (2022) undertook a systematic review of the literature to understand barriers and facilitators relating to belonging in higher education with regards to a range of minoritised groups including the LGBTQ+ community, racially marginalised groups, those with a disability and students who are first-generation university students. Along with a range of factors relating to teaching and learning they found that *'inclusive policies and procedures as well as related support services are additional elements of campus infrastructure that play a key role in facilitating academic success and belonging of students.*' (Taff and Clifton, 2022:129). Furthermore, of key relevance to the structure of

CDTs and DTPs, the review found that *'receptivity of classmates'* and '*acts of care and compassion by faculty and staff'* (Taff and Clifton, 2022:129) were key to facilitating belonging.

Each of these studies demonstrates that belonging in higher education is a multi-faceted issue and requires understanding within individual contexts, considering the broad range of additional factors that influence a sense of belonging. Within the setting the importance of individual cohorts and the wider postgraduate research environment could be a key factor in fostering a sense of belonging for students. The following section considers the literature on cohorts in higher education in the context of centres for doctoral training.

2.14. Cohorts and Doctoral Education

Many studies into doctoral experiences focus on small scale cohorts or individual experiences. There is yet to be a comprehensive study which examines Centres for Doctoral Training in the UK. There is also limited exploration of the general doctoral landscape in the UK, with most research focussed on programmes or environments in the United States. Additionally, this tends to be focussed on qualitative, constructivist approaches with few applying a mixed methods approach.

Cohorts can be defined as *'a group of about 10-25 students who begin a program of study together, proceed together through a series of developmental experiences in the context of that program of study, and end the program at approximately the same time'* (Lei et al., 2011:1). However, cohorts in funded doctoral centres are often much smaller, with the average between 10-20 students.

Holmes et al. (2010) investigate completion of the doctorate using a qualitative interview and case study model, though they do define a set of parameters drawing on their experience of partaking in a cohort. These include equal participation, shared goals and engagement 'Significant attention must be given to the creation of "community' within the cohort and among cohort members' (Holmes et al., 2010:10) suggesting this is key to a successful cohort environment.

Santicola (2013) adopts a phenomenological case study approach, to examine attrition rates and student motivations. Ford and Vaughn (2011) examine the notion of self in a cohort setting, and Oetjen & Oetjen (2007) explore student perspectives on the benefits of doctoral models. Bista & Cox (2014) use a retrospective analysis of the doctoral programmes to explore cohort education. They reflect on this in the academic discipline of education, primarily focussing on the Education Doctorate (EdD).

Further studies examine the role of group supervision (Fenge, 2012), community creation (Scribner & Donaldson, 2001; Seifert, Hasinoff & Mandzuk, 2005) and notions of belonging (Kember et al., 2001). Other research focusses on the benefits and drawbacks of cohorts, but not within the doctoral landscape (Lei et al., 2011).

This research examined the wider landscape, taking into consideration the views of a range of stakeholders and comparing non-CDT students and CDT students, from a range of disciplines.

'Centres for Doctoral Training (CDTs) are one of the three main ways by which EPSRC provides support for Doctoral Training. … they also provide a supportive and exciting environment for students, create new working cultures, build relationships between teams in universities and forge lasting links with industry.

Students are funded for four years and include technical and transferrable skills training, as well as a research element.' (EPSRC, 2018:1)

I explored the benefits of multi-disciplinary cohort models. Within my previous work environment, students expressed the benefit of working within a multi-disciplinary environment. In this case, the two disciplines were Computing and Mathematics, closely related in their modes of prior teaching. I hypothesised that the ease of communication changes, where disciplines are less closely related and environments for interactions are created around the students.

The research explored the notion of Communities of Practice, in relation to the 'thinking together' concept (Pyrko et al., 2017) which may occur where there are multi-disciplinary research environments. In considering theories to underpin the research and identify whether there are any overarching theoretical frameworks that can be used to conceptualise and understand Centres for Doctoral training Wenger's (1999) Community of Practice framework is explored. This is introduced and discussed in the context of doctoral learning environments in the following section.

2.15. Community of Practice as Theoretical Grounding

Communities of practice were conceptualised by Lave and Wenger (1991), and further developed by Wenger (1999) in the exploration of the roles of communities of practice in the workplace. They can be described in the following way *'a community of practice is a set of relations among persons, activity, and world over time and in relation with other tangential and overlapping communities of practice'* (Lave and Wenger 1991:97) or as *'groups of people informally bound together by shared expertise and passion for a shared enterprise'* (Wenger, 1999:139)

The development of the theory and framework led to three core elements being identified (Wenger et al., 2002) for a group or community to be defined as a community of practice: domain, community, and practice. Each of these elements is described in turn.

The domain - the central argument put forward by Wenger (1998) is that a community of practice is distinguished by the membership having a shared interest and competence or expertise in a particular area which makes them distinct from others, with members having a shared commitment to the domain. This therefore separates communities of practice from other existing groups, for example friendship groups. However, membership of the community requires individuals to demonstrate continued engagement therefore in a doctoral environment this would primarily apply to students who elect to engage with it.

The community – within a community practice, communities can be described as groups of individuals who '*engage in joint activities and discussions, help each other, and share*

information. They build relationships that enable them to learn from each other' (Wenger-Traynor, 2015:1). Within CDTs/DTPs where there is a specific remit to encourage students to work together in a cohort environment, scholarly communities will form and develop over time, however this also occurs in established research groups within academic environments. The distinction therefore lies in the final core element of these communities, the notion of shared practice.

The practice - Members of the CoP develop a shared repertoire of resources. This shared repertoire may include shared narratives, experiences, tools, and problem-solving approaches through which they develop a shared practice. In the example of doctoral students this shared practice could be the process of becoming academic researchers, learning from one another and more experienced colleagues as they progress through their doctoral journey. This is potentially more prevalent in cohort-based environments where students are, by design, more closely linked through their daily practice and structured activities and curricula within centres. In CDTs/DTPs with a specific topic focus this could potentially be enhanced as specialised research methodologies and ways of working could be more prevalent, therefore enabling further development of this shared practice.

According to the model theorised by Lave and Wenger (1991) communities of practice encompass various aspects of apprenticeship including the concept of 'peripheral participants'; those members who are newer to the community. This is particularly relevant for exploring the formation of communities of practice within CDTs/DTPs as new cohorts join each year and join an established network of doctoral researchers who have been navigating the system and creating shared meaning making of their experiences within the centre and the shared practice of completing a doctorate.

Lave and Wenger (1991) also emphasise the importance of the role of power dynamics in the terminology around legitimacy as it relates to the community of practice, suggesting that as members become engaged and are embedded into the community their legitimacy as part of the group increase thus shifting the social dynamic and hierarchies in existence.

Whilst there are many positive accounts and reflection of community of practice membership, the model is also important to examine from the perspective of where communities do not succeed or face challenges. This is essential to consider when researching communities of learners and the challenges of bringing together individuals from a range of heterogenous groups in a cohort.

The various and complex facets that make up the community of practice theory lend themselves well to exploring doctoral centres, both where students are situated in a shared space and geography and for those geographically and institutionally separated cohorts. The theory can be used to examine what can be learned from each of these models.

Furthermore, the community of practice theory enables the exploration of the interview data to examine whether centre staff specifically refer to this model and whether this informed the centre design and structure. Where there is little evidence of the community pf practice framework being used, this could also provide a possible future framework on which to design these centres of communities of learners. In developing the core facets of the community of practice, Wenger et al. (2002) also outlined a set of seven principles for cultivating communities of practice:

'1. Design for evolution
2. Open dialogue between inside and outside perspectives
3. Invite different levels of participation
4. Develop both public and private community spaces
5. Focus on value
6. Combine familiarity and excitement
7. Create a rhythm for the community.' (Wenger et al., 2022:51)

In considering how these phases could potentially be applied to CDTS and DTPs, each could work in turn as the centre progresses from the application stage to creating long-standing and ongoing communities. Phase one could be applied at the conception of the CDT/ DTP, including during the funding application in the description of how the centre will meet the aims and objectives of creating a successful cohort environment in which students can

thrive. It could also be used to structure the curriculum and additional activities within the centre, including the facilitation of external activities, incorporating phases two and three with the encouragement of external partner participation and embedding student perspectives.

2.15.1. *Communities of Practice in Doctoral Programmes*

There is a wealth of literature focussed on communities of practice e.g., Wenger (2002), Pyrko (2017) and their benefits in educational settings. Communities of Practice have also been explored in a wide range of educational and workplace settings, however the examination of these in the context of doctoral centres is limited. Research has concentrated on the development of teacher and educator programmes (Goos & Bennison, 2008; Cuddapah and Clayton, 2011; Kelley et al., 2020).

A number of articles have explored the role of communities of practice and their role in developing peer support; a key facet identified within doctoral centres. Cuddapah and Clayton (2011) evaluated the use of CoPs within a new teacher cohort, brought together as part of a professional development network designed to provide support and encourage retention. They found that the interactivity between the elements of the communities of practice was key in the support of students and emphasised a focus on the community aspects of this. (Cuddapah & Clayton, 2011)

Wisker, Robinson and Shacham (2007) explored the use of communities of practice to support distance learning doctoral cohorts using what they termed a *'guardian supervisor'* model (Wisker, Robinson and Shacham, 2007:303). This work was situated in a timeframe prior to the large expansion of the CDT/ DTP/ DTC networks, but in an environment where the challenges of isolation amongst both doctoral students (and supervisors) was being increasingly acknowledged. The authors argued that *'both supervisor and student might feel isolated in terms of their research work together without the kinds of supportive community of practice offered by a research culture which nurtures'* (Wisker, Robinson and Shacham, 2007:304).

Although my study was set within doctoral centres, several of the student respondents were not located with their cohorts, therefore the development of online communities of practice and the learning from studies carried out prior remain valid, with particular relevance during the pandemic.

Further research has also looked at the use of social media within the development of CoPs within education (Goodyear, Casey and Kirk, 2014) Whilst this was not initially an area of priority for this study, the use of social media and online communities became more prominent during the pandemic, as both staff and students worked to forge relationships at a distance.

Janson and Howard (2004) explore the 'odyssey' of students becoming a community of practice based on reflections of eight doctoral students, where they developed shared actions to overcome barriers and feelings of isolation during their programme of study. Kriner et al. (2015) describe how communities of practice in doctoral environments can enable students to develop their scholarly identities and recommended the integration of teaching and scholarly activities into doctoral programmes. The study was based on a small cohort of five students all engaged in an adult education programme therefore the results, whilst adding to the emerging literature in this field, are not generalisable across all cohorts of doctoral students.

A further study by Roberts (2021) explored the role of librarians in a community of practice of doctoral students (n=9) focused specifically on skills development in research and writing. The findings showed that students valued the CoP in the development of their writing practices and develop shared meaning making through the process of being involved in the CoP. Whilst the study is not widely applicable across all doctoral contexts it highlights the value of consciously bringing students together during their doctoral journey as they develop into researchers.

Research by Bentley and Reed (2004) also noted that teamwork, shared goals and communities form within doctoral cohorts. They situate this within a frame of influence created by the professors within the department, supporting the notion of structured

framing around student groups. *'This is true for the members of the doctoral cohort who come together as a result of prior planning by the cohort professors and the academy in general.'* (Bentley & Reed, 2004:40) They explore cohort communities through a range of frames and metaphors and consider the role of students and the whole cohort within each of these, providing a basis on which to analyse the relationships and interplay of each of the actors within the doctoral training environment.

The same could be argued of UKRI doctoral centres where students are brought together through the centre structure and then go on to develop their communities within this. Whilst, according to Wenger's (1999) original work on communities of practice doctoral centres would not fit neatly into this, the structure of the centre does afford the opportunity and facilitates the environment for these to flourish. Wenger's original conception of communities of practice was structured around voluntary participation in communities, though arguably students choose to join the centre for doctoral training.

However, Bentley and Reed (2004) do also acknowledge that 'within a few minutes of the start of the first class on the first day of doctoral cohort, students realize that each of them share a power-among-equals relationship, a collegiality among cohorts' (Bentley & Reed, 2004: 40).

This suggests that communities exit without the structure of centres or the intervention of staff whereas Webber and Dunbar (2020) acknowledge that external involvement can be present in the formation of communities. '*Such communities exist to share knowledge and expertise, and can develop naturally out of interactions among practitioners or be created deliberately'* (Webber and Dunbar, 2020:2).

Chapter 3. Methodology

3.1. Introduction

This chapter describes the methodological approach for my study, the exploration of my journey to becoming a mixed-methods practitioner and situating myself within a particular paradigm. It also includes a reflection on using the community of practice framework to examine Centres for Doctoral Training.

I explore my positionality and the concept of being an 'insider-outsider' researcher and reconcile the ethical issues associated with this. I am a researcher who has experienced the cycle of being an insider and an outsider. I consider this in the context of my data collection and analysis throughout my study, drawing on the benefits of experience and considering the potential limitations and biases that could arise. I review these issues as part of an ongoing reflection, alongside more generic ethical issues related to research and participant confidentiality.

I define my study protocol, justifying the use of my chosen methods throughout the research cycle and explaining my decision-making throughout the study. I have provided all consent forms and information delivered to participants in appendices (see Appendices 4 and 5).

My data collection methods included a student survey, interviews and analysis of existing government and UK research council reports and learned societies and professional groups' responses to government reports and decision-making. These methods allowed me to examine my research in the context of the current funding environment for doctoral students in the UK and analyse the historical decision-making process in this area. I also undertook secondary data analysis on existing reports of student satisfaction within the postgraduate sector, using the Postgraduate Research Experience Survey (Advance HE, 2022) to enable comparison with my research.

I used mixed methods in my data collection and analysis, which aligns strongly with the pragmatic standpoint whilst adhering to strict quality and ethical standards.

I remained reflective and critical while defining my epistemological standpoint and the impact of this on my chosen methodology. In doing so, I was able to adapt and refine my approach to ensure scientific rigour and quality.

3.2. Positionality and the Ethics of an Embedded Researcher

My position as an embedded researcher, and thus my ethical position, has fluctuated throughout my study. My continued motivation to study this topic area was initially driven by my experience as the Coordinator of a Centre for Doctoral Training (CDT), where I was responsible for the management, and teaching of, doctoral students. This unique positioning gave me an insight into the student experience, and I identified a contrast to that of other students within the department. Whilst this provided an area of interest for me, I was also critically aware and conscious of the potential for bias within my research as my post was funded through the award for the CDT. Additionally, I developed close relationships with each of the students, providing pastoral care and academic supervision of their work. By engaging in continued reflection and analysis of my methods, I worked hard to ensure that this did not influence my research by not only presenting CDTs as a wholly positive experience. Whilst I could not fully mitigate against this, I considered a wide range of scenarios. I prepared for these, considering the notion of power dynamics as a manager and doctoral student, as described by Fleming (2018). I also reviewed the challenges posed by Humphrey (2013), particularly pertaining to the use of stories or narratives of experiences which involved others external to the consent process. Whilst I gained consent from all participants, some student free-text responses did name centre staff (albeit positively), and all provided their institution. During the analysis, I removed all references to an institution and only used this data to understand the geographical distribution of responses.

Further, Humphrey (2013) outlines the need to assert and maintain your role as the researcher whilst conducting research interviews. When interviewing any staff with whom I was previously familiar, I reasserted my independent status at the start of the interview, explained the purpose of the research and refrained from proactively disclosing any prior

knowledge of the participant's centre. However, in two instances, this did arise during the discussion as the participants referred to specific activities that I was familiar with or had previously been involved with. I acknowledge that whilst mitigations can be put in place and ethical standards upheld, there are times when insider-researcher knowledge is called upon during the research.

In addition to my position within the CDT, I was a member of a national network of CDT managers, meeting several times a year to share best practices and insights from each of the centres, and partaking in the organisation of cross-centre cohort-building activities. This enabled me to access a broader group of centres in which to situate my pilot studies and access potential interview participants.

Whilst the role of an 'insider researcher' has been defined by Kanuha (2000) as 'conducting research with communities or identity groups of which one is a *member'* (Kanuha, 2000:440), the notions of identity and bias also stem from sociology and anthropology where ethnography is a widely used method. As (Parker, 2007) notes, ethnographers use participant observation the same way natural scientists review physical phenomena and use these to make assumptions. This approach can lead to issues and bias within research when an 'insider' assumes prior knowledge of the participants (Asselin, 2003), an area I have reflected on throughout my study.

The notion of an insider-outsider researcher is considered a continuum (McNess et al., 2015), whereas (Adler & Adler, 1987) define three membership roles, in which my initial status would have been as a *'complete member researcher'* (Adler and Adler, 1987:67). Throughout my study, my role shifted, and I considered the differences between being an insider-outsider, an outsider (leaving the organisation for a role in a national institute), and an outsider-insider (working back within a university setting, but not within the CDT itself). In examining my role, I developed a series of questions for each research stage (Figure 3) and included a reflection cycle for each part of the research. Upon reviewing previous work by Adler and Adler (1987), I considered what the unique attributes of each role would consist of (Figure 4) in practitioner-based research. This figure describes my roles during the

research and examples of how each role could apply to researchers across different sectors. At each stage, the insider researcher must reflect and understand the implications of their position and relationship to the study stakeholders and participants. Furthermore, they should continually explore how existing and new relationships impact access to participants and the framing of any analysis.

I also considered the work of Costley et al. (2010), on the ethics of undertaking research within my work environment, ensuring I was comfortable with the research before interviewing former colleagues. Before commencing the research, I also discussed my plans with senior management and directors within the institution. Whilst my work does provide some critique of the funded centre structure, it is not specifically linked to one institution's practice. The research was also carried out within all required ethical frameworks and guidelines, and the practice of the research posed little institutional risk. Though some benefits could be realised in terms of the potential findings, these were disseminated to a range of audiences, therefore not biasing in favour of the institution where I was initially employed. I also considered what I was asking from (then former) colleagues in terms of their time taking part in interviews and the implications of this (Carol et al., 2010). In one instance, a participant used the interview as an opportunity to reflect, followed by requesting a copy of the transcript to take forward ideas they had proposed, noted by Costley et al. (2010) as a potential outcome of practice-based research.

As an individual who has taught and studied the area of developing reflective practice, I maintained a reflective standpoint. Asselin (2003) notes how insider researchers need to conduct research with their 'eyes open', whilst (Dwyer & Buckle, 2009) notes the importance of continuing to communicate and define your position as an insider. Bourdieu et al. (2011) consider this issue in the context of epistemology and the impact on the quality of the research, stating: *'warnings against ethnocentrism count for little if they are not constantly revived and reinterpreted by epistemological vigilance'* (Bourdieu et al., 2011:72)

As an insider-outsider, there was also a level of introspection in my research design stages. I aimed to minimise bias by only using my experiences to explore the research question

rather than impose my experience on the study or move towards an autoethnographic approach, where personal reflections are not useful for the analysis (Delamont, 2009). I also employed 'reflexive bracketing' (Ahern, 1999) techniques to allow me to manage bias throughout. I did this by initially considering my positionality as a researcher and the impact my role within a funded centre could have on my research methods. I placed particular emphasis on how my positionality and experiences could impact the study analysis and any inferences made and developed a personal version of the insider-outsider model based on Dwyer and Buckle's (2009) work. Reflexive bracketing techniques also afforded me the opportunity to consider the role of the gatekeepers in my research, and this is reflected upon as a potential limitation in the data collection method. Throughout the research process, I also presented my work to supervisors, internal panels, and conference audiences, using each as a point to reflect on my chosen methods and to get feedback on my approach.

I remained reflective of my position and strictly adhered to British Educational Research Association's (2018) ethical guidelines. I also ensured transparency around my intention to research the area of the student experience within doctoral cohort programmes, with all research participants and my employers during the study. I also disclosed this to staff members from the research councils during my interactions with them.

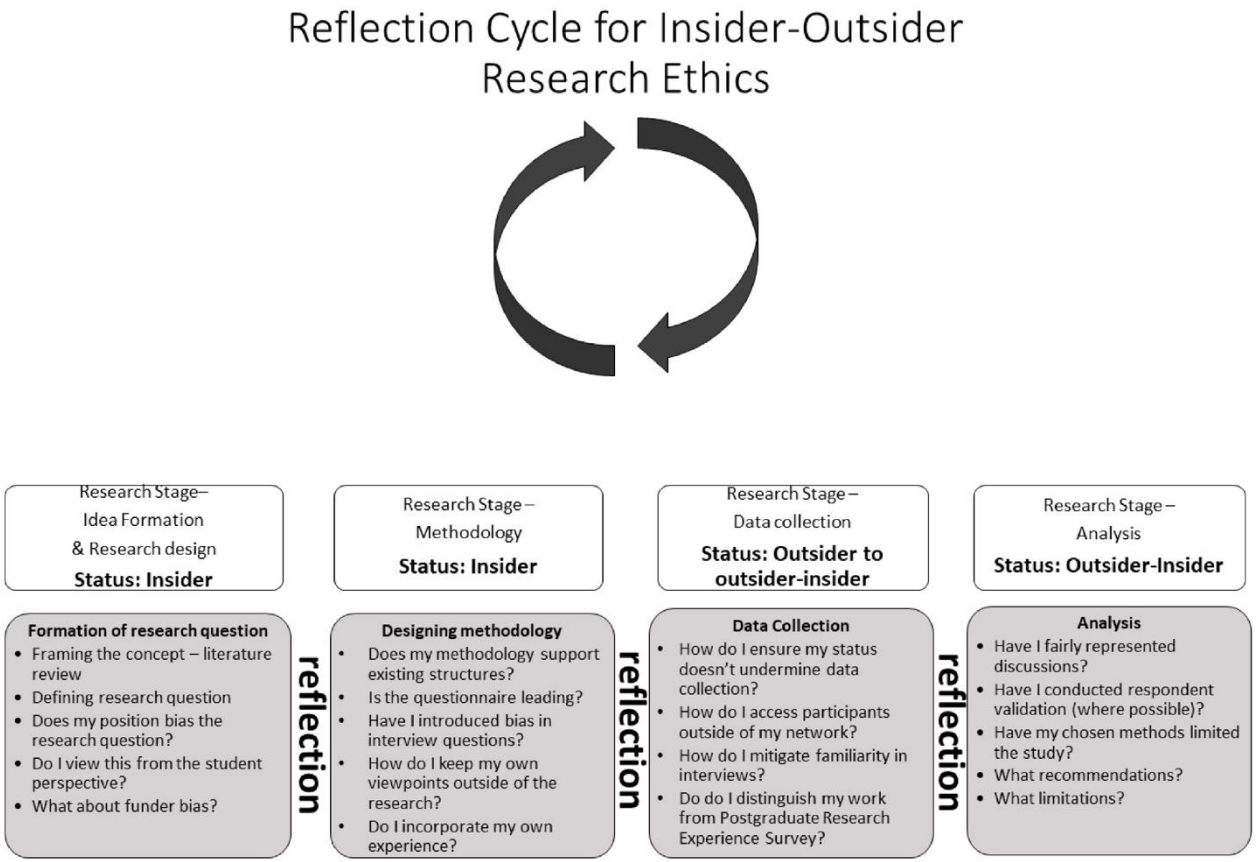

Figure 3 – Personal Reflection Cycle for Insider-Outsider Ethics (McGee, 2019) – Reconsidering my role in light of Dwyer and Buckle's (2009) continual defining of roles in research.

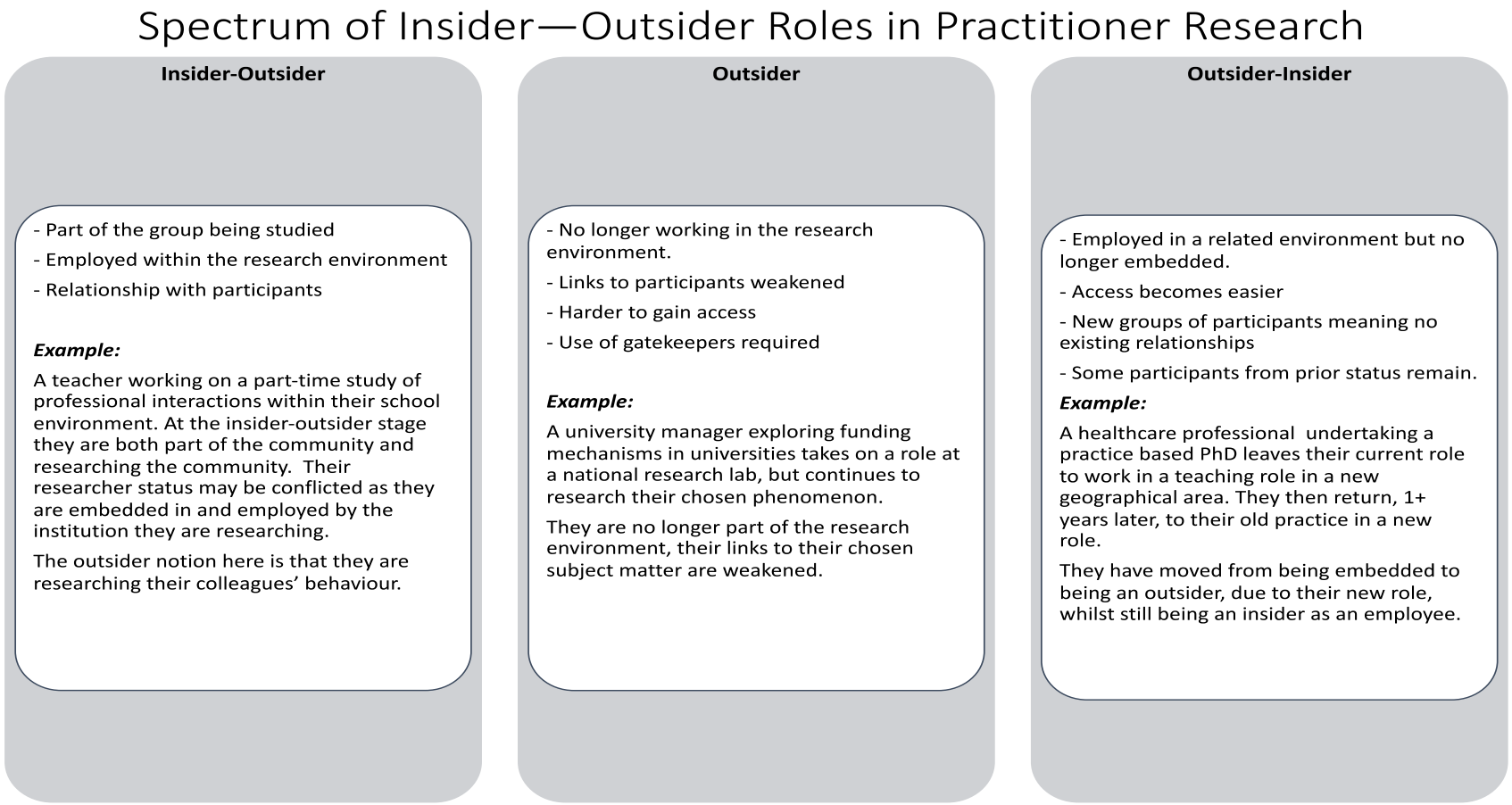

Figure 4 – Spectrum of Insider-outsider roles in Practitioner Research (McGee, 2019) - Reconsidering my role using Adler and Adler's (1987) Membership Roles in Field Research

3.3. Epistemology & Mixed Methods

My research study required a multi-faceted approach as I wanted to ensure I combined knowledge from a range of perspectives: staff, students, policy officials, and funders. Furthermore, the findings from the study have implications for a wide range of stakeholders, and I, therefore, lean towards a pragmatic stance to draw together a rich dataset and present this in a variety of formats most appropriate for each audience. I took a 'question driven' or pragmatic approach to my research to select the most appropriate methods to answer research questions.

I situate my study within the Pragmatic standpoint, whilst also including elements of constructivist theory and transformative research in relation to the potential impact on future policy around the funding of doctoral centres. I consider my research a post-positivist approach, eschewing the traditional 'scientific' model of quantitative measurement to include various forms of data gathering, multiple analyses and a holistic approach to my data collection and analysis. Post-positivism rejects the positivist approach that a researcher can be an independent observer of the social world. Post positivists argue that the ideas, and even the identity, of a researcher influence what they observe and, therefore, impact upon what they conclude.

Much of the literature relating to research methodology is intertwined with the notion of epistemological standpoints (Greene, 2008; Cohen et al., 2011; Johnson & Onwuegbuzie, 2004) and is, in part, underpinned by theories from Sociology and Anthropology. Bourdieu et al. (2011) consider the role of intellectual background and training and how this can influence one's choice of epistemological standpoint.

However, it could also be argued that the philosophical intent, or motivation to undertake a study, defines what paradigm you are aligned to. In this regard, I would identify primarily as a pragmatist. I sought to understand if there are practical interventions, whether they be social, geographical, or pedagogical, that can be implemented to improve the student experience and transfer learning from cohort-based doctoral programmes to students working outside of this environment.

Whilst pragmatism is the primary underpinning approach, I also draw on constructivist theory, drawing on O'Leary's (O'Leary, 2004) position that post-positivists align with this standpoint. There are elements of my research which benefit from this theoretical underpinning, especially those pertaining to the student experience and examining doctoral environments. However, given my aim to provide recommendations to UK Research and Innovation and Higher Education Institutions, and to transform the student experience for doctoral students, I also examined some aspects of transformative research.
While I recognise the limits to my ability to change policy directly, I am aiming for my research to be taken into consideration and applied by my own institution and partner institutions across the UK. This includes providing a set of policy briefings, guidance notes and research publications resulting from my research.

There have been numerous and varied critiques of the pragmatic approach, in relation to quality and rigour, without regard for the practical solution it affords researchers. *'There is a commonsense use of the word pragmatic that implies a certain lack of principles underlying an action'* (Denscombe 2008:274). Denscombe (2008) argues that there is a misunderstanding of pragmatism being linked to the methodology. I provide a counterargument to the criticism of pragmatism as the mixed methods researcher is arguably more diligent and committed to the scientific exploration of their chosen area. A mixed methods approach requires careful consideration of the choice, sequence, and combining of methods. The mixed methods researcher applies pragmatism purely in terms of action setting and completion, not a disregard for thought. This is especially relevant within educational research, where a longitudinal case study could be complemented by external statistical studies or supported by surveys alongside in-depth interviews, to add context. Whilst there is some disagreement over the notion of the appropriate research paradigm for mixed methods, Denscombe (2008) argues that, as with all research paradigms, there needs to be a *'level of variation and inconsistency'* (Denscombe, 2008:271). Some critics of the qualitative approach argue that the use of case studies and interviews is not scientific, failing to recognise the limitations of prescriptive, positivist approaches, e.g., Evans and Benefield (2001). Such criticisms can also provide value in

highlighting the importance of asking salient questions and ensuring methodology is considered within the literature review.

Whilst I agree that a researcher should not select only methods that they think will support their preferred outcome, I argue that mixed methods is the most appropriate vehicle to answer my research questions. By aligning myself to the pragmatic standpoint, I was able to select the most appropriate methods for my study, ensure my research has practical and tangible outcomes, and I am not constrained to a more rigid paradigm. I argue that the notion of rigid paradigms, which include the use of only one method, without considering the appropriateness of this for context, is outdated and particularly unhelpful when conducting research which requires a comprehensive approach. In an attempt to free mixed methods from the traditional paradigms, they have been named as a distinct third choice (Gorard & Taylor, 2004; Johnson & Onwuegbuzie, 2004; Teddlie & Tashakkori, 2009). Others have attempted to provide alternative paradigms for this combination of methodologies; for example, Denscombe (2008) proposes communities of practice as a model for mixed methods. He argues that this approach could communities of practice '*provide the basis for a research paradigm that is sufficiently flexible, permeable, and multilayered to accommodate the variety of ways in which mixed methods are used and the variety of motives researchers might have for adopting a mixed methods approach'* (Denscombe 2008:278).

Epistemological standpoints have a long-standing role in the assessment of quality in research, with some arguing that pragmatic research does not meet high quality standards. Whilst Torrance (2012) argues that qualitative research analysis can be influenced by the researcher's perspective, Hanley et al. *(*2016) argues we should move away from paradigms to assess research quality. I was previously concerned about the association of focusing on what works for practice (Biesta, 2007 & 2010; Creswell, 2015) and the associated connotations of this. As a mixed methods practitioner, I value both the positivist (scientific and quantitative) and constructivist (humanist, qualitative) approaches to get the most inference from the data available. In the selection of mixed methods as an appropriate methodology, I also referred back to work on heuristics for qualitative research (Kleining &

Witt, 2000), considering their four key rules of conducting research, which state that researchers should be *'open to new concepts and change his/her preconceptions if the data are not in agreement with them'* (Kleining & Witt, 2020:2); that the research topic is preliminary and may change; that 'data should be collected under the paradigm of maximum structural variation of perspectives' and 'the analysis is directed toward discovery of similarities' (Kleining and Witt, 2000:3). However, the further stages of this approach were limiting to my own design, as I had selected my area of research, though I remained open to the emergence of new ideas and research topics.

Some quantitative focussed sciences fail to recognise the value of methods such as ethnography, Design Based Research (Brown, 1992) and interviews. My research sits within an educational context, saturated by metrics, where league tables and quantitative measures dominate assessment. This perpetuates the myth that only quantitative approaches provide evidence of quality and, in some instances, a return on investment, particularly within Higher Education Funding. This is interwoven into the fabric of educational institutions, with the introduction of the Research Excellence Framework (REF (Research England, 2019) and Teaching Excellence Framework (TEF) (Office for Students, 2022) and the Knowledge Exchange Framework (KEF). The use of quantitative metrics in higher education is acknowledged as an issue across the sector e.g., Havergal (2016) and Scott (2016) argue that: 'Communities bound together by a love of inquiry are being turned into fiercely managed 'knowledge businesses' (Scott, 2016) However, whilst figures are a commonly used metric, the 2016 assessment of Centres for Doctoral Training, carried out by EPSRC, also included a series of open-ended assessment questions for the management of CDTs to complete (UKRI, 2017).

However, these were limited in many cases to 150–200-word segments, resulting in limited answers without real depth or narrative. This was addressed in a follow-up statement by the EPSRC in response to a public critique of the CDT evaluation: *'These ratings reflected a number of factors and were not simply a reflection of the quality of student training being carried out by the CDT. In many cases, the discussions between the panel and those CDTs*

invited to interview helped clarify any discussion points identified so the published table does not reflect the overall view of the CDTs by the panel post-interview.' (EPSRC, 2018).

The use of particular quantitative methodologies not only influences funding decisions, but also impacts upon the nature of enquiry and the associated literature reviewed within research generally. Such methods of meta-analysis treat research as units of analysis (Elliott, 1990), *'entirely based on quantitatively expressed study attributes and outcomes.'* (Green and Hall, 1984:38). Metrics can reduce research to figures and tables, rather than focussing on quality and the transformational role of research.

To conclude, the importance of metrics in quality evaluation and assessment should be considered alongside qualitative methods, such as interviews, focus groups and case studies, to give a truer picture of the context of doctoral training in the UK. My research primarily concentrates on EPSRC investment (with comparisons from other areas) as this research council currently funds the highest proportion of doctoral students in the UK and favours the Centre for Doctoral Training (CDT) model over the Doctoral Training Centre (DTC) or Doctoral Training Partnership (DTP) model.

3.4. Rationale for Mixed Methods

The mixed methods approach has grown in popularity in recent years (Denscombe, 2008), although it could be argued that the roots of the approach go much further back (Hesse-Biber, 2015), as all categories of scientists sought to examine emerging phenomena in a holistic way. Fielding (2010) notes that despite the growth of mixed methods as a practice, it is still not orthodox for many researchers. Fielding's (2010) work considers the use of mixed methods research in the context of research funded by the UK Government, which has particular resonance for my chosen research topic. In seeking to avoid criticism which was previously levelled at the use of solely qualitative work within government, the so-called 'government by focus group', the use of mixed methods enables me to provide multiple and corroborating evidence bases. However, the political climate has changed dramatically since Fielding's (2010) research was published, and now there is a pressing need for more

research to support evidence-based decision making in government, which encompasses a wide range of methodologies.

In defining the research question, I initially selected case studies as my chosen research methodology, in the context of education, making reference to three articles examining cohort learning, group cohesion and belonging in student groups (Kember et al., 2001; Mello, (2003); Scribner and Donaldson (2001), use a case study methodology (examining a group and not explicitly stating mixed methods), Mello (2003) selects a single person case study (with mixed methods), and Kember et al. (2003) used a case study design using a qualitative approach. Case study research is useful for practice-based research, but using this method alone can be limiting. It can, however, be used to investigate and inform practice and potentially identify areas for improvement or that worthy of further analysis. Harland (2014) identifies one advantage of this approach, stating: *'The work firstly benefits the researcher undertaking the project and then, when new learning and knowledge are applied to practice, it can have utility for others'* (Harland, 2014:1114). Some critics of the qualitative approach argue that the use of case studies and interviews is not scientific, failing to recognise the limitations of prescriptive, positivist approaches, e.g., Evans and Benefield (2001). Upon reflection and considering the limitations of the studies which employed this method, I elected to pursue a mixed methods approach, as case studies were not suitable to fully represent the data from all perspectives. By examining the literature, I was able to gather an evidence base to support my intuition that a one-method approach would not yield the most holistic results.

'The research typically utilizes data collection methods such archival analysis, interviews, surveys, questionnaires and observations and incorporates either quantitative or qualitative data – or both' (Ravenswood, 2011:680).

There are numerous and varied definitions of mixed methods research (MMR). Newby (2014) defines mixed methods as: *'A research design that incorporates quantitative and qualitative approaches either in parallel or sequentially.'* (Newby, 2014:664)

Whilst this provides an adequate definition of the process of mixed methods, the process for selecting the types of mixed methods can be complex and can depend on the research stage and sequential design employed. Brannen (2005) explains how mixed methods can be employed throughout the research process at research design, data collection and interpretation and contextualisation stages. Tashakkori & Creswell's (Tashakkori & Creswell, 2007a) definition of mixed methods differs from Newby's (2014) stating: *'Research in which the investigator collects and analyses the data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or program of inquiry'* (Tashakkori & Creswell, 2007b:4)

The choice of mixed methods for my own study was grounded in my belief that this approach could add value for each of my intended stakeholders through the form of narratives supported by evidence. Gorard & Cook (2007) argue that whilst figures can be persuasive to policy makers, narratives are often used to illustrate key points and retained by audiences. This is particularly relevant to my research, as I utilise statistical findings from my survey and the Postgraduate Research Experience Survey (PRES) supported by free text answers and quotes from face-to-face interviews. Alongside these primary data sources, I also undertook secondary data analysis on several government reports, recommendations from learned societies and outcomes from UK Research and Innovation reviews.

Further benefits of this mixed methods approach surround the involvement of participants within the research process. Torrance (2012) argues that it can enable the voice of respondents to feature more prominently and contribute to the co-construction of knowledge. However, the extent to which this is realised is contested particularly in respect of whose voices are chosen to represent a collective; and the assumptions of groups being homogenous. (Matthews & Dollinger, 2022) Further, the importance of power dynamics (Patrick, 2022) and the selection of voices is key for my research to provide a balanced consideration of the themes raised.

Findings were validated by offering the opportunity for interview participants to validate any opinions they revealed during the research. Whilst there is an important ethical issue

around the researcher-participant opinion, and whether any changes should be made, it is important to also acknowledge researcher privilege and ensure participants' voices are represented accurately throughout. This is particularly pertinent to my own situation, as an 'insider-outsider' and one whose role has shifted throughout the study.

3.5. Challenges for Mixed Methods in the Policy Landscape

I intend for my work to be distributed to both policy makers and decision-makers in education, which requires careful consideration for both my choice of methodology and data analysis and presentation. It could be argued that there is a contradiction even within government funded research, with a public message around case studies and an underlying assessment culture based on quantitative metrics, e.g., case studies used for good news stories, and numbers used to evaluate. Within my work, there may be some generalisations pertaining to students working within cohort environments, Larsson's (2009) 'Generalization through context similarity' or those who receive funding versus those who do not. However, some of my research will undoubtedly face challenges in terms of replicability. This can be a particular issue for the position of qualitative research which aims to influence, or make recommendations for, policy making. This is highlighted by Pring (2000):

'Generalisations, however tentative, are what policy makers need' (Pring, 2000:51)

Whilst the value of qualitative methods is being eroded by metrics e.g., REF and TEF, the Research Councils are still aiming for the best approach to answer research questions. The one-size-fits-all, traditionally quantitative, approach is not universally used by Research Councils UK (RCUK) now UKRI, who acknowledge the importance of a multi-disciplinary approach: *'Novel, multidisciplinary approaches are needed to solve many, if not all, of the big research challenges over the next 10 to 20 years'* (RCUK, 2018 via web archive).

This disjointed view only further serves to highlight issues around the choice of methodology and the importance of context in scientific enquiry. I selected mixed methods to get the best quality information to answer my research questions and the analysis and framing of that information is appropriately adapted to deliver the true outcomes, in an understandable format for policy makers and funders.

I advocate MMR, noting that it must be applied correctly to realise it strengths. A key difficulty in assessing the quality of MMR lies in the semantics of the area. This includes researchers using the methods, without explicitly stating so (Evans et al., 2011) and confusion and complexity over where to situate themselves. Creswell (2015) outlines six distinct points, to describe what mixed methods is not, highlighting its difference from multi-method research, using a number of triangulation and validation methods. In attempting to provide a concrete definition of mixed methods, one begins to explore the complexities in understanding this methodology. Add to this, the long-standing debate linked to paradigmatic stances and epistemology and the defence of mixed methods becomes problematic. Entrenched behaviour linked to paradigm stances can leave mixed methods practitioners with an identity crisis. High quality, rigorous research should outweigh the power of paradigms and the focus should be on the quality of exploration and rigour applied to the investigation and analysis. The assumption, that all MMR is linked to pragmatism, is both damaging and limiting to this methodology. As (Greene, 2008) outlines, many researchers adopted MMR as their contextual settings required it. The benefits of using a mixed methods approach and embracing multiple paradigms can lend itself to a strengthened and more robust research methodology – a counterargument to those tied to a rigid paradigm and attached methods.

In my consideration of the limitations of single approaches to research methods, and the value of a holistic approach, I reiterate my standpoint on the use of mixed methods for question driven research. My choice of methods and the implication for my study design is explained further in the following section.

3.6. Study Design

Within this section, I outline in brief my chosen study design and sequence. Each of my chosen methods and the rationale for each is explored further in Section 3.11.

My research included a purposive, sequential approach (see Figure 5), combining secondary data analysis with stakeholder interviews and an online survey. This afforded me the

opportunity to take an iterative and informed approach to examine my research questions, which are detailed below.

3.7. Research Questions

The research aims to identify what could be learned from CDT/DTP environments to inform future practice within doctoral training environments. To answer the research questions, data was collected from staff and students, with the use of comparative datasets available from large-scale, national initiatives and publicly available demographic data.

The research questions were refined during the study and informed by an iterative process of literature review and consideration of secondary data, and subsequently informed the design of the study.

The research questions are:

RQ1. From the perspective of CDT/DTP staff and postgraduate researchers, how well do CDTs/DTPs function and what do they achieve?

RQ2. What does this evaluation add to the learning on CDTs/DTPs which is of value to doctoral provision and associated practice more generally?

3.8. Literature Review

Throughout the development stages of my research, I explored several approaches to my literature search. These included the use of systematic review to support the framing of my research question, reading through grey literature (Lawrence, 2018) including responses from the academic stakeholder community in the UK, government reports and outputs from the UK Research Councils.

As my research is situated within an ever-changing political landscape, the use of systematic review was too limiting due to the required boundaries on specific themes, timeframes, and peer-reviewed literature. I opted to undertake a historical review of the literature. I undertook a thorough literature search of peer-reviewed articles, books and monographs

relating to both research methods and the topic area. My full literature search and search techniques are outlined within the literature review and associated appendices.

3.9. Research Stages

The following section and Figure 5 describe my research design, and individual data collection methods are expanded upon in the Data Collection section.

The secondary data analysis and literature review, combined with my own experiences of working with the sector, enabled me to frame my areas of exploration and construct my research questions. In doing I was able to build a robust study, in an area where specific investigation of the doctoral landscape in the UK was lacking. To analyse the surveys, NVivo was used (NVivo, 2023) to identify themes from the surveys. The use of semi-structured interviews enabled me to further explore issues and incorporate these into my analysis and framework development. The interviews with directors and funders explored their reasoning for their choice of structure within their centre and examined whether there were pedagogical theories behind their choices or whether this was defined by potential future outcomes for students, or an inherited structure.

The rationale behind the sequential design is that each individual evidence base can open the possibility of new investigations and inform the other routes of evidence gathering, for example, if the PRES survey highlights a national level issue of peer-to-peer interaction or reveal any issues for exploration within the interviews. The following section outlines each stage of the research process and the rationale for the choice of method. To finalise the research design, I followed the process summarised by Newby (2014) with consideration for the fact that the research took place within an existing system with multiple parties, in this case across multiple higher education institutions and within CDTs and DTPs. This therefore informed how I approached the research design to ensure I gathered the perspectives of a range of stakeholders to effectively answer the research questions.

The initial study design also incorporated data collection from staff working at UK Research and Innovation. However, after initial contact with staff, consent was not granted to

undertake interviews with these staff due to ongoing reviews at individual research councils into their doctoral provision. Further validation of the student survey findings was also planned via a series of in-person focus groups with students. However, it was not possible to deliver these in the scope and timescale of the project due to the extended lockdown period across England. Therefore, all findings are tempered accordingly and, where possible, triangulated with existing datasets and reviews published during the research timeline. An amended study sequence is provided in Figure 5.

The table below provides a mapping between each research stage, the research question(s) being addressed, and the data collection methods used.

Research Stage	Research Question	Data Collection Method
One: Thematic and Critical Review of Literature	Formation of research questions. Validation of study area.	Literature Review.
Two: Examining PRES data & scoping interview questions	Elicit initial themes for survey design.	Secondary Analysis.
Three: Defining survey questions	RQ1 and RQ2.	Survey Design.
Four and Five: Interviews with Key Stakeholders and Analysis of grey literature	RQ1 and RQ2.	Semi-structured interviews.
Six: Survey Design and Distribution	RQ1 and RQ2.	Online Survey.
Seven: Survey Analysis & Cross-comparison	RQ1 and RQ2.	Analysis and Secondary Analysis.

The research was undertaken in the following sequence:

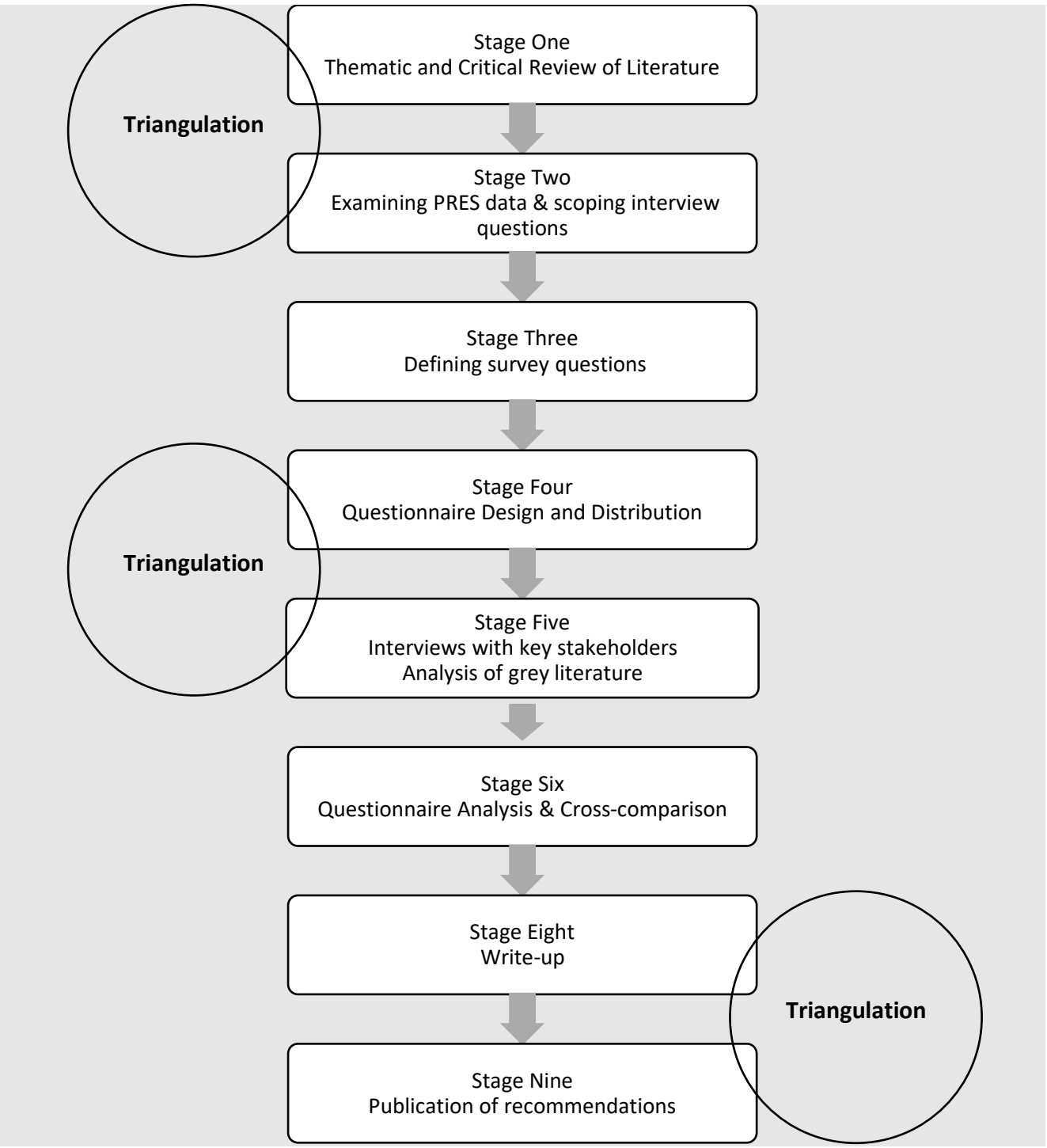

Figure 5 – Amended Process Timeline of Research Activities

3.9.1. *Stage One – Preliminary Research – Thematic and Critical Review of Literature*

Stage one of my research required a full examination of the literature on cohort doctoral education and the funding of doctoral programmes in the UK. I further included a

discussion on Communities of Practice and the concept of belonging as related to doctoral students as themes emerged from the data. Taking into account the limitations of systematic review, including the work of Wegerif (2008), Hammersley (2003) and Maclure (2005), I explored a range of approaches best suited to my chosen methodology. The need for a full review of context and historical discourse required a thematic and critical approach to reviewing the existing literature. This is discussed further in my literature review in Chapter 2. The initial exploration of both peer-reviewed articles and grey literature provided important context on the structure and funding of doctoral training in the UK, which further informed the analysis of the research questions, with reference to how centres function and meet the aims set out by funders and national reviews within the sector.

3.9.2. *Stage Two – Examining PRES Data & Scoping Interview Questions*

I reviewed relevant literature to formulate the interview questions, including reviews of doctoral provision and funding calls. This was combined with my existing knowledge of, and practice within, the doctoral landscape to devise appropriate interview discussion topics.

3.9.3. *Stage Three – Defining Survey Questions*

To shape the survey questions, I examined data from the Postgraduate Research Experience Survey (PRES). This survey is circulated to all post-graduate research students, to assess their satisfaction and includes information on the research environment.

From my initial assessment of the results of the survey, taken from three years of reports, I decided to include matching questions within my survey, relating to the research environment and opportunity for interaction, which both ranked poorly in the PRES results.

I reviewed the PRES data and findings from the literature review alongside my existing knowledge of the doctoral landscape, taking into account my learning from three years of coordinating and teaching in a CDT. This combination of approaches enabled me to devise a question set to support the research questions and explore the key topics of the research. However, a limitation of this design was that the survey was not piloted therefore potentially missing some areas for exploration; this is detailed further in Section 3.11.

3.9.4. *Stages Four and Five – Interviews with Key Stakeholders and Analysis of Grey Literature*

Stage five ran concurrently with stage four, as I used the crystallisation methods outlined by Denzin (2012), moving between methods. This enabled me to construct a coherent narrative of my area, encompassing both the perspectives of students and key stakeholders. This added weight to my findings and allowed me to produce a holistic piece of research to present to stakeholders. I initially planned to undertake a total of 20 interviews across the range of stakeholders. However, only 11 were possible due to the reduction in stakeholder groups available, as UKRI staff did not participate in the interviews.

During this phase, I interviewed the directors of CDTs (who receive funding from the Research Councils and industry). I also interviewed key members of staff involved in the management and administration of CDTs, as they often hold multiple responsibilities in relation to the students. These can range from the design of cohort-building activities, to preparing evaluation reports, and offering a one-stop-shop for student enquiries. Thus, these individuals build strong connections to both the centre and the students and provide a unique insight into this model of learning. In addition, it is likely that they will provide a unique insight into the workings of the CDTs and an alternative perspective to the directors, who have a high-level, strategic view.

3.9.5. *Stage Six – Survey Design and Distribution*

Observations from working within a CDT at the outset of this research, discussions with students and colleagues, PRES surveys, alongside a review of existing research shaped the areas for the survey. I used a 7-point Likert scale (Cohen et al., 2011) alongside open questions to allow respondent choice.

3.9.6. *Stage Seven – Survey Analysis & Cross-comparison*

I used the Online Surveys (Jisc) tool (as approved by Newcastle University's ethics committee) to collect the data and produce initial results from the survey. This tool enables participants to provide anonymous responses. All respondents were given the opportunity

to opt-in to receive initial findings at the end of the study. I ensured that all data was stored securely in line with the EU General Data Protection Regulation (GDPR), (Information Commissioner's Office, 2019).

3.9.7. *Stage Eight – Write-up*

This final stage involves the analysis and triangulation of the data sources gathered, providing an overview of the doctoral landscape. My initial analysis examined the quantitative data from the survey, I then triangulated this with the qualitative data, to identify any trends and similarities between findings.

I highlighted key examples of how student and institutional perspectives could be used to implement changes in the CDT model, where required, and provide recommendations for the future creation of doctoral training models.

3.9.8. *Stage Nine – Publication of Recommendations*

My final stage of write-up and analysis includes the creation of a series of reports aimed at key stakeholders, including funders, CDT directors and graduate school offices within universities.

3.10. Data Collection

Within this section, I describe my data collection process, the rationale for the sequential design of my study and the selection of the appropriate participants for the research, identifying how each group adds value to the research.

Multiple challenges present themselves in collecting and categorising research data (Symonds & Gorard, 2010). These can arise from a number of factors, including flawed design choices, incorrect analysis, or a misunderstanding of statistical methods (Gorard, 2010). As an insider, I have carefully considered the selection of my research participants, ensuring that I do not influence the study by selecting only individuals known to me or those I know to have positive experiences. Mercier et al. (2014) also highlight this as an issue relating to gatekeepers, one barrier which I have had to overcome in my research, citing

research where only 'well-behaved' children were selected to take part in a study (Mercier et al., 2014). Oakley (2002) also alludes to this in relation to my chosen research methods of a student survey and the target sample. *'If the notion of 'evidence' is to mean anything other than the intellectual property of elite groups, the accessibility of both the process and the results of research synthesis to a range of users must be an integral value.'* (Oakley, 2002:179)

In order to mitigate this, all respondents had the right to withdraw their data and were given the opportunity to access the data from their interview. I remained mindful of the impact of participants attempting to change or amend their narratives, though I received no such requests during the research.

Ethical concerns in my research relate to presenting a positive bias towards the centre for doctoral training (CDT) model. A reflective position throughout has enabled me to reconcile with my multiple identities, firstly as employee and student-researcher and then as an outsider with experience. In continuing to consider my privileged position, I attempted to mitigate a Hawthorne effect (Parsons, 1974), a critique of collecting evidence in research. My duty as an ethical researcher must supersede my role as an employee of the CDT. Groundwater-Smith and Mockler (2007) argue that ethics must drive a study, and research quality cannot exist without ethics.

3.11. Data Collection Methods

A criticism of small-scale qualitative studies is that findings can be presented in isolation, without a full contextual comparison. Without removing their value in exploring particular phenomena, they can lack reproducibility or fail to encompass a comparison study (Gorard & Cook, 2007; Groundwater-Smith & Mockler, 2007). Through the usage of both qualitative methods (interviews) and a survey, with the addition of institutional evidence in the form of the Postgraduate Research Experience Survey, I developed a larger evidence base for analysis. I utilised Creswell's (2015) criteria, which is used to assess submissions to the Journal of Mixed Methods Research (Creswell, 2015: 103), to shape my research.

This included an exploration of what data would be required to effectively answer my research questions. Research Question 1 required data collected from both staff and students to understand how CDTs/DTPs function and provide examples of positive, negative, and neutral aspects of them. This then informed Research Question 2, which was to explore what could be identified from the research to inform future provision and practice within doctoral learning environments. Each stage of the data collection design was structured around the research questions. Once the community of practice model (Wenger 1999) was chosen as a theoretical framework on which to analyse the characteristics of centres, the analysis was further restructured to incorporate this into answering the research questions. For example, how can a community of practice model be used to inform future doctoral learning environments? The following section describes the full data collection process.

3.11.1. *Sampling*

I examined sampling techniques (Cohen et al., 2011) and considered the issue of gaining access to respondents, alongside potential bias. As I was previously employed within a CDT and my former institution hosts several CDTs, I received permission to contact these centres for my initial exploration. The funding council were made aware of my plans to examine CDTs and gave their support, offering contacts across their portfolio. Access to participants was classed as low risk, due to existing permissions and access being granted. I ensured that bias was managed appropriately and that results were not weighted towards the benefits of the programme, such that it benefits the perspective of the funding bodies. However, the planned research to interview UKRI staff members was removed as this proved challenging during the final data collection phase, due to ongoing reviews across the sector. In order to mitigate this, I used existing findings and insight from my data collection (student survey; staff interviews) to feed into the reviews and provide written evidence. Whilst this meant the views of staff within the research councils were not captured, this was at a later stage in the data collection process and, therefore, did not significantly influence the research design.

A purposive or non-probability sample was used (Cohen et al., 2011) as the chosen participants were students who are undertaking doctoral degrees, staff working within CDTs and associated university staff leading doctoral programmes. In addition, funders were selected where they had portfolios of multiple centres and were responsible for the evaluation of outcomes, to gain their perspectives on the model. As detailed above, it was not possible to get UKRI staff perspectives as part of the data collection process. However, the views of university staff and CDT/DTP students were the primary method through which to answer my research questions.

I used professional networks and publicly available information from UKRI to identify target participant groups. This dual approach helped to manage bias around existing relationships and ensured I targeted individuals from a range of disciplines, not just those funded by EPSRC (UKRI, 2019a). However, it is important to acknowledge that although the students within funded centres were the target population for this study, they represent a privileged group in the sector. This is partly due to the lack of diversity in the student cohorts, as demonstrated by data from UKRI (UKRI, 2021) and wider external factors relating to who has access to this funding (Harrison et al., 2015; Wakeling and Laurison, 2017; Budd et al., 2018; Leading Routes, 2019). This is therefore considered in the analysis, conclusions, and recommendations from the study.

3.11.2. *Semi-structured Interviews*

Semi-structured interviews were a core component of the data collection, as they allowed me to examine the decisions behind the management of CDTs/DTPs and explore further the issues raised by students and the PRES survey. As Brinkmann (2013) highlights, this method lends itself particularly well to the exploration of lived experiences, in this case, the set-up and management of CDTs. Whilst the interviews included pre-prepared questions, I also allowed the participants to talk freely about their experiences, decision making processes and allowed time for reflection from the participants throughout.

Three initial groups were selected for interviews, incorporating the perspectives of funders, administrative and management staff, and those with academic leadership responsibility

within the centres. To enable a holistic view of this topic area I had identified that it was important to include UKRI views within the research and explore whether UKRI's perspective on key issues aligned with those of staff and students within higher education institutions. The funding agency UK Research and Innovation (UKRI), across the various research disciplines it covers, provides in excess of £450 million of funding to Centres for Doctoral training. This is distributed through a variety of schemes, including DTPs, CDTs, and the National Productivity Investment Fund (Department for Business, Energy and Industrial Strategy, 2018). As outlined above, the interviews with UKRI staff were not possible due to ongoing reviews across the sector. However, the research findings were presented as part of these reviews.

Due to the distributed nature of the universities involved in my study, many of the interviews were conducted via telephone and video conferencing software. This decision was also a necessity for interviews conducted after March 2020, during the COVID-19 pandemic when staff were required to work from home as part of a national UK lockdown (Institute for Government, 2022). Whilst these communication methods present their own challenges, such as a lack of body language cues for analysis, they do provide researchers the possibility of reaching a wider participant base. I adhered to guidelines given by Cohen (2011) and Arksey (1999) ensuring I remained neutral and without judgement, whilst clarifying and probing the interviewees where required.

3.11.3. *Survey*

The survey design was informed by secondary, thematic data analysis of the PRES survey and emerging themes from my prior experience working within a centre for doctoral training during the initial study design phase, and discussions with networks of managers. As a result of these discussions and consideration of existing surveys, I took the decision to not run a pilot survey and move directly to primary data collection. However, this led to some limitations in the survey design particularly relating to the language used around industry engagement. On reflection this question should have encompassed the opportunity for students to report on a range of external engagement and partnership activities, particularly for those with in the social sciences and arts and humanities disciplines where

these activities take place as part of the ongoing doctoral programmes in DTPs and CDTs. Cohen et al. (2011) suggest a 14-point survey planning process which incorporates a pilot phase at stage 10 in the process. However, whilst the survey was limited in some aspects of the design it did incorporate questions and measures from the Postgraduate Research Experience Survey, enabling some cross comparison with a larger dataset. The PRES reports and analysis also informed the survey design as I was able to identify trends and current topics in the wider postgraduate sector. Furthermore, the aims and objectives of CDTs/DTPs as outlined by centres and funders in relation to cohort environments and providing additional opportunities provided the basis for questions around the student experience and garnering perspectives from students on the advantages and disadvantages of the CDT/DTP environment.

To distribute the survey at scale I elected to deliver this as an online-only survey, with the understanding that all students have access to the requisite resources and digital skills to access this. Within my target group all students will likely have access to a personal computer provided by their institution or access to an institutional machine to access the survey. This method also allows students to access, and return to, the survey during a time convenient to them.

I elected to use the JISC Online Survey system, as approved by Newcastle University. The system has a secure server and interface, making it suitable for collecting confidential responses. No respondents were required to give any personally identifiable information, although they were asked questions relating to their area of study, funder of their programme, career stage and institution (should they chose to provide this).

Equality Diversity and Inclusion Data

Students were asked a question relating to their gender, with options to state their preferred gender, non-disclosure, and a non-binary option. I justified this inclusion as during analysis themes pertaining to gender may have arisen in terms of student support, cohort belonging, value of networks and ways of working amongst others.

Students were not asked to provide information on their socioeconomic status, although a number of measures now exist as a way to assess this. At the time of the study this data was not routinely collected for postgraduate students, though this is done for undergraduate students as part of national widening participation programmes. The current methods for assessing this can be challenging, particularly at postgraduate level as students have already attained undergraduate (and master's level) degrees. Gorard et al. (2019) argue that no single indicator can be used to assess relative disadvantage although some categories, such as whether a student received free school meals, was a care leaver or has a disability can be used to assess prior disadvantage.

A further limitation of the survey design was that participants were not asked to provide their ethnicity. The lack of this data meant that further analysis on ethnicity was not able to be carried out although the small sample size of potential participants from minority ethnic groups would have provided limited opportunity to draw statistical significance from. However, this data could have added insights for the qualitative data obtained from open ended questions on aspects of the student experience for students from Black, Asian, and Minority Ethnic backgrounds. Data from UK Research and Innovation released in 2022 shows that only 10% of studentship awardees are from Black, Asian, and Minority Ethnic groups though data was not available for approximately 30% of awardees. *'Students from the Asian ethnic group are the largest ethnic minority group followed by the Mixed and then the Black ethnic group.'* (UKRI, 2021a:3). This lack of diversity in the funded student population has also been highlighted by the Leading Routes 'Broken Pipeline' (Leading Routes, 2019) project, therefore data from this informs the analysis around the issues of diversity in funded student cohorts.

I elected to keep the survey completion time and number of questions to under 7 minutes to avoid respondent fatigue (Lavrakas, 2008). I had initially planned to distribute my survey in March-May 2019, with a period of six weeks allocated to gather responses, however I moved this back to October 2019. This change enabled me to incorporate students transitioning from taught courses to the research stages of their programme. Furthermore, it avoided a clash with Research Fish (2019) and PRES Data collection periods, in an effort to

promote engagement with my research and mitigate the effects of multiple surveys (Porter et al., 2004).

One limitation of the chosen method for distribution was the use of gatekeepers in the forms of managers, administrators, and course directors. In using these channels, I had to be explicit that the respondents were in no way coerced to provide responses which only reflected positive aspects of their experience. However, this route also lends credibility to my study in that is validated by the centres and delivered through trusted routes, rather than a 'cold-calling' approach which students might not wish to respond to.

I amended my surveys to include questions taken from the 2018 PRES survey, in order to examine whether there were differences between the general doctoral community in the UK and those in receipt of funding and placed within Centres for Doctoral Training or Doctoral Training Partnerships.

One key difference between this evaluation of centres and that carried out by EPSRC in 2016 is the consideration of the student voice. Within the EPSRC's evaluation they did not seek student representation or validation during evaluation or following the publication of their reports. This research provided students with the opportunity to contribute to their perspectives which could be implemented in their study lifetime and improve that of future students.

The survey consisted of open-ended questions and 7-point Likert scale, see Appendix 6. The open-ended questions were designed to elicit responses not able to be measured by the scales and enable students to further comment on aspects of their experience. This supports the study research questions which were to explore, from the perspective of CDT/DTP staff and postgraduate researchers, how well do CDTs/DTPs function and what they achieve. The open-ended questions address this by purposefully asking students about specific aspects of their experience, both positive and negative. The questions further explored whether students saw any perceived differences in their experience in comparison to those outside of funded centres. This was asked in order to better understand what could be learned from

these environments to inform wider doctoral provision. Further, students were asked specific questions about their environment and aspects of this, to inform analysis around cohort environments and the potential impact of co-location.

3.11.4. *Secondary Data Analysis – Postgraduate Research Experience Survey (PRES)*

My study incorporated a landscape mapping exercise to examine current models of doctoral training, an analysis of government evaluation reports and reports from UKRI, as well as Postgraduate Research Experience Survey (PRES) results and reports from 2017-2021.

To shape my research question and as an additional data source for triangulation, I examined institutional data from the Postgraduate Research Experience Survey. This survey is circulated to all post-graduate research students, to assess their satisfaction and includes information on the research environment. It is ordinarily circulated every two years, but from 2017 it has been circulated annually. Whilst I used data from the 2018 survey, it should be noted that only 66 institutions took part in 2018, during the transition to annual reporting.

I reviewed the data for themes, to frame my survey and interviews. There may be notable differences in this data as the Russell Group (2019) universities did not participate in this year, and they constitute 63 of the 75 universities awarded CDTs in 2018. I considered which disciplines the students are studying in, at what stage of study they are at, and which issues arise most frequently. These themes informed the survey, to examine some key features which could potentially impact upon the student experience.

3.11.5. *Data Management Plan*

I prepared a data management plan and followed guidance delivered by Newcastle University's Research Data Service (Newcastle University, 2019), alongside attending training on this subject. My data was securely stored with password protection and backed up using Newcastle University's OneDrive. I reviewed my data management plan throughout the course of the study and amended as new pieces of data were gathered and during my analysis phases.

Due to the confidentiality of my respondents' data, I was unable to make my full datasets open access and available within the university repository. However, the data used for my secondary data analysis is all publicly available and thus could be used to for further research in this area.

All data sources were kept in a secure online repository, using Newcastle University's OneDrive (University, 2019), which is backed up routinely and password protected. A full data management plan was undertaken and reviewed periodically (see Appendix 7).

3.11.6. *Respondent Validation*

Respondents were given the opportunity to validate any of their responses and receive copies of any transcriptions should they wish to. A full consideration of this practice and its importance is outlined within the following section on ethics.

3.12. Ethics

Ethical clearance was granted for my study by Newcastle University Faculty Ethics Committee in March 2018, (ethics ID 3845/2018). My positionality was considered fully at the outset and reflected upon throughout my research (see Section 3.2). I adhered to the British Educational Research Association (2018) guidelines for the conduct of ethical research. Particular issues pertaining to confidentiality, researcher privilege and policy makers are considered below.

3.13. Confidentiality

All interview participants were assured that their data would be held confidentially, and that all responses would be anonymised during the transcription and analysis phase. I ensured this by assigning a number to each of my interview participants, defining them only for my own analysis as part of one of the identified targets groups; CDT Managers, CDT administrators, CDT Directors, University staff with responsibility for doctoral programmes. To further preserve anonymity, respondents were not identified as being from a particular

institution during the analysis or discussion. Following the transcription process, allocation of numbers to participants and data analysis, all audio recordings were deleted.

All survey responses remained confidential as participants were not asked to provide personally identifiable data such as their name or email address. They were asked their gender and the institution at which they were studying, as optional questions. No generalisations were attributed to regional areas where there were fewer than 10 respondents, to protect participants from identification.

3.14. Informed Consent

Participants were provided with a study information sheet (see Appendix 4) before they took part in the research and invited to ask any further questions of the researcher. Contact details for the researchers and the researcher's supervisor were provided, alongside the contact details for the Faculty Ethics Committee. All participants were provided with a consent form to indicate their consent to take part in the research - these were collected in advance of participation and retained in a secure environment. Before each interview took place, the participants confirmed that they understood how their responses would be used, were offered the opportunity to receive a transcript of their interview and were notified again that their responses would be recorded for the purposes of data collection and analysis.

All participants were notified that their data would be held confidentially and that any responses they provided would be anonymised. Participants were also informed that they could withdraw their participation at any point during the study or after their contribution had been made. I ensured that all participants were well informed and provided their full consent to take part. All respondents were over the age of 18, without any declared reasons for not being able to take part due to incapacity. The subjects covered in the study were not considered to be sensitive, although I remained mindful of any topics which may cause upset (such as any instances of bullying within their environment). If sensitive topics did arise during the interviews, I would have signposted the participant to their respective wellbeing service and remained neutral.

3.15. Researcher Privilege

My positionality and journey through being an insider-outsider to outsider-insider has been considered thoroughly throughout the research project. However, it also necessary to reflect upon my privileged position as a researcher and to acknowledge this in relation to my chosen participants. Whilst none of my chosen participants could be viewed as traditionally marginalised groups, they are nevertheless entrusting me with their opinions and perspectives on a wide range of issues relating to their current situation.

I aimed to remain neutral throughout my interactions with my participants and also considered the dynamic of engaging senior academics, those in the positions of directors within CDTs and how this interplayed with my position as a junior researcher. I ensured that this dynamic did not affect any of my analysis or data collection procedures by recording fully all of my interactions and triangulating responses before making assured inferences.

3.16. Ensuring Fair representation

In using mixed methods for both my data collection and analysis, I intended to give an equal weighting to each type of method to ensure a comprehensive and unbiased study. As with purely quantitative or qualitative studies, a careful balance is required in developing inference and theory from a combination of methods. I managed this by using triangulation (see Section 3.9) at several stages during the research cycle, justifying any findings or extracts used and ensuring study and methodology limitations were acknowledge at each stage. In doing so, I was able to give each of my different participant groups a voice in the research and not lend additional weight to for example, research council opinions, as students have traditionally been excluded from the evaluation process other than being used as case studies (see EPSRC 2016 CDT mid-term review) (UKRI, 2017).

3.17. Policy Makers & Ethics

At the outset of this study, I was transparent in my approach to studying the area of CDTs and acknowledging all aspects of this approach. Although I hypothesised that this model could be beneficial for all students, if the model could be transferred to general doctoral programmes, I also noted that there could be some aspects that may disadvantage some

disciplines or groups of students from less advantaged backgrounds. I maintained a critical and balanced position and included questions on this in interviews. This enabled me to retain a neutral position in developing my analysis and deal with any potential dynamics of power which may have arisen from these interactions.

3.18. Analysis

The following section describes my chosen methods of analysis as well as a description of my chosen sequence and triangulation methods. My analysis incorporates both qualitative (thematic analysis of interviews) and quantitative (NVivo analysis of surveys) methods, alongside a review of grey literature and PRES reports and datasets.

3.19. Analysis of PRES Reports

I analysed PRES reports from 2013-21 for student satisfaction levels in relation to the following areas:

- Culture
- Research Environment
- Opportunities to interact with other students

The rationale for the inclusion of reports from 2017 onwards ensures that CDT students who were in their research stages from 2011 onwards were included in the sample. It also aligns with the timeframe of changes to the postgraduate funding landscape, in which funding was removed from individual projects and studentships and primarily assigned to CDTs.
I undertook the analysis by downloading the PRES reports issued each year (2017-21) and the raw, cumulative data where it was available (2017). The raw data enabled me to identify some key topic areas I had chosen for the research, as the reports focus on a key theme each year and did not provide in-depth analysis of each area in the survey.

3.20. Grey Literature

I began by analysing grey literature, which can include technical and research reports, working papers, policy documents, evaluations and briefings which are outside of the peer reviewed publication domain (Lawrence, 2018). In doing so I hoped to be able to identify

themes to both support my future interviews and my initial hypotheses that CDTs provide a more supportive and beneficial learning environment for doctoral students.
I analysed reports and recommendations to the UK Government from pre-2010, to incorporate the evidence used to create CDTs, arising from the Smith report (Smith et al., 2010) and understand the full context of the landscape in which my research is situated. Alongside this I considered the wider landscape in which this decision was taken, following a review of funding in 2012 (McLain, 2012) and again in 2017 (EPSRC, 2017) before the new CDTs were announced.

The analysis of these documents was conducted via a systematic search using Google (2019), the search was undertaken in 2018 and again 2019 (documented in Appendix 7) following the public case of a complaint (THES, 2018) against EPSRC's transparency in handling the CDT mid-term reviews. The full case against EPSRC was not upheld by the Information Commissioner's Office and only the feedback scores for each centre were released, however the importance of the subject area was highlighted by the interest in this case and therefore it was necessary not to entirely disregard this piece of information.
I coded each of the pieces of literature by identifying key areas of interest including:

- Peer interaction
- Student support
- Funding for students
- Development of student activities
- Positive cohort experiences
- Student Experience
- Student Centred Approaches
- Opinions on Doctoral Training Centres

Each of these areas was included, as they provide information related to my research questions and enabled me to ascertain whether any key themes were discussed or referenced.

I also reviewed reflective blogs by CDT Directors including (Hall, 2016) who provided a personal reflection on the success of the model, this added context from the perspective of an individual involved in the delivery of a CDT. In doing so I was able to gain supplementary, although limited, evidence for the success of the model, and a reference to the importance of CDTs being student focussed - a key theme in my research questions.

3.21. Interviews

In analysing the interviews, a number of methods were employed including transcription, coding, and identifying meaning alongside extracting the content and identifying themes for the triangulation process. To retain confidentiality of participants, as discussed in the ethics section, I anonymised each of my interview participants by grouping them by type of respondent and assigning a number to them. My chosen methods of analysis are detailed below.

3.22. Transcription

The level of detail in transcription often depends on the researcher's discipline (Roulston, 2016) and in selecting the appropriate analysis I undertook a review of transcription types including Systemic Functional Linguistics (Loretta, 2018). I decided to employ a simplified transcription method (Silverman, 2006) as I am situating my data within a wider context and investigating the context as a priority over the linguistic structure of the utterances.
A further consideration during the analysis process was my role as interviewer and the interaction with participants, as *'Any tale involves a teller'* (Toolan, 2001:1).

Rapley (2001) also argues that interviewers' talk should be considered in analysis, and I continued to monitor my influence throughout the interviewing stage. For example, I identified where my own pauses led to an elongated and expanded response from participants. In addition, I ensured that any extracts used in my discussion represented both the interviewer and participants' speech, not just the participants' responses. This afforded me to view the interviews as *'finely co-ordinated interactional work in which the talk of both speakers is central to producing the interview*' (Rapley, 2001:306)

As I explored the interview data, I constructed narratives which were used to support or add a counter example to elements of my research questions. Rühlemann (2013) defines these as conversational narratives, the stories that occur during conversation. Although my interviews were not natural conversations, they nevertheless had the same constructs in terms of roles. A key consideration within my analysis was to examine whether this role-taking was restricted by the interview context, as a *'single turn constructional unit'* (Goodwin, 2015:198) can pose an issue for storytelling. In examining the pauses, I was able to infer where participants were given adequate time to respond and add additional material to their responses.

Wong & Breheny (2018) provide examples of the different roles assigned to interviewers by participants and argue that identifying these roles can assist researchers in their analysis. In my situation as an insider-outsider, this was considered throughout the analysis stage, and I anticipated this would alter depending on the participant. With the administrators and managers, and some CDT directors, I noted that I might have been viewed as an empathic listener (Wong & Breheny, 2018) due to my previous work experience and role as a centre manager, with an understanding of the landscape.

3.23. Coding and Identification of Key Themes

Following each of my interviews I transcribed the audio Interviews and coded the interviews to identify key themes. I followed steps outlined by Saldana (Saldana, 2009) which included *'analytic memos'* (Saldana, 2009:41), first cycle coding, second cycle coding and moving towards synthesising and theory formation. I also referred to any notes taken during the interview, as prompts. The interviews were coded within one week of the interview, to reduce the impact of any loss of context and over-reliance on the recordings and transcripts. Throughout the coding stage I cross-referenced the transcripts with my secondary analysis stage and used consistent themes to enable triangulation and comparison.

3.24. Surveys

Surveys were analysed using NVivo and thematic analysis completed alongside statistical analysis on the Likert scale data. By combining analytical methods, I ensured that the rich

qualitative data was not lost within the quantitative results. The open questions afforded participants the opportunity to give further detail in each of their responses. The answers to these open-ended questions were then triangulated with the interview data during the triangulation process between PRES data and my own survey. I was keen to understand whether there were differences in the satisfaction levels of CDTs students and this comparison enabled me to do so.

The analysis of Likert scales and the respondent selection process has been debated with Kulas & Stachowski (2013) positing that *'middle category endorsement'* may be a result of several factors, including individuals' personality traits and tendencies towards self-reflection, alongside instances where they had no strong opinion. I selected a 7-point Likert scale in order to capture any middle-ground responses, where respondents either did not feel strongly about their satisfaction or did not find an appropriate response category. In analysing the data from surveys, I identified differences between for example, stage of study and satisfaction, or levels of support and satisfaction with this. The numbers of respondents are provided with each of the analyses, to support any statistics used and not draw inferences from small numbers of respondents.

During the analysis of my survey, I examined comparisons between groups to assess whether there were core differences or similarities between groups, with example questions laid out below:

1. Are students more or less satisfied with their opportunity to interact with the wider research group in year 1 or in year 3 of their studies?
2. Does satisfaction with the research environment grow over time or diminish?
    2.1. Can inference be made as to why this might be or is further exploration of this area required?
3. Are students with more cohort opportunities more satisfied overall?
    3.1. With the opportunity to interact outside of their group?
4. Are students who have the option to give Feedback and have Interaction with Leadership, (where they feel it is listened to) more satisfied that those who do not?

Original question: *Are you provided with opportunities to give feedback to the CDT management board?*

5. Are students who have dedicated support more satisfied overall? (where answer is yes to both questions below)
   Original question: *Do you have a dedicated point of contact to answer queries within your Centre? If yes, do you find this helpful?*

3.25. Study Limitations

This section explores the limitations of my study, which include scope, timeliness, choice of respondents and methodology, study design and reproducibility.

3.25.1. *Self-reported Data & Status of Participants*

In using both interviews and an online survey the research was subject to the risk of self-reported data, resulting in unreliable inferences being drawn from responses. This is a common issue when using interviews as participants are asked their opinions and to comment based on their own individual experiences. In addition, responses to surveys can be affected by the timing of the survey and on levels of satisfaction at that time. To counter this, I provide a comparison of students studying at different stages of their doctoral journey, for example students in year one may be more satisfied than those in year three who are nearing completion or vice versa. Participants may also compare themselves to others when completing the survey questions relating to satisfaction levels, as has been observed in Quality of Life measurements (Rapkin & Schwartz, 2004).

Many of my interview participants were also in receipt of funding from UKRI therefore my questioning, and associated information about my study, made explicit that no information gathered from individuals would be shared with the funding body. In doing so I attempted to reduce the effect of reporting only positive aspects of the CDT/DTP model.

In addition, there are issues pertaining to the replicability and reproducibility of this research. Whilst the survey questions could be used to gauge opinion in future years there

may be variability depending on a number of external variables such as levels of funding, changes to development programmes and the wider political landscape.

3.25.2. *Coding*

As I have undertaken this study as a single individual, a potential limitation lies within the coding of my interview transcripts (Campbell et al., 2013). I have mitigated this by fully explaining my method, providing the coding framework, and ensuring participants were given the option to validate their responses. I retained all of the interview details during transcription and also included all of the interviewer's utterances during the analysis stage in order that all of the contextual information was present in the coding and analysis.
In addition, my reflection throughout ensures that the analysis and coding of the interviews reduced any bias imposed by extraneous variables such as my own interest in the phenomena being examined (Krippendorff, 2011).

3.25.3. *Reproducibility*

The study incorporated multiple information sources including secondary data analysis, which are situated in a particular timeframe, funding environment and political context. This provides an issue for future replication of the research.

In attempting to reproduce this study, researchers would need to undertake a further review of outcomes from mid-term reviews and assess any changes to the funding landscape. However, I will make my coding framework, survey, and interview questions available for future studies, so that they can be reproduced or adapted to suited future studies in this area.

To manage potential issues around student representation, I include a recommendation to incorporate additional questions into PRES or recommend that UKRI consider this research in their analysis of CDTs/DTPs. I further recommend that UKRI consider students within their mid-term reviews, as part of an independent review, rather than use successful case studies within general evaluation submissions. This would afford research councils the opportunity

to gain an understanding of student satisfaction in addition to collecting their outcomes via Research Fish.

3.26. Dissemination

The following section details the plans for the dissemination of the research and the potential audiences for each. Throughout the study I maintained a pragmatic approach, combining my aim to construct new theories and knowledge with practical application of the research.

3.26.1. *Policy Makers*

Research in higher education (and education research more broadly) is often criticised for having little relevance to policy makers (Sallee & Flood, 2012) or fails to be translated in an appropriate format, whilst governments are required to be more transparent and utilise evidence in their decision-making processes (Robinson et al., 2018).

In disseminating the research, I will produce a one-page executive summary of the research, a brief description of the methodology and a clear set of recommendations arising from my research. This will be made available to UKRI staff responsible for the provision of CDTs, with the option to access the openly available datasets. This more easily digestible format for policy makers also gives the option for them to access further information if required, whilst reducing the burden on staff. In doing so I make my research useable outside of academia and translate my study into actionable plans.

3.26.2. *Higher Education Institutions*

I intend to publish the research in academic venues alongside the presentation of my work within the graduate development community, for example the UK Council for Graduate Education's conference and VITAE conference. By engaging with the wider postgraduate education community, I aim to reach an audience of practitioners, who can look to implement changes within their organisation.

3.26.3. *Academic Publications*

As the research also aims to produce new theories and applications on how best to deliver the cohort doctoral experience, I have identified suitable academic publishing venues for my research. Following the submission of the thesis, I will submit papers for publication based on the key findings from the research including:

Paper Topic	**Related Chapter**	**Potential Venue**	**Planned Submission date**
Impact of informal peer learning on doctoral student experience.	Chapters 6	International Journal of Doctoral Studies	October 2023 onwards
Impact and recognition of External Engagement in Doctoral Education: A Policy Perspective (recognition of move towards mandatory external placements as future work)	Chapters 4, 5, 6	Higher Education Policy	October 2023 onwards
The Impact of Interpersonal Relationships on the Development of Communities of Practice in Doctoral Cohorts	Chapters 4,5,6, 7	UKCGE Conference 2024	October 2023

I also intend to further develop my work on the cycle of being an insider-outsider and how this affects practitioner research.

3.27. Ensuring Research is Accessible

As outlined in my data management plan (Appendix 7) the surveys and interview questions, along with the coding framework for the secondary analysis, will be made available in Newcastle University's data repository (Newcastle University, 2019). This approach to open access will afford other researchers to replicate some aspects of this study in future and ensures an open science approach to the research.

Chapter 4. PRES and Survey Findings

In the following section, results are presented from the student survey (respondents n=209). The findings are compared against national datasets, using publicly available data from the Postgraduate Research Experience Survey (PRES) (Advance HE, 2022). Whilst the sample sizes differ significantly, I included the student satisfaction questions from the Postgraduate Research Experience Survey (PRES) in 2017 in this survey. This enabled the exploration of trends in this data and that of a large, cross-cutting dataset which incorporates the views of both funded and non-funded students across many higher education institutions. In doing so, any differences in the cohort of CDT/DTP funded students were analysed for similarities and differences, to assess against the research questions around what centres achieve, and what the findings reveal to support further knowledge on doctoral provision.
In addition, where available, I compare my sample with data from the Higher Education Statistics Authority (HESA, 2019) in relation to the participant demographics within my student survey.

The survey findings are presented using cross-tabulation graphs and narrative comparisons, combined with quotes from the free-text responses to add depth and context to the findings and draw out nuances. I examined whether there were differences in gender; age; reason for studying; subject discipline. A detailed review of the benefits and drawbacks, as reported in the free-text responses, is presented. These themes are explored further in the Discussion in Chapter 7.

The following section begins with an overview of the PRES themes from 2017-21 and their relevance to this research study. This is followed by the findings from the student survey.

4.1. Postgraduate Research Experience Survey

The Postgraduate Research Experience Survey (PRES) is a national survey conducted by Advance HE (formerly the Higher Education Academy), which examines a wide range of topics in relation to the postgraduate experience across UK higher education institutions. It is now an annual survey (from 2019), having previously been conducted every two years. Advance HE conducted a consultation exercise in 2017 to consider various factors, including

the data gathered on doctoral training centres and partnerships and a new section on wellbeing. A further consultation in 2021 led to the removal of a series of questions, including those on whether students were funded through a Doctoral Training Partnership and whether they were undertaking paid employment; arguably both crucial factors for student satisfaction due to the external impact these may have on workload and also the additional funding provided for students in DTPs. Furthermore, the survey now does not ask students to state their reasons for pursuing study and the section on wellbeing was removed; the reason stated was to reduce the survey length.

It is important to note that whilst a large number of data is gathered as part of this annual exercise, higher education institutions are not mandated to participate. Despite this, there is high uptake across the sector, with 117 institutions running the survey in 2017, 107 in 2019, and 45 in 2020. The notable drop in institutional take up of PRES in 2020 may be reflective of the external factors at play that year, most notably the COVID-19 pandemic, which significantly impacted all areas of student experience. Whilst this provides important contextual background, the actual lack of institutions taking part in 2020 could be attributed to various factors. Firstly, institutions were working in extremely challenging conditions and perhaps rightly judged that their postgraduate students would not respond positively to being asked to complete a further detailed survey during this time. Furthermore, many institutions were already undertaking a range of surveys and fact-finding exercises to support students within their institutional contexts.

Secondly, institutions were adapting to an unprecedented shift in their pedagogical and operational approaches to ensure students were supported in their studies. This placed an additional focus on their wellbeing, belonging and concerns over isolation, culture, and myriad other factors brought to the fore during the pandemic. This could also have impacted the capacity of institutional staff to administer the survey leading to limited take up by institutions.

Depending on which institutions took part in 2020, this does potentially have an impact on the PRES findings, where these were stratified by students who were funded by a UKRI

doctoral centre. UKRI-funded students faced further uncertainty around their studies during this time period, due to a lack of clarity from funders around funded extensions and students being asked in some instances to reconsider the scope of their research. These are all important considerations for the 2020 data, although the take up of PRES was higher in previous years.

In 2019 there was a total response rate of 46% (across 117 institutions) which represented 53% of the UK's postgraduate research (PGR) student population (Higher Education Academy, 2019). The full dataset is not available for each year, so comparisons and summary findings were drawn from annual reports produced by Advance HE. In 2017 a larger dataset was made available, enabling direct comparisons to my student survey, and acknowledging the significant difference in sample size. The summary below is grouped into the main findings from PRES 2017, 2019 and 2020, followed by an exploration of key themes, including research culture, student feedback, and for 2017 a comparison with students in doctoral centres, as this data was available.

The 2017 PRES report showed high levels of satisfaction amongst students overall; however, there were differences across disciplines which warrant further investigation and comparison with my own survey results. As this dataset was publicly available, I was able to compare questions directly with my own areas of research. The PRES dataset also asked participants to identify if they were studying within a CDT/DTP, which afforded an additional data point for comparison. The data was explored to see whether opportunities presented to students (as part of their doctoral study) differed across student groups. This was key to understanding any differences which could arise as a result of being situated within a funded centre, a core focus of this research.

4.1.1.1. Opportunities

In 2017, PRES included a question relating to opportunities which I mirrored in the student survey to enable a baseline comparison. Using the full PRES dataset, PRES data from respondents who had identified themselves as DTP/CDT students, was compared with the survey respondents in this study (all of whom were from a CDT/DTP environment). The

responses to my survey showed a high percentage of respondents were offered a wide range of opportunities during their studies. The table below shows a comparison between the full PRES data, students within DTPs/CDTs in the PRES dataset, and responses from the student survey. Overall, respondents in the student survey and PRES CDT/ DTP students do appear to have more opportunities, but the extent to which this applies across each category differs, as explored below.

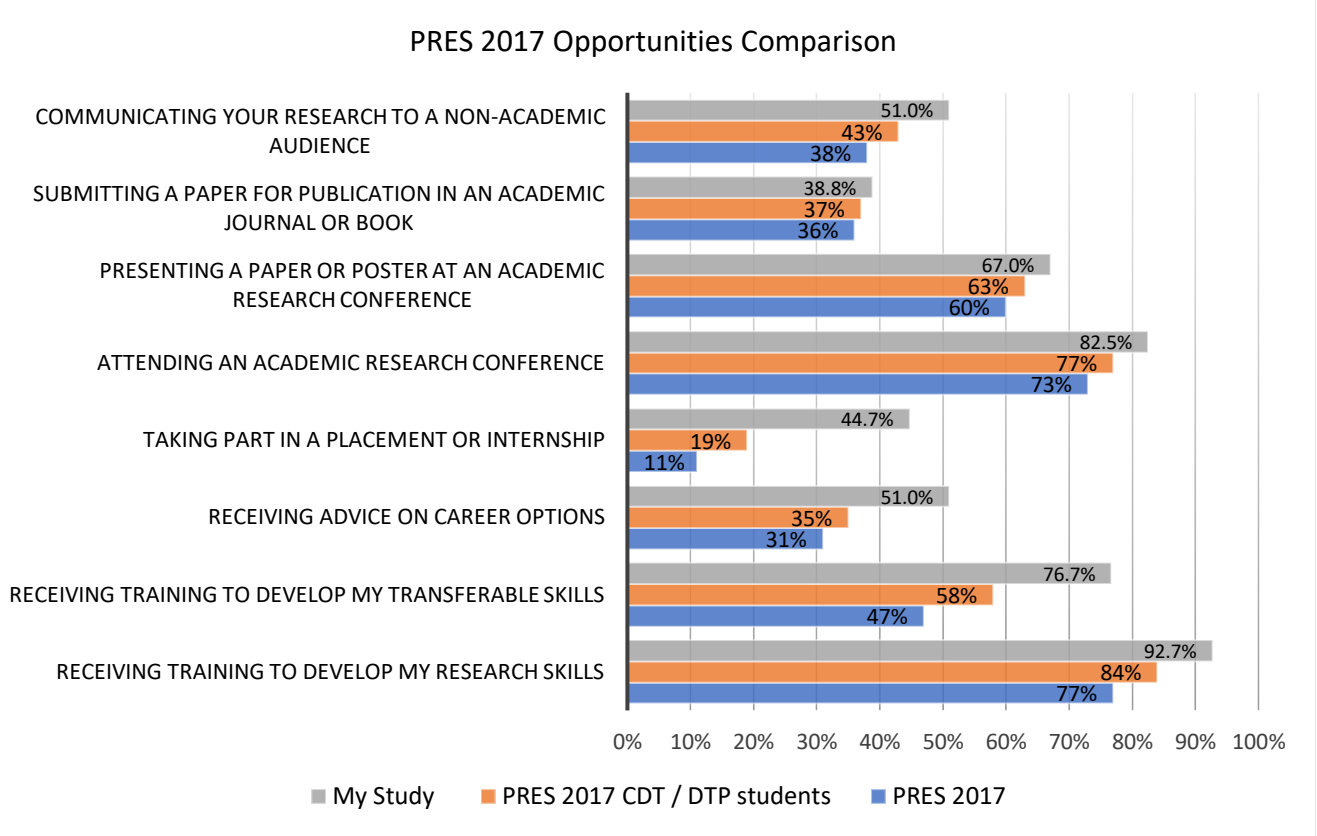

Figure 6 – Postgraduate Research Experience Survey 2017 - Opportunities data comparison across the whole respondent dataset, DTP students and this survey

The results (Figure 6) show that there is little difference across the three groups in some opportunities relating to dissemination. For example, publication submissions, presenting at and attending conferences. However, the students in my survey do appear to have slightly more opportunities to do this according to the responses.

Students in funded centres appear to have more opportunities related to transferable skills and careers. This could be in part due to the additional focus on producing doctoral graduates ready for the labour market and centres providing structured activities around

this. This is also highlighted in the clear gap in the opportunity for taking part in a placement or internship, though the total remains under 50% of respondents, even for students within funded centres. However, this does seem to be a clear differentiator, perhaps due to the additional funding available or the external networks involved with these centres. This is an important finding as it links to a key activity expected of centres by the funders and one which is promoted by centres, thus related to their core function. This could be attributed to a range of factors covering both external and funder expectations and the participants themselves.

- **Embedded Partnerships -** Firstly, there were a substantial number of students who participated in my survey who were funded by a centre where external partnerships are embedded. In previous incarnations of DTPs, whilst external partners were involved, there were no set expectations from funders around the provision of external placements and internships. In CDTs, partners are expected to provide co-funding to the centre, and this has been a requirement since 2014.

- **Maturity of Centres –** In the intervening time between the PRES data collection exercise in 2017 and my survey, a further two years had passed, which could have led to the further development of intern programmes within centres.

- **Study Stage of Learners –** a further potential difference is the year of study of the respondents as they are more likely to undertake placements in the mid-to-late stages of their studies.

- **Institutional Culture and Expectations –** In many instances undertaking a placement or internship would be perceived as a potential deviation from doctoral study. The requirement for students to complete, rather than taking on external placement opportunities, may be prioritised. Furthermore, for students who are self-funding, any prolonged period of study absence leads to them being without paid work for a longer period of time. Additionally, the inclusion of placements and internships is not integral to most students' doctoral programmes. For example, it is not an explicit

part of the VITAE framework, although career development and working with others are referenced in this. Following the ESRC requirement for current DTP renewals to include placements may impact future results on this topic, though we would not expect to see a change for non-funded students unless a significant shift is made across the sector to include career opportunities as an integrated part of postgraduate research programmes.

The data also suggests that in areas such as '*receiving training to develop my research skills',* more than 75% of students had been offered this. This was higher in the PRES DTP / CDT respondent group (84%), with a further increase in this within my own study (92.7%). Research skills development is a core component of many doctoral programmes, for all students therefore arguably there should not have been a difference in the responses to this. What could be the potentially defining factor here is that students in DTP and CDT environments will have structured and tailored programmes perhaps reinforcing the student perspective that they have had this opportunity. This finding does provide important context on the potential success of CDTs achieving their aims in respect of providing well-rounded and comprehensive research training programmes, with the important caveat that the budget for these CDT/DTP programmes is significantly higher than the institutional budget serving many thousands of students. It is also important to acknowledge that data in this example is not separated by year of study and is aggregated across student groups.

The data suggests that opportunities to develop a wide range of training and activities pertaining to additional development and future careers are more prevalent in funded doctoral centres. However, opportunities are only one factor of the student experience and overall student satisfaction is also a key indicator.

The findings on student opportunities provide useful context in relation to RQ2 as they could be used to increase the provision of opportunities across the sector to address disparities where they exist between funded and non-funded students particularly related

to career advice and transferable skills – which could be delivered with potentially low-cost interventions.

4.1.2. *Overall Student Satisfaction*

In the 2017 PRES survey, students within creative arts and design were the least satisfied student group, especially in relation to their opportunity to discuss their research with others and their research environment. This was in comparison with students in Biology who were the most satisfied with these opportunities. The physical structures and thus, potentially the social opportunities and interaction with others differ across these disciplines. Students within for example, Biology, and related disciplines are often co-located within a laboratory environment, potentially working on related studies or with complementary skill sets and studies. This physical structure could lead to increased interaction with the potential for both positive and negative outcomes, due to the close proximity of students and staff. The lab-based environment could be compared to the centre model favoured in CDTs; however, this can be challenging to replicate in distributed cohorts. It is therefore important to establish whether there are best-practice examples from labs which could be used to connect distributed students, for example through digital and face-to-face communication channels or ways of working. Within the student survey, the free text responses did not show a significantly higher level of dissatisfaction from students within centres funded by the Arts and Humanities Research Council, which suggests that the centre model could mitigate some of the areas of dissatisfaction relating to research environment. However, respondents from these disciplines did report comments around their working in environments which included their physical location and their work in libraries or other space potentially highlighting why some students from these disciplines may feel they have less opportunities for interaction. As the student survey data was collected prior to the pandemic it was not possible to undertake a full comparison pre and post the COVID-19 pandemic.

4.1.3. *PRES 2019*

In 2019 PRES data was only available as selected aggregated responses and via the annually published report. However, this still provided a valuable source of information about the student population to refer to, though with limited opportunity for an in-depth comparison.

The PRES 2019 (Advance HE, 2019) results included an analysis of free text responses, coded and themed, with Learning and Support (38%) as a main point of concern for students.

Environment and culture comments accounted for 24% of responses with key sub-themes, including interaction with other students, a core facet of doctoral centres and significance to this study. Unfortunately, the dataset is not publicly available for analysis to assess whether these students were part of a cohort environment. However, it does highlight that engagement with other students is a key issue for postgraduate research students.

When asked about other aspects of research culture, e.g. *'I have frequent opportunities to discuss my research with other researchers including research students',* 66% of PRES respondents agreed with this. Although the sample size for my study was significantly smaller, respondents reported satisfaction with this aspect of their programme.

4.1.3.1. Student Feedback

The issue of student feedback featured across PRES surveys 2017-2020, with interesting changes in the 2020 data collected during lockdown. Whilst only 55% of students reported satisfaction in this area there was an 10% increase during the pandemic, '*It is encouraging that a larger proportion of PGRs feel that their feedback is valued and acted upon at a time of unprecedented change and social distance, and when it is therefore especially important to make sure the student voice is represented.'* (Advance HE, 2020:21) This broadly aligns with student responses in my survey, although the question differs in its focus, the recommendations apply. In the student survey, respondents were asked: *Are you provided with opportunities to give feedback to a management board? (Y= 76%) Do you feel that any*

concerns you raise are addressed appropriately? with only 42% of students responding that their concerns were addressed and 46% responding with *'sometimes'*.

One recommendation from this is that centres regularly engage in 'you said, we did' events or provide regular updates to students so that they understand the impact of their feedback and how it has been actioned. Some higher education institutions do already publish how PRES data is used in their institution including the University of Bath who provide detail on how the feedback has improved a range of areas. (University of Bath, 2023) Further, the University of Bristol informs students that *'PRES is one of the most effective mechanisms for you to improve and change the University for a better and more positive experience'* (University of Bristol, 2023) and the University of Exeter provides students with clarification on what PRES is used for *'Your responses are vital in helping us understand what we are doing well and what we can do better to improve the experiences of Research Postgraduate Students at the University of Exeter.'* (University of Exeter, 2023)

The University of Warwick also publish results alongside an explanation of how student feedback is used internally: *'The survey lets us know what is working well and what's not, helping us make things better. Responses from you help us improve both our current and future support, enabling us to do better for all of our Postgraduate Researchers.'* (University of Warwick, 2023)

However, without a sustained communication campaign and supporting resources to leverage this across institutions, and within doctoral centres, this could be a missed opportunity to engage the student population. This data therefore supplements the knowledge base on how student feedback can be used effectively and could inform future strategies for doctoral centres to ensure students are made aware of how their feedback is used (RQ2).

4.1.3.2. Conclusion

The PRES results enabled the exploration of a range of themes including opportunities; student satisfaction; subject discipline differences, and research culture. The results showed

that there is a difference in the opportunities provided to postgraduate students in funded environments, with particular reference to career development; a topic expanded upon in this research as part of the student survey. Additionally, PRES data showed that the opportunity to interact with others was a key topic area; one which is covered in detail in the results of the student survey presented in Section 4.2 and an area for future development for all higher education institutions.

4.2. Student Survey

The following section describes the results from the student survey, which was distributed in 2019, using a purposive sampling method to target students in UKRI-funded centres across the UK. However, the respondents came from England, Scotland, and Wales with no responses from Northern Ireland. In total, 209 student participants completed the survey from a range of UKRI-funded centres, across both CDTs and DTPs.

The survey combined free text, Likert scale and closed questions to capture responses from student participants as detailed in Chapter 3. All students were reached through the administrative contact within their centre. This ensured that I was able to target the correct audience for the survey. However, it also meant that access to students was decided by the centre management. Each of the centres I contacted, and their response, was recorded in order to track the number of centres requested to participate. Whilst the respondents were asked about their subject area, university, and funder, this data was only used at an aggregate level to identify geographical representation, breadth of disciplinary topic areas and funder split within the respondent population. The subject area data was also compared with Higher education Statistic Authority (HESA) data (HESA, 2021), for comparison with comprehensive postgraduate student demographic data.

There is a far greater number of CDTs than DTPs across the UK. To represent the views of DTP students, I also contacted DTPs in the UK to try and mitigate any low response rate. Within the CDT network I selected a range of CDTs that had started in 2014, to collect perspectives from students who are part-way through the doctoral journey and those that started in 2019 to allow for comparison across the student population.

I undertook a preliminary search of UKRI websites to obtain a list of funded centres and checked whether the centres were still active. I also looked at whether they offered a taught first year, for example, if they had an embedded master's programme. I wanted to ensure I had a varied sample for the study that included centres with a range of approaches. Responses varied, with some providing no acknowledgement, others agreeing to send on the survey and others agreeing to be interviewed and circulate the survey. An initial low response rate from centres did lead to fewer students participating in the survey. To try and mitigate this, I extended the survey for a further two months and contacted further centres. The results of the survey could not be validated for statistical significance due to the small number of respondents. It was not designed to be a truly representative view of students within funded doctoral centres in the UK; however, the data collected has enabled the exploration of several key themes pertaining to the student experience.

Within this section, I describe the results of my survey, the rationale for the presentation of themes, and the process employed. As I reviewed and structured the results, I prepared a series of visual maps to act as a basis for coding free-text responses, this is described in further detail and presented below. I also present demographic data relating to age and gender to allow for cross-comparison and analysis of arising themes. As detailed in the methodology section, no data was collected on socioeconomic status or ethnicity.

4.2.1. *Institution*

Participants (see Figure 7) reported the institution they were studying at, which covered Scotland, North East and Yorkshire, North West England, the Midlands, London, South West England, South East England and Wales. To preserve anonymity, these are not reported on in detail within the findings. No detailed analysis was undertaken on the geographical location of students and their experiences based on this, however, the relative costs of living and opportunities for external engagement could play a role in the overall student experience. Figure 7 shows the proportion of respondents by geographical area, of the 209 respondents, 188 provided the name of their institution.

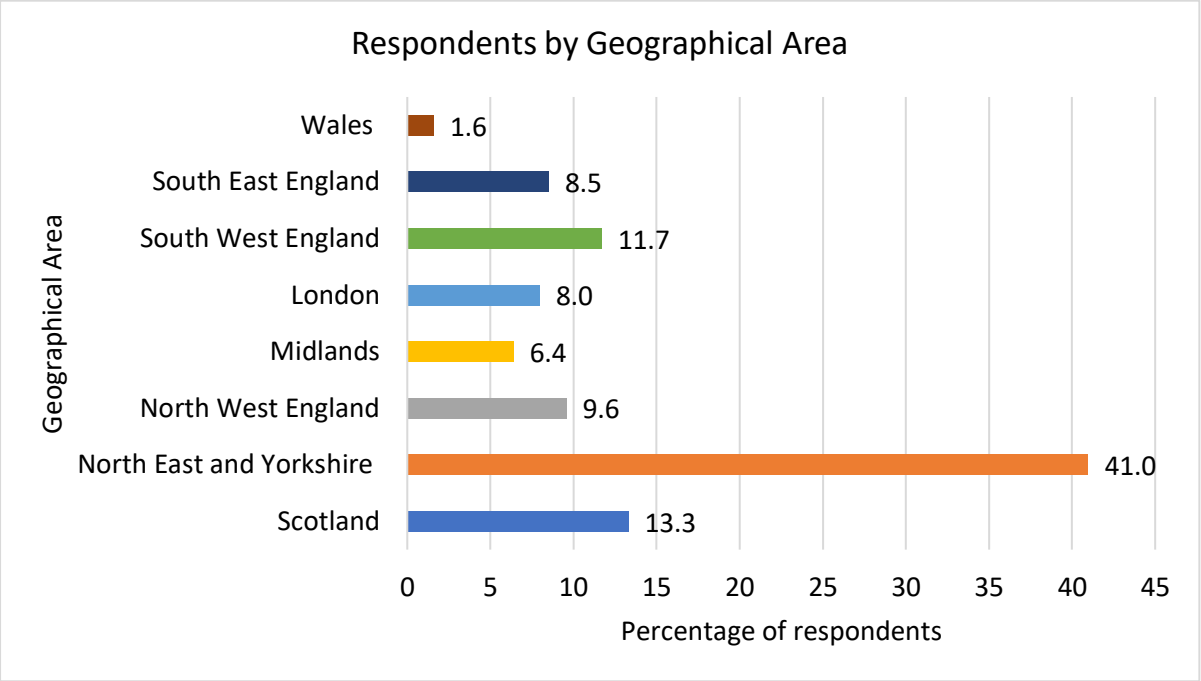

Figure 7 – Percentage of respondents who disclosed geographical area (188 of 209 respondents)

4.2.2. *Subject Area*

Each of the respondents was asked to provide their study/subject area. This was collected to evaluate differences between subject areas. This was set as a free-text answer, and the results were then categorised and grouped into subject areas. Some students opted to provide a response which included the name of the centre in which they were studying, rather than their specific topic or research area. In these instances, to protect anonymity, I have removed the names from the presentation of results below and instead grouped responses from the same centre into individual categories e.g., CDT1, DTP1, based on their centre.

Where multiple answers were from the same academic discipline, I identified similar words and grouped the responses. An example of categorisation is given below, also demonstrating where a subject may cross two disciplines, as with data science which often incorporates mathematics, statistics, and computer science.

Mathematics and Statistics: Maths, mathematics, stats, statistics, statistical, and statistics and mathematics, mathematical sciences, inference, machine learning

Sub-studies: Data science, data analytics, AI, artificial intelligence, machine learning

Computing: Computer Science, computing, programming, algorithms, cybersecurity, systems.

Sub-studies: animation, digital entertainment, Human-computer interaction (HCI)

Following categorisation into subject areas I then further categorised these into Science, Technology, Engineering and Mathematics (STEM) students, humanities, and art and creative industries students. In PRES data, students from Arts and creative industries showed the lowest levels of satisfaction with their research environment and I therefore used this as a comparison point to see if this differs if the students have access to funding, further training, and other cohort activities.

Subject areas are grouped by HESA subject codes and presented below in Figure 8. Figure 8 shows that most of the respondents are from disciplines within the remit of the Engineering and Physical Sciences Research Council. This funder provides the highest level of investment to CDTs in the UK. However, based on investment levels, there is also a higher-than-expected number of students from the arts and humanities subject areas. This is perhaps due to the individual gatekeepers contacted who publicised this to the students within their centres.

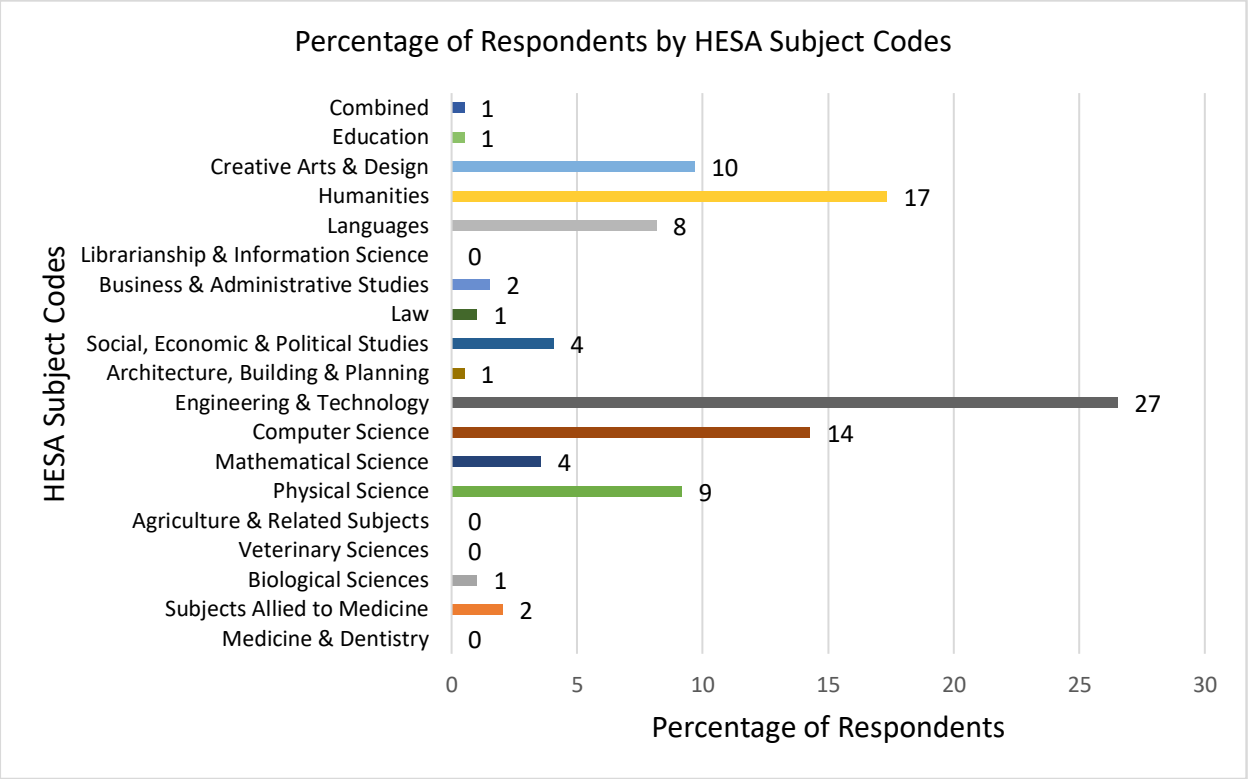

Figure 8 – Subject areas - percentage of respondents categorised by HESA code.

4.2.3. *Employment*

Respondents were asked whether they were in employment prior to studying and whether they were still in employment, with the option to select both. This question was posed to identify if there were differences across the respondents who had experienced employment, or who had chosen to leave employment to pursue doctoral study.

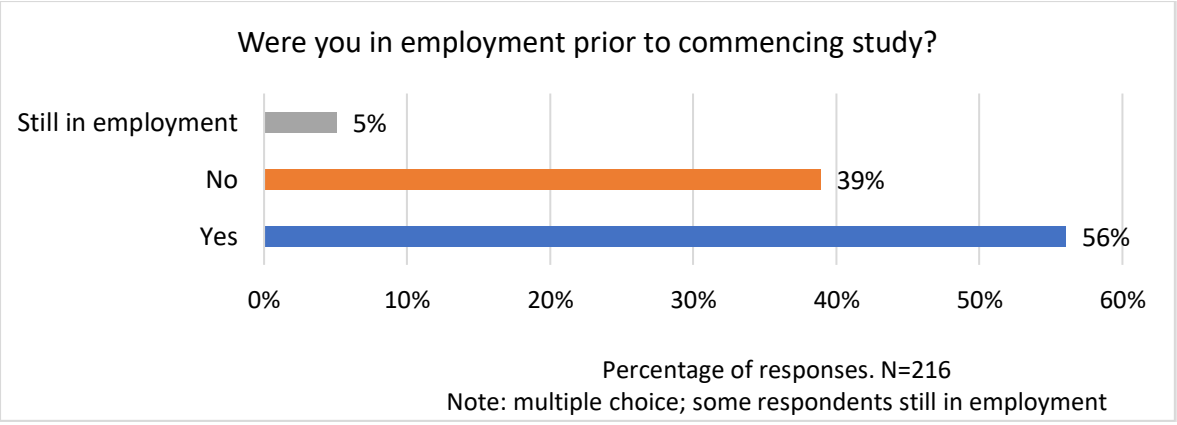

Figure 9 – Percentage of respondent who were in employment prior to study; still in employment.

4.2.4. *Demographics*

I collected demographic data relating to age and gender but did not capture sociodemographic data or ethnicity; therefore, no inference can be made about these categories. However, previous studies have demonstrated a lack of diversity in higher education, emphasising the gap between undergraduate and postgraduate student enrolments for students from some minority ethnic backgrounds.

4.2.4.1. Age

Each respondent was asked to provide their age, with the option to decline to answer. There was a 100% (n=209) response rate to this question. These data were compared with HESA data across two age ranges as categories differed: HESA state under 20, 21-24, 25-29 and 30 years and over. The data categories used were not broken down by specific ages, so within my dataset, I combined 20-25 and 26-30 and 31-35 and 36-40, for the purposes of comparison with national level datasets.

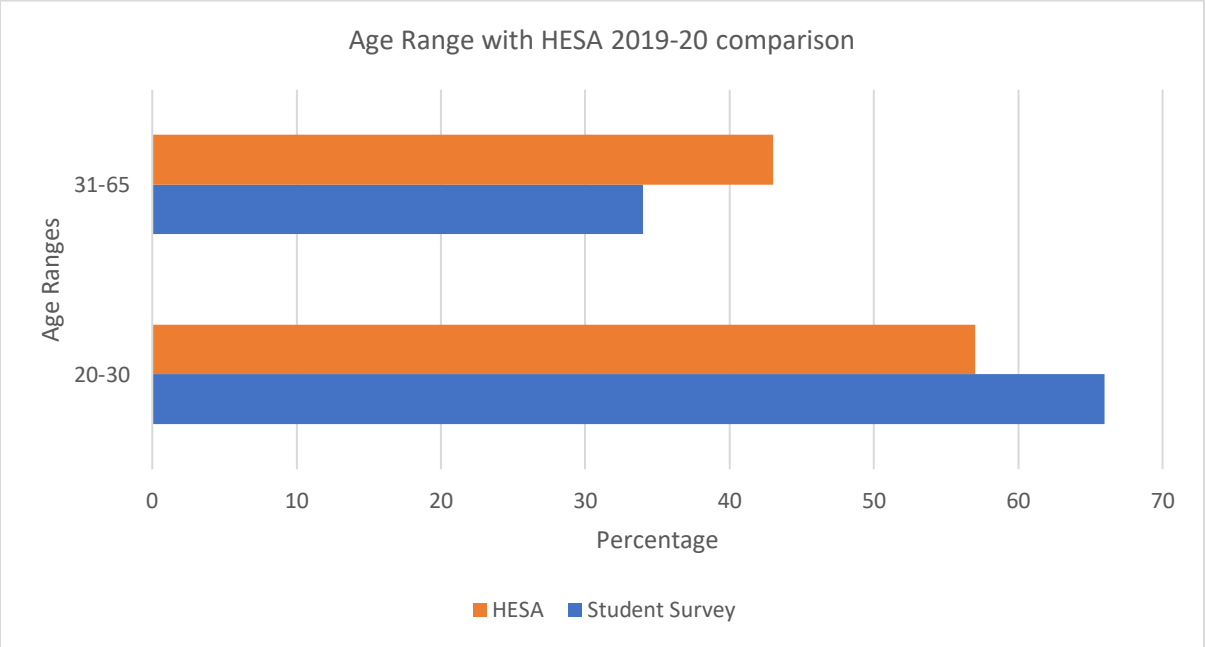

Figure 10 – Comparison of age range of respondents in HESA'19-20 and this student survey

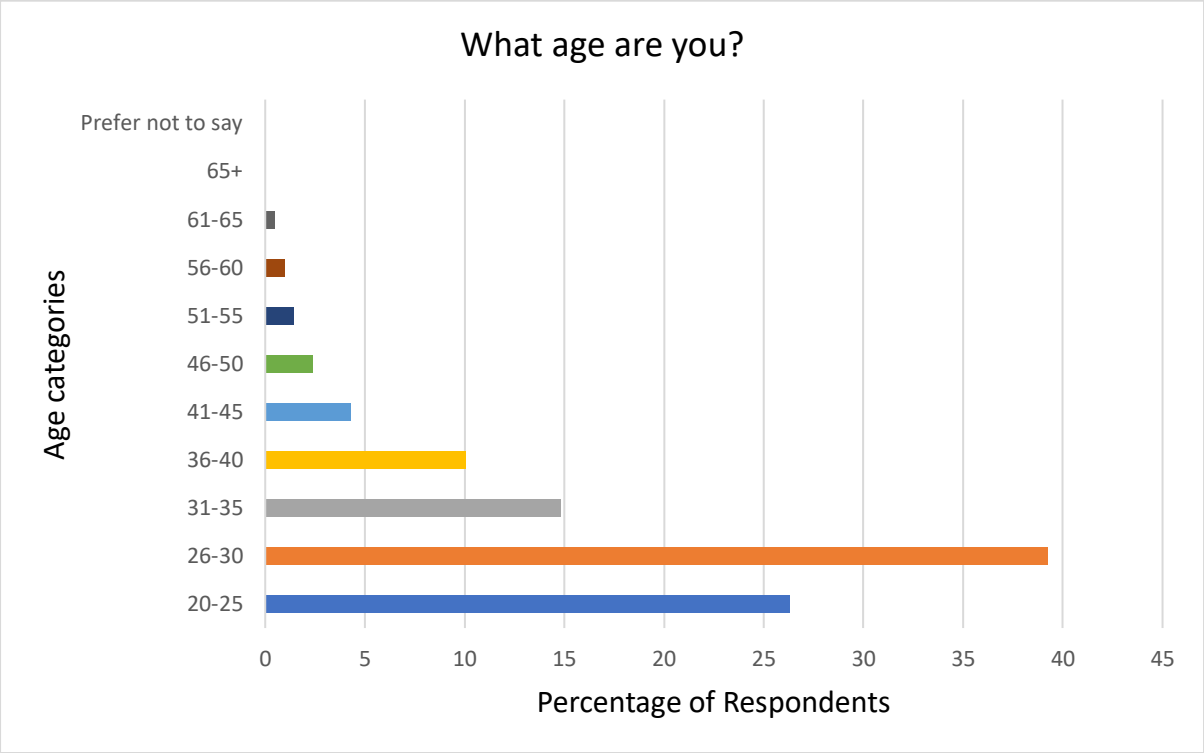

Figure 11 – Percentage of Respondents by Age

Whilst 26% of respondents came from the 20-25 age category, the largest majority of respondents were within the 26-30 age range (39%), suggesting they had returned to study following a period within the workplace. The 31-35 and 36-40 age categories comprised 15% and 10% of the respondents, respectively. The proportion of respondents above the age of 40 was 8%.

There were no respondents in the dataset in the 65+ category, and no respondents declined to give their age. The lower percentages within the older age categories are unsurprising. However, 72% of respondents were older than 25, which suggests a move away from individuals going straight from undergraduate or master's degree to doctoral study. Further comparisons within the dataset are made below, and any difference noted.

4.2.4.2. Age and Study Mode

Figure 12 displays the proportion of respondents in full or part time study, grouped by respondent age. All respondents in the 20-25 age range are in full time study. The proportion of part time learners increases with later age groups, most notably in the 36-40

age group. The relatively small number of respondents in the 41-45 and later age categories limit our inferences for these groups.

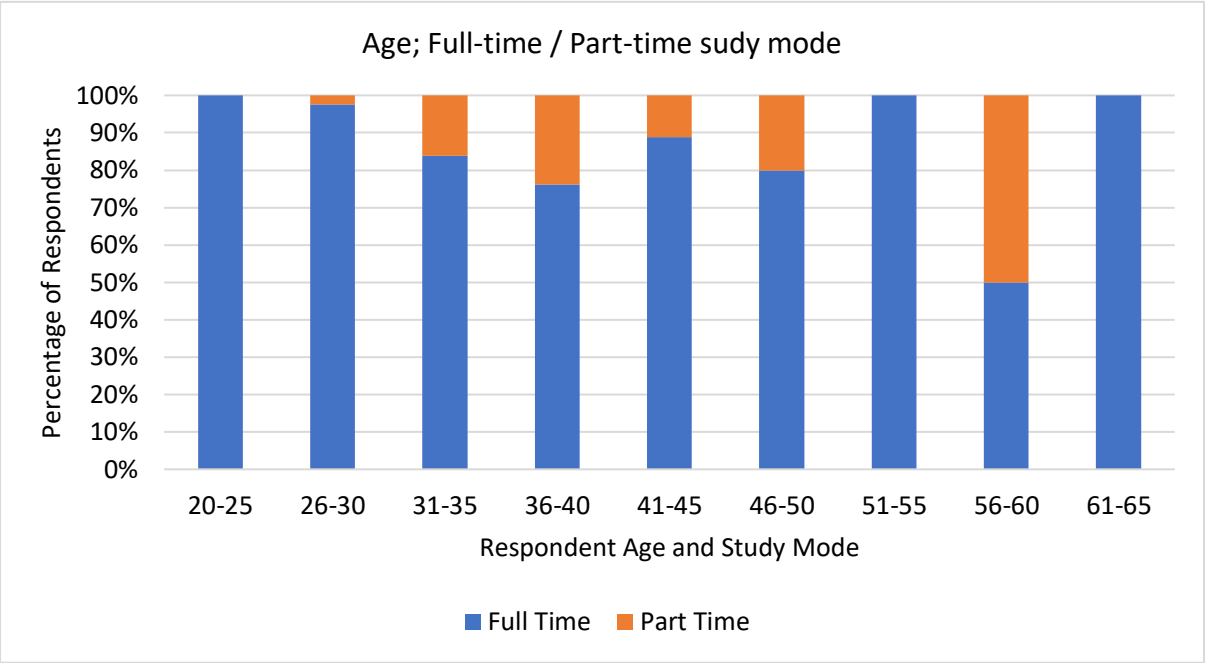

Figure 12 – The proportion of respondents in full or part time study, grouped by age.

4.2.4.3. Age and Reasons for Returning to Study

Comparisons between age ranges are presented below to assess whether the reasons for postgraduate study differ across age groups. These were compared across career choice categories as this is potentially significant for students returning to study after a period of leave or after leaving employment. Figure 13 shows that the responses were broadly similar across age groups, based on the percentage of responses from each category. However, whilst there are fewer individuals in the 46-50; 51-55 categories, they expressed preferences towards improving their career prospects outside of an academic or research career, as opposed to within academia. This could point to the use of the doctorate to improve career prospects and broadly aligns with the findings provided in the 'other' category. What is interesting is that more than 50% of respondents in the categories up to age 45 were all interested in a research career. This career path could be within the voluntary, community and social enterprise sector, research organisations and industry and is not limited to academia in higher education institutions. This provides an interesting avenue for exploring future doctoral graduate career journeys.

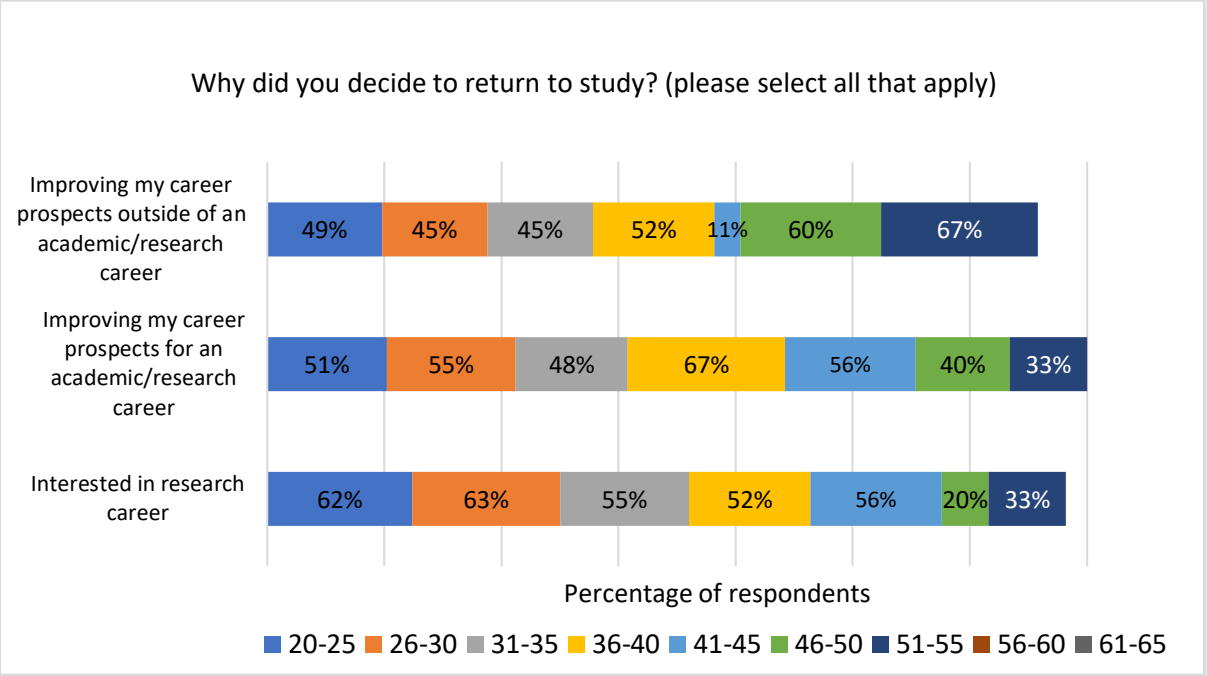

Figure 13 – Age and Reasons to Return to Study – career.

4.2.4.4. Age and Opportunities

The data showed that students respondents came from a wide range of ages, with expected fewer numbers in the older age categories. However, due to the claims made by centres that all students have access to a range of external activities and opportunities, I was interested to see if there were differences across ages ranges within the sample.

The findings are grouped into three opportunity categories: skills, research and transferable; career activities and placements; dissemination (academic and non-academic). These groupings enabled an exploration of each of these topic areas, where age could be a key factor. For example, whilst not all students returning to study at a later stage in their life may want to take up all opportunities, they should all be offered the opportunity to do so. Satisfaction with various elements of their programme is explored in Section 4.5.

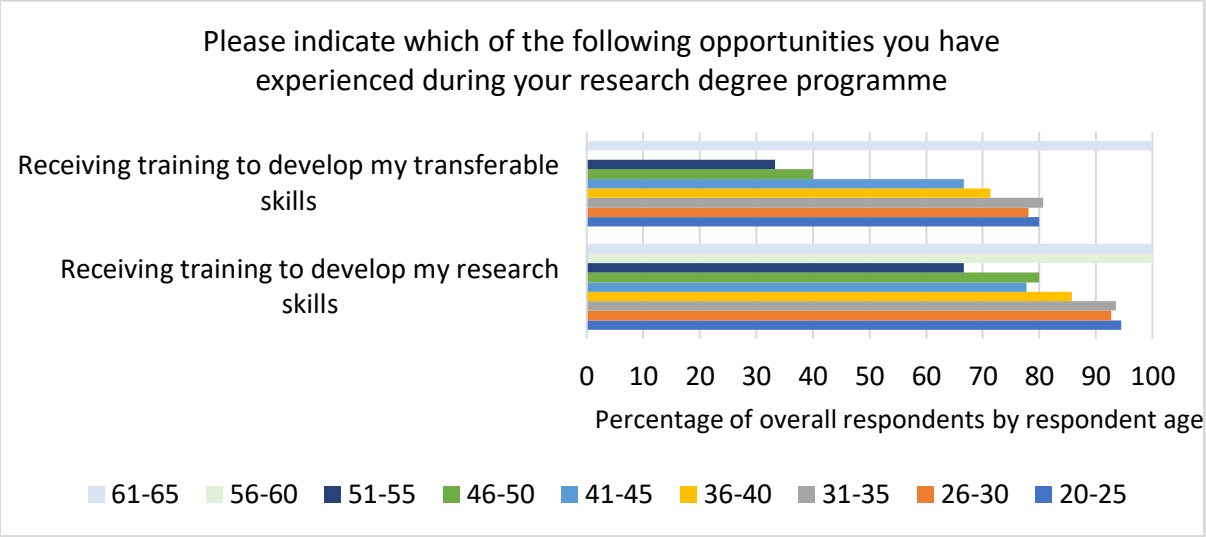

Figure 14 – Opportunities experienced during the research degree; Skills, by age.

Skills

Figure 12 shows that although there were no significant differences across several of the age groups with relation to skills offerings 20-25; 26-30; 31-35), the data shows that there is a downward trend for age ranges 36 onwards. This could be attributable to a range of factors and the data shows that this age category is likely to have had more pre-study years in work as well as choosing doctoral study as a career change option. This could partially explain the drop in the numbers here for this question. What is not clear is whether the students were offered, and declined, these opportunities.

Career Opportunities

There were no responses from respondents in the 61-65 category for these questions, however the data shows that there is only one individual in that category in the overall sample and they are in their first year of study, which could explain why they have not been offered a placement or internship opportunity. Furthermore, across 51-55; 56-60 and 61-65 categories overall, 7/11 respondents were in year one or two of their programme. The data show whilst some age groups appear to have been offered more opportunities for internships, the only age range with a clear difference was for those in the 41-45 age range. Where career advice is concerned it would appear that those in the age ranges 41-45 and 46-50 were least likely to have received career advice, however the data also shows those in

the 20-25 age category also appear to have had fewer opportunities for this, though this could reflect their early stage of study and that they have not reached the stage of the doctoral journey where this would be offered.

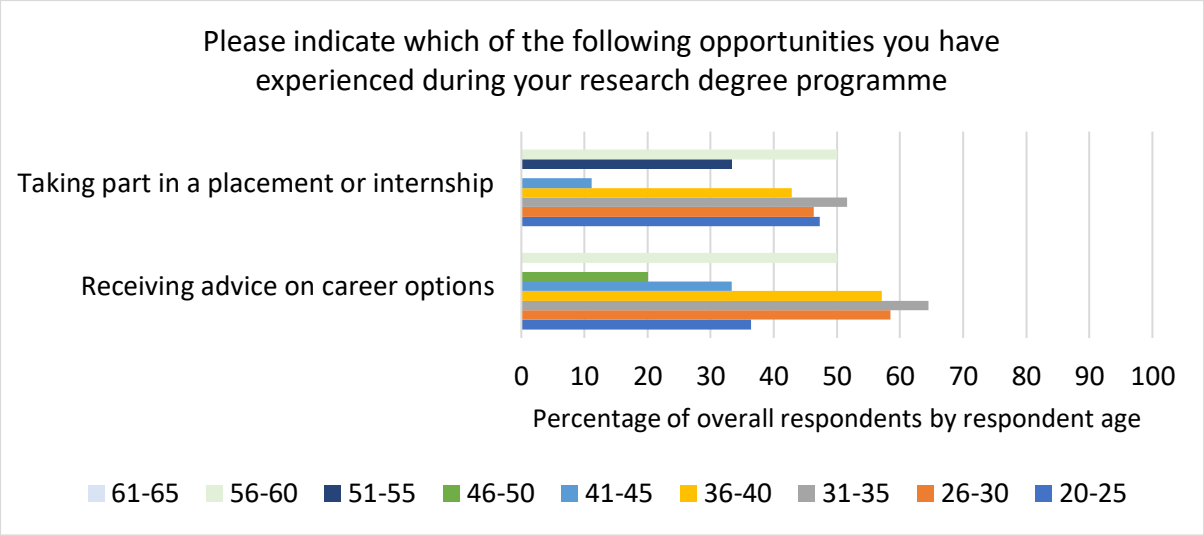

Figure 15 – Age and Career Opportunities

4.2.4.5. Age and Satisfaction; Involvement with wider research community

Figure 16 explores if there were differences stratified by age, in the perceived satisfaction of students with their opportunity to interact with the wider research community.

Overall, the responses suggest that students were satisfied with their opportunities to be involved with a wider research community. However, it also shows participants in the higher age range were broadly satisfied though they were more likely to fall in the middle category. However, these only accounted for a small proportion of the overall respondents.

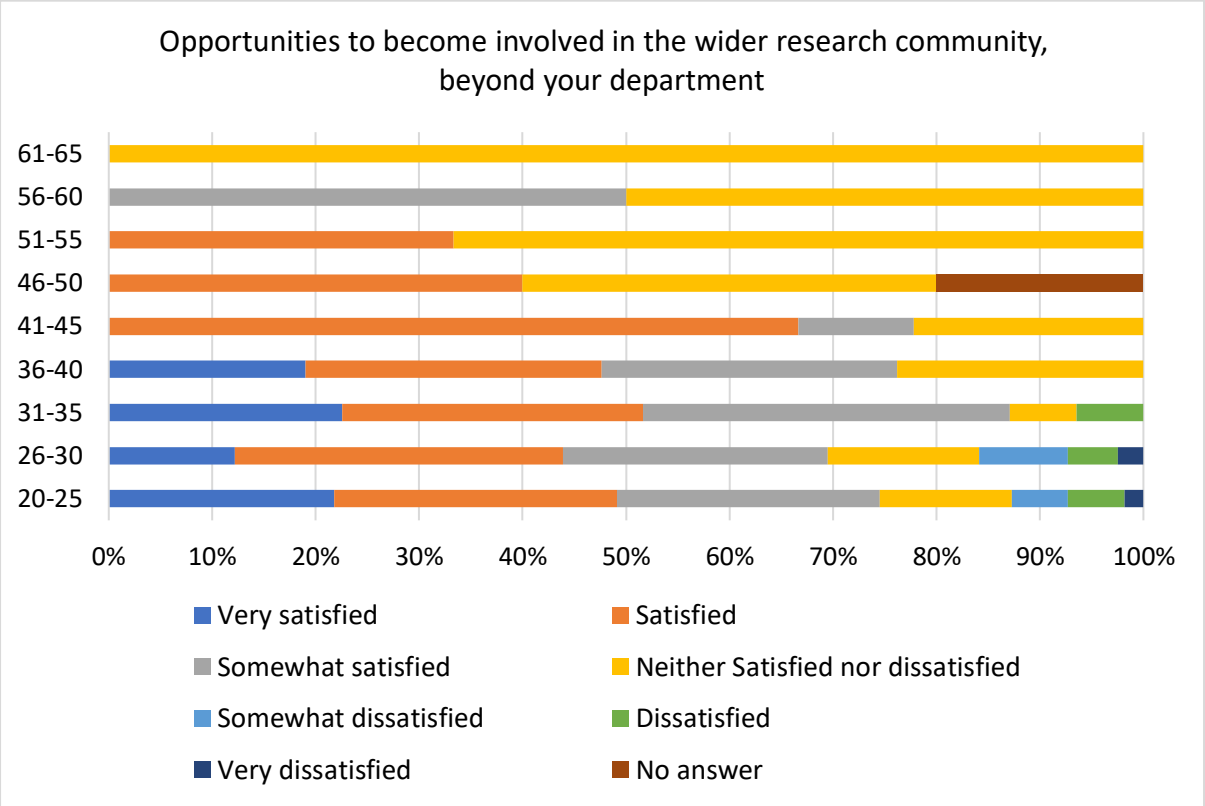

Figure 16 – Age and satisfaction with opportunities to get involved with wider research community.

4.2.4.6. Gender

All respondents (n=209) provided their gender, 60% (n=125) identified as female, 39% (n=82) as male. The number of non-binary respondents represented only 1% (n=2) of the sample size therefore limited inference will be made from this. Two other available options received no responses; *'other'*, with the option to add a descriptor in free text, and *'prefer not to say'*.

Throughout the analysis of the results, I accounted for the fact that the largest group of respondents identified as female, to regulate for any gender differences. I also used this as a comparison tool when drawing inference within the discussion section. The following graph shows percentages in relation to the number of respondents.

In order to benchmark and compare against national level datasets I also compared the data with data from Higher Education Statistics Authority (HESA) data (see figure 17).This is

caveated to reflect that in the student survey respondents were asked to identify their gender, whereas HESA figures are collated based on sex.

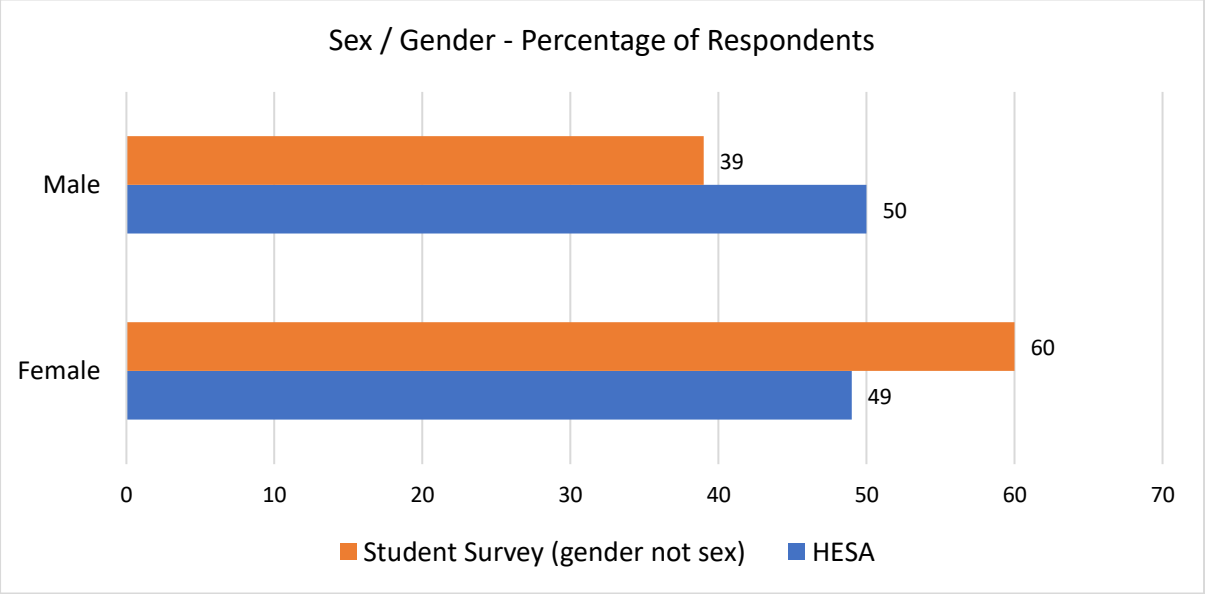

Figure 17 – Sex / Gender comparison with HESA 2019-20 data.

The data (figure 13) shows that this survey had a slightly higher percentage of respondents who identified as female, therefore this was considered in the discussion of responses though the actual overall response rate numbers are low.

4.2.4.7. Gender and Reasons to Return to Study

Respondents were asked to identify the reasons they chose to return to study, and examined to see whether there was a difference between genders across the categories. There were no significant differences across the answers.

An interest in the subject area was the dominant response across all genders, suggesting that although funding was available this was not the main driver for students engaging in doctoral study.

4.2.4.8. Gender and Opportunities

The topic of gender and opportunity was also considered, presented in Figure 19. The data shows that respondents who identified as male were offered more opportunities to submit their work for publication and receive advice on career options. Respondents who identified

as female reported higher levels of opportunity in relation to receiving training to develop their transferable skills. The other categories showed little difference across by gender with all reporting similar levels of opportunity. As there are only two non-binary respondents little inference can be drawn from the responses to this question.

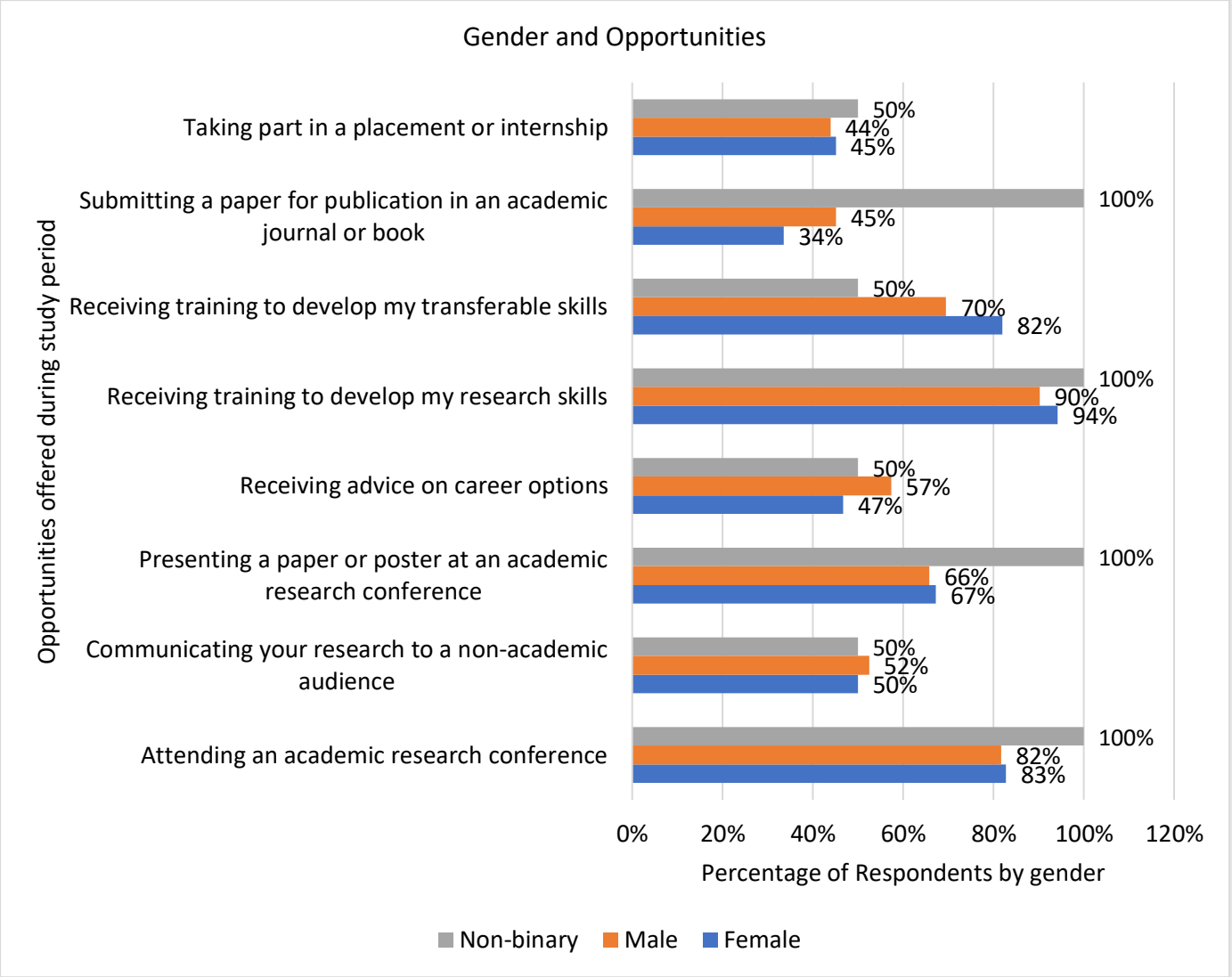

Figure 18 – The percentage of respondents receiving opportunities during their study, grouped by gender.

4.2.5. *Reasons for Returning to Study*

Participants were provided with a range of options to select from to denote their reasons for returning to study and were able to select multiple choices without ranking.

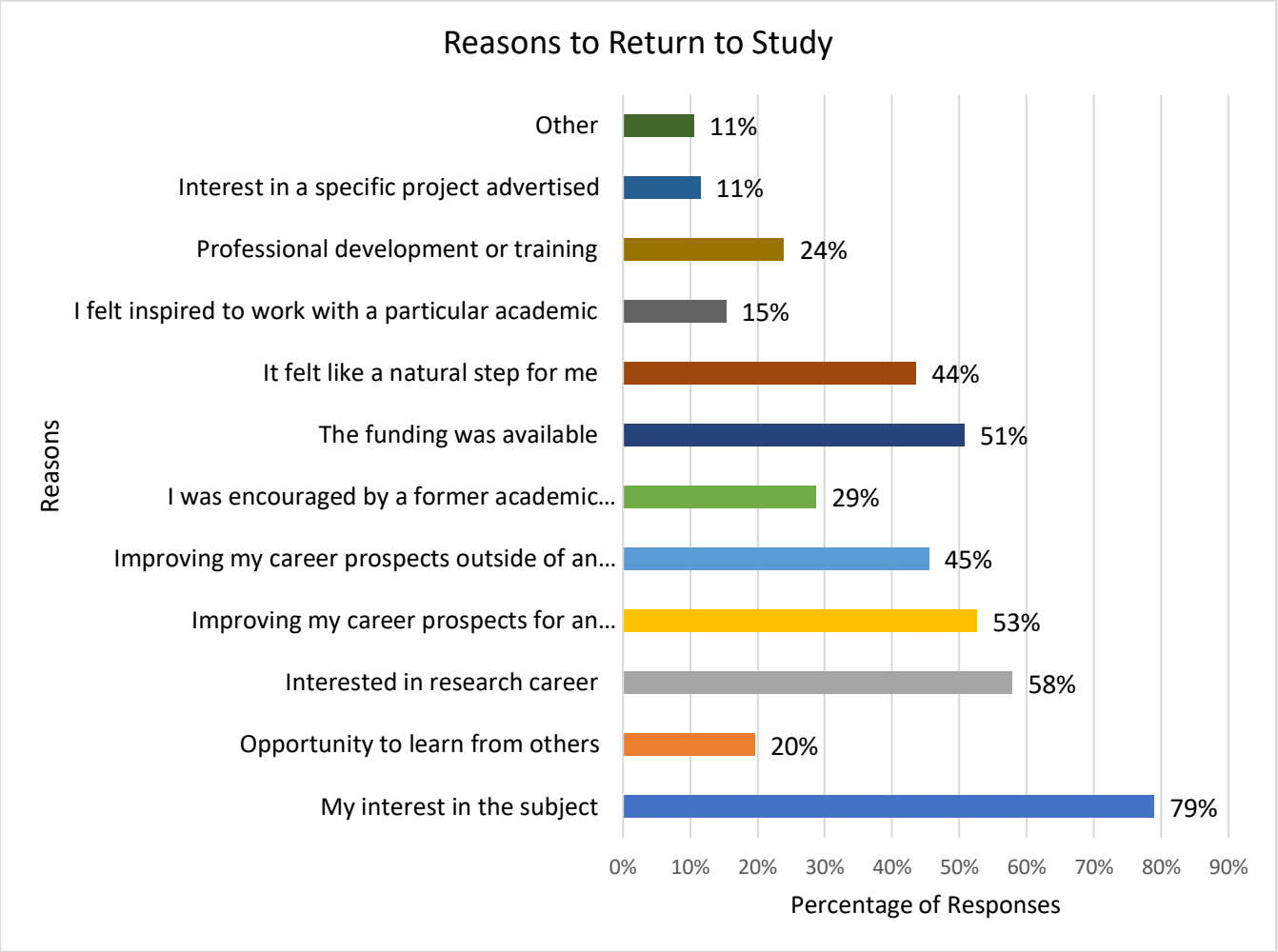

Figure 19 – Percentage of Respondents reporting each reason for return to study.

In addition, the option to provide a further free text response was offered; 22 respondents provided answers to this. The responses fell into four broad categories: career change, research /education interest, uncertain direction, and other. However, the majority of the responses were related to career change, this is explored further below.

Career change

Although participants who were placed in the 'career change' category were thematically linked, there were subtle differences in the rationale behind their decisions with some alluding to an almost forced position, due to precarity within their working environment:

> *"I work in the voluntary sector which is extremely precarious, lots of freelance work, never get a permanent contract etc. I am doing my PhD part-time so now have clear*

knowledge that I will have a steady income and will be working on a specific project for seven years - this to me is a great luxury and a very appealing aspect of undertaking a PhD." (F, 31-35, PT, Funding Council unknown)

Three further participants noted redundancy as key motivating factor alongside the opportunity to gain new skills and encouragement from others.

"Made redundant from main job; encouraged, opportunity all came together at the same time" (F, 51-55, Funder not known)
"Existing contract coming to an end" (M 31-35, EPSRC)
"Update my skill set after being made redundant from my last job" (F, 51-55, EPSRC)

Others referenced a desire to change careers due to a lack of opportunity in their current chosen area, whilst also selecting a number of multiple-choice options related to both academic and non-academic career options:

"I had reached a ceiling as far as I could go in my career" (F, 31-35, ESRC)

For one participant this was also an opportunity for change in relation to the focus of their work, whilst another was already working in a related area and their multiple-choice answers also reflected their desire to pursue a career within academia.

"Felt stagnated in job, wanted to do something different and potentially have a positive impact for society and the environment" (F, 41-45, EPSRC)

"I was doing projects anyway, and a doctorate was a way to align these with an academic career rather than for example as a business" (F, 36-40, ESRC)

The following participant noted a career break and a knowledge gap within their sector combined with funding provided them with the opportunity to pursue a doctorate.

"There was a gap in knowledge within the sector in which I was working that I had identified. No single institution was likely to invest in the research and so a funded PhD seemed like an opportunity to carry this out. I had also had a career break to have a family and the PhD offered similar pay to what I would have got part-time and although it was full-time, it offered enough flexibility to allow me to take it on." (F, 41-45, Funder not known)

Two further respondents provided brief responses without further details:

"Career change" (F, 26-30, EPSRC)
"I was looking for a career change." (F, 26-30, NERC)

Whilst career change was cited as a supporting motivation, it was not the only factor that drove participants towards the pursuit of a doctorate, as all respondents also selected a wide range of multiple-choice reasons for returning to study. From the 22 participants who provided a free text response to this question, 18 identified as female, of which 8/9 cited career change reasons for returning to study.

4.2.6. *Year of study*

Each participant was asked for their year of study to allow for comparisons in satisfaction levels over the course of their studies. In particular, I wanted to examine whether opportunities for engagement with other student and research groups changed over time. The graph below shows the distribution of respondents by year of study as a percentage of all respondents. There was a fairly equal distribution of students in years 1-3, with few in year 4-5 and only 1 student in year 6 and year 7 respectively.

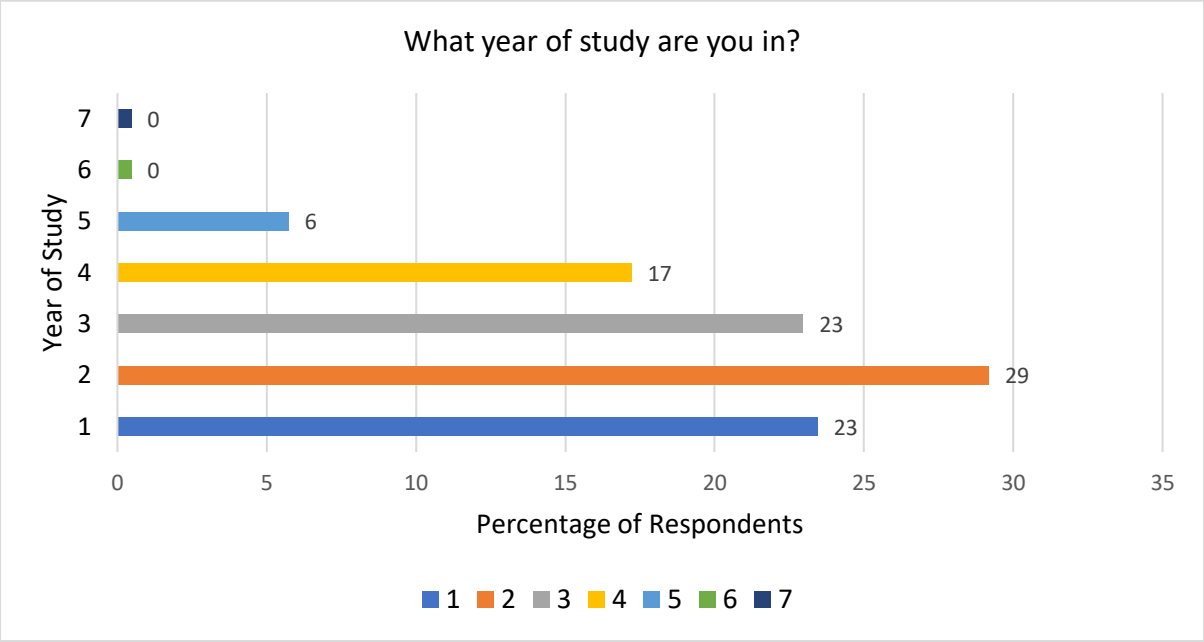

Figure 20 – Percentage of Respondents by Year of Study.

Many centres have a taught first year, or integrated training across the partnership in the first year. This would arguably lead to a greater interaction in year 1, with a drop-off over time. However, as students within centres will also have organised cohort activities, I expected the results to show a sustained interaction / satisfaction over time.

The students who were in year 5 noted a marked downturn in their satisfaction to interact with their cohort, this is unsurprising as many programmes are four years in duration. There is a wider issue to be investigated for part-time students, as their full-time counterparts will graduate potentially up to two years before them.

4.2.7. *Study Mode*

I was also interested in what proportion of students within the sample were studying part-time/full-time. The graph below shows that 93% of students were studying full-time, with only 7% part-time students enrolled at the time of the study.

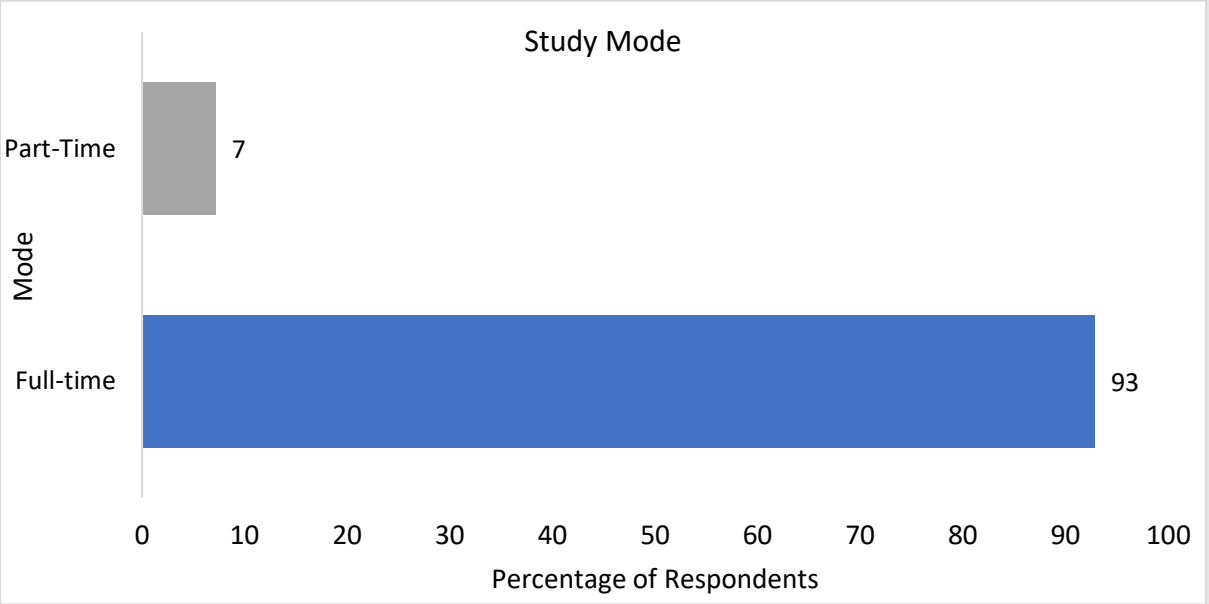

Figure 21 – Percentage of Respondents in Full and Part-Time Study Modes.

4.2.8. *Funding Model*

As funding models differ across the sector a question was asked to ascertain how students were funded. The majority of students were able to identify how their centre was funded, with 'don't know' accounting for less than 10% of the responses. As all centres are required to acknowledge their funding source on promotional material, it is unsurprising that students were able to identify this. This suggests a move away from earlier studies on DTCs, for example a study by Budd et al. (2018) which showed that students had few ties with their DTC and did not identify themselves as part of a centre. The graph below (figure 23) shows the percentage of students funded by each funding council.

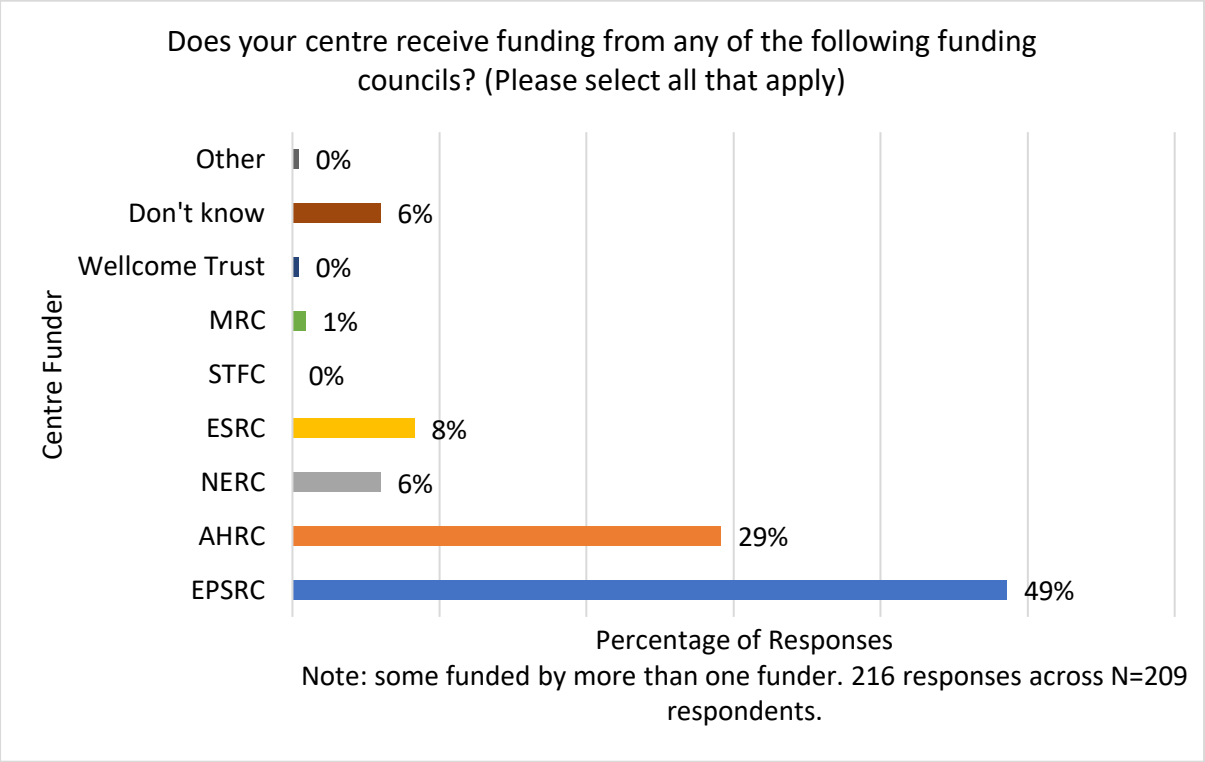

Figure 22 – Proportion of respondents grouped by centre funder(s).

The data showed that the majority of respondents were funded by EPSRC, which reflects the fact that EPSRC has an overall higher allocation of funding across UKRI. However, the study data had a higher proportion of respondents from AHRC funded centres and fewer proportionally from MRC and ESRC centres. The table below is adapted from UKRI (2021) open allocation data published for 2021/22. This was used as data with further granularity was not publicly available and serves as an illustration of the differences across funding councils.

	AHRC	BBSRC	EPSRC	ESRC	IUK	MRC	NERC	RE	STFC	UKRI	TOTAL
Research and Innovation Budgets allocation £M	110	364	946	183	667	709	352	1772	554	37	5694
Percentage Allocation	2	6	17	3	12	12	6	31	10	1	100

Figure 23 – UKRI Research and Innovation Budgets allocation (UKRI, 2021b).

4.2.9. *Cohorts and Co-location*

A core focus of the study was to examine experiences for those within cohort learning environments such as CDTs and DTPs. In order to explore this fully I wanted to understand what percentage of the respondents were located with their cohort. This question opened up further routes of enquiry around the cohort environment. The results are presented below followed by the additional exploratory questions:

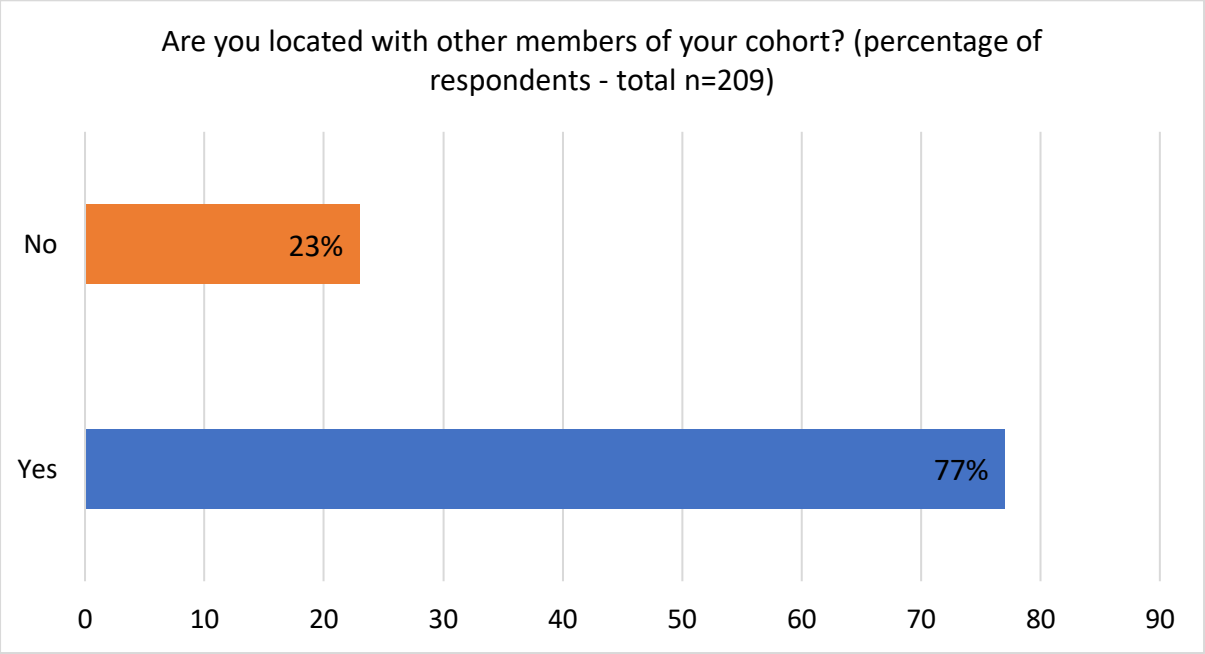

Figure 24 – Student co-location percentage of respondents

Additional follow-on questions were asked to establish whether students found this beneficial or not. To further explore the reasons behind responses, further questions were posed asking what ways they found this to be beneficial with categories provided to select from, as well as the option to provide a free text response, via a further *'other'* category. The topic of social comparison first arose from the responses to this question, and is further explored in the discussion chapter and in the consideration of recent UKRI reports, with one respondent stating:

> *"Awareness of whether my project's progression is slow/fast compared with others."* (M, 26-30, EPSRC)

A further response highlighted that despite being co-located with other students from their cohort, their interactions were limited.

> *"I rarely see other DTP students at my university but when I do it is beneficial."* (F, 26-30, AHRC)

The responses (n=148) to the multiple-choice options are presented below; responses were not ranked or restricted allowing respondents to select as many options as they thought relevant.

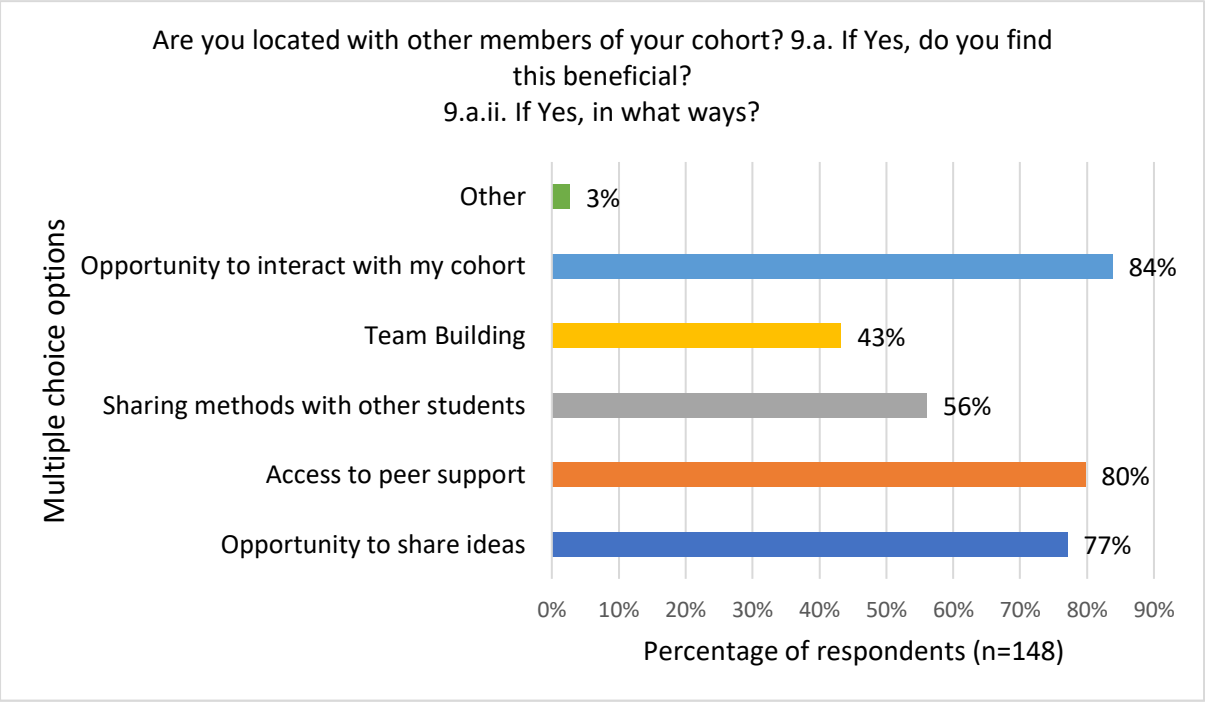

Figure 25 – Number of respondents and reasons they found co-location beneficial – n=148

The data clearly showed that students valued opportunities for peer support and interaction, alongside the option for educational and learning opportunities, such as sharing ideas and methods, which would suggest a move towards a community of practice model. Whilst the options provided were designed to identify these key areas, a further *'other'* category was provided with option to add free text, however only four respondents chose to provide additional detail which could suggest that the core benefits were captured in the selected categories. The *'other'* responses included two answers where students indicated that they were located with only a small number of other students from their centres; one

who only saw the benefit of being located with students from their own discipline and a further student who used co-location as a comparison marker. Whilst this student deemed this as beneficial, this was a topic which arose as a disadvantage in subsequent questions.

> *"Awareness of whether my project's progression is slow/fast compared with others."* (M, 26-30, EPSRC)

Where respondents did not find co-location to be beneficial, they were asked to provide reasons why, including multiple choice and free text answers. The multiple-choice answers are presented below, again respondents were not asked to rank responses nor were these restricted to a single choice, enabling respondents to select all that were relevant. A small number of respondents thought this wasn't beneficial (n=13); the responses are presented below:

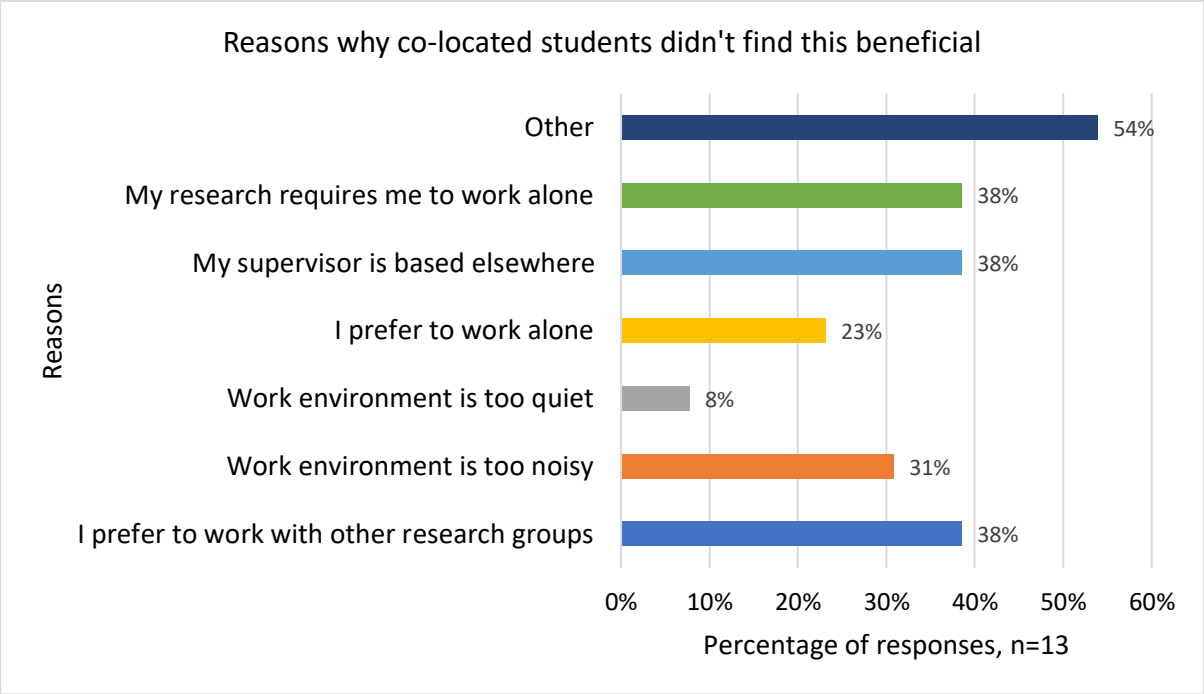

Figure 26 – Reasons why co-located students didn't find this beneficial.

Free text responses for not finding this beneficial were limited, but significant in their content, with the majority of comments relating to specific differences within their research or topic area, whilst another alluded to the difference in the age of the group:

> *"Our subjects are disparate. Age is also an issue."* (M, 46-50, AHRC)

"I do not have many research interests in common with the DTP people from my cohort" (M, 26-30, AHRC)

One student also referred to the need to access specific resources, which could be challenging for cohort cohesion and support where student subject areas do not lend themselves to being part of a collaborative working group.

"I mostly work from home and in archives/libraries elsewhere." (F, 46-50, AHRC)

However, in these instances, further exploration of how to integrate these students should be undertaken to provide some parity in the student experience.

A further student noted not being able to have a reciprocal relationship with colleagues within their cohort:

"Our projects are so disparate, I have little to contribute to the other students and few have any interest in my work." (F, 26-30, EPSRC)

The comments are distributed across two of the funding councils and do not appear to be stratified by either gender or age, but subject discipline does seem to be an issue, which also arose in the general feedback in the free text responses to disadvantages. In particular students from AHRC centres highlighted this as a disadvantage.

"My research area is very different than those in my department" (F, 31-35, AHRC)

If centres are aiming to create multidisciplinary learning environments, as claimed by funders and the centres themselves, then there needs to be facilitated opportunities to enable students to interact in a meaningful way; an area explored further in the discussion and recommendations.

"I think I would learn more from my other supervisors research group" (M, 26-30, EPSRC)

This is challenging for institutions to mitigate, particularly where the centre covers a wide range of disciplines or topic areas, and where the distinct projects within those centres don't allow for further integration with students working in the same field. In these instances, the centres do not necessarily provide the antidote to the lonely journey, nor do they fulfil the criteria for a community of practice as no shared learning is taking place. Each of these responses provides valuable learning and points for reflection in the discussion, particularly in relation to the notion of the community of practice. It further illustrates some key points for the design of doctoral communities and spaces, using learning from the centre models.

4.2.10. *Frequency of Interaction and Centre Activities*

For students who were not co-located with their cohort I was interested in finding out how often they met with their cohort, as this is often portrayed in external advertising and by UKRI as a unique attribute of funded centres. The graph below demonstrates that within the sample some students only met with their cohort on annual basis, which could suggest that the proposed benefits of the cohort environment would not be as valuable for these students. In turn this could lead to a lack of access to the less tangible benefits of cohorts; peer learning, belonging and friendship as identified by student respondents. This data highlights that in some instances the centres do not successfully achieve their proposed aim of bringing together students and creating a cohort environment.

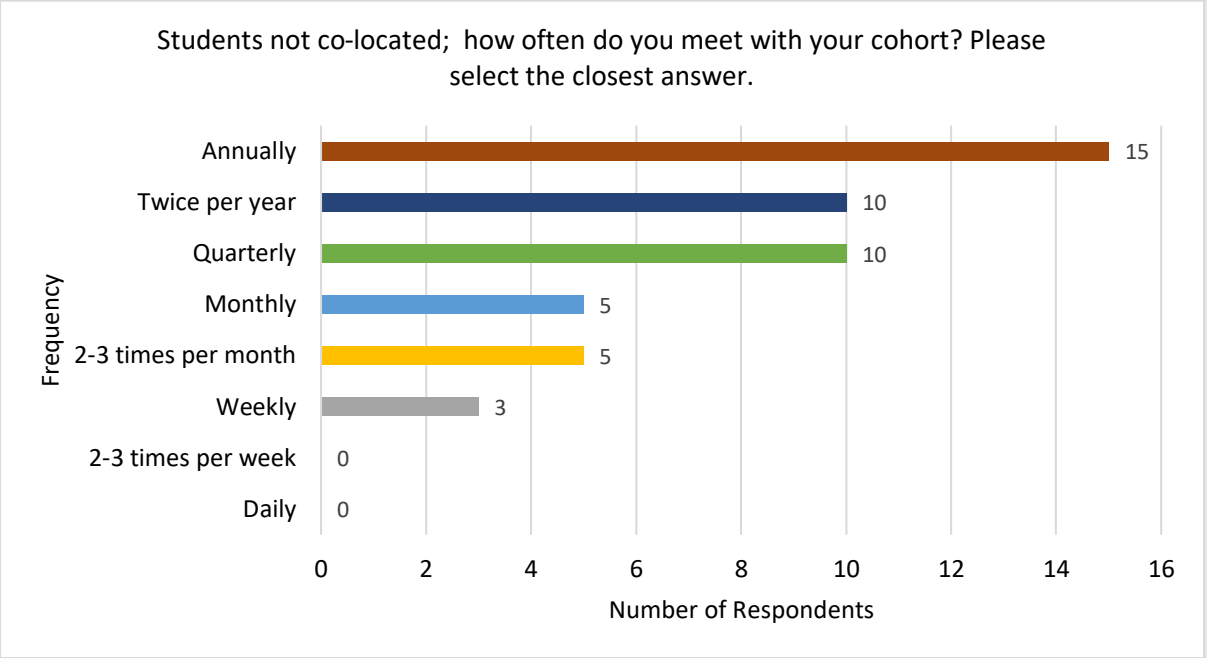

Figure 27 – Students not co-located; frequency of meetings with cohort

4.2.11. *Advantages of a Cohort Environment*

Participants were asked *'Do you think there are any advantages of studying within a cohort environment? Please list all that apply.'* and provided with a free text response box to capture more detailed responses. The response was 86% (n=180), of which the majority were positively coded. The free text responses were extracted and categorised based on themes arising from the data; Social context & structure; Peer support; Academic support; Shared learning; ideas/methods/knowledge exchange; Training/learning opportunities; New understanding; Environment. These themes are grouped in the graph below and further expanded upon with quotes from the free text responses, presented across themes.

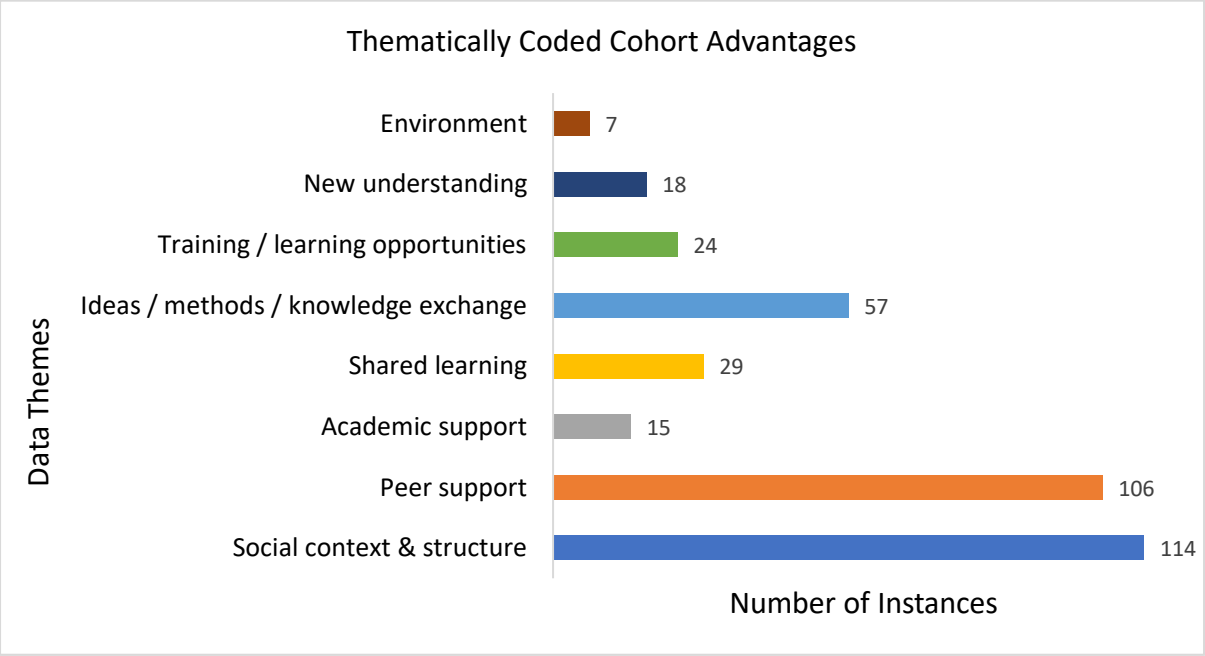

Figure 28 – Thematically coded advantages – number of instances

The topics which arose most frequently related to social aspects of the doctoral environment with peer support and social interaction central to this. Further areas worthy of exploration are those related to the development of education including the exchange of knowledge, methods, and ideas and how the interplay of these with the development of friendships and peer support. Data from each of these themes contributes to what is known about CDTs/DTPs and their functions, particularly relating to positive aspects of cohort environments, a core function of these funded centres. The findings could also support further learning on doctoral environments in relation to how these could be structured to enable the wider realisation of these benefits.

4.2.11.1. New Understanding - Shared learning, Ideas, Methods, and Knowledge Exchange

Whilst new understanding could also be categorised as knowledge exchange, the nature of this is distinct as this is the respondents themselves recognising and reflecting on this as a benefit, perhaps at a later date. The acknowledgment of this could be significant in terms of a benefit of this environment as in the examples provided it led to students re-thinking their research or being able to overcome barriers they were facing.

There were a number of examples where respondents were able to articulate key benefits related to their learning, suggesting that this environment could informally facilitate knowledge exchange. One respondent noted that:

> *"Yes. Can discuss and get their insight into problems in a way you wouldn't think of as people go into different fields."* (F, 20-25, EPSRC)

A further example of this serves to highlight where a student outlines some aspects of a community of practice, without explicitly using this terminology:

> *"Exchange of ideas, sense of community, mutual support and feedback, learn through the work of others"* (F, 26-30, AHRC)

This also demonstrated that the environment provided the opportunity for new learning.

4.2.11.2. Social Context and structure - Relationships and Friendship

Whilst coding the benefits of the cohort environment I noted that alongside more general topics of connectedness and peer support, friendship featured several times either as the central topic or a secondary theme as part of the overall package of perceived benefits. The word friendship / friend appeared 21 times. Many of these responses also reference aspects of wellbeing and support and intersect with other aspects of the shared experience. The following quote illustrates that the sharing of ideas was a key advantage, but that the cohort environment provided the opportunity for friendships, albeit as a secondary point.

> *"We are able to support and help each other whether it is a personal problem or a research problem. Sometimes somebody can look your problem from a different perspective and help you solve it with an approach you might not have thought of yourself. Being part of a cohort has given me the opportunity to make lots of friends too."* (F, 26-30, EPSRC)

A further student also referenced this, with friendship a core part of a broad set of connected benefits:

> *"Great opportunity to meet and connect with people with common interests and common goals, create friends, exchange ideas and give advice on a range of situations."* (M, 26-30, EPSRC)

Participants also noted the reduction is feelings of isolation, seen as a key issue in addressing the 'lonely' journey' element of doctoral study. In this example a respondent suggests this environment as a solution to mitigate a range of issues students can face:

> *"Yes as it prevents feeling isolated and creates a friendly and supportive working environment. Academia can feel very alienating, being around other people in the same situation is the only solution"* (F, 26-30, AHRC)

Another respondent noted friendships as their first topic alongside connection and learning benefits, but also with reference to reaching outside of their immediate cohort group.

> *"Build friendships, learn about research areas other than own, connect with other doctoral students and departments."* (M, 26-30, EPSRC)

Whilst student wellbeing is considered in the disadvantages (section 4.3), it was also raised as part of a wider range of benefits of having a group of friends, a less recognised benefit of centres.

> *"You feel more supported as you have friends who can give advice, boost your mood or even help you with parts of your research you are struggling with. Doing a PhD can be very lonely and isolating so studying in an office with others doing similar things reduces that a little."* (F, 20-25, EPSRC)

A further student noted that the friendship and peer support added to an overall sense of ease and enjoyment and how this provided support in challenging times:

> *"Yes, friendship and peer support makes the PhD much more enjoyable and easier as you have people around you who understand the process and can support you through difficulties"* (F, 26-30, EPSRC)

4.2.11.3. Peer Support, Connectedness and Belonging

A core theme of peer support, connectedness and belonging was apparent in the free text data with the word isolation (n=16 mentions) being used in relation to centres reducing this in a variety of ways. This included students referencing the chance benefits of co-location in relation to their academic development:

> *"Yes, you have a sense of belonging, you can share your thoughts and feelings with others who are mostly experiencing similar circumstances, you pick up many important for your PhD development things because you see a book in someone hands or simply overhear* ***(Sp.)*** *a conversation"* (F, 41-45, AHRC)

Furthermore, students specifically noted:

> *"I enjoyed having a group to belong to when I started the PhD - I immediately had a group of friends, a sense of belonging and I felt apart* [a part] *of something. I also really enjoy having people to support me and who are at the same stage as me, who understand what I'm going through and share the same struggles."* (F, 20-25, EPSRC and other funder - redacted to retain confidentiality)

Others noted key aspects related to belonging and wellbeing:

> *"yes, reduces loneliness, peer support, can ask for help or advice"* (F, 20-25, ESRC)

Each of the above examples highlighted the importance of the shared spaces and environment. They also emphasise the importance of how being situated in a group had supported not only their sense of belonging but enabled them to develop friendships alongside the tangible educational benefits of sharing ideas and methods.

4.2.11.4. Shared Learning and Academic Benefits

Students were able to articulate a range of benefits relating to the research and academic development as a result of being within a cohort environment, specifically where they perceived themselves as being separate to their assigned academic school.

> *"Yes. I don't relate to my school and have built a network (friendships and research collaborators) via my faculty. I think that the dto* [DTP] *cohort would be a smaller version of the faculty dynamic. It would allow us to discuss research across disciplines, build knowledge across the university, build friendships and rapports, know more outside of our subject area and school"* (F, 26-30, ESRC)

The above quote highlights the value of the cohort environment as a learning environment alongside less tangible benefits of friendship and rapport building. It also highlights how students perceive academic communities, referencing a faculty set-up. This was also noted by a further student who referenced this in the specific context of their chosen discipline (an area where CDT funding is provided via the EPSRC).

> *"Yes, particularly in science and engineering there is extensive opportunity for collaboration and co-publication."* (M, 26-30, EPSRC)

This also points to students recognising the need for working alongside others to publish their work; a core part of academic dissemination and demonstrating that students understand this as part of the research process.

However, other students saw the interdisciplinary learning as a distinct advantage too, suggesting that this led to additional valuable insight and enabled them to reconsider

challenges from new perspectives. This also lends weight to the centres being communities of practices where shared learning is taking place and contributing to new knowledge generation for learners.

> *"Yes. Can discuss and get their insight into problems in a way you wouldn't think of as people go into different fields. Feel like more of a community."* (F, 20-25, EPSRC)

However, this was not unique to students in specific scientific disciplines as this was further referenced by students from creative disciplines who also saw the advantage of interaction with a wider range of academic colleagues and across disciplines:

> *"I share a studio with some Music and Fine Art PhDs, as well as lecturers. The normalisation of discussion of work with academics at different career stages has been particularly advantageous."* (M, 36-40, AHRC)

The reference here to *"normalisation"* could also point to the fact that students could ordinarily be separated from the wider academic community and by integrating into a shared environment this has provided benefits for students. It should however be noted that whilst this was a finding from a student within a CDT/DTP, such environments also exist within established research groups, though the learning could be applied across other doctoral environments to add collegiality and community.

4.2.11.5. One Size Doesn't Fit All

Whilst many students articulated positive responses to studying within a cohort, there were a small number of students who didn't see any immediate benefit. Examples of these are provided below illustrating a range of reasons for this.

Firstly, one student appeared to have cynical perspective on the cohort environment, also critiquing the approach to working alongside colleagues from other disciplines and suggesting there were no benefits to working with others.

> *"Not really to be honest. The whole idea of sharing and networking within the cohort is dreamt up by people sitting at government desks. Classics might work with history or philosophy but that's about it. 99% of the more broadly interdisciplinary things are academically useless and at a low level."* (M, 26-30, AHRC)

Another student suggested that the benefits were not applicable to them, due to having established networks within her city. This suggests that a 'one size fits all' approach may not be appropriate within centres, presenting a challenge for the design of both educational programmes and additional networking and engagement activities. Whilst a more tailored approach might be useful for some students it would be difficult to replicate at scale.

> *"I'm sure there are but since I have been based in* [city redacted] *for a significant period, I felt no need to get involved in events with my cohort."* (F, 20-25, funder not known)

A further student alluded to their previous work experience as a reason:

> *"No. Maybe if I had never done research before or didn't have previous work experience it'd be a nice introduction to working in an office, but that doesn't apply to my work CV thus far."* (F, 36-40, ESRC)

The above examples, both positive and negative provide a range of areas explored further in the discussion and recommendations. These include the role of peers in both learning and personal development, the challenge of cohorts where students have a range of prior experience levels and experiences. Alongside exploring the benefits of being located within the cohort, the following section explores whether students can articulate the difference between their own experience and the experiences of students studying outside of this environment, of particular value to understanding how the funding could be applied outside of the centre model.

4.2.12. *Advantages Compared to Traditional Model*

I was interested in ascertaining whether students were able to identify anything distinct between their own CDT/DTP experience and whether they saw any advantages to the model, versus a traditional doctoral journey. This enabled an examination of what was potentially unique about the centre model and what the data revealed about what the centre model had achieved from the students' perspective. On reflection, further detail could have been added to this question to provide additional context, to enable students to explore the differences in more detail, as some weren't aware of differences. This could have included examples including that some students aren't fully funded, some study in isolated environments, work alone, and don't have a structure around their studies which could have prompted different responses from participants. Participants were asked *'Do you feel there are any advantages to studying within a Centre for Doctoral Training / Doctoral Training Partnership compared with the traditional doctoral journey?'* This was provided as a free text response box and an optional question; 89% of participants (n=187) provided an answer.

The responses to this question yielded a wide variety of topics and provided a range of issues for further exploration in the discussion including access to additional opportunities; funding; industry placements; additional events and the familiar topics relating to peer interaction and other types of support. The responses were categorised and coded to identify trends in the data and quotes selected to illustrate key topics, detailed below.

4.2.12.1. Access to Industry and External Partners

Several participants noted that their centre had enabled them to access external networks and industry connections. Whilst all funded centres are likely to have a focus on the development of external engagement and partnerships, not all will use the terminology 'industry partners' therefore this category was broadened to enable all external partnerships opportunities to be reflected. This is particularly important for ESRC and AHRC centres where the partnerships could be with arts organisations and those in the voluntary, community and social enterprise (VCSE) sector.

"Focus on business/commercial aspect of research e.g., leadership and management training. Strong links with industry." (M, 26-30, EPSRC)

Participants also referenced entrepreneurship, seeing this as distinct to other research activities:

"Besides the traditional research background, there is also strong industry connections and a focus on entrepreneurship." (M, 26-30, EPSRC)

As well as the opportunity to collaborate with industry partners, participants also noted that there will additional topic-focussed talks and training opportunities provided to them.

"Several advantages: The opportunities to access courses and programmes across a consortium. Collaborate with industry partners. Attending additional sector focussed/industry facing talks and courses organised by the DTP. Meeting and sharing experiences with other interdisciplinary researchers. A generous stipend to allow for extensive time commitment to research focus." (M, 26-30, AHRC)

One participant stated the industry connection was the primary reason for studying through a funded centre route:

"For me, developing my studies in partnership with a company has been very beneficial, as I am interested in continue in an industrial career, and I would probably not have enrolled in the programme if it were a different way." (M, 31-35, EPSRC)

A further respondent cited the industry connections in relation to potential future employment opportunities and being able to access internships:

"Less isolated and feel part of a team. We get lots of opportunities to meet industry partners and all the benefits that come with that, e.g. internships." (F, 26-30, EPSRC)

In many funded centres students are encouraged to undertake work placements and internships, and it is notable that in the 2022 call for Doctoral Training Partnerships (ESRC, 2022) this is now a requirement. However, one student remarked that this was not fully recognised in their institution:

> *"I think the advantage is feeling a sense of belonging somewhere other than your HEI. I do not live in the place where I study, and think if it weren't for my DTP cohort I could potentially feel very isolated and cut off from the rest of academia. I think too much focus is put on a researchers connection to their HEI, and more consideration needs to be put into the networks they build outside of it. I get the impression it is undervalued by institutions. Not only this, but you really see the full breadth of different types of research out there, by sharing experiences and formats and stories - this is something I might not have been so aware of otherwise."* (F, 31-35, AHRC)

Findings such as this could also be used to strengthen industrial engagement if centres were aware of the importance to students and had mechanisms to feed this into their structure. The findings showed that overall centres were achieving a positive response, from the perspective of students to their efforts to provide external engagement opportunities for students, with some exceptions.

4.2.12.2. General

Participants also supplied responses which encompassed a range of topics and cited their centre as a key route to access several opportunities:

> *"Yes! Meeting more people with similar research interests from across other institutions in the DTP. Building social and research networks. Having greater access to events and specially across the DTP (seminars/training/workshops), It has opened some doors as the funding is prestigious. We are well supported by the team, it makes accessing opportunities (attending conferences) easier when this may be difficult at school level (lack of funding/admin not as supportive)"* (F, 26-30, ESRC)

A further participant thought that the environment also encouraged a change in the style of learning, an interesting reflection:

> *"Yes, faster pace of learning and peer support, motivation to improve"* (M, 36-40, EPSRC)

Some participants acknowledged the additional privilege afforded to them and how the benefits of this were shared with non-funded students through a regional programme (name of centres redacted to respect confidentiality):

> "*I think it's great that in* [redacted] *all students have access to almost all of the* [redacted] *events and activities regardless of how they are funded - you shouldn't have to miss out on all this stuff if you are self-funded or whatever, if anything you will probably benefit from it even more"* (F, 31-35, funder not known)

A key theme across the responses was the additional opportunities, but also the link between this and individual student development of skills useful outside of their doctoral research pathway. This quote also illustrates that in some instances centres are broadening their opportunities to students outside the funded cohorts thus reducing the barriers to access that can exist across the two-tier system.

Student Autonomy and Agency

Whilst acknowledging the additional support provided, an area worth of further exploration arose around how the additional funding provided to students had afforded them more autonomy and agency. This was raised in a number of ways, including: freedom to concentrate on research; funding to organise events and being able to choose additional learning opportunities.

> *"*[redacted] *organises events specifically for* [redacted] *funded students and provide funding for conferences etc. + allows us to organise our own training events and conferences with support and funding".* (F, 31-35, AHRC)

Examples like the above also develop the skills required in future academic and non-academic roles, including taking on additional responsibility.

Additional Events and Opportunities

Participants frequently referenced their access to additional opportunities which is pertinent when considering widening access and equity for students across PGR communities in the UK.

> *"…My colleagues beyond the cohort don't seem to have the same kind of connectivity across the UK that I feel I have been able to access."* (F, 31-35, AHRC)

The ability to be able to network within and outside of the PGR environment could play a crucial role in the future career pathways for students.

Whilst funding was only one of the motivating factors for students deciding to choose doctoral study (see Section 4.2) it also featured in the free text responses identified as being a differentiating beneficial factor. This was only raised by a small number of students in comparison to other topic areas and often in comparison with other points. However, the funding provided does enable students to take part in additional activities, though the comparison with the PRES data did not show significant differences between student groups in their opportunities to attend and present at academic conferences.

4.3. Disadvantages

The following section outlines some of the disadvantages reported in the survey, with relation to studying within a cohort environment. This was included to ensure that there was not a positive bias towards the advantages of the centre model, and that students could express any concerns they perceived or had directly experienced. It also enabled further data to be gathered to add to the learning on doctoral provision, with a specific focus on the cohort aspects of this. This includes free-text responses, and other indicated levels of dissatisfaction, such as students who reported that they did not have access to core

activities within centres for example, cohort-building activities. The findings are structured in further themes below.

4.3.1.1. Free Text Responses

The survey question allowed for free text responses, so as not to pre-suppose any issues and direct answers towards particular themes. Results were coded into themes using both manual coding, and word-frequency queries using NVivo software.

The disadvantages were grouped into four overarching themes:

1. Belonging
2. Environment
3. competition
4. wellbeing

The rationale for selecting these areas was to cover the main facets of the doctoral experience and to include the learning experience alongside social and personal issues. During this process I used visual maps to identify what language and words would be used to identify potential topics, which are included below.

During the review of the results, I identified responses which did not fit neatly into any of the proposed categories, for example general comments which were not identified as issues. Following the initial coding against the six themes I added a further 'other' category to capture these. This additional category included relevant comments, which were used to support the analysis.

Within each area I began to identify words which were used to describe issues related to these topics and then checked the text again for any potential missing data.In some cases, there were overlapping themes, for example wellbeing and belonging, and wellbeing and issues such as bullying. Where this arose, the results are presented across both themes and quotes used to illustrate particular key points. The quotes are coded in order to identify instances of themes, these are indicated in brackets.

To complement the word frequency, I also coded each response individually, using colour-coding to link to each of the identified themes. This enabled me to have a visual representation of the data and to identify recurring themes to aid with further analysis. Once the results were coded for initial themes, I then further coded to assess frequency of themes to identify topics for further analysis. The themes were also used to compare with advantages presented by students.

Throughout the presentation of these results, several quotes are used to ensure that one student's position does not dominate the presentation of the findings. This is particularly important due to a tendency for respondents to potentially report negative experiences more than positive experiences. In addition, one student's negative experience could have negatively weighted the rest of the results.

Out of the 209 respondents, 142 responded to the question: Do you think there are any disadvantages of studying within a cohort environment? Please list all that apply. From the 142 responses, 41 respondents responded with '*no'*, '*none at all'* or similar variations. Others reported some issues, but often prefaced these with *'sometimes'* or *'possibly' 'possibility of'* suggesting that these were not seen to be significant problems for the students. Further responses are categorised below.

4.3.1.2. Belonging

As the centre model of doctoral training is often reported to be the preferred solution to student isolation and belonging, I was particularly interested in unpicking this as a key theme for investigation. Centres are regularly suggested as being a solution to reducing isolation, by bringing students together in a shared learning environment; conversely, they might separate students from a wider educational environment. Where centres are given specific space within a building or part of campus this might preclude students from engaging with other networks or student groupings.

> *"Only if it's just with your cohort, it must be mixed with other cohorts or it's not a true higher education learning environment and will lead to close-mindedness. It's*

the only real opportunity in life where you get to be mixed with all sorts of disciplines and this should be heralded. However, it must not dilute your academic discipline as the aim is to be the best in your field so that you can add to the academic environment by being a specialist in a certain area." (environment, belonging, education) (F, 31-35, ESRC)

This quote demonstrates that whilst students see the value of being located with a cohort, they identified that this could lead to close-mindedness.
Further students expressed similar discontent with the centre structure, noting that the environment created a distancing effect, which could impact overall belonging.

"Yes, differences in topics and environment create distance. Not a natural way to make friends. Some people just don't get along." (M, 36-40, EPSRC)

One student also communicated feelings related to a lack of belonging in a stark statement relating to their situation:

"I don't feel in a cohort environment" (F, 51-55, funder unknown)

Whilst also relating to belonging, this could also signal further challenges for this student, given the benefits outlined by others related to learning and relationship building.

4.3.1.3. Environment (Structural and Physical)

Initially, physical and other environmental factors were going to be presented as separate entities, however several responses covered both the physical setting and other aspects of environment, including noise. Within the environment section geographical factors are also included in order to incorporate perspectives from respondents within distributed and multi-institutional centres. Within the topic of environment other cross-cutting topics arose, and these quotes are appropriately coded. As this work was carried out prior to the COVID-19 pandemic the environment topics related to this are not included in my data.

Word query: geography, geographical, location, centre, building, office, distance, institute, institution(s), distract, distractions, noise, noisy, talking, chatter, chat, focus, focusing, focussed, team, place.

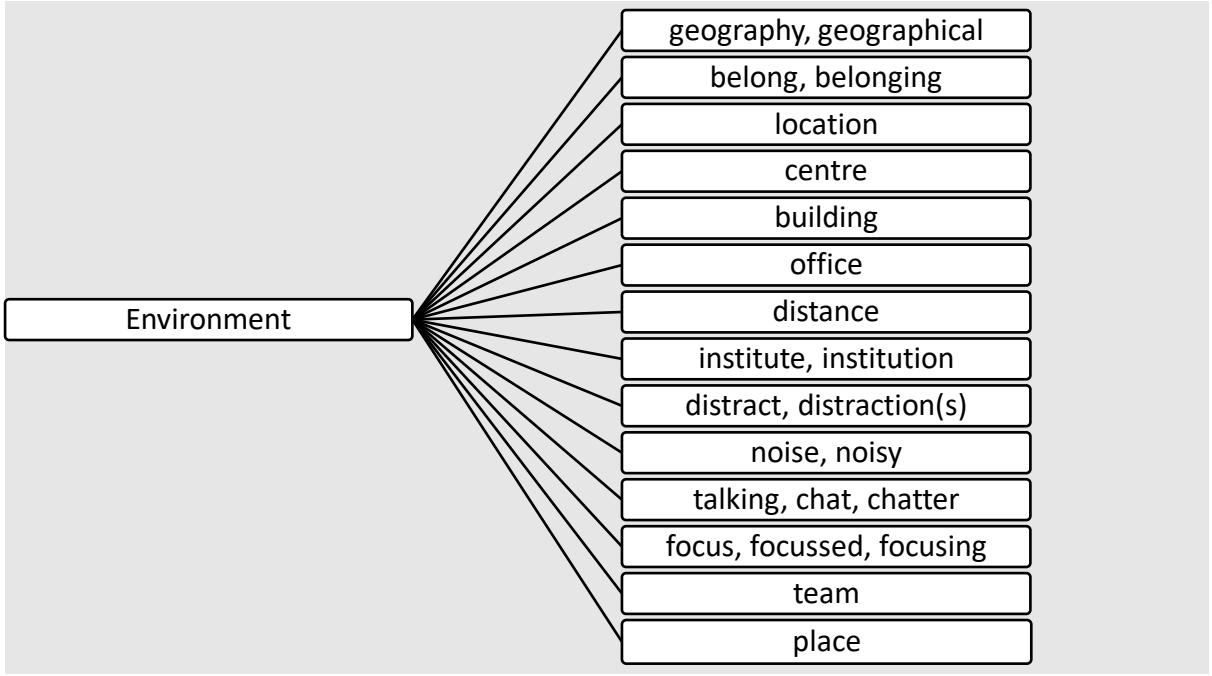

Figure 29 – Words associated with environment.

As the survey was conducted prior to the pandemic many of the students were still physically located with their cohort. For some respondents, their centre being multi-institutional proved to be blocker for collaboration.

> *"Our DTP comprises* [number redacted] *geographically-distant universities, so in practice it is difficult to work together with students form* [from] *other HEIs and other disciplines"* (F, 46-50, AHRC)

(Topic: environment, education, belonging. Type: structural, physical)

This was also reflected by students where activities were centred around one institution, with few activities taking place at their chosen study location. Centres could partly mitigate this by offering opportunities across their partner institutions.

> *"Although I am part of a cohort - I would not say I study within a cohort environment. I do not live in my place of study, neither do most of my cohort so therefore the act of 'studying' together happens rarely."* (F, 26-30, AHRC)

Geography also proved challenging for students with supervisors across different universities where they were geographically distant; however, this might not have been partially resolved by the now widespread use of videoconferencing.

It was not just students who were geographically separated from their cohorts that faced challenges. Students located with others noted challenges around noise distractions including *'loud people'* and the structure of the open plan office space; these are seemingly common issues for many workplaces. Several responses suggested that the physical location and set-up could impact on their ability to focus on their research.

> *"sometimes the large open plan office that we work in can be a bit too noisy. It would be good if there were some quiet rooms or areas for us to go to if we need to concentrate on something in silence."* (F, 26-30, EPSRC)
> *"Open-plan office can have some drawbacks. (Loud people)"* (M, 26-30, EPSRC)
> "yes - office space is always busy and loud, can be hard to concentrate" (F, 20-25, EPSRC)

Furthermore, others saw their physical location as a barrier to other forms of engagement, though they valued their cohort connections:

> *"slightly more disconnected from the remaining doctoral students, but the inter-cohort connection seems more valuable to me"* (M, 26-30, EPSRC)

A further student expressed high levels of dissatisfaction with environment, further critiquing colleagues and their centre:

"Terrible office environment. The CDT culture supports lazy people, who either do virtually no work and/or are an irritation in the office. It's not a research environment. - Expectation to do too many things/ constantly disturbed from research. - As we are collocated, we have limited exposure to our research groups so are in some sense isolated from our specific research area, but overexposed to others." (M, 20-25, EPSRC)

This suggests whilst the environment was an issue for this student, further underlying tension within their centre had been exacerbated by their co-location.

4.3.1.4. Competition

Where students are grouped together, and particularly when they are co-located, there could be the risk of internal competition and comparison within the student groups. Whilst this could be beneficial for some students and act as a motivator, the issue of upward social comparison can be a challenging and demotivating factor for some students and impact on wellbeing. During the review of the disadvantages, I chose to explore this topic, using NVivo to extract responses which featured the following words: Compete, them, progress, competitive, compare, other(s), against, evaluate, another. This combination of words allowed for the capture of related themes and topics.

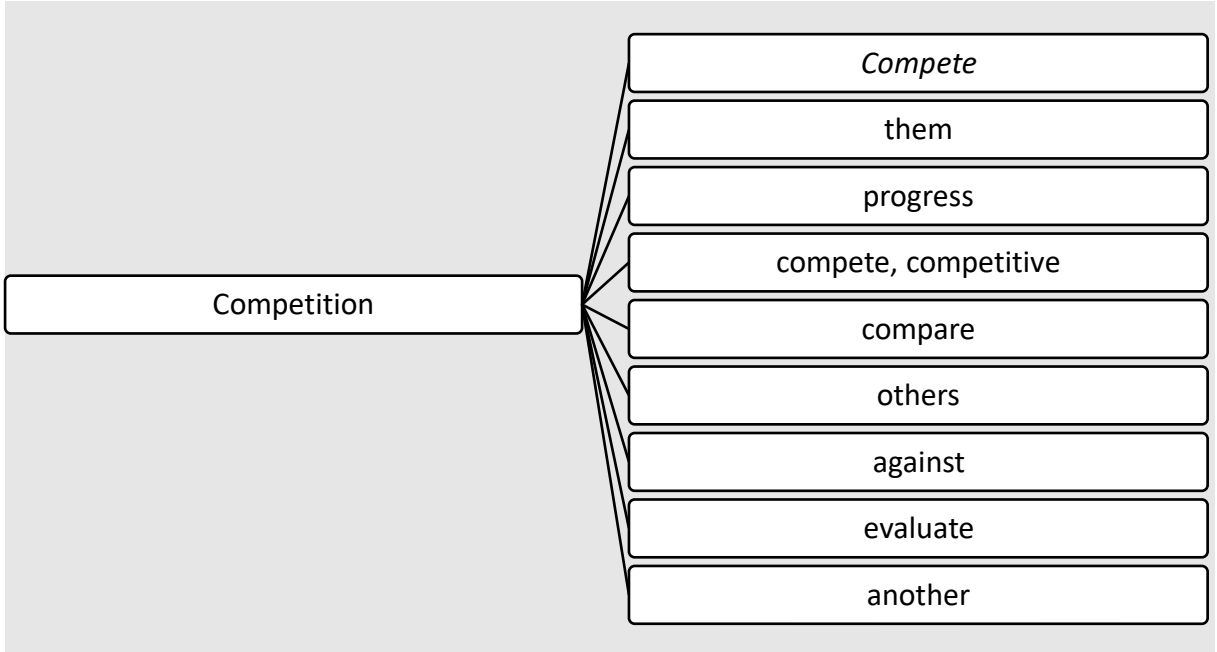

Figure 30 – Words relating to competition in student survey free text responses

The above figure shows the words that were contextually categorised as being linked to the theme of competition. An example response which highlighted this as an issue is provided below:

> *"Can create a feeling of anxiety when other members of the cohort are making good progress on their projects, but you are having issues. This can further increase the issues as stress builds up."* (M, 26-30, EPSRC)

This also shows that the cohort environment could further compound wellbeing issues for some students.

4.3.1.5. Wellbeing

Student wellbeing is an area that has received increased attention in recent years and is often considered among the long-acknowledged challenges of undertaking a doctoral programme. I was interested to see to what extent these issues also arose for students in funded centres and whether students identified any of the aspects of the centre environment as a partial cause of these. I looked for common themes within the disadvantages section where associated words or topics arose including those related to feelings of loneliness and isolation as well as common terms linked to both physical and mental wellbeing. I also included any phrases relating to workload, which whilst not unique to funded students in centres, could impact on overall wellbeing of individuals. The word query is shown below, and contextual examples provided by the quotes.

Word query: Mental, health, unhealthy, stress, isolate, isolation, belong, group, alone, unwell, distress, stressed, feel, feeling, cope, coping, workload, distract(ion), hard, struggle, pressure, negative, negativity, outside, bullying, bully, bullied, harass(ment)(ed), tired, tiring, fatigue, toxic, anxiety, anxious.

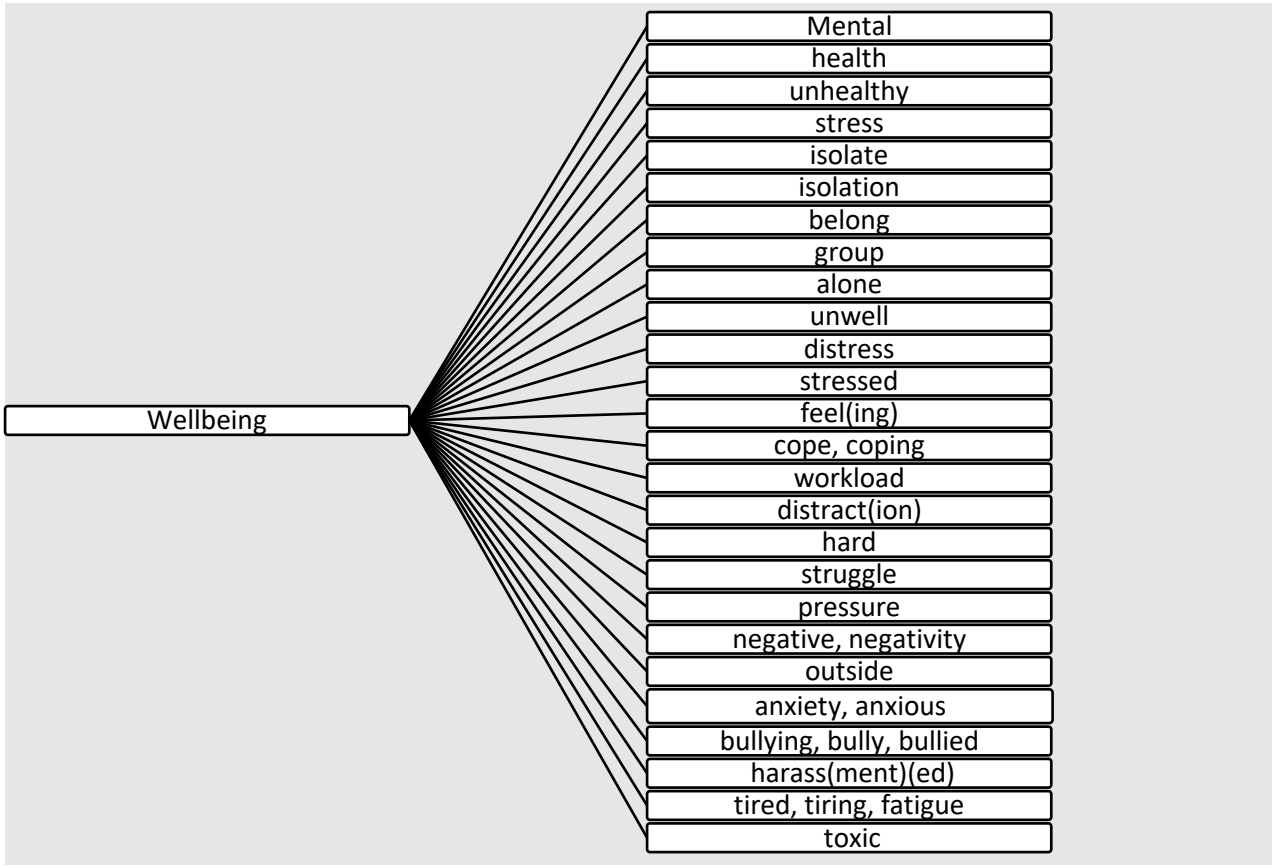

Figure 31 – Words relating to wellbeing.

Whilst there were very few instances of serious concern, one respondent provided a detailed list of issues that had arisen due to the behaviour of the principal investigator in their centre which had led to negative impacts on student wellbeing and access to resources describing their CDT as a *"bunker"*. Although this was an isolated comment in the dataset it nevertheless raises an important issue around the management of centres and the power dynamics within these.

The main topics relating to student wellbeing arose from comparison with others with students referring to:

> *"Putting pressure on myself to meet milestones at the same rate as other members of the cohort"* (F, 26-30, EPSRC)

Whilst this could be perceived as a general issue in this environment, it could lead to further instances of stress and anxiety if expectations around this aren't managed within centres,

particularly where students are working within multidisciplinary research centres with individuals working at different paces.

4.3.1.6. Community of Practice and Disadvantages

In order to fully explore the Community of Practice theory, to conceptualise cohorts in doctoral centres, I also examined the data for any themes arising from the exploration of free text responses on disadvantages. Once each response had been coded in themes as above, they were then further coded against the three core facets of a community of practice: domain, community, and practice (Appendix 11). A total of 143 students answered the question on disadvantages, of which 92 were coded against the CoP core attributes. The other responses were removed where the response was *'no'*, *'not really'* or similar responses. Responses which detailed other issues, not related to any attribute of a CoP, were also removed to enable an in-depth exploration.

Of the 92 disadvantages listed, 62 were coded as referring to the concept of community, though only one explicitly used this term; others referenced *"getting along"*, geographical separation or the how their space was distracting. Despite the theme of community being a key topic area, there was little data to suggest this linked to a broader community of practice. This could suggest an absence of community of practices in some centres.

Where all elements of the CoP were present (coded domain, community, and practice) the responses linked closely to the topic of continued learning and development, critical for engagement within a community of practice.

> *"You might get stuck talking to the same people all the time and not looking for solutions or approaches outside your subject area."* (F, 26-30, ESRC)
> *"It can be distracting. Once you start your PhD then they don't usually have relevant knowledge to help you with PhD topic related questions"* (F, 20-25, EPSRC)

This reflection suggests that for some students, being situated with their peers is only useful where they can learn from and support one another to further their learning. Whilst from

the 92 comments only six were coded with all three elements of a CoP, the comments suggested that centres were not achieving a truly, multidisciplinary learning environment that all students benefitted from.

4.4. Cohort Activities

Survey participants were asked whether the centre, in which they were studying, organised cohort building activities. Whilst 80% of respondents indicated that this was the case, this meant that 20% of students reported that their centre did not organise any of these activities. Given that CDTS and DTPs are often cited as good practice examples of cohort environments, it is surprising that centres do not directly offer these. However, this could also be attributed to the use of language within the question, whereby some respondents did not recognise activities as being targeted towards cohort-building.

Of those respondents that indicated that their centre organised cohort building activities they were then asked the types of activities which were provided by their centre.

As the respondents' centres receive funding from a variety of UKRI funding councils, the results were further broken down to identify if there were any differences across these.

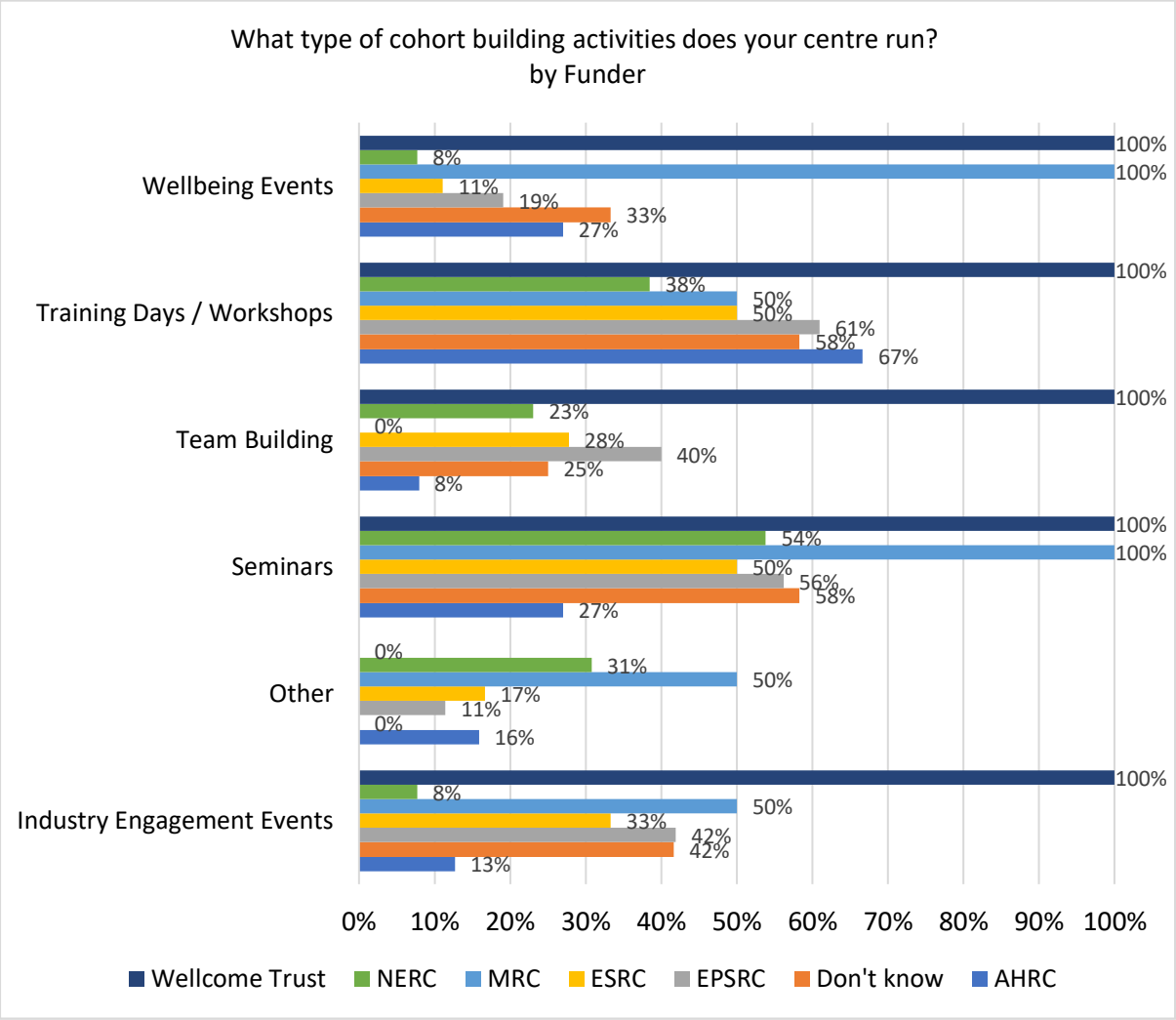

Figure 32 – Percentage of respondents by funder

Only 35% (n=58) of respondents indicated that their centres organised team building activities. This low percentage was somewhat surprising, due the perceived focus on cohort building within centres.

The response was even lower for wellbeing events although this is now receiving more prominence across the sector and therefore might not have been an integrated part of the core activities of centres over the 5 years.

77% (n=126) of respondents cited that training days and workshops were provided by their centre. Whilst this is an encouraging number, the expectation was for this to be 100%, if centres are truly fulfilling the expectations of funders and students. A comparison between the years of study was also conducted to see if this perception changed over time. For

students at an earlier stage of study, they might not yet have been able to attend training days or workshops, although many centres operate a formal training year, and it could be the case that students have distinguished this as being different to the offer of training days and workshops.

In response to the question '*What type of cohort activities does your centre run? Industry Engagement events*, only 38% (=63) of respondents indicate that these took place within their centre. This is perhaps in contrast to the aims of research councils, such as EPSRC, who require a high level of match funding and engagement from industry partners.
This was further broken down into percentage of respondents by funder, although it should be noted here that the 100% responses represent less than 1% of the total respondents. However, the data showed a much lower level for AHRC respondents, than other funding councils (see figure 33). It's unlikely that centres funded by other UKRI sources, such as AHRC, don't run any partnership events, but creative industries and arts organisations, charities and public sector organisations perhaps aren't deemed as industry engagement by students. Those types of organisations tend to be more prevalent within the AHRC-funded centres due to the nature of the funding and research areas. There could also be an issue with language used in the question; I might have unintentionally biased responses where using the term partnerships would have been more appropriate. Upon reflection this question could have been reframed to as partnership and industry engagement events to capture a wider range of interactions across the spectrum of research funders. This would have potentially mitigated against a low response rate from students funded by the AHRC, where centres don't necessarily have large financial donations from organisations, but instead have organised partnerships and artist residencies.

4.4.1.1. Students in Centres Without Centre Organised Cohort Activities

Participants where their centre did not organise cohort building opportunities were also cross compared with whether the students self-organised activities within their centre. Where both answers were no, there were a total of 12 students in the sample. These were then compared with question 12:

'Do you think there are any advantages of studying within a cohort environment? Please list all that apply.' Despite their centre not organising cohort building opportunities or being part of a self-organised learning community, these students did recognise a range of advantages of being in a cohort environment. What is perhaps challenging in some of these examples is that not all of these students had been afforded these additional opportunities throughout their programme.

Once student reflected on their experience stating that:

> *"Yes, I would have liked more opportunities to bond with my cohort to foster a more community feel"* (M, 26-30, AHRC)

Whereas others had moved during their programme, although no further details were provided on what their previous situation had been, though their other responses suggested that they had not felt part of a cohort environment previously.:

> *"I am now in a building with people from different cohorts and this has been very useful"* (F, 51-55, funder not known)

Both of these responses suggested that students recognised the befits of cohort colocation and had sought this in relation to their sense of belonging.
Others noted that their centre worked to mitigate geographical distribution through organised activities, which had worked to resolve feelings of isolation; further cementing the notion that students valued this.

> "In [redacted] helps to develop a sense of connectness [connectedness] with an [redacted] DTP cohort beyond this institution, as well as a sense of connectedness of PhD students across [redacted]. This is amazingly useful, as the PhD can be an isolating experience." (F, 41-45, funder not known)

However, there were some students who perceived fewer benefits of studying within a cohort environment, particularly where their centre did not organise cohort building activities. Responses included reflections from participants who expressed previously that the centre activities did not consider their previous work experiences.

The responses from participants who responded 'no' to this question, were compared with their responses on disadvantages and their satisfaction levels relating to other aspects of the research environment. This will provide a comparison with previous analysis of the DTC model by Budd et al. (2018), which demonstrated that some students didn't identify with their DTC.

4.5. Student Satisfaction Levels

As part of the student survey, overall student satisfaction levels were explored with additional questions relating to cohort interaction. The results are presented below by themes of cohort interaction; comparison with interaction with other groups; access to external networks.

Cohort Interaction

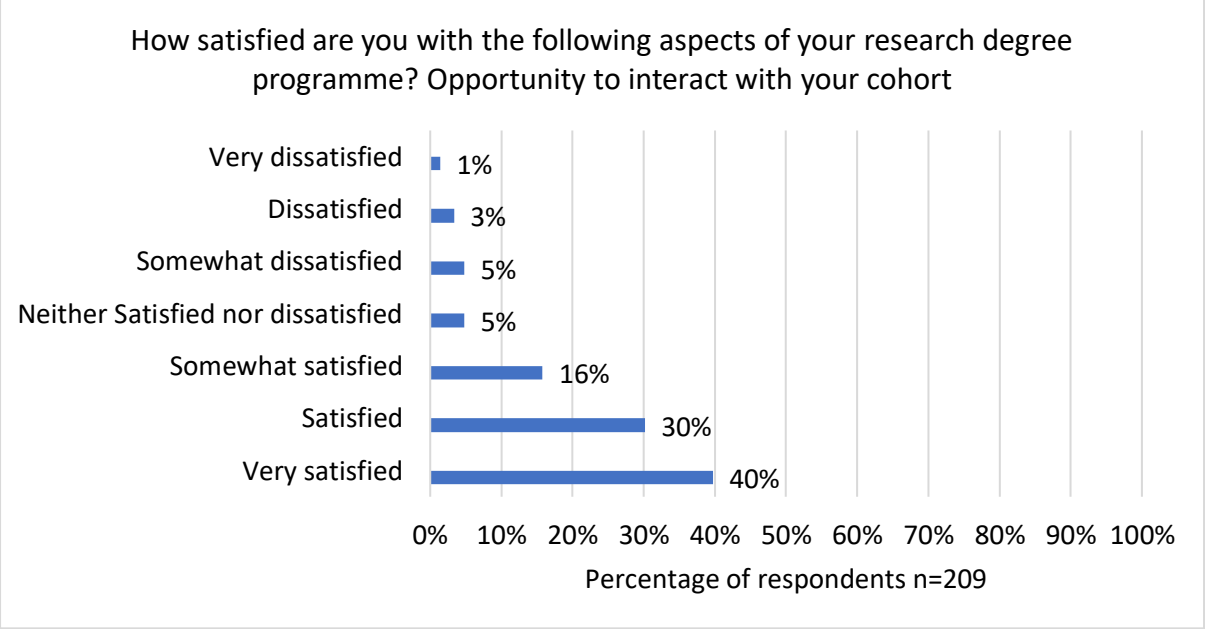

Figure 33 – Satisfaction with Opportunities to Interact with your cohort.

The data shows that whilst the majority of students were satisfied with the opportunity to interact with their cohort, there were some who were not. The respondents towards the lower end of the satisfaction scale should not be disregarded as this presents both a challenge and opportunity for centres in respect to student wellbeing. In a 2018 report by Research England and VITAE on postgraduate research student wellbeing the use of cohorts was encouraged to address wellbeing concerns: *'the use of cohort training programmes to promote and improve wellbeing and mental health related provision for PGRs. HEIs should also explore how they can encourage PGR peer support networks, more structured PGR cohorts or communities and PGR champions that specifically focus on wellbeing and mental health'* (UKRI, 2018:32). Centres which offer the opportunity for frequent and sustained cohort interaction have the opportunity to improve student wellbeing if this environment is supportive. The data presented in the free text responses on cohort advantages also supported this, as students indicated that the support of peers had aided their progression and wellbeing. This also provides an opportunity for funded centres to share examples of best practice for the wider student environment within their institutions. A further comparison was undertaken to ascertain whether students were also satisfied with their interaction with other cohorts and other students in their institution. The data shows that whilst students were satisfied with their interaction with their own cohort, they were less satisfied with their opportunity to interact with other cohorts and other students within their institution.

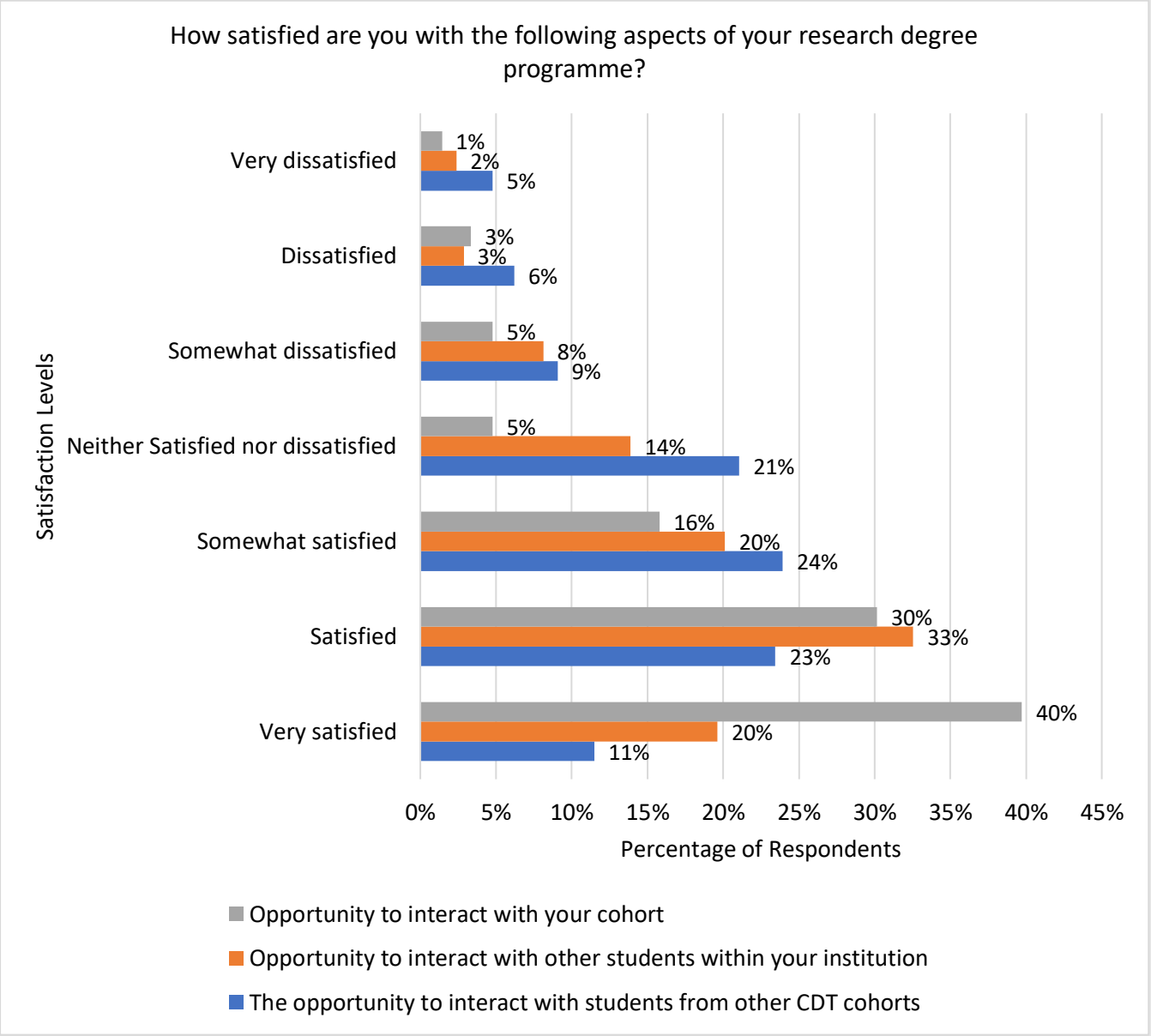

Figure 34 – Satisfaction with opportunities to interact with your cohort; other students within your institution; students from other CDT cohorts.

Access to External Networks

Given the external focus on partnerships in centres, high levels of satisfaction were expected in this category. However, the survey showed that only 40% of respondents were satisfied or very satisfied with their access to external networks. This was also in contrast to the benefits given by students who communicated that external networks were a key benefit.

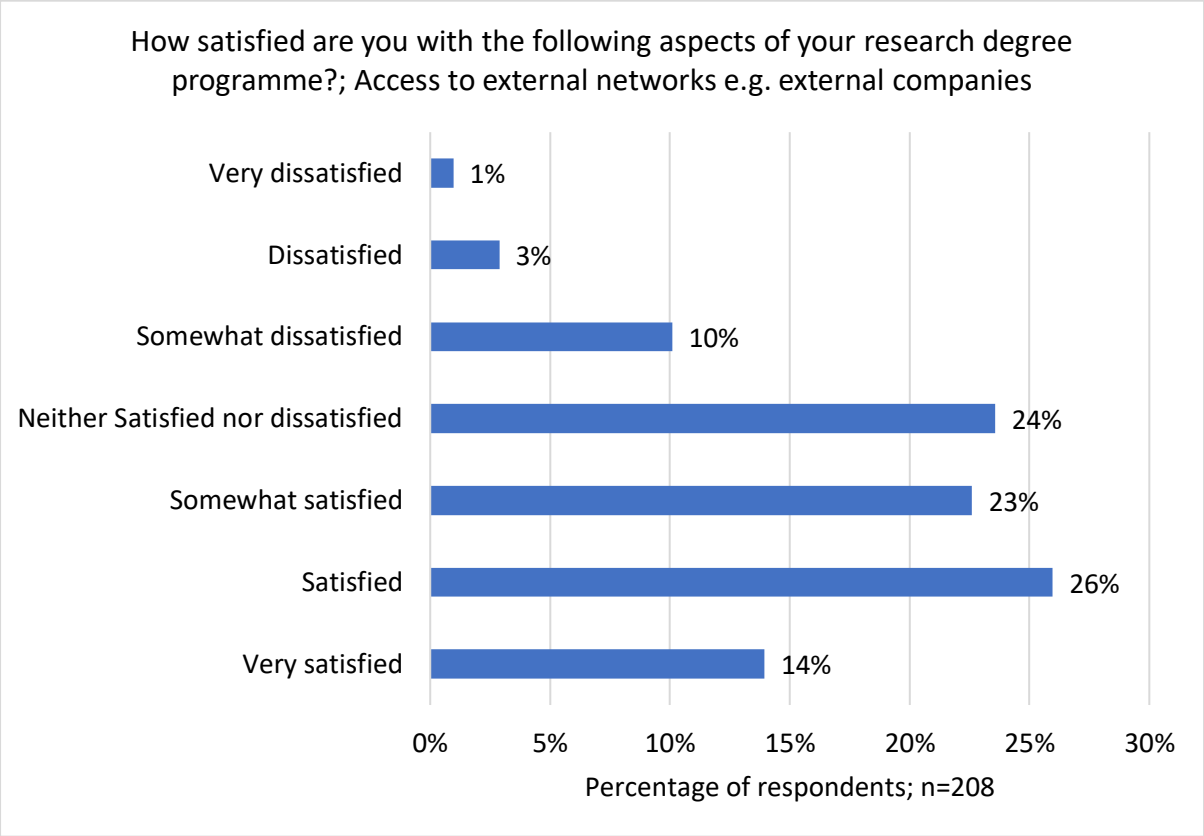

Figure 35 – How satisfied are you with the following aspects of your research degree programme?; Access to external networks e.g. external companies

4.6. Centre Contact Points

Within centres it is customary practice for a centre manager or administrator, or in some cases both roles, to be employed to manage operations and administration of these large investments. This is often a core post written in at the bid application stage and employed within the host organisation. I was interested in whether students had a dedicated point of contact within their centre and whether they recognised this role, particularly if students, as in Budd et al.'s (2018) study, did not always identify as being part of a centre. The graph below details the percentage response to this question.

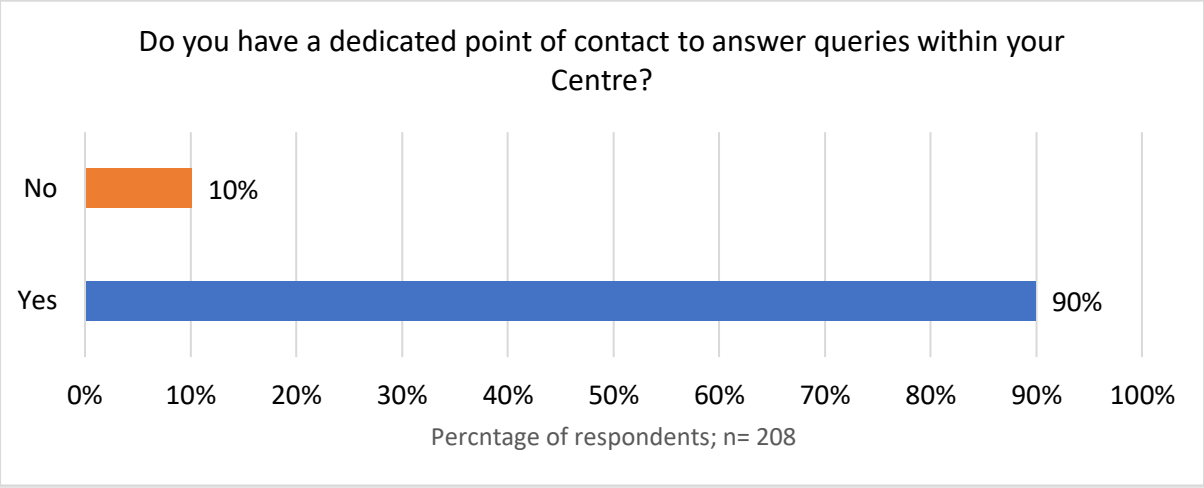

Figure 36 – Question 15. Do you have a dedicated point of contact to answer queries within your Centre?

Additionally, respondents were asked to identify what type of support was offered, through the use of a free text box '*Do you have a dedicated point of contact to answer queries within your Centre?; If Yes, what type of support do they provide?*' (q,15;15a). There was an 82% (n=171) response rate to this question. The free text responses are expanded on in the discussion specifically the exploration of the role of centre staff in communities of practice; centre functions; perceived success of centres and the impact on the student experience where inference can be made. It was clear from the responses that centre staff were responsible for a wide range of activities including general administration, signposting, pastoral care and support, events management, and finance. This was also reflected in staff interviews and drawn upon in the discussion. The free text responses were grouped into themes and quotes selected to illustrate each of these, as detailed below.

4.6.1.1. Administrative Support

A core theme within the responses was the role of centre staff in providing administrative support, with particular reference to navigating internal systems and process which can sometimes prove challenging for students within higher education institutions. It is not uncommon for institutions to have a set of complex systems and bureaucratic processes for accessing funding, additional services, travel, and expenses booking and student welfare.

"Information about funding and forms that you have to fill out. I haven't used them for any other support, but I would be happy to contact them if I had any wider concerns about my project." (F,20-25, AHRC)

4.6.1.2. Pastoral Support and Student Wellbeing

A number of respondents signalled that their point of contact provided pastoral support, with responses making reference to emotional support and wellbeing.

"can discuss academic and personal issues"; (F, 20-25, EPSRC)
"essentially anything. academic problems, industrial problems, personal problems. travel arrangements. meeting arrangements." (F, 26-30, EPSRC) *"pastoral support"* (F, 26-30, EPSRC)

Staff working within these roles in universities will traditionally have administrative and project management experience, with some staff also having postgraduate (sometimes doctoral) qualifications. However, they are not trained in providing counselling, emotional support and other types of pastoral student services despite this clearly being a core facet of their roles within centres.

Wellbeing has received increasing focus across the higher education sector in recent years, potentially giving more prominence to this role within centres. Respondents also made specific reference to wellbeing:

"From academic to personal wellbeing, also they help managing my relationship with supervisors" (F, 20-25, EPSRC)

Whilst some students had not experienced this element personally, they were aware of this being offered within their centre:

"I have heard from other students they have helped them to handle situations related to the effects of health and well-being on their phd studies." (F, 20-25, NERC)

4.6.1.3. General

Several respondents referred to the fact that their contact point was involved in multiple aspects of their programme and that their role was all-encompassing.

> *"Pretty much everything you could imagine"* (M,36-40, EPSRC)
> *"Everything - they are very good to be fair."* (M, 20-25, EPSRC)
> *"Any questions with regards to the centre or programme"* (M, 20-25, EPSRC)

Furthermore, respondents provided positive feedback relating to the staff within their centre, in the following examples this related to the centre administrative and management support teams:

> *"Everything.* [names redacted] *are amazing, have never felt that there was anything I wanted that they couldn't get for me or tell me how to get."* (M, 20-25, ESRC)

Students also identified the various roles that support staff played in response to the question:

> *"Pastoral, advice and relevant information"* (M, 26-30, EPSRC)
> *"Mentoring, administrative support, wellbeing"* (F, 26-30, AHRC)

However, many students primarily referred to the support as being administrative, without specifying tasks and not all students recognised this role of the support staff, or the activities created for them. In response to Q10 *Does your centre organise cohort building activities?* 20% of students responded *'no'*. As their centres do not organise activities, the role of staff in creating a community of practice would be harder to evidence.

Students also referenced the organisation and opportunities afforded to them as being part of a doctoral centre: *Do you feel there are any advantages to studying within a Centre for Doctoral Training / Doctoral Training Partnership compared with the traditional doctoral*

journey?

> *"events are planned for you, there is a team whose job it is to look out for you/help you with the doctorate"* (M, 20-25, EPSRC)

Student led peer activities also featured in both the survey results and in extracts from staff interviews. Interestingly in one interview a staff member recounted the challenges of *"not being involved in everything they do"* (participant 6).

It was reported that 75% of students organised activities within their centres, in addition to centre organised activities. These self-organised activities spanned both social and academic topics including reading groups, seminar series, cinema visits and bake sales. This suggests connections and relationships which go beyond the academic environment and into shared experiences and the forming of social connections, a recurring theme in the data.

4.6.1.4. Negative Perspectives

However not all students outlined benefits to having a point of contact and relayed issues within their responses including in relation to the overall programme:

> *"do not provide enough sufficient support. unclear how the program is set up and run."* (F, 20-25, EPSRC)

Others expressed a more cynical view of the type of support offered:

> *"The usual fatuous self help stuff and well meaning gestures."* (M, 46-50, AHRC)

Respondents were also aware of issues around continuity and communication, whilst still acknowledging some positives:

> *"Advice and help from the central office, which is usually good. There is an academic liaison at my university but that role is currently fulfilled by a new person and I couldn't tell you who it is. I got nowhere trying to contact the predecessor in that role*

over some issue I had the other year. My former departmental contact was active. All seems quite variable" (F, 46-50, AHRC)

A further student cited communication with their contact point as a key issue.

"They rarely answer emails." (F, 31-35, AHRC)

Another respondent made reference to the centre's structure and their impression of this, highlighting issues of capacity:

"Too early to say as this is a recent innovation in a period of transition in a massively overfunded and understaffed research centre." (M, 36-40, EPSRC)

The above examples provide important context for considering how centres are structured and ways in which they could be improved; they also point to potential issues around workload for staff.

4.6.1.5. Visibility of Support

Whilst the majority of respondents articulated specific elements of support they received and were able to provide examples, there were several responses which indicated students weren't aware of the support available. This was a very small minority of students and in one case could relate to the fact that the student was in year 1 of their studies and therefore had not yet had significant interaction with their point of contact: *"not sure yet"* Whilst stage of study could be a factor in how students perceive their point of contact and the support offered, communication between the core team and the cohort of students should be established at the induction stages of the programme.

4.6.1.6. Conclusions – Centre Contact Points

Staff working in these centres are required to demonstrate a series of core skills and switch between these regularly to meet the needs of the centre and the students. This is

recognised across the research sector, with groups now established to share best practice including the PRISM community (PRISM, 2023) and UKRI's research culture initiatives.

It is clear that students recognise the roles of the contact points and, in many cases, the varied support they offer. In some instances, it was apparent that the students really valued their contacts and saw them as integral to their centre. This is particularly important when considering the risks involved with precarity around contracts for these staff and the link to fixed-term employment within higher education. This topic arose during interviews with centre directors and is expanded on within the discussion.

4.7. Conclusion

Findings from the student survey revealed that student satisfaction with their overall programme and opportunities was high, suggesting that centres are achieving some of their core functions with relation to providing a supportive, cohort environment with opportunities for external engagement outside of the standard curriculum. Acknowledging the comparatively small sample size, the survey data also showed higher levels of satisfaction across several core areas when compared with the larger PRES dataset, with particular emphasis on external opportunities. This is perhaps unsurprising given the additional funding provided to centres, and external emphasis on this being a core function of funded centres (as defined by the funders). Students also saw external engagement, for example with external partners and industry, as a key benefit providing an insight into potential improvements for wider provision across the sector and a focus for additional investment by institutions.

Whilst additional opportunities were cited as important, they also shone a light on the potential pitfalls of centre structures with some respondents feeling under pressure to take advantage of all activities, whilst others found these a distraction from what they perceived as their core function - completing their own research.

Overall students reported that the benefits of a cohort environment outweighed the negative aspects of this, but several reported that their centre did not organise regular

activities for interaction, or these were centred around particular institutions. This suggests that some centres were not functioning as intended, potentially due to resource constraints or other organisational factors not disclosed to students, or that students were not aware of. The findings suggest that activities to bring students together were valued with many respondents associating this with their own sense of wellbeing, belonging and importance in terms of interpersonal relationships. Further, students communicated the value of sharing methods, tools and learning in relation to their research, suggesting that the cohort environment, where effectively facilitated and resourced, supports students with their academic journey. The findings also revealed important counter information about students who already had established networks, or significant work experience, who asserted that organised teambuilding activities and collaborative activities were of less value. This has potential implications for future centre structures, which could be adapted to incorporate the learning of students with prior experience.

Themes within the student survey were also echoed in the interviews with staff, covered in Chapter 5.

Chapter 5. Interview Findings

The following chapter presents the findings of interviews with centre directors and centre managers. Interviews were conducted with staff members (n=11) from Centres for Doctoral Training and Doctoral Training Partnerships. Interviews with Directors of doctoral centres were used to gather perspectives from individuals involved with the application, curriculum design and strategic leadership of centres. I interviewed individuals from both CDT and DTPs, and whilst this has a modest sample size, the interviews revealed themes relating to institutional challenges, risk, staff workload and bonds formed between students.

In the majority of instances, centre directors are the individuals who co-designed and wrote the original funding applications. Alternatively, some now lead on the design and delivery of the strategic vision of centres. Given their roles, I wanted to explore what rationale directors provided for the initial set-up and application of their centre. I also conducted interviews with eight Managers of doctoral centres. The interviews covered topics relating to student activities, the set-up and management of the centre and events led by the centre team. Participants were also asked about the relative advantages and disadvantages of the centre model and whether they had suggestions for alternative funding models in the UK. One interview was conducted with two individuals who opted to do this together, as although they were based in different centres, they were hosted by the same lead institution and offered different perspectives on the set-up and management of the centres. Four of the interviews (one joint with two participants) were conducted before the COVID-19 pandemic, two at the beginning of the pandemic (April-May 2020) and the final four after a year of being in the pandemic (May-June 2021). This is reflected upon in the write up of these results in relation to views expressed by staff and reflecting broader viewpoints from across the sector concerning the wellbeing of staff and students. Interviews were mainly conducted using videoconferencing software, with two taking place in person prior to the outbreak of COVID-19. All interviews were transcribed and coded for arising themes (see appendix).

The findings from the staff interviews are presented thematically, with excerpts provided to support the themes and highlight where there was congruence across the interviews. Whilst the interviews were conducted with individuals in director / strategic roles and those within

management or professional support roles, the findings are presented together, with clear distinctions made where themes only applied to one group of research participants.
The findings explore the research questions in relation to how centres function, what they achieve and what can be learnt from the data, which could be applied to broader learning on doctoral provision.

The chapter first focuses on the benefits of centres as perceived by staff, then describes the disadvantages reported, followed by general findings surrounding centre structure and process which highlight differences across the various centre models.

5.1. Benefits

The benefits of doctoral centres cited by participants were varied and covered institutional-level detail alongside the perceived and observed benefits to the communities of students with whom they worked. Each of these enables a deeper understanding of how centres function and their potential success in achieving their aims of creating supportive learning environments with a cohort structure.

5.1.1. *Students Forming Close Bonds*

Several perceived benefits were outlined in the staff interviews concerning student bonding, with all staff reporting on this, providing positive stories of interaction and activities.

Staff noted additional activities and social events within their CDT that they identified as unique in relation to the academic department in which they were situated.

> *"they hang out outside of the office, they go on holiday together. They've got active channels where they keep in touch with each other like slack and they do weekly quizzes. Together they serve their own seminar series and that isn't something that I've seen across the school"* (participant 6, CDT)

Staff also provided examples of how students support one another.

"From a student point of view, I think the biggest benefit is the cohort bonding and being part of something that other people are part of so they can have some shared experiences" (participant 8, CDT)

"There's certainly some people that I could easily see that if they were on traditional PhD, that would be very isolated." (participant 6, CDT)

5.1.2. *Student Support within Centres*

Staff spoke of how students felt supported within their centres, which was also echoed in the student survey suggesting a good alignment across staff and student perspectives.

"You know, I've had a few comments that say is really good, that that they've, they've got the DTP that you know if things aren't going good that they can fall back on us and we can try and sort things out for them." (participant 5, DTP)

This was accompanied by a comment that the individual departments students were placed in weren't always best placed to support them. However, this was not always represented in the student responses; some felt that they would have been better placed in their supervisor's research group.

5.1.3. *Benefits for the Wider University*

Staff discussed how the set-up and continued investment in the doctoral centres had provided a wider set of benefits for their institutions in terms of research capacity, additional funding, and staff development. Whilst this was not evidence that they had been systematically collating, EPSRC CDTs were asked (in the 2016 mid-term review) to report on this. These findings also provide valuable insight into how institutions could support staff engagement where centre models exist, or to support the creation of structures to nurture early career staff within research groups where this does not occur.

The benefits and examples in Director interviews closely mirrored those reported in interviews with centre managers but with a focus on wider strategic aims in relation to the development of academic staff within departments. They also reflect student perspectives

in relation to engagement with external partners and additional training opportunities afforded to students.

Directors reported benefits relating to the cohort nature of the centres and student relationships within cohorts. Whilst exploring the community of practice model and situating CDT/DTP students within this framework, I posited that friendships within cohorts made them distinct from a standard community of practice. One Director noted that they had observed a difference in the bonds that were formed within CDTs:

> *"I do think that having the friends in in the CDT is different to having friends in in other circumstances, who did not quite understand the environment you're in who may not quite understand the pressures you're under."* (Director 1, CDT)

This corroborates comments made by students on the benefits of being located within a cohort environment.

Alongside the common themes around student cohort benefits, director interviews also revealed that having a doctoral centre often led to other tangible benefits, including increased funding. One director spoke of how, without having built the critical mass of research in their chosen area, they might not have previously been considered as a partner for an external opportunity. Their institution had invested significant internal funds into doctoral centres and noted how this had led to success with other external funding calls:

> *"and that they've you know they've sort of said to me anecdotally 'Oh well, you know if we didn't have this critical mass of research effort in this area. We wouldn't have been sort of on the radar to be invited to participate in this bid' so that was you know part of the intention for the institution was to be able to create critical mass."* (Director 3, CDT)

As well as increasing funding and research capacity, a theme which arose was the opportunities for researchers to be involved in doctoral centres and the potential benefits of this, demonstrating that external engagement led to additional opportunities:

> *"ideas have come out through activities… an academic can say on their funding application I've got a track record of delivering research with industry because I've worked on this project."* (Director 2, CDT)

A further director talked about how, as their department had expanded, new staff coming in were bought into the idea of the CDT, reflecting on the change that had taken place over a 6-year period:

> *"they've come in with that mentality, because of course you sort of you get it, and then you you propagate it, and so the department now really feels even more behind the concept"* (Director 2, CDT)

The centres had also led to a range of additional ideas for funding being developed as a part of the internal collaborations developed, with plans for future calls already in development. The directors also noted that centres had allowed early career staff to develop their supervision expertise and research ideas, particularly where they could propose topics for the PhD students. However, they also noted it was important not to become complacent and remaining open to applying for additional funding opportunities.

5.1.4. *Engagement with External Partners*

Engagement with industrial and a range of other external partners, is regarded as a critical component of UKRI-funded centres, with an expectation of match-funding provided to support studentships and other centre activities. Current calls for centres (ESRC, 2022; EPSRC, 2022) stipulate an increased involvement of partners in centre design and management and an expectation for all students to be exposed to partner organisations. Whilst recognising the benefits of this approach for students, and the increased funding this brought in, directors articulated challenges with getting traction with industry partners and

the complexity linked to leveraging this funding. In one scenario, a director pointed to their strategy to create an almost self-sustaining position of funding following the end of the original funding. However, the funding levels had not been realised, and they were now re-evaluating their approach.

A further centre reflected on their approach to applying for renewal and restructuring their skills programme to focus on perceived industry needs around employability and deliver these through the CDT.

> *"developing an enhanced training structure or a stronger industry focused structure and building of the industry relations and taking on board what employees, employers need from their future employees, we kind of shaped the program a bit more in that regard and had much stronger industry involvement in the delivery of the programme as well in the second bid"* (Director 1, CDT)

The continued strive to balance delivering a positive student experience, whilst meeting the expectations of external partners is a significant issue. The interviews suggested that centre directors feel the impact of increased external pressure and the expectation to produce industry-ready graduates. Whilst this shift could prove positive for student outcomes in relation to future work, it may further skew the purpose of doctoral programmes towards employability. This continued trajectory could prompt a major shift to more suitable doctoral programmes, including apprenticeship models such as that proposed by Senior et al. (2020).

This industry-focussed sentiment was also echoed in the interviews with managers, where one remarked that without industry involvement, there would be little difference between the CDT programmes and other doctoral offerings. This demonstrates that the training offered by centres could be influenced by external factors, as well as established frameworks in the sector and funder requirements. This finding also highlights a potential difference between centres and the standard route for PhD students, as well as how centres

function within their partnership model frameworks and requirements for external involvement and engagement.

5.1.5. *Training*

Each participant was asked about their training activities for the students, including what type of activities they organised and whether they organised additional cohort building alongside development workshops. Management staff saw the additional opportunities as being advantageous and noted differences to the standard doctoral route:

> *"I would say the industry component as being one of the biggest factors because I think that it gives the students links to industry. It gives them a flavour for how industry works because it's very different from academia."* (Participant 3, CDT)

The topic of working with partners was specifically linked to the future employability of students too:

> *"additional training allows them to be a bit more kind of workplace ready, so the idea that they are often working with an employer or with a sponsor company."* (participant 8, CDT)

One director also spoke of the potential difference in learning outcomes that occurred when students were located together, comparing pre-COVID and during COVID. They hypothesised that when learning new and complex topics (for example, advanced statistics) students performed better when they were able to ask questions of the students co-located with them who had prior experience of the topic area.

The partnerships and links to external organisations are unique to doctoral centres in that partners often contribute both funding and time to support additional activities within centres, not available to non-funded students. These additional interactions provide students with the opportunity to experience new learning environments. Another centre reported how their training was broader in scope but allowed students to explore other

areas and offered residential and international networking events as part of their broader offering.

> *"I would say is that the training that we can provide is we can provide some very broad training and that's if you're just doing your PhD by yourself. You can be very focused and not look up at all from what you're doing"* (participant 5, DTP)

This broad training offering was also reflected in the student survey responses, though not all students appreciated the variety of topics, with some preferring to focus on their narrow field of research. However, centres are required to provide broad training programmes, and the findings suggest that this is being delivered.

Directors detailed the structure of their training programmes and how these were delivered, whilst outlining the challenges of specific models and how they adapted these in response to student feedback.

> *"You can actually run different courses and they can pick and choose what they'd like to do so they're moving more towards the flexible model now where in the past, we had a very rigid one. Where they had to do everything, all of them. And that didn't necessarily go down well."* (Director 1, CDT)

Not all participating centres had yet adopted this student-led, flexible approach, with many continuing with a core first-year assessed programme, followed by a series of other activities. However, all centres did work with students to understand their training needs. An interesting observation made by one director was that sometimes the training programme could be viewed as *'spoon feeding'* the students, and in providing such a structured programme, the environment doesn't always promote independence in the student cohort.

5.2. Disadvantages

Although staff detailed mainly positive accounts of their doctoral centres, they also presented challenges across various topic areas, broadly categorised into institutional (structural and cultural), students and supervisors.

5.2.1. *Disadvantages - Student Engagement*

Student engagement within centres is seen as critical for their success, as activities are built around shared experiences, shared learning, and a sense of community.
Where students failed to engage meaningfully or consistently, staff within centres felt this acutely, as they invest time and effort into organising activities and are also aware that these are not offered to all students undertaking doctoral study:

> *"I think we, the staff think there is such a fantastic opportunity. And if students aren't bothered by that is very hard to get them engaged."* (participant 6, CDT)

Staff were also aware that for students, these opportunities could benefit them in other ways, beyond their academic studies, suggesting that the centre structure could also mitigate disadvantages:

> *"I think generally having the network around them gives them a bit more of a an anchor perhaps."* (Director 2, CDT)

> *"But there's certainly some people that I think would have a harder time socializing on a traditional PhD route and then they would through a CDT"* (participant 6, CDT)

However, others acknowledged that the centre route isn't always suitable for students. This was reflected in some student responses.

> *"No one size fits all; not all students are suited to the CDT"* (Director 1, CDT)

This presents a challenge in creating the balance of a cohort of students who fit the category of being future research leaders and developing the skill sets of students who would most benefit from the environment. It also draws into question how well centres function if they are attracting students who do not wish to engage with the additional activities and opportunities afforded to them - a key consideration for centre design.

5.2.2. *Risk*

Although staff in management and administrative roles did not explicitly express concerns relating to risk, several discussion topics raised this as a potential area of exploration. Doctoral centres are subject to funding terms and rely on securing new rounds of funding via a competitive process through UKRI, which poses a risk to their continuation. For some centres, despite positive initial peer review, their research council funding was not renewed. For staff on fixed-term contracts, early career researchers and the ecosystem built around the centre, this poses a risk to the future ecosystem. This was raised in the interviews with Directors who had experienced this.

Within DTPs, there was also mention of competition across partners in relation to the allocation of studentships.

> *"I think the only one really, and this may just be that we find in our partnership, is there is often I kind of I guess more political but the tug of war and away between the departments and the DTP as to who gets priority."* (Participant 7, DTP)

This also arose in centres where students applied for projects put forward by supervisors, as not all supervisors would be allocated students, with topic areas outnumbering the number of students each year. This proved challenging to continuously engage a range of academic colleagues in the centre.

As doctoral centres offer a wide range of opportunities, generally perceived to be positive, centre managers also highlighted this as an area where tensions sometimes arose both with students and between centres and supervisors.

> *"Without saying about how great all the training and all the additional stuff that we provide is I think students sometimes get a bit overwhelmed that they can, they feel that they should be doing their PhDs and whether it's their real or perceived feel that sometimes at their supervisors don't quite understand how the DTP works"*
> (Participant 5, DTP)

Staff also noted that students didn't always acknowledge or appreciate the full range of opportunities available to them.

> *"I wonder sometimes if they are a bit begrudging of mandatory cohort events"*
> (participant 1, DTP)

This was also a topic raised in the student survey responses, whilst another manager noted that students often saw the benefit of the training in the later stages of their studies.
One manager also provided an example of students attending a larger collaborative, cross-institutional event, but then remaining within their cohorts and not taking advantage of wider networking opportunities.

> *"I have to say I was a little bit disappointed because a number of our students attended, which was great. But then I noticed that at the lunch at lunchtime or coffee breaks, they would all sit together, and they would kind of self-isolate from the wider group"* (participant 6, CDT)

This event prompted a deeper reflection from the manager, who pondered whether this was down to social anxiety or a lack of willingness to engage. As managers have such an integral role within the centres, there were several points during the interviews where it acted as a reflection point for them.

Alongside issues relating to the specifics of centres and opportunities for students within these funded environments, there is also a wider issue of students who sit outside of the

centres. One participant highlighted this as a particular issue when students were situated together:

> "*people sort of sitting next to each other with different levels of support, I think it can be quite challenging for individual students when they see other people getting access to opportunities they don't have access to."* (Director 3, CDT)

Despite the varied advantages of the funded centres, directors also communicated a range of disadvantages they had observed. These can be broadly categorised as workload related; equity; risk and student experience.

The primary issue identified by directors was related to equity across student groups, with several referring to a two-tier system and being aware of the impact of this on the wider student cohort in their institution. A further comment was that the *"playing field isn't level"* referring to the student experience, but also the opportunities and potential future outcomes for the students. One respondent noted that the concentration of funding was also an issue they were aware of referring to *'haves and have nots'*. However, all directors were positive about the current model; perhaps a reflection of their position in successfully being awarded a centre.

This unequal environment prompted a further comment on how this impacted the student journey as *"non-CDT students don't get the same experience"* (Director 3, CDT). However, directors also noted the potential negative impacts of those involved with centre using the example of how one negative student could impact the whole cohort. One director also noted that not all students are suited to the CDT environment; a comment raised by students in their responses too. This opens up a wider point for discussion on how best to ensure the 'right' students are provided with opportunities to study in these environments, whilst meeting the expectations of all centre stakeholders.

A further potential disadvantage or risk attached to centres is their timebound nature, with one director reflecting on the potential loss of the centre to their department:

"It sounds dramatic… but it would lose you know a bit of the beating heart." (Director 2, CDT)

Echoing concerns from the manager interviews, directors also reflected on the role of supervisors, noting that if the supervision teams have control of various aspects of the student experience, it can make this challenging if the student needs to change supervisors. This was in relation to students embedded within research groups and where they might have access to resources outside of the centre. This suggests that getting the balance right between involving supervision teams and getting them on board with the centre's aims and ensuring students have access to appropriate wider research communities can be challenging.

A final common theme in the interviews was the topic of workload, with one director stating the centre was a *"huge workload for staff"* (Director 2, CDT) and another stating it *"can be a burden on academic leadership teams*" (Director 3, CDT). Whilst both groups of staff interviewed (managers and directors) demonstrated a clear sense of commitment and ownership in the centres, workload continues to be an issue for all involved.
The potential disadvantages and challenges highlighted by the interviewees all provide important learning points not just for designing future centres, but for doctoral provision more widely. In particular, staff reflections on the workload allocation, commitment of staff and impact on funding cycles are potentially reflective of broader sector challenges.
Whilst these were common themes, the interviews also revealed differences in structures within centres, covered in the following section.

5.3. Structure of the Centres

Each CDT and DTP has a different operating model, as the research councils do not mandate a model for educational content, frequency of training or structure, enabling autonomy across the portfolio of funded centres. Whilst all centres offer a training component and a combination of cohort-building activities and academic events, there was no one model across the centres featured within the study.

Within the presentation of the results, the distinction between participants from CDTs and DTPs is outlined in brackets after each quote. As the centre structures differ, this enables an analysis of any commonalities and differences within the centres, especially where there is a geographically distributed structure (more prevalent within DTPs).

5.3.1. *Space and Student Location*

Guidance provided by the funders of centres stipulates that centres should provide an environment where students can learn in a cohort environment and benefit from peer interaction. However, the extent to which this is realised through co-location varies across centres. A question on student space and whether students were co-located was posed to participants, with a range of differing responses, with some referencing joint lab and office space where the disciplines required this:

> *"what they did was they put the cohort together, the first year cohort together all in room (my colleague called it the 'pen')…then they would move out to other offices… and then you'd get some mixing"* (Participant 3, CDT)

Others reflected on the importance of mixing with groups outside of the cohort, suggesting that despite being within a group this could lead to isolation from other groups.

> *"I think it's important for them to mix with other PhD students, otherwise it can be a bit isolating" (*Participant 4, CDT)

With DTPs, interviews revealed that students were dispersed across institutions, though this did not seem to, from the perspectives of centres managers, impact on the student cohort building:

> *"No, no, they're spread across their whole partnership. And some of them left that are based at* [redacted] *will be based with other students from other cohorts, because I mean some of the departments have quite a few students to begin with,*

but then at some at smaller partners might find they've only got one student a year so they wouldn't be" (Participant 7, DTP)

Each of the participants noted the importance of students being located together in their first year, particularly where they had an integrated master's course to facilitate group working, with an acknowledgement that further integration with research groups was important in future years as students moved into their research phases. This also reflects the perspectives and preferences of students from the survey data, who noted that some students would have found value in being situated with the supervisor's research group. This does demonstrate that whilst CDTs appear to function in a way that best meets the needs of students, others could learn from the models applied elsewhere. However, it is important to caveat that this with interview finds that suggested that whilst some best intentions around knowledge flow and exchange had been designed into the structure, they had not always been realised:

"we actually wanted them to be (if they could be) with their research group that they associated with via their supervisor, that way they could bring back the knowledge. It never quite worked" (Participant 3, CDT)

This was set in the context of physical structural changes happening within the university, outside of the boundaries of centres, suggesting that centre design could potentially be disrupted by external physical factors including space limitations.

5.3.2. *Research Project Selection*

One main difference across the centres pertains to recruitment and project selection. Whilst some centres advertised specific studentships during recruitment, others undertook a selection process for students partway through the first year of the programme.

"we recruit to the DTP we don't recruit to a project at the start." (participant 7, DTP)

"some of them will go for ones they make up themselves and have their own supervisors, some will be a mix of them will take you know, one that's already been advertised and tweak it to their so it's very much a student led and student organized project as well." (participant 7, DTP)

"The co-funding …is usually through industry partners and the way that we work is that we get potential supervisors to put forward projects each year. That they'd like student for and it's the supervisors who will have the relationship with the cofunders say that they'll bring a project with a you know a certain amount of co-funding attached to it." (participant 5, DTP)

Within multi-institutional centres (the norm for DTPs, but less common in CDTs), there were a variety of ways in which studentships were allocated, even within institutions.

"Yeah…I know for the other DTP administrators. We've got a you know, a network and we'll do things slightly differently." (Participant 5, DTP)

Whilst it is important for centres to retain autonomy in their design to best fit the partnership model and the academic discipline in which they specialise, the findings suggest that shared learning across DTPs and CDTs could add to improved processes across centres.

5.4. Situating Doctoral Centres in Institutions

In each of the interviews with staff, the topic of institutional fit and doctoral centres was raised. Whilst institutions apply for doctoral centres, the autonomous nature of centres with their differing structures and independent funding often posed challenges for staff within centres. These challenges ranged from support recruitment practices, procurement, learning and teaching and progression. One participant described this as:

"The CDT is a lot of square pegs in a round hole with the university systems." (participant 6, CDT)

In some institutions, groups of managers have formed to address institutional challenges, share best practice, and address challenges collectively. Whilst not communities of practice by a strict definition, they nevertheless play an important part in the development of institutional networks and supporting centre staff.

In addition to structural challenges, staff also reported cultural issues with relation to staff involved with, but not part of the core team within, the centre. Doctoral centres are designed to provide added value to the student experience and *'Students have access to cutting-edge skills training in key areas to enhance employability and research capability.'* (UKRI, 2023a) and '*EPSRC-funded Centres bring together diverse areas of expertise to train engineers and scientists with the skills, knowledge and confidence to tackle today's evolving issues, and future challenges'* (UKRI, 2023a)

This focus on additional skills training often means that students are engaged in a wider range of activities, supplementary to their research project, sometimes a cause of tension between centres and student supervisors.

Staff engagement with the centres was a topic raised across interviews, with one participant citing challenges of staff submitting ideas which could have been used for external funding applications and the balance of this.

> *"it can kind of distract from seeking external funding."* (Director 3, CDT)

This suggests that whilst the funding of centres is positive, it could lead to some staff not engaging in further funding opportunities as they saw the CDT as a route to explore their research topics. However, others described their centre as providing more avenues for research.

5.5. Funding Models

Due to the differing models of funding across research councils and the requirement for EPSRC CDTs to have match funding and institutional support, staff were often involved in

managing a funding portfolio and sometimes complex studentship arrangements. UKRI, in recent awards, have asked applicants to have match funding in place to support the research council funding, but this is managed differently across the sector depending on the type of centre, level of contribution from the research council and the partners within their networks.

Whilst some were awarded 50% of their funding from the research council:

> *"normally it stays sort of a 50/50 split between the CDT and an industry funder, but we will work with other either educational institutes… and we've got three students who are* [redacted] *funded so they're affiliated. Students, so they are funded by* [redacted] *rather* [redacted]*."* (Participant 8, CDT)

Others were awarded twelve studentships per year from the funder (75% of their total), with the remaining made up of institutional funding from the universities in the partnership, supplemented by external funding.

> *"We've got guaranteed co-funding… three half studentships a year from the* [redacted] *graduate school and one half studentship a year from* [redacted] *… and then okay and we try and get another you know more co-funding if possible. So, we, on average, we go we have about 16 students each intake here"* (Participant 5, DTP)

One centre received 50% of its funding from the research council and the rest from contributions within their partnership of higher education institutions and research institutes, across their network but without contributions from external partners:

> *"we're pretty much 50% funded now by now and 50% by partnership so various partners, put in contributions for students get funding, so it's almost about 50/50 now"* (participant 7, DPT)

As staff explained the varying funding models, there did not seem to be a standardised approach to this, and they highlighted a potential area of risk for individual centres if partnerships or relationships with external stakeholders were to breakdown. However, the responses also highlighted the value of centres to all partners involved, as significant, multi-year contributions were offered to secure studentships.

5.6. Recommendations

Centre directors provided a range of valuable insights into their centres, their experiences of applying for funding, the set-up and management of centres and also the challenges they had faced. The participants also provided a range of recommendations pertaining to how centres could operate in future, alternative routes of funding and disseminating best practice from the centre to a wider group of students. A suggestion which arose in both manager and director interviews was the alignment of research topics to broader areas of importance. In one instance this was linked to the sustainable development goals; another suggested their own university strategy and broader strategic aims. The rationale for these suggestions were mixed but all linked to impact and the potential for the research topic. This is explored further in Chapter 8 Recommendations.

> *"Align studentships to a bigger strategic area"* (Director 1, CDT)

Further suggestions included more commonality across centres and the wider use of interdisciplinary areas; reflecting the themes raised by students who, in the majority, found this to be useful. Specific to DTPs was the suggestion of less defined pathways (this is a common structure across DTPs).

Centre managers were generally in support of the doctoral funding model, although they supplied several suggestions for widening the model and alternative options. As all of the interviewees were employed by centres, it could be argued that they have a vested interest in the continuation of the funding, however, some centres were reaching the end of their UKRI funding period. These staff demonstrated a reflective nature in their responses, considering new models of participation and future models for funding doctorates. Their

insight is valuable for both higher education institutions and funders, as the staff who have a significant role in managing and delivering activities in centres.
Staff pointed to examples of best practice they had seen at other institutions and spoke of how they thought this could be applied more strategically in their own workplace.

> "*When the funding should always come from Research Councils, I do wonder if faculties or schools could be a little bit more coordinated in PhD recruitment. And perhaps, I have no idea how you would do this, but just being a little bit more coordinated around particular research priorities or research areas and forming groups of students that will focus on a particular theme or topic"* (Participant 6, CDT)

The above quote also demonstrates how the lived experience of centre staff could be used to inform future direction within institutions, a theme in other interviews:

> *"I think that you can try and use the funding for the greater good, and… when you're running opportunities"* (Director 3, CDT)

This participant was not alone in highlighting how funding could be better distributed to benefit a larger group of individuals, identifying the pitfalls of this funding route.

> *"wary of creating a two-tier system…involve non-funded students on a 50/50 basis"* (participant 1, DTP)

Each of these suggestions could improve the environment for non-UKRI funded students, and the data showed that managers echoed the thoughts of centre directors in respect to the two-tier system concerns. These perspectives and suggested improvements further add to the understanding of how centres function within their own institutions and how they could potentially be better utilised.

5.7. COVID-19 Pandemic

Staff who were interviewed during the COVID-19 pandemic (n=6) reported several issues relating to student wellbeing, cohort cohesion and the impact on staff.

It was evident from the responses that staff were heavily invested in ensuring students had a positive experience, maintaining their connections with one another and supporting their ongoing wellbeing. Interviews that were conducted towards the beginning of the pandemic (April 2020 onwards) differed from those conducted 12 months on, relating to issues surrounding impact on the overall student experience, the funder response to the pandemic and the impact on staff. Whilst some were confident that the pandemic wouldn't impact on existing cohorts, the announcements from UKRI suggested otherwise, with some students being required to reduce the scale of the study.

Others provided examples of how they worked to support the students in their centre. The following extract was taken approximately five weeks after the first UK lockdown in March 2020:

> *"I've been checking in with them all individually as well and trying to get a sense of how people are coping."* (participant 6, CDT)

Other centres reported that they had been organising online events for student induction and training and acknowledged the challenges for developing community in doing so.
The interviews also demonstrated the range of initiatives that centres were leading on to try and mitigate the impacts of remote working and to continue to provide supportive learning environment for students. These findings show that whilst remote learning and physical distancing measures were imposed on centres, staff adapted rapidly to continue to support students and aim to continue provide a cohort environment for them. This potentially demonstrates that a structured centred environment could provide vital support for students when unexpected circumstances occur, learning that could be applied to wider doctoral provision.

5.8. Conclusion

The interviews with both staff groups revealed commonalities in the commitment of staff to provide a supportive environment in which students could succeed. This is demonstrated by reflections around opportunities for learning, peer interaction and engagement with external organisations.

The interviews also demonstrated differences in the set-up and management of centres in relation to activities, frequency, and the level of involvement they had with the students' day to day activities. Although not explicitly communicated in all instances, the results of the survey also revealed that the staff were involved in a number of additional support activities, part of the 'hidden curriculum', suggesting that students also recognised the role that staff played.

5.8.1. *Conclusion – Staff Interviews*

The interviews with centre directors provided insight into some of the strategic decision making that takes place within institutions around the development of programmes, the planning and reflection to provide a well-rounded educational experience and striking the balance between institutional need and wants, funder requirements and the expectations of external partners. The interviews also exposed the fragility of funded centres and the desire to continue with what they believed were valuable initiatives, even when renewal bids weren't always successful. In some instances, this resulted in continuation via smaller, institutional initiatives, aligned to both institutional strategic objectives and broader global goals. This demonstrated the commitment of staff, further supported by their suggestions for future funding initiatives. Many of the reflections of the directors were echoed in the interviews with management and administrative staff in funded centres as the other core team supporting doctoral students as part of a wider institutional ecosystem.

5.9. Involvement with UKRI Reviews and changes to the Research Plan

Engagement with stakeholder groups within UKRI was prominent in my original plan and methodology. Engagement with this group and the potential to input into UKRI decision-making and to represent the views of core staff within the funding councils was a core part

of this planned research. In the initial stages of the study design, I spoke to several staff within the research councils who expressed interest in the study and informed me of planned reviews being undertaken, including ways to become involved with these. However, planned interviews with UKRI staff members proved challenging, in part due to being able to access the key staff, issues surrounding the pandemic and planned UKRI reviews taking place within my study period. However, the early discussions with staff in UKRI enabled me to actively contribute to the broader reviews taking place. This included taking part in workshops and focus groups and contributing my research findings within these workshops. In doing so, I have retained a core element of policy stakeholder engagement.

Chapter 6. Situating the Research in a Community of Practice Framework

This chapter synthesises the key findings, with analysis grounded in the community of practice theory developed by Wenger (1999). This framework provided a lens through which the data was explored alongside other social theories of learning. In addition, informal peer learning was considered as the topic of peer support occurred frequently throughout the student survey data and in staff interviews.

Wenger (1999) states three required elements for a group to become a community of practice. These are a shared practice, a shared domain, and a community. Whilst this framework has since developed and been applied to a range of contexts (Barton & Tusting, 2005; Wenger et al., 2002), it remains a relevant construct through which to view learning communities, particularly where there is a shared goal and joint endeavour; in this instance the doctorate.

I examined doctoral centres using Wenger's (1999) Community of Practice (CoP) framework, assessing various components of centres using data gathered via the student survey and staff interviews. I mapped the free text responses to the student survey and within the staff interviews (Appendix 12) to identify where these met the criteria for a community of practice. Complementary theories and approaches are also considered as underpinning work to examine the development of relationships within centres and the role of staff and students.

The role of actors and actor-network theory is drawn on to explain some phenomena within centres, particularly during cohort formation and in developing structures for relationships to develop. The role of individual and collective behaviours within centres is also explored, contextualising the impact within the study findings.

The notion of change and multiple communities of practice is also explored in the context of student cohorts and external (to the centre) research groups. The role of operational and academic staff within centres, and their roles in these, potentially multiple, communities of practice is also considered.

6.1. Moving within and outside of the Community of Practice

Doctoral centres are transient and timebound, due to the timeframe of funding and students' doctoral journey. This is also reflected in Communities of Practice, which Wenger (1999) describes as systems with '*interrelated forms of participation, discontinuities propagate throughout it*' (Wenger, 1999:90).

Hancock (2018) argues that the CoP model doesn't work as a framework for doctoral students, as it doesn't account for *'the highly individual nature of the doctoral experience'* (Hancock, 2018:39), and a lack of evidence of the key components of a CoP. However, this could be due to the lack of community for those on traditional journeys, who are not situated in a structured cohort environment.

As communities of practice can occur throughout the lifecycle of a doctoral centre, students may move through a spectrum of communities and roles within these CoPs. The CoP theory emphasises individuals' changing roles in their community, adapting an apprenticeship-like model. There are also added complexities in relation to the diverse groups and memberships that students have throughout their doctorate. Whilst the data did not explore the topic of strong and weak ties, the potential groups or 'communities' are outlined in Figure 38, and students may weave between these throughout their studies.

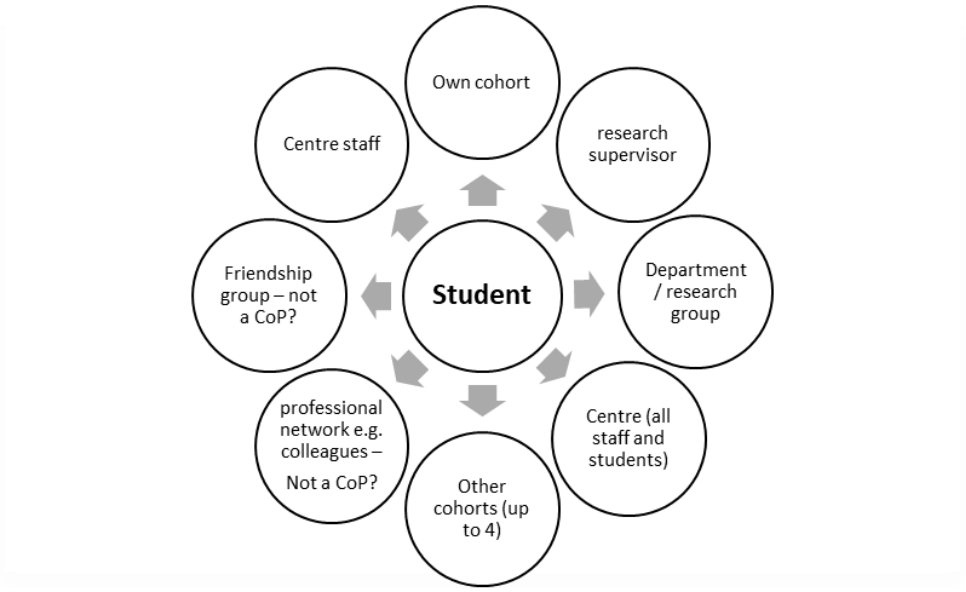

Figure 37 – Diagrammatic representation of the potential groups / 'communities' students may align with throughout their studies.

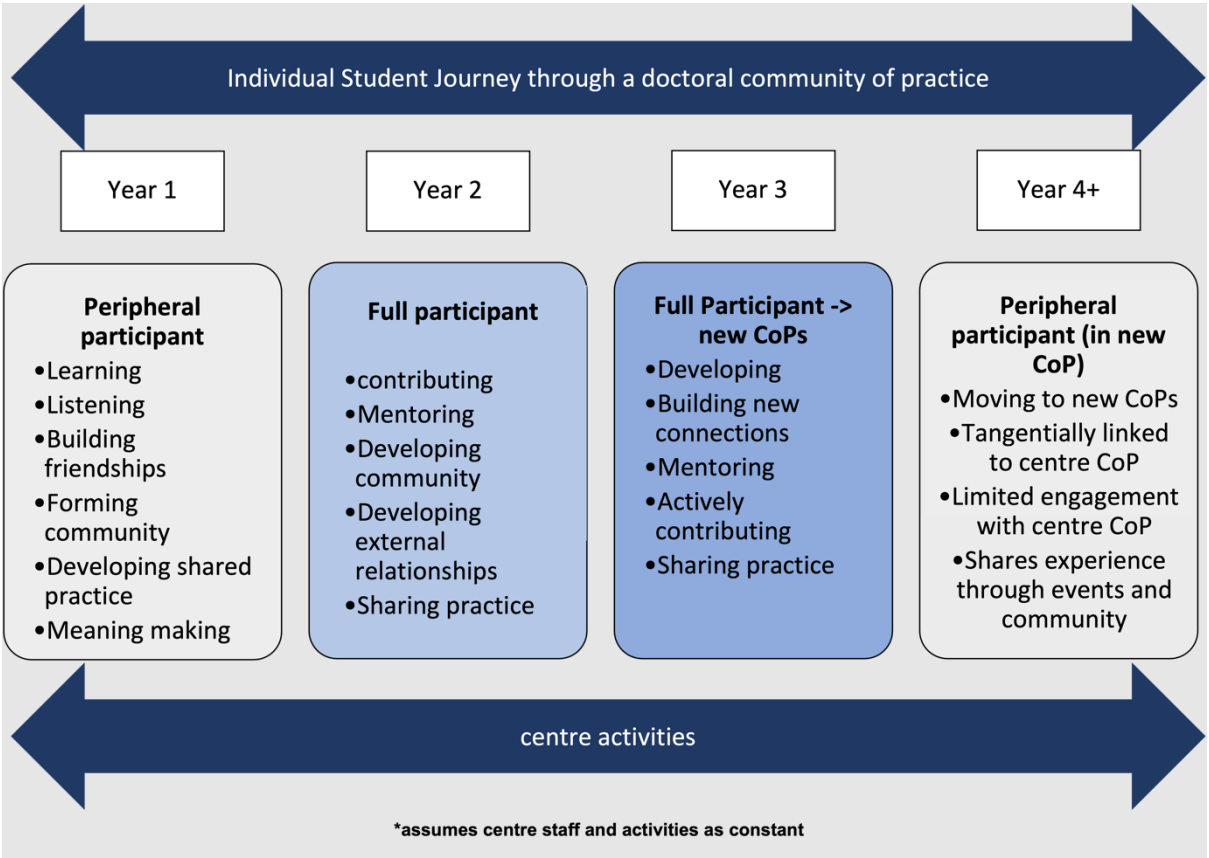

Figure 38 – Diagrammatic representation of the Individual Student Journey through a doctoral community of practice.

To examine how students might fit within communities of practice and how their roles could change over time, I developed the model above to visualise this (Figure 39).

Year 1: Students begin as peripheral participants when joining the centre. This is a critical period for forging links, building friendships, and making sense of their environment.

Year 2: Students leverage their relationships to strengthen and may act as mentors for incoming students. They will begin to share methods and practice from their research, both internally and through external dissemination.

Year 3: Students will not only be embedded in the community of practice in the centre but may also be members of external communities, through external networks, internships, and placements. In this phase, learners may span several communities of practice, serving as an interface to knowledge exchange across these. These movements support Wenger's (1999)

argument that discontinuities are a common thread in CoPs '*interrelated forms of participation, discontinuities propagate throughout it'* (Wenger, 1999:90). I posit learners at this stage will gravitate towards the communities deemed most valuable for their future.

Year 4: This stage may signal a shift away from the community, towards peripheral participation, on completion of their studies and subsequent employment.

This description of learner engagement in the community of practices assumes centre staff and activities to be constant throughout the period. This may be disrupted by staff retention challenges for inaugural cohorts, or in the early stages of the operationalisation of centres, where not all training is available. Where structured training programmes do not exist, without sustained pedagogic input within centres, CoPs might not be sustained or even formed. The role of staff as part of communities of practice is explored further in Section 6.4.

6.2. Different Centre Models and Impact on Communities of Practice

This section explores the potential impact of centre structures in creating a community of practice. The role of staff in designing and delivering the activities in centres is considered, and whether the design of space and activities was intentional or driven by circumstance, is critical when discussing the participation in a community of practice. A common thread throughout this was the role of staff as facilitating actors in these environments; the role of staff is further detailed in Section 6.4.

As not all students were situated within one location, I was interested to understand whether co-location intersected with the formation of communities of practice and the implications for those students who are not co-located. The COVID-19 pandemic also impacted how centres were structured with a move to remote environments for many students. This is considered with reference to the staff interviews during various stages of the pandemic, as the student survey took place in advance of this shift.

A core facet of some participating doctoral centres is co-locating students within a central space, to encourage collaboration and peer support. The student survey and staff interviews identified potential benefits of this model for students (as discussed in Chapters 4 and 5), but does this also translate to creating a community of practice?

Wenger (1999) argues that '*geographical proximity is not sufficient to develop a practice'* (Wenger, 1999:74), further stating that mutual engagement, joint enterprise, and a shared repertoire should also exist. Meanwhile, exploring CoPs within higher education, Tummons (2017) notes how teaching spaces are adapted to suit the needs of the different academic disciplines. Kumar et al. (2011) argue that a: *'Sense of community, or social presence, is considered a prerequisite for achieving a deeper level of intellectual discourse.'* (Kumar et al., 2011:127) Kumar et al.'s (2011) work was situated in a doctoral cohort, with a mixture of online and in-person delivery. Whilst the course team set up several online engagement opportunities, students did not fully utilise these. Students reported the on-campus sessions as the most valuable and cited inadequate opportunities for in-person interaction as reasons for dissatisfaction with the programme.

Interviews with Centre Managers cited the benefit of student co-location: *"Co-located students look out for one another".* I posit that the peer support made possible through co-location is a function of developing a shared repertoire through mutual engagement in the doctorate.

Though Wenger (1999) is clear that geographical proximity does not make a community of practice, I argue that it plays a key facilitating role in the case of doctoral centres. This has a significant implication in geographically distributed DTPs, presenting a barrier to forming communities of practice. Interviews conducted with staff during the pandemic highlighted that they struggled to recreate a community online.

However, whilst co-location could be beneficial, students are not a homogenous group, and the coding of student-reported disadvantages showed that having a peer group which could also support learning and development in a shared domain area was important.

The community of practice theory (Wenger, 1999) highlights that diversity is important in developing CoPs, suggesting that the successful development of CoPs would be more prevalent in multi-disciplinary environments. My data, supported by the information from doctoral centre websites and advertising materials, showed that students within CDTs are co-located with others from various academic disciplines. Not all students considered co-located environments favourably, with students reporting challenges relating to disparate subject disciplines and the mismatch between their topics and those of the wider group, stating preferences to be located with their supervisor's research group.

However, this issue is related to the student's chosen research area and being situated within a multidisciplinary research environment, rather than a function of being co-located. The issue of location and where students were situated was also a theme within the staff interviews with Centre Managers concerned that some students worked from home or situated themselves with another research group. It was also an issue for those managing distributed centres, who found arranging activities for multidisciplinary groups challenging. This topic is worthy of ongoing consideration, particularly given the norm for homeworking continuing following the pandemic. Suppose even a small number of students feel disconnected from their cohort, or the wider cohort group within the centre. In that case, this could lead to disengagement, isolation, and potential disruption to group cohesion. This requires further consideration for operational and academic leaders, considering the design of multi-disciplinary doctoral centres and providing a positive and enriching learning environment.

Whilst there might be benefits of peer engagement, it could be more beneficial (from a community of practice perspective) to situate some students with researchers from their discipline. This would potentially allow them the other benefits of a community of practice: meaning, making and reification. However, some students noted that being in a multidisciplinary team allowed them to develop new methods and ways of considering their research problems. This included the added benefit of providing an enriching learning environment, and strengthening their research practice, arguably a core purpose of a doctoral training environment.

This suggests that CoPs can exist across disciplines, providing there is shared learning and a common purpose, in this instance, the completion of the doctorate. This example was also true of my own EdD cohort, where disparate educators were brought together for shared learning, group assignments and the discussion of research methods and perspectives.

Therefore, it is necessary to examine the factors and actors contributing to forming communities of practice. These actors could be transient, but as a standard constant, centre staff might play a significant role.

Cohort environments might also lead to some students feeling excluded from these communities of practice, an area worthy of future exploration.

It is potentially significant that some students reported that they were not given a chance to provide feedback to a management board and were broadly *'Neither Satisfied nor dissatisfied and Somewhat satisfied'* with their overall experience, suggesting a range of factors could impact whether students felt part of a community of practice, including notions of hierarchy and equity.

Without the evidence of each of the CoP themes being present, doctoral centres are not communities of practice in themselves, although they could provide an environment for creating these. Examples from the student survey (Section 4.3) suggested that some of the disadvantages identified by students could lead to a breakdown in CoPs or prevent their creation. Many of the topics identified could also provide a basis for a framework for centre management to improve the student experience within centres and to create cohort-based communities.

Wenger-Trayner (2015) notes that *'having the same job or the same title does not make for a community of practice unless members interact and learn together'* (Wenger-Trayner, 2015, Para.7). This was used as the basis for examining disadvantages where students identified issues relating to education, learning, and training. In addition, for a group of

individuals to be a community of practice, they should also have an identity defined by a shared domain of interest, with a commitment to this and a shared competence that distinguishes members from other people (Wenger-Trayner, 2015). Whilst there is evidence of this within doctoral centres, it differs depending on the type of centre, the centre structure, geographical closeness, and relatedness of the disciplines.

A further example of where doctoral centres and their communities fit within the CoP framework can be explored through the notions of apprenticeship within a CoP, where new members are known as legitimate peripheral participants. (Lave and Wenger, 1991) This also relates to incoming cohorts within centres, especially where cross-cohort activity occurs. Students reported the interaction with other cohorts who had already experienced some of the challenges they were facing; the staff also confirmed buddy and mentorship arrangements across cohorts, thus reinforcing this model.

6.3. The Role of Friendship in Communities of Practice

The data suggest that the role of peers and the development of interpersonal relationships and friendships were important for students' overall wellbeing.

Wenger (1999) did not consider friendship as a significant contributing factor in CoPs, although Wenger acknowledged this to be intertwined or a by-product of the environment.

In addition to centre-organised activities, it was reported that 75% of students organised activities within their centres. Whilst these self-organised activities spanned both social and academic topics, including reading groups, seminar series, cinema visits, and bake sales, there was an emphasis on community building. This suggests connections and relationships which go beyond the academic environment and into shared experiences and the forming of social connections.

Therefore, the data support the assertion that centres provide students with more than an academic community of practice. They are an opportunity to form social ties and friendships combined with peer support. Peer support is seen as a key facet of 'success' within doctoral

programmes (Gardner, 2009), and students frequently referenced this. However, this is only useful if you have *'people who like to spend time together'* (Kiley & Halliday, 2019: 670). This supports some of the topics the data highlighted would be challenging for forming CoPs when students did not feel connected or get along with their peers.

6.4. Staff as Part of the CoP

Staff within doctoral centres play a core role in the design and delivery of learning and community building. Wenger (1999) argues the community is driven by individuals who are active participants across each of the areas. Therefore, to be seen by students as a core part of the community of practice, they may also need to be part of the shared learning or practice.

Tummons (2017) notes that communities of practice can also be about what people in them *'do not do'* (Tummons, 2017:5). This is pertinent to the exploration of CoPs in doctoral centres, as activities within these centres are driven by a range of internal and external factors, relationships, and power dynamics. The hierarchy within the centre environment can be affected by the directorship, operational staff, and individual supervisors of students.

Wenger (1999) discusses the concept of brokers within communities. It could be argued that all centre staff act as brokers, creating engaging learning opportunities and supportive social environments. During the interviews with centre managers, they each mentioned creating a supportive community, although no participant explicitly used the terminology community of practice. However, the conscious creation and knowledge of communities of practice and associated methodologies could enhance the learning environment for all. Operational staff often took on the role of mediators, event organisers, social secretaries, and problem solvers. It could also be argued that, in doing so, they act as brokers within the creation and sustainability of communities of practice.

Students also identified the various roles that support staff played in the student survey mentioning pastoral support, mentoring and wellbeing, and a wide range of information and advice. Students also reported that staff were able to signpost them to relevant other

departments within their university, suggesting that despite their autonomy, there was still an appropriate link with university structures. The familiarity with centre staff perhaps made students feel comfortable contacting them for a wide range of queries. Furthermore, staff interviews revealed that centre staff were involved with recruitment, induction, training activities and cohort/team building events, thus developing relationships and familiarity with students. This all suggests that staff are integral to the community, though they might not be full legitimate participants, moving to peripheral participants as each new cohort joins and activities and communities become self-sustaining.

However, many students primarily referred to the support as being administrative, without specifying tasks. Not all students recognised the role of the support staff, or the activities created for them. In response to Q10, *Does your centre organise cohort building activities?* 20% of students responded *'no'*. In centres where staff do not organise activities, the role of staff in creating a community of practice would be harder to evidence. However, this can be caveated by the fact that these students will still have had other activities, including training and development opportunities provided to them.

Students also reference the organisation and opportunities they have as part of a doctoral centre: Do you feel there are any advantages to studying within a Centre for Doctoral Training / Doctoral Training Partnership compared with the traditional doctoral journey?

> *"events are planned for you, there is a team whose job it is to look out for you/help you with the doctorate"* (M, 20-25, EPSRC)

Student-led peer activities were also featured in both the survey results and extracts from staff interviews. Interestingly, in one interview, a staff member recounted the challenges of not being involved in all aspects of students' activities, whilst all interviews revealed a sense of ownership and responsibility for the majority of the students' activities to a greater or lesser extent. However, the extent to which staff involvement impacts the creation of the community of practice is worthy of further exploration, drawing on the findings of Feldon et al. (2019), whose lab-based study of doctoral students found that '*PIs' laboratory and*

mentoring activities do not significantly predict students' skill development trajectories, but the engagement of postdocs and senior graduate students in laboratory interactions do' (Feldon et al., 2019:1). Whilst doctoral centres do not have all the characteristics of labs, especially where students are not working on shared topic areas, or where they are geographically distributed, there is a commonality in the role of peers from across different cohorts, particularly where informal mentoring and buddy systems exist. This also supports the assertions made in the director interviews around the role of centres in involving the wider research group and developing early career supervisors. Whilst staff clearly play a key role in designing and delivering activities which support the formation and continuation of CoPs, their influence is limited if there is no desire from the students to engage.

A further example of where doctoral centres and their communities fit within the CoP framework can be explored through the notions of apprenticeship within a CoP, where new members are known as legitimate peripheral participants. (Lave and Wenger, 1991) This also relates to incoming cohorts within centres, especially where cross-cohort activity occurs. Students reported the interaction with other cohorts who had already experienced some of the challenges they were facing; staff also confirmed buddy and mentorship arrangements across cohorts, thus reinforcing this model. However, it could be argued that in order for centres to be identified as a CoP, there needs to be both shared learning and immersion in practice, for example, in nursing education (Burkitt et al., 2001). Centres, where there is an integrated master's programme to develop the core competencies of students, would therefore appear to be a community of practice, as they build shared experiences, knowledge, and practice. Centres without this shared, formalised structure could lack the fundamental elements of a CoP. It is arguably more challenging for multidisciplinary centres to be 'true' communities of practice due to the disparity of topic areas and interests, though they are learning communities.

Within the findings, some student participants expressed their opinions about the desire to be located or affiliated more closely with their supervisor's research group. This could demonstrate a deeper understanding by students of the need to share their practice and be part of a wider learning community of value to them. In discussions with centre staff, all

highlighted the desire to ensure students were integrated with others in the student's research area but also trying to maintain the connection within and across cohorts. Staff reflected on this challenge and noted particular instances of non-engagement, supporting the notion that communities of practice require commitment and sustained involvement. The findings also reflected the fluctuating and timebound nature of communities of practice. Still, without the explicit description of their community being a CoP, this was not consistently recognised by staff within centres who were keen to retain a community throughout a student's journey.

6.5. Are Centres Communities of Practice?

Whilst the evidence shows that centres have several elements of communities of practice, questions remain as to whether they fit neatly within this framework and whether an expansion of this framework is required. The following section considers some limiting factors of using the community of practice model to categorise what happens in funded centres. These are considered in light of access to other communities, student engagement and willingness to participate.

As I examined the data from the survey and interviews, I theorised that the centre model was not a 'one size fits all' solution to the lonely journey or, indeed, an ideal environment for all students. Whilst students indicated that funding was not their only choice for study, this was still identified as a key driver, due to the funding primarily being distributed through the centre model, it is therefore inevitable that some students find themselves within a centre environment, where this is not always the most optimal mode of study for their chosen discipline or for their individual preferences. The student survey results substantiated this, particularly where students felt an affinity to another academic grouping or community. Findings were coded to identify where the CoP model (within centres) was not realised.

For some students, being located within a centre meant they felt excluded from other communities of practice, in some cases in all three aspects as they identified the cohort

reducing links to their research group and that attending cohort events meant time away from developing other relationships that they had chosen to focus on.

For others, the cohort environment led to a distancing from their own area of research, which could lead to a disconnect in developing shared practice and expertise within their chosen domain. Some centres only co-locate their students for the first year, after which they move to a location with their chosen research supervisors and their research groups. Whilst one student thought that mixing with other cohorts was beneficial, they were forthright in asserting that this should not dilute your own chosen discipline.

Whilst students who were not co-located had generally high levels of satisfaction across the programme, the issue of community was raised in the free text responses, suggesting that distributed centres would need to provide further provision to support the formation of CoPs. The data highlighted a wider issue relating to practice, as some students weren't able to study together and develop those shared practices required for a CoP. Such examples also give rise to question around the purpose of doctoral centres as examples of cohort learning; often referenced as a key benefit of their existence. Responses included references to students not residing where they studied and noting that their cohort rarely studied with one another, thus impacting community, domain, and practice.

However, this was not unique to distributed centres, as Co-located students within CDTs work in different research areas, albeit tied by a common theme. The thematic structure is more prevalent in the CDT model, in comparison to DTPs, but does not necessarily lead to the automatic forming of CoPs, as highlighted in the findings.

> *"Yes, differences in topics and environment create distance. Not a natural way to make friends. Some people just don't get along."* (Community, domain)

Student free-text responses identified several instances where all facets of a community of practice were present (domain, community, and practice) whilst also providing examples of how their experience could be improved to meet the needs of their research. These

included more interaction with their supervisor's research group or more targeted activities related to their chosen discipline, a challenge previously identified for centre staff to design and facilitate. Membership of a CoP requires knowledge sharing and commitment to membership (Wenger, 1999); therefore, enabling and supporting students to develop these external networks is key to their ongoing engagements in relevant communities.

Whilst students voiced their preferences for expanded and alternative communities, it is important to note that the lack of a community of practice within the centre did not preclude an overall positive experience for students. This suggests that communities of practice are just one mechanism to support a positive student experience.

The community aspect was raised as an issue for students who noted feelings of isolation from others in their building/department. This topic was also highlighted in staff interviews due to the sometimes-independent nature of centres within institutions. Their external funding, increased links with external partners and often cross-department and cross-institutional nature can lead to centres not fitting neatly within existing institutional structures. Students also noted that they were excluded from funding schemes and opportunities within their university and were told it should all be provided by their CDT. These examples provide a need for a deeper exploration of how centres function within their wider institutional structures and how further integration can occur between non-centre and centre students. This is explored further in Chapter 7.

This suggests that the centre model could be limiting the opportunities for students to join other CoPs outside of their centre. Whilst those students in co-located centres might have access to networking and cohort building, those with disparate geographies or fewer students in their subject areas could be further disadvantaged, exacerbating the lonely journey and echoing the findings of Wisker et al. (2007), *'The more isolated the student and supervisor, the less support institutions seem to be able to offer'* (Wisker et al., 2007:304). However, centres have a mechanism to counter this effect through community-building activities with regular opportunities to bring students together in person and online.

The data did not show that students were consciously aware of the formation of a CoP within their centre, although free-text answers mapped onto the CoP framework. The ability to fully participate in the community could be hindered by structures put in place by centre leaders and managers. Whilst 76% of students said they were given the opportunity to give feedback to the management board, 42% of these reported that they felt concerns weren't appropriately addressed. This suggests that students feel that their collective voice is not always acknowledged. Therefore, whilst there is some notion of CoPs within centres, this does not extend to exerting influence within the management of the centre. For some students, this could lead to dissatisfaction and lack of engagement.

These findings offer an opportunity for centres to more effectively communicate how feedback and concerns are managed through, for example, 'You Said, We Did' sessions at various intervals in the academic year. This improved communication would enable centres to further engage with students.

6.6. Summary

Whilst doctoral centres share some similarities with a Community of Practice, the data suggests there are subtle differentiators. Therefore, it could be argued that an expanded version of this framework is required, which places a greater emphasis on friendship and support, alongside the sharing of methods, ideas, shared practices, and goals. The role of 'actors' within centres also requires further exploration within the context of a CoP framework. Additionally, the findings suggest that whilst not all doctoral centres are communities of practice, they do involve legitimate peripheral participation, described by Lave and Wenger (1991) as *'the process of becoming a full participant in a sociocultural practice. This social process includes, indeed it subsumes, the learning of knowledgeable skills.'* (Lave and Wenger, 1991:29).

If centres are to fully realise the potential of a community of practice, then further resource and facilitation is required to support this, taking into account that some students would benefit from CoPs outside of their immediate cohort.

Chapter 7. Discussion

This chapter presents an analysis of the findings in relation to the research questions presented below:

RQ1. From the perspective of CDT/DTP staff and postgraduate researchers, how well do CDTs/DTPs function and what do they achieve?

RQ2. What does this evaluation add to the learning on CDTs/DTPs which is of value to doctoral provision and associated practice more generally?

The chapter is structured as follows to consider the key themes of the research as they relate to the research questions. The key topics covered are peer interaction (Section 7.1), external engagement (Section 7.2), the role of staff (Section 7.3), student engagement in centre management (Section 7.4), the creation of a two-tier system (Section 7.5) and structure of training (Section 7.6). Section 7.7 considers whether centres meet their aims by drawing on student and staff data and information from funding councils. Section 7.8 provides a conclusion of the chapter.

7.1. Peer Interaction

This study found that peer interaction was beneficial for creating a supportive environment and stimulating informal learning opportunities. Findings also revealed potential issues with peer interaction, including themes of competition, access, and geographical disparities. This is an important finding to expand on what is known about doctoral provision (RQ2) and how this could be improved.

7.1.1. *Peer Support and Influence on Learning*

Students referred to the positive aspects of peer support within a doctoral centre, with several noting the impact this had on their learning and research. Topping & Ehly (2001) assert that peer-assisted learning is a deliberate action, made up of a range of facets, including *'Helpers consciously assisting others to learn, and in so doing, learning themselves.'* (Topping & Ehly, 2001:114). The actions of doctoral students in cohorts, unconscious or otherwise, appear to take on the characteristics of peer-assisted learning, albeit in an informal way. These findings have also been observed in cohort learning in other

contexts where the *'cohort experience provided a level of collaboration and comfort for the students that supported learning experiences.'* (Hickson, 2016:20). This supports my assertion that peer learning can exist without a formal acknowledgement of the process and adds to what is known about doctoral provision where cohort environments are present. It also adds to the learning on how CDTs can support peer learning (RQ1; RQ2).

Furthermore, this finding provides additional context on the function of CDTs/DTPs and their role in developing peer learning across student communities. This was further reflected in staff interviews who saw this learning as a key successful function of their centre (RQ1). This suggests that peer learning should be further supported and developed in doctoral communities.

Peer learning has also become an expected part of doctoral centres, as highlighted in the most recent call for EPSRC CDTs, *'a cohort approach to training through peer-to-peer learning both within and across cohorts. This cohort approach to training should be provided throughout the lifetime of student's doctorate training programme'* (UKRI, 2022b). However, the language differs in the ESRC call for DTPs with emphasis on cohort engagement, *'facilitating opportunities for interdisciplinary engagement and ensure students benefit from being part of a cohort beyond their immediate department.'* (ESRC, 2022). This could reflect the distributed nature of DTPs. It could be argued that to avoid widening disparity in provision, all research councils should use consistent language and have clear expectations concerning their doctoral training pathways.

It was evident from the interview data (see Chapter 5) that the role that mentors played and peer sharing of methods across cohorts was important. This suggested an informal practice of cognitive apprenticeship (Collins, 2005). In interviews where the staff development of early career researchers was highlighted as a priority, this also extended between senior staff members, those starting their supervisory roles and from faculty members to students. This cognitive apprenticeship approach, if formally recognised, could lead to positive outcomes for students within centres and further develop the skills of staff and students involved in the process. Whilst not a specific core function of CDTs/DTPs, findings showed

the positive role of centres in developing early career researchers and initiating the sharing of resources and practice across staff groups. It also adds to the research on how they operate to support the creation of research communities in higher education, even when not intentional by design. These findings specifically answer Research Question 1.

7.1.2. *Friendship and Cohort Interaction*

Positive relationships with peers were shown to have supported the development of students' research and education, their role in a community of practice, their sense of belonging and potentially their overall wellbeing and experience during their doctoral journey.

A distinct finding of this study is that students often highlighted their friendships as a core part of their experience. This further adds to the research on doctoral environments and how centres potentially support the formation of these interpersonal relationships through their structure and activities. This learning could be applied to the wider doctoral landscape, and in some areas, exists in successful research groups. This finding specifically answers RQ1 and RQ2 as practices within centres could be expanded to wider doctoral provision. The role of friendship has received little attention to date, particularly within the community of practice literature. Students reported benefits spanning education and research, including their sense of belonging, role in a community of practice and overall wellbeing.

This finding contrasts with a recent student survey by WonkHE/Pearson research (Jackson & Blake, 2022), where some students saw friendships on their course as being distinct and linked only to their studies. This would suggest these are peripheral friendships. The WonkHE/Pearson (Jackson & Blake, 2022) survey targeted a wide range of student communities for its sample, so that these differences could be attributed to a) differing priorities for doctoral learners, and b) the effectiveness of structured cohort environments in supporting the formation of deeper ties. Additionally, this could point to the deliberate structures of centres in creating the environment for friendships to thrive. This would suggest a further aspect of a successful centre and an expansion of their functions as both students and staff viewed this as an integral part of the student experience in centres. This

suggests that centres achieve their aim of creating a cohort environment that both supports interactions and learning communities and that the two elements intertwine through a student's lifetime in the centre, which contributes to answering RQ1. However, it also poses further questions for those students who are not engaged or seek to disengage from the cohort, providing additional learning and points for future research on doctoral provision, linked to RQ2.

The findings of this research accord with those of WonkHE/Pearson (Jackson & Blake, 2022) for mature learners, those with existing networks or an existing career pathway. WonkHE / Pearson (Jackson & Blake, 2022) found that these particular students *'specified that they were not interested in making friends but that they were interested in belonging to a learning community.'* (Jackson & Blake, 2022:1).

Whilst the findings on friendships reflect those in my study, the WonkHE/Pearson (Jackson & Blake, 2022) study differs in that student respondents in my study who identified no need to make friends also provided comments to suggest they did not wish to engage in other forms of communities outside of their own research pathway. Given the nature of doctoral research being a potentially isolating experience and the challenges of a limited period of funding, this is perhaps surprising, but further investigation with postgraduate students is warranted to explore this further. Previous research into students' sense of belonging in higher education by Wilcox et al. (2006) and Ahn and Davis (2020) also found that friendships and social interaction were key, suggesting this remains pertinent for student engagement in these environments. Belonging was a core theme in the data both in the student survey and staff interviews, and the centre activities facilitated this environment.

A central focus of this research was to examine attributes of UKRI-funded centres, to understand how they function and to identify where this could be used to improve the student experience across a wider landscape. The data on friendships could be used as an example of the benefits of doctoral centres, with the caveat that this model may not suit all students, which relates to RQ1 and RQ2 as it applies to wider doctoral provision.

Within the 2021 EPSRC report, several areas referenced the significance of student relationships, peer learning and belonging: *'They also provide a supportive and exciting peer-to-peer environment for students.'* (EPSRC, 2021:17). EPSRC asserted that *'CDTs are required to provide a cohort experience to the students, with additional training and support, alongside the research training individuals receive through their doctoral project'* (EPSRC, 2021:17). This did appear to be corroborated by both student and staff reporting on the additional activities they offered. There was also substantial evidence to support the assertion that a 'cohort experience' exists within centres, initiated and facilitated by staff and continued throughout with student-led activities and peer support. In relation to RQ1, this suggests that centres within this sample achieve their core function of providing a supportive cohort environment in the majority of instances, as cited in the student survey and staff interviews. Furthermore, this finding could be used to address well-documented issues around student wellbeing and engagement, also associated with the topic of belonging and learning from this study could be applied to address in other doctoral settings where there is not an established and inclusive research culture.

Friendships, peer support and community-building were demonstrably key facets of life within funded centres, enhanced further when students were co-located. These activities sit outside the community of practice model and suggest this could be expanded to include these less tangible but important areas. The data showed that 76% of students reported that they self-organised cohort activities. Alongside the informal learning opportunities presented above, students also organised a wide range of social activities to strengthen their ties.

However, not all students felt part of this community, and these were highlighted in a number of ways, including reporting feelings of a lack of connection due to their subject areas, already having an established group of peers or having active negative feelings about their programme and cohort (named in this research as cohesion disruptors). This suggests further investigation and exploration of how to mitigate this is required, and a further review on how best to integrate these students into what are designed to be collaborative

learning environments. This finding adds to learning on how centres function and provides important considerations for the makeup of groups in all doctoral environments (RQ2).

Staff interviews revealed that whilst they were keen to continue to be involved with the student activities, supporting them throughout, they also recognised the importance of students having the opportunity to interact without staff being present.

It is therefore important to reflect and acknowledge the role of staff in initiating and seeding these interactions across the student groups in the initial induction and education activities and programmes, with the staff becoming more peripheral participants as students move through their educational programme.

7.1.3. *Student Support and Wellbeing – Bridging the Gap*

Alongside the tangible benefits of additional educational opportunities, funded activities, internships, and external engagement, one of the key findings was the impact on student wellbeing. This can be difficult to measure meaningfully using closed survey techniques. An option to provide free text responses on the benefits of the centre model, of co-location and the difference between their chosen pathway and the traditional (solo) study route was included. In doing so, the survey elicited responses through which interesting themes emerged, including student wellbeing. Students identified the centre's role in supporting their wellbeing and connectedness, identifying this as a key benefit. This echoed findings in the staff interviews where staff provided their perspectives on their role - and that of the centre - concerning the wellbeing of students (particularly during the pandemic). This suggests that centres were also to provide additional support beyond that of supervisors and the institution in which students were enrolled, a key function potentially not previously envisaged in centre design by institutions or funders. This finding informs us about how centres function (RQ1) and supports existing evidence on the importance of group environments for student support and wellbeing and adds to learning on this from the perspective of postgraduate students (RQ2).

It also reflected a broader sense that students felt connected to their centres and knew how to get additional information and support. This was previously highlighted as an area of

concern in a report published by Budd et al. (2018). *'For the ESRC students, there was little to no sense that DTCs were a visible or tangible entity to which students belonged'* (Budd et al., 2018:36). However, this could also point to the rise in funding deployed towards CDTs and DTPs since the original research conducted by Budd and the significant time investment of staff within centres to enable the community environment, whilst not explicitly stating their aims to deliberately create a community of practice.

7.1.4. *Social Comparison*

Whilst students generally reported positively on their cohort as a supportive and enabling environment, the close-knit community aspect of centres could lead to social comparison. This manifested either positively, as the basis for continued impetus and drive, or negatively, resulting in feelings of being ineffective and potentially leading to disengagement and anxiety.

Research suggests that impetus and drive are determined by context and perceptions of achievability. (Lockwood & Kunda, 1997) found that *'Models of attainable success can be inspiring and self-enhancing, whereas models of unattainable success can be threatening and deflating.'* (Lockwood and Kunda, 1997:101)

Social comparison theory enabled a brief exploration of the concept of 'upward comparison', when an individual perceives that they are not performing at the same level as others, leading to feelings of inadequacy (Martinot & Redersdorff, 2005) and competition. This arose in the student survey as a reported disadvantage of studying within a cohort environment.

Social comparison was not highlighted as an issue during interviews with staff. However, they did acknowledge issues of competition and cliques within centres. The issues concerning competition are related primarily to the selection of PhD projects (in some centres, these are selected during Year 1).

Further, funders highlighted the need for support for students within these environments with respect to comparison. *'Working independently. As the majority of students are new to the area of their doctorate, there were concerns raised about their abilities compared to their peers.'* (EPSRC, 2021:39)

Whilst students primarily reported a positive experience within their CDT/DTP, their concerns mirror those above, with some stating that they were concerned about their progress in comparison to others in their cohort, leading to issues of social comparison. Others, however, saw this as a motivating advantage, suggesting this is an individual factor rather than an area for overarching concern, provided staff are aware and put steps in place to mitigate this on a regular basis. This would require ensuring students are supported sufficiently by their supervisory teams and understand that within interdisciplinary environments, the pace of research can vary significantly. This finding provides important learning for the future of doctoral provision if advocating for more cohort environments and co-location of doctoral students, towards answering RQ2. It shows that detailed oversight such as that provided by centres could be required, a potential resource implication for institutions.

7.1.5. *Social Cohesion*

The following section draws upon the theme of social cohesion and the role of this within doctoral centres. The notion of positive actors and cohesion disruptors is introduced and examined. Peer support and the role of the centre staff in relation to student satisfaction are explored.

Friedkin (2004) alludes to *'micro-macro'* interaction and the importance of *'causal mechanisms in groups that link individuals' attitudes and behaviours with the group level conditions in which they are situated' (*Friedkin, 2004:410).

Within student cohorts, this is key to providing a positive and enriching experience for students. The importance of individual members' attitudes and behaviour is critical in engagement within a cohort, and the role of cohesion disruptors or students who become

disengaged could be critical to the success of a cohort. There is also the risk that the opportunity of funding can lead students to apply for places within these centres as a way to progress individual research paths, but not seek to engage with the communal aspects of the experience.

Whilst doctoral centres provide a unique environment for postgraduate research students to work alongside one another in a cohort, they also present a challenge for cohesion. This was highlighted in the findings in Section 4.3.1, where students did not see direct advantages of studying within a cohort environment, nor any advantage in comparison to a standard doctoral route.

The notion of cohesion disruptors was introduced in the exploration of communities of practice and the importance of social cohesion in their formation, continuation, and success.

Cohesion disruptors are defined in this context as individuals, or groups of individuals, who do not actively engage within their centre or seek to sabotage the supportive cohort environment within centres. These individuals can be broadly categorised into those who actively disengage and seek to disrupt and those who are disengaged for other reasons but, in doing so, may also disrupt the cohort environment.

Whilst student participants primarily reported positive benefits of their cohort environment, some also raised concerns about others within their environment and the impact their behaviour had on others around them. This was also echoed in staff interviews where staff reported instances of students who were disengaged with the programme or who formed smaller cliques, causing issues within the environment for other students. One participant revealed that an intervention had taken place, instigated by staff and student concerns over the behaviour of some individuals and their impact on the wider cohort groups.

Again, the role of staff and their continued commitment to managing the student environment could provide a route to mediate challenging situations, but not one that many staff are trained or equipped to deal with. This provides important learning linked to RQ2,

that could be shared with institutions where additional training is required for staff working in these centres. It could also be applied to individuals working with doctoral students, to manage these challenges effectively.

The advantages of a cohort environment were numerous and covered cultivating a sense of belonging, connectedness, and a shared experience, leading to reduced feelings of isolation.

The findings illustrated that whilst the cohort experience does work for most students surveyed, it is challenging for others. Meanwhile, some do not perceive the value of the experience, or are indifferent. Students have been successful in a competitive process to gain a fully funded (often supported with a stipend) place within their chosen institution; therefore, it is somewhat surprising to see that they do not value one of the core components of centres. Whilst there is no evidence that these students are active disruptors, their attitudes could present a challenge for both staff and students who share their environment.

Funding could have acted as an external 'force' on the original motivation of students to join a doctoral centre, whereas for other students, the option of a shared curriculum, opportunities for engagement and networking and the cohort itself could have acted as positive forces, reinforcing Festinger (1950) and Back (1951) who emphasise the idea of forces within social cohesion. Gross & Martin (1952) put forward that any definition of cohesion should be grounded in individuals' attitudes to how attractive the group is to them. However, such theories fail to account for groups who are brought together by, for example, funding opportunities for research, as could be argued within doctoral centres. Whilst students are selected on their academic merit and potential to deliver the chosen research topic, there could also be a role in the involvement of current students in the recruitment of students. This would enable the exploration of such issues and attitudes, whilst acknowledging that shy or less forthcoming individuals also have a valuable role in the doctoral community. This could be particularly important in certain disciplines, where students might typically consider themselves to be introverted (McGee et al.,2016)

In the development of a theory of social cohesion and group communication, Festinger (1950) argued that *'a better understanding of the dynamics of such communication would in turn lead to a better understanding of various kinds of group functioning.'* (Festinger 1950:271)

Within doctoral centres, it is necessary also to understand the underlying structure, forces, and actors at play in order to understand the impact of this on the student experience.

Disciplinary differences and stereotypes (whilst normally to be avoided) could additionally be acknowledged and used to support the development of appropriate mechanisms to support group cohesion and the development of students within these environments. For example, work (McGee et al., 2016) conducted with a group of Mathematics and Computing postgraduates found that particular aspects of engagement and group work were challenging to the individuals within the group. *'Pity that we need to go out and speak with people – I think the fact that we are all mathematicians and computer scientists means that by our very nature, we are introverts.'* (McGee et al., 2016:86).

Drawing upon these 'differences' and working with students to support interdisciplinary learning and highlighting the benefits of this could be beneficial for social cohesion for students struggling to engage within a cohort environment, but perhaps less effective for those who actively choose not to be integrated. With respect to RQ2, the findings demonstrate that centres could play a role in creating supportive environments, and the learning from these could be applied across institutions, with some investment of time and resource.

7.1.6. *Role of Place and Space*

The majority of issues surrounding the role of place and the physical research environment originated from those who were located with their cohorts in dedicated spaces. Many comments centred around distractions and noise prevalent in open-plan offices, with students citing being unable to focus, read or tackle topics in-depth, supplementing their comments with requests for dedicated quiet space. Further responses from students in

geographically distributed centres reported that they felt disconnected and found it challenging to work with others from other disciplines and across institutions. In relation to RQ1, this finding suggests that whilst centres operate with the intention of co-locating students for positive interaction purposes (as evidenced by the interview findings), this design does not always result in a work environment suitable for research. The COVID-19 pandemic placed an additional challenge on institutions to retain engaging activities for existing students and build communities for new students, with interviews revealing the perceived impact this had on learning with a focus on the importance of the physical space and co-location for peer learning. Whilst not unique to CDTs/DTPs, this acknowledgement of having physical spaces for doctoral students to work closely together does provide a key point of reflection that could be shared for those institutions where students do not have a dedicated space or where students are not fully integrated into an established research group, adding to the learning in this space as relates to RQ2. At one institution, the spaces were designed so that students had a working space close to the lab they worked in, but also located with their cohort to share information, learn, and socialise with others. Several centres referred to how the physical space was intertwined with centre design but that institutional structures (physical and political) sometimes led to a disruption of this, for example, new building projects or processes that did not align with centres. Whilst host institutions are involved in applications for centres and must approve these, in some instances, the data showed that long-term planning or integration of the centres was not fully considered, learning to be considered for future centre structures and institutional process changes (RQ2).

A recurring theme within the staff interviews was the importance of shared spaces in which students could communicate and share ideas with one another. The COVID-19 pandemic emphasised the need to develop connectivity within the digital space whilst still allowing students to develop their networks without a staff presence. The growth in digital communication tools has afforded opportunities to try and recreate elements of a physical workspace, with varying degrees of success. In addition, staff interviews revealed that some centres supported students to have their own spaces to interact, including the creation of online student-mediated spaces.

7.2. External Engagement and Opportunities

Centres claim to offer a wide range of benefits and opportunities and to situate students within world-leading research environments, with several referring to multi-disciplinary offerings. External engagement is key to establishing relationships and enabling students to understand the real-world application of their research. According to an EPSRC review, CDTs *'aim to create new working cultures, build relationships between teams in universities and forge lasting links with industry'* (EPSRC, 2021:17). The success of working cultures does appear to be borne out in the findings with students frequently referring to the benefits of structure and peer support. Students were also able to identify the role of external partners and the opportunities afforded to them. This suggests that centres are achieving this aim (RQ1). The student data also revealed that some students had a desire to interact with others outside of their cohorts, highlighted as important by Hancock and Walsh (2016) *'Doctoral scientists must be guided to form working relationships with individuals from different disciplines and institutions to their own.'* (Hancock and Walsh, 2016:44).

Staff interview findings also support the EPSRC (2021) statement relating to building relationships and knowledge exchange across teams within universities; however, several challenges were identified.

There were accounts of supervision teams (and students) viewing the centre's activities as detracting from core research, potentially causing factions to form, and creating tension within institutions. Funded centres have a series of requirements placed upon them, which could be used to shape conversation where there are supervisory teams and students who see additional activities as being surplus to the requirements of doctoral study. This is contrary to the principles of the UKRI (2021) Statement of Expectations for Postgraduate Training, which states that: *'Supervisors should recognise doctoral study as a wider training opportunity and encourage and support students in developing their careers.'* (UKRI, 2021:1-2) and the ESRC's (2015) guidelines *'Ensuring that supervisors are engaged with the Doctoral Training Partnership or Centre for Doctoral Training by having a clear strategy for*

communicating with supervisors and ensuring that they are fully engaged with the aims and objectives of the DTP or CDT' (ESRC, 2015a)

Whilst the use of UKRI guidelines might not serve to build a collegiate and supportive culture within research environments, it could be used to construct a set of internal ways of working for both students and supervisors if discussed at the outset of the programme and with regular reminders throughout. It would also provide centre leadership teams with a basis on which to challenge colleagues who were not fully engaged with centres. The structure in centres and the models developed for external engagement could also be used to support colleagues without funding who are looking to develop external engagement opportunities for the wider doctoral student community.

A further area raised in the EPSRC (2021) report relates to the additional activities provided by centres, primarily seen as a positive advantage by both students and staff in the findings. *'Too much mandated time for non-research activity could reduce the attractiveness of doctorates.'* (EPSRC, 2021:39) However, this report's findings partially align with views found in interviews, with staff providing examples of where students, and also staff supervising doctoral students within centres, saw other activities detracting from research time. It was also highlighted by some students within the survey who expressed dissatisfaction at being asked to partake in activities which were not part of their core research. However, such assertions should be used with caution and are limiting to the student experience if we only view the route through a doctorate as purely research-based without a range of supporting activities. The notion that non-research-focussed time is not useful directly conflicts with the notion of developing a wider skill set and that of student wellbeing and undertaking activities to support this. It is also in direct conflict with a further finding in the report, which states: *'A specific experience that students requested was more access to networking opportunities and cohort activities with other students, both within and across organisations'* (EPSRC, 2021:61)

This was also reflected in student survey responses, where they were asked whether there were any advantages of studying within a cohort environment. Whilst many saw additional

activities as a distinct advantage, not all students thought this was beneficial, with some citing disciplinary area differences or not seeing the value of this. This finding answers RQ2 as it is valuable learning in relation to what is currently known about doctoral provision in relation to multidisciplinary environments.

Staff who had also worked within a central function (for example, a graduate school) reported a gap between funded centres' provision and what the central function was able to offer with their limited resources and funding. Staff also revealed that relationship building was seen as particularly valuable when the collaborations were across disciplinary boundaries where previously there had not been the opportunity to do this.

Within host institutions, there could be the perception of funded centres being given autonomy, opportunity, and significant funding to create additional opportunities. Whilst this has a positive impact on students, this additional activity is not without drawbacks, including the impact on staff workload and wellbeing.

The importance of developing external partnerships was significant across all staff interviews. It was seen by some participants as the key differential between the CDT model, going as far as to state that the programmes would not be as valuable without this.

ESRC, in their response to the review of the PhD in Social Sciences (2021), also committed to introducing and supporting their centres to implement placements in the future with an initial 'Research in Practice' pilot: *'To support all students to participate in placements there will be maximum flexibility in when they can be taken, and DTPs will be expected to work with host partners to ensure opportunities are available both physically and virtually and on a full and part time basis.'* (ESRC, 2021:4). This commitment demonstrates that the funders have recognised the value of these additional opportunities for their students and their future career trajectories.

However, it is important to acknowledge the significant investment of time, commitment, and effort by staff in forging and sustaining these connections, developing internal

relationships, and maintaining a positive research culture. Several staff interviews mentioned the increased workload of running a centre, both prior to and during the pandemic. This learning adds to existing findings around the provision of doctoral centres (RQ2), as this was also mirrored in the AHRC review commissioned in 2021 (AHRC, 2023a), which reported that the set-up and management of centres could be cumbersome for the staff involved. Therefore, the wellbeing of staff and the skill set required to direct and build this activity strategically, should be a key consideration in future reviews and funding calls, ensuring this forms a core part of any support structure within centres.

The findings demonstrated that students acknowledged the additional benefits of external engagement. Whilst this was more prevalent in respondents within EPSRC-funded centres, respondents from ESRC and AHRC centres noted this too. These differences could be due to different foci within these centres, for example, a focus on producing 'industry ready' graduates or those servicing so-called areas of high value to the economy.

This focus has now been extended to ESRC and AHRC centres, with the requirements for placements and internships embedded in recent funding calls launched online. *'As part of research in practice, our ambition is that all students have the opportunity to complete a placement in academia, policy, business or third sector organisations.'* (ESRC, 2022) However, the recent AHRC review (2023a) differed in the recommendations, citing that this should not be made mandatory and instead recognise the different skill sets and experience levels of students, acknowledging that many doctoral students already come equipped with a vast range of work experience.

Reports based on labour market analysis provide evidence that students from Social Sciences, Humanities and the Arts for People and the Economy/Environment (SHAPE) disciplines possess the skills required by the fastest-growing industries. The UK's National Statistician Ian Diamond remarked in a recent online article that '*Far from optional extras, the skills furnished through studying these subjects are indispensable to our economy, to society and to individuals.*' (Diamond, 2022, para. 14)

However, this does pose an additional and fundamental question about the purpose of doctoral training and whether CDTs/DTPs meet these aims. This is explored further in Section 7.7 in the context of a series of recent reviews, new funding calls and external reports such as that conducted by the Wellcome in 2020 (Wellcome Trust, 2020), which has driven a rise in the visibility of research culture and the significance of this within higher education.

The student survey and staff interviews identified clear routes of access to external opportunities, facilitated through centre links, organised activities and the additional funding provided. This suggests that centres are achieving this core function (RQ1) and do this well. Each of these findings has relevance for doctoral provision (RQ2) both within and outside of funded centres as institutions navigate new territory relating to student employment outcomes and the perceived 'value' attached to programmes.

The analysis of the data and the findings of PRES showed that centre students were far more likely to have been given the opportunity for external placements and internships. Within the recommendations, I advocate for the need to understand better how these opportunities manifest into future employment outcomes.

7.3. Role of Staff and Doctoral Centres

Staff play a key role in both centre strategy and structure pertaining to both the student experience and curriculum design. They are key 'actors' in the environment, though the role of actor-network theory (Latour, 2005) is not considered in detail in this research. The role of actors, both individually and collectively, does however have an impact on several of the key areas, notably the role this plays in relationship building and in the development of peer learning.

Within the student survey, respondents were asked about staff support and dedicated contact points to identify what types of support students were able to access in their centres. The dominant message was that students received support for all aspects of their programme, with additional signposting offered where required. The findings highlighted

that staff played a key enabling role in their centres and that their contributions were core to the student experience. This is a key finding relating to RQ1 in relation to how well centres function and that in the majority of cases in this sample, students felt supported and could identify their point of contact.

This finding is especially important given the distanced experience many students will have had during the COVID-19 pandemic. Whilst the student survey was conducted before the COVID-19 pandemic, some staff interviews were conducted remotely during this period, during which staff strongly enforced the message around their role in the student experience, and the significant workload impact. Staff spoke of the creation of communities, initiating activities for belonging and meeting with individual students to provide pastoral support. Within the staff interviews, the respondents noted their role in the centres, with most of them showing a deep sense of commitment to students. However, whilst the centre staff are, to an extent, more deeply involved with all aspects of centre activities and operations, their perspective is not unique in relation to students' belonging. Further research was carried out by WonkHE and Pearson (Capper & McVitty, 2022), exploring the importance of the role of staff and institutions in creating a sense of belonging and inclusion during the pandemic. Their research involved over 5,000 students and over 400 staff; some argued that institutions have a responsibility for supporting student belonging, whilst others highlighted the potential negative impact this has on staff with limited resources. However, other research also supports the assertion of the involvement of staff in centres, with Howard et al. (2022) making the following recommendation *'Faculty must also be included in these informal spaces since they too are part of the cohort system.'* (Howard et al., 2022). This is a key area of consideration when rolling out wider programmes of student support where staff resources and funding are limited, which arguably may be less of an issue in funded centres.

Staff interviews highlighted the critical role of staff in successfully operationalising centres, and the beneficial aspects of staff working together to provide a positive environment for their students. Staff reflected on operational challenges and broader strategic considerations, considered in turn below in relation to RQ1.

Skillset: There was evidence that the varied and extensive skill sets required to run a centre successfully are not always well understood. This spans student engagement, curriculum development, institutional negotiation, external relationship management and student support. Staff highlighted that the breadth of the skill set required was not always recognised through job titles or role descriptors. For management and administrative roles, there are significant challenges of operationalising centres at pace, with often short timescales between funding notification, commissioning, and the launch of programmes. For academic staff, progression criteria may not always recognise the additional work required for the strategic design and day-to-day delivery of a centre, including the development of new curricula.

Hidden roles: There is an unseen impact on the staff involved. Perhaps the most significant is the provision of pastoral support, a role often not clearly defined within their job descriptions. This hidden role should be acknowledged and, where required, additional support provided to staff. This was partially mitigated in some institutions, where informal networks had been established to enable administrative and management staff to meet regularly, share resources, best practices, and common challenges and provide informal support to one another.

Continuation of funding: The staff interviews also highlighted that staff felt a level of individual responsibility for the continuation of their centres, including the risk of losing the funding in future application rounds. This was particularly important for centre directors and senior managers, where their strategic vision, capacity building within the department, and staff employment relied on the continued funding of the centre. Whilst this was not explored within my study, this could also impact the student experience, with students perceiving non-renewals as a reflection of the centre and their own prospects.

Staff retention: As staff within the centres may also be subject to fixed-term contracts, there is a risk that staff leave before the end of the centre, leading to poorer student experiences and a loss of research community within the institution.

7.4. Student Engagement in Centre Management

Student engagement in centres was evident on several different levels: students as engaged with their centre's activities, students as active members of their cohort and communities, and students engaged with the centre management.

The data showed that whilst a large proportion of students had the opportunity to provide feedback to their centre management, it was not clear how this was used by the centres. Recent literature on student participation suggests that institutions can use *'student partnership pedagogy as a tool to address grand challenges'* (Matthews and Dollinger, 2022:8), providing that all students have equal opportunity to participate and that particular students are not positioned as providing the voice of all students. This is particularly important in funded centres, where there could be centralised power held by centre directors and managers in determining the structure and curriculum of activities. For example, students reported that not all activities were suitable, were a repetition of previous educational activities, concentrated too heavily on team building, and were not suitable for those with work experience. This finding answers RQ1, providing an insight into how centres function. Furthermore, this supports RQ2 with regard to the need to have a wide range of student perspectives when planning and delivering centre activity, which is also applicable to the provision of doctoral training offered outside of centres.

Patrick (2022) considers the context of power dynamics within higher education and advocates the use of a participation ladder to assess levels of student participation and how much student voice is used to impact decision making. This could be done consciously within centres, with centre directors and managers making explicit where student feedback is used to make changes to manage expectations. The prior experiences of students, particularly those with research experience and work experience, could play an important role in centre engagement, as they might use their experience to shape conversations but also may be more likely to disengage if their perspectives are not taken into consideration. Centre leadership teams need to balance their approach to maximise the benefit for the whole student cohort.

Despite some students noting that they had either not been given the opportunity to provide feedback or that they weren't sure how this had been used, staff interviews revealed that student feedback was sought and that activities were designed around this.

7.5. The Creation of a Two-Tier System?

It has been argued that funded doctoral centres create a two-tier system. Despite the best efforts of widening participation programmes in undergraduate and, to a lesser extent, post-graduate taught programmes, access to doctoral education for minoritized groups, including those from low socio-economic backgrounds, remains low. The concentration of funded centres in Russell Group institutions and the disparity in funding across disciplines exacerbates this, leading to fewer opportunities for these groups of students, as reflected in previous research (Wakeling & Laurison, 2017).

Issues of access exist across academic disciplines in relation to funding distribution. Students from arts, humanities, social sciences, health, and education have significantly fewer opportunities due to the disparity in funding across the research councils. Work to raise the profile of SHAPE contributions has been extensive over the last two years, with the British Academy launching its campaign and a report (2022) around this, and the Chief Statistician adding further commentary on this (Diamond, 2022). Recent evidence suggests that students from a range of SHAPE disciplines contribute equally to the economic landscape in the UK and are employed in a range of positions (Morgan Jones et al., 2020b). Furthermore, research council funding is more heavily directed at high-ranking, research-intensive institutions, leaving little room for the development of access routes for students who sit outside of this.

To put this external research into practice, institutions should leverage the funding they receive from centres to support initiatives that reduce these structural inequalities and lobby for additional investment into SHAPE disciplines.

Alongside the wider structural and funding inequalities that exist, a more subtle internal inequality persists within universities around the notion of a two-tier system and those 'have and have-nots' in relation to opportunities and funding. This sets an important context in which to situate the findings from the staff interviews, during which several referred to a 'two-tier' system. Centre staff in the interviews, whilst reflecting on and articulating the various benefits and advantages of funded centres, nevertheless raised concerns about the wider student cohort. Participants acknowledged the privileged positions funded students have within a centre and the difference between the opportunities provided to the wider cohort, citing the two-tier system as a growing concern. The data, which answers RQ1 in relation to how centres function and what they achieve, also suggests that the less tangible elements of centres, including social aspects and friendships, were stronger within centres.

However, where there were instances of challenging behaviour, being outside of a close-knit cohort environment could arguably be a distinct advantage.

Perspectives from staff who also had a current or previous role in their institution's graduate school or central post-graduate research office, offered fresh ideas on how best to capitalise on the funding provided to centres for the greatest benefit of students. They also highlighted the challenges of providing an equitable experience for non-funded students across their institutions. These findings provide valuable insight to answer RQ2 as they are applicable to wider doctoral provision. However, it could be argued that funded students should be distinct, given the competitive nature of their studentship – this is certainly reflected in the messages from funders and from centres in their recruitment messages, that these students are future leaders. To what extent this is true remains to be evidenced, due to limited data on the outcomes of the student cohorts, beyond the case studies provided in funding council promotional materials (EPSRC, 2018 via UK web archive).

7.6. Structure of Training

The findings revealed notable differences in the structure of training and educational opportunities across centres, providing insight for RQ1 around how centres function. There appeared to be little commonality even within centres funded by the same research council.

This is anticipated, with each centre proposing its niche focus and a distinct offering. There are important exceptions to this, particularly:

- The requirement from 2018 onwards for all funded centres to incorporate responsible research and innovation in their programmes.
- The requirement for ESRC centres to offer a comprehensive programme of social research methods training.

Such requirements do not exist across the other funding council programmes. Interviews with centre staff revealed a variety of approaches, underpinned by a commitment to positive experiences and a wide range of opportunities for additional training.

The majority of students in the sample saw the value in these additional training opportunities. However, some students would have preferred more tailored offerings or to have contributed to the structure and choices on the programmes, data useful to answering RQ1 on how centres function. Whilst this could be possible for training offered in later stages of the programme, for those programmes with integrated masters years, there would be constraints as these may be modules running across a variety of courses in the institutions. These credit-bearing modules would be subject to institutional QA processes limiting adaptability. This represents a challenge for centre staff working to provide an equitable and well-rounded curriculum for all students, whilst also acknowledging the mixed demographic of ages and career stages of their cohorts.

Outside of the formal centre programme, it was apparent from the student survey that a wide range of informal, student-organised learning opportunities exist within funded centres, supporting the community of practice model. Students noted that they held a seminar series to share their research with their peers in their cohorts; this was substantiated by centre staff, who saw this as a way for students to connect and get feedback in a safe space. These informal activities form a critical part of development as a researcher, encouraging debate and thinking around research, enabling the exploration of new and innovative ideas, and supporting the development of communities of practice. It

also mirrors the activities of established research groups and academic communities – a desire reflected in some student responses, which suggests this does not occur in all centres. This is a key finding in relation to RQ1 as it reveals that, in many cases, the structure of centres afforded students the opportunity to also capitalise on informal opportunities for shared learning. Although some informal learning activities did occur in some distributed cohort environments, students who were co-located will have received the indirect benefit of being able to reflect and continue informal conversations beyond the boundaries of the structured sessions. This finding adds to what is known about doctoral cohorts and could be applied to support the structure of doctoral activities outside of centres (RQ2).

Involving students in the process of programme design could make learning environments and opportunities even more valuable for participants. Data from the interviews provided evidence of the use of student feedback to improve programmes, drawing on the benefits of a student-staff partnership. A recent review of student voice and participation suggests that *'partnership is ultimately a relational pedagogy that works because students share responsibility for learning, teaching, and educational endeavours with teachers/staff/administrators and each other.'* (Matthews and Dollinger, 2022:7).

Whilst this signals an important movement towards co-creation of the curriculum in doctoral centres, the data from students who had previous work experience suggests that there are still improvements to be made to ensure a valuable experience for these students, particularly if they are using the doctorate as an opportunity to change career, a topic evidenced in the responses from my survey. This is a key finding in relation to how doctoral training is organised more broadly (RQ2). Further effort to understand the needs of this group should be made, drawing on the research in adult and lifelong learning. The data from the survey on the age of students also suggested that a significant proportion of students were now coming to doctoral study at a later stage, across all centre funders. This could further impact the appropriateness of the activities organised by centres as students already bring a level of experience and expertise. The centres have a requirement to develop and nurture students' research expertise and progression beyond the doctorate, as cemented in funder expectations and in the Vitae (2015) researcher development framework.

The survey data suggested that some students preferred to work in isolation, had a need to do so, or found the environment not conducive to their chosen study topic, citing a lack of relevance of the learning activities. This finding answers RQ1 as it gives an insight into how some centres function and is in contrast to what was reported by staff who cited student feedback as key to their programme design. This could suggest a lack of engagement with the student cohort to fully understand their training and educational development needs, instead opting for a programme that sits within existing modules or programme frameworks within institutions. This finding also adds to what is known about doctoral environments (RQ2) and could be used to support institutions to further co-develop the curriculum with the involvement of students, particularly those with existing external and internal work experience or professional training.

7.7. Expectation vs Reality - Do Centres Fulfil Their Goals?

In this section, I undertake a robust assessment of whether centres fulfil the aims and objectives set out by the funding councils and whether the findings of this research support this. Whilst my research does not provide a nationally representative sample, it nevertheless provides a set of perspectives for consideration in future evaluations and the wider doctoral research landscape related to RQ2. The aims of the research councils are outlined with specific reference to previous and current funding calls, alongside the recent reviews of programmes (EPSRC, 2022; ESRC, 2021).

7.7.1. *External Funding Calls and Reviews*

Funded centres are awarded based on a nationally competitive process, with some institutions restricted to a limited number of applications. This seeks to ensure significant institutional support and that only the highest quality applications are submitted.

Both the Engineering and Physical Research Council and the Economic and Social Science Research Council commissioned reviews into their doctoral programmes in 2020, with reports published in 2021; the Arts and Humanities Research Council followed with a review in 2021 (AHRC, 2023a). The ESRC review directly informed the current funding call for recommissioning their existing centres (ESRC, 2022).

Prior to this and provided here for context, the Wellcome Trust launched a report on their doctoral programmes in 2018 (Wellcome Trust, 2018), citing that 39.7 per cent (1,067/2,685) of all respondents thought that the primary purpose of PhD training was *'to develop highly skilled individuals who can contribute to a knowledge-based economy and meet changing skills needs in the workforce'* (Wellcome Trust, 2018:8). In comparison, 30.6 per cent (821/2,685) considered the primary purpose to be '*to train the research leaders of the future'* (Wellcome Trust, 2018:8)

Across each review, the language used differed depending on the funding council. This could be indicative of wider sectoral differences between traditional STEM disciplines and the social science and arts and humanities (SHAPE). The growth in doctoral centres could also be driven by external influences, as highlighted by Hancock (2021), who argues, *'The expansion of doctoral education is in part ideologically driven; as policymakers invoke the vision of an economy reliant on knowledge and highly skilled workers.*' (Hancock 2021:520). Examples of centre aims (taken from centre websites) are given below: *'build an inclusive cohort of students with diverse skillsets'* (EPRSC CDT); *'environment for creative collaboration and innovation'* (AHRC DTP).

In the 2015 ESRC DTP call and the 2018 EPSRC CDT call, several key areas were identified for funding success, which centres were required to evidence. Both calls highlighted the importance of the cohort environment for students, with ESRC placing particular emphasis on the development of cohort identities within centres. The ESRC noted this as an explicit requirement in their call:

'Studying as part of a cohort has been shown to be hugely beneficial to students in terms of the support they receive from one another and also the training opportunities available to them. We remain committed to supporting cohorts of students and want ESRC DTP students to develop a cohort identity alongside other affiliations (to their discipline, department etc). Therefore applicants are required to outline their strategy for building a DTP cohort across all partners and pathways.' (ESRC, 2015)

As noted in the student survey, some participants reported that they did not feel part of a cohort or struggled with challenges related to the geographical locations of their centres. Therefore, not all centres funded by ESRC will be able to meet this aim without significant investment in activities across their locations, whilst also avoiding having single students or very small cohorts based at one institution. This is important for what it tells us about how centres function (RQ1) and what might be important to improve doctoral experiences, both within centres and, more broadly, for provision across the sector (RQ2).

Students within the survey recognised the additional opportunities to interact with external partners, too, when asked, *'Do you feel there are any advantages to studying within a Centre for Doctoral Training / Doctoral Training Partnership compared with the traditional doctoral journey?'*. This demonstrates that, to an extent, centres do meet this goal from the perspectives of students. However, it would be good to capture data on this post-PhD completion to gather student outcomes and reflections on the impact of this external engagement on their future career path. Additionally, a follow-up study following the introduction of placements and internships in the new round of funded ESRC centres would be required to assess the impact of these new schemes.

7.7.2. *Contribution to a Highly Skilled Workforce*

Centres are expected to produce future research leaders, and the data showed that whilst students identified funding as a contributing factor to undertaking doctoral study, it was not their only or primary reason. However, the funding enabled some students to explore this route as an option, especially where changes in employment circumstances had occurred, or individuals had felt their careers had stagnated. This was also reflected in the demographics of the respondents, with several returning to study between the ages 30 and 35 with some years of employment experience. This demonstrates that centres provide opportunities for students coming straight from the undergraduate or master's programmes, as well as providing new opportunities for those wishing to retrain or enhance their skill set. This finding further supports RQ2 on how this evaluation adds to the learning on CDTs/DTPs,

which is of value to doctoral provision and associated practice, by informing thinking on future doctoral provision, and course structures for those seeking a career change.

This also provides a counterargument to the widening access issues previously highlighted as funded places are potentially opening up new career routes which previously were not available, arguably addressing issues related to an ageing workforce and contributing to growth economies; a key argument made by policymakers but perhaps not in the way originally envisaged. This adds to the learning on doctoral provision (RQ2) by providing an insight into why students pursue further study. However, it could be argued that the global workforce does not require individuals with doctoral-level qualifications, and research on their outcomes in the UK environment is limited (Hancock, 2021). Furthermore, it has been argued that the growth in people with doctorates is in some ways diluting the quality of the qualification, that there are too many highly qualified individuals and not sufficient academic posts for them to go into. It could also be argued that in some disciplines, many employers do not require individuals to be qualified to doctoral level, a key challenge for the future of doctoral education and research in some areas.

The fast-moving, high-growth industries that the UK funding councils are keen to continue funding are those in which the technology moves at a faster pace than a three to four year funded research programme and where research and innovation are driven by larger corporations. This is supported by the findings reported by Kavanaugh and Kumar (2019), who found that adaptability, flexibility, and willingness to learn were more important to employers than technical expertise, recognising that *'the clock on technical expertise quickly runs out'* (Kavanaugh & Kumar, 2019, para. 3). Therefore, it is critical that in these disciplines, students are encouraged, supported, and given the opportunity to work alongside external partners to ensure the maximum impact of their research.

Additionally, many of the areas which do not receive significant levels of funding and investment, but in which the research is of high value to the creative industries and/or wider societal benefit, should be encouraged to work alongside voluntary, community and social enterprise organisations, local authorities, and non-governmental organisations. To

address some of the challenges facing the UK and global societies and economies, an understanding of the wider impact and application of work undoubtedly adds value and increases the chances of future employment, whether within or outside of academia.

There is limited data in the UK to support the assertions of centres relating to future graduate employment and outcomes in relation to the contribution to the economy and the differences in backgrounds and motivations of students, as noted by Hancock (2021) *'Important contextual information about the doctoral research project, supervision and funding are not collected and cannot be factored into an analysis of employment outcomes.'* (Hancock 2021:532). In light of this, further research into student outcomes is recommended, particularly with students who experienced challenges in relation to widening access provision or geographical separation.

7.7.3. *Centres and Not Meeting Expectations*

The survey data revealed that there were some students who felt the centre model had not fully met their expectations, which informs what is known about how centres function (RQ1). Examples came from both part-time and full-time students and emphasised the importance of environment, skills development and the importance of context-specific opportunities to interact with peers in their discipline, key to understanding how to best create these opportunities for doctoral students across the sector (RQ2).
Doctoral Training Partnerships in some disciplines emphasise that their centre provides *'flexible, student-centred training that nurtures disciplinary expertise in conjunction with interdisciplinary perspectives'* (AHRC DTP). Students within the survey echoed these thoughts in their survey responses with particular emphasis on multidisciplinary working and how they were exposed to new methods alongside additional training opportunities. This finding gives an insight into how centres function (RQ1), suggesting that they achieve some multidisciplinary learning opportunities.

However, there were some limitations in relation to the creation of multidisciplinary team working, and this is also reflected in the literature. Hancock and Walsh (2016) argue that *'CDTs are unlikely to sufficiently prepare doctoral researchers for team and interdisciplinary*

work and – perhaps more significantly – for the challenges that such contrary working conditions would place upon a professional identity underpinned by individualism and single discipline expertise' (Hancock & Walsh, 2016:42). The data showed that this is the case where there isn't a culture within institutions of multi-disciplinary working. However, the interviews with directors suggested that the CDTs had aided in building this culture in their departments, therefore suggesting the centre function could serve as a central point to encourage this activity (RQ1). Furthermore, students appeared to value the opportunity to work alongside others outside of their discipline, particularly where this led to new venues of thinking and improved their own research. However, where peripheral actors such as supervisors did not see the value of the additional cohort activities and where students were fixed in their viewpoints about working only with related research groups, it would be challenging for centres to fully prepare students for interdisciplinary work. This finding answers RQ2, as the learning on how encouraging external opportunities to support the development of students could be applied across doctoral provision to encourage supervisory teams to champion this.

Students also recognised the opportunities they had been afforded in comparison to their peers outside the DTP, with some students recounting that they had been given access to additional national networks that their counterparts had not.

The majority of AHRC-funded students in the survey saw distinct benefits. However, one student's overall responses indicated that the centre environment was not well suited to them as they communicated that they didn't value the activities provided or multidisciplinary working. This further supports the notion that centre environments are not suitable for all students, but this could be challenging to ascertain at the outset or interview stages of recruitment.

The overarching EPSRC CDT aims statement from their doctoral review to *'create new working cultures, build relationships between teams in universities and forge lasting links with industry'* (EPSRC, 2021:17) does reflect viewpoints from the data within my study, with students noting that overall, this led to a positive environment for social and

educational reasons. This is also supported in the data gathered from interviews with staff, each of whom reported the benefits of both situating students within cohorts and the strength of industrial partnerships, citing that industry partners knew they could come to CDTs as a central contact point. Others highlighted that industrial partnerships and internship opportunities demonstrated an added value outside of the standard doctoral route, where students studied alone and did not interact with industry.

One Director also referenced the importance of the centres in building research capacity for colleagues at all levels within their department, stating that the CDT had driven a multidisciplinary research environment in their institution.

There was also a consensus that funded centres created additional collaboration outside the department in which they were situated, suggesting a wider benefit to the institutions involved. The interview findings from the director participants also suggested that centres could be used to generate research ideas for future research grant applications, which echoes the findings of the EPSRC review and the desire to both effectively support the creation of new research avenues, whilst developing and maintaining a critical mass of expertise in particular geographical areas.

However, senior staff also highlighted a key risk of the current funding rounds (several CDTs were not awarded a second round of funding in the last EPSRC call) and the implications of that for the research ecosystem:

> *"if we lost the CDT, it would lose the beating heart of the department"* (D2)

Whilst balancing the need to enable new centres to be funded and expand the network of centres, the risk of losing research capacity built over time should be a key consideration for funders.

7.7.4. *Access to Opportunities*

Whilst exploring the findings in relation to RQ1 - how centres function and what they achieve; and RQ2 - what this could add to what is known about wider doctoral provision, the issue of access within centres arose as a key topic area. The findings related to how doctoral provision could be designed to best meet the needs of students, particularly where geographical separation exists. As the survey was conducted prior to the COVID-19 pandemic these findings are considered in the context of face-to-face interaction being possible. The findings are also considered in light of the results of the EPSRC (2021) review of doctoral provision.

The findings highlighted that some students had established networks, therefore, access to new teams was not seen as a priority, whereas others cited a lack of opportunities to connect due to geography. This, therefore, means that students in centres who are unable or do not wish to relocate could find that geography affects their ability to *'access doctoral opportunities.'* (EPSRC, 2021:32), highlighted as an issue in the EPSRC review of doctoral provision. The EPSRC report, however, fails to address this issue thoroughly, drawing on the notions of the 'levelling up' agenda and the government's 'build back better' aspirations. The report also notes that *'It is important that as part of these considerations, we ensure that we do not diminish the success of the UK's existing outstanding research institutions and knowledge-based economy.'* (EPSRC, 2021:61)

Whilst the EPSRC (2021) report recommendations suggest a commitment to exploring lifelong and alternative routes into doctoral education, there is scant reference to socioeconomic factors and barriers which impact students applying to, and gaining a place at, a research-intensive university. CDTs are awarded primarily to Russell Group institutions, although DTPs do have a wider reach in involving a greater number of academic partners. However, staff in this research also reported that even within a centre partnership, for example, a DTP, not all institutions are equal in their access to students or securing students for their projects, and thus their ability to participate. This finding provides understanding in relation to RQ1 as it shows that not all centres function in the same way in relation to providing equitable access to students across a partnership.

A key recommendation in the EPRSC report states that this should be a priority in future recruitment: *'Doctoral education should be available to people following a variety of career paths. EPSRC should work with stakeholders to continue to improve access, diversity of entry points to doctoral education and tailored support for individuals.'* (EPSRC, 2021:64)

This issue is not unique to the engineering and physical sciences and is also reflected in the ESRC review of the PhD in Social Sciences (ESRC, 2021) and the wider literature on access routes to higher education. Throughout my interviews, the topic of a two-tier system emerged, with both Directors and Managers acknowledging this as a disadvantage of the current funding model and the application of this. Suggestions to diversify funding models were provided, and this was also reflected in the recommendations within the EPSRC's doctoral review (2021).

'EPSRC should provide a stable long-term baseline of investment to support a creative and innovative fundamental research community (such as the current algorithmic DTP investment), alongside a more dynamic framework to respond to and support emerging strategic priorities (for example, by investing in more frequent CDT competitions and including studentship investments alongside research investments in top priority strategic areas).' (EPSRC 2021:5)

Whilst this would mitigate some of the issues around levels of investment, unless this was more equally and fairly distributed, it would not support HEIs to support a greater number of students to engage with the activities provided to CDT students. The investment in top-priority strategic areas would also need careful consideration and definition to avoid the continued narrative of high-value economic attribution being equated to high value in terms of overall societal value and benefit.

Alongside the wider structural issues of funding, there exists a subtler access issue within the centres themselves. Students who were geographically distributed or not co-located noted that activities were centred at one institution and that their own institution had little

engagement with the centre. In staff interviews, however, where centres were across multiple institutions, it was reported that activities were rotated, as each institution offered different opportunities and skills, and these were catalysed to give the students a well-rounded training programme. In relation to RQ1, this suggests that whilst some centres worked to distribute opportunities across their partner institutions, this was not necessarily recognised by the students. Shared learning across centres and developing examples of best practice could be used to mitigate some of the internal access issues faced by students. Furthermore, the findings showed that for some students, the centre structure was a limiting factor in accessing the communities they found most valuable, that of linked research groups. This finding addresses RQ2 as it highlights the importance of ensuring opportunities for interaction with colleagues from within one's discipline within multi-disciplinary research environments.

7.7.5. *Creating the Balance*

Centres claim to offer a wide range of outputs and benefits for students, including educational opportunities, external engagement and career prospects, and a supportive cohort environment. The findings demonstrate that for centres to be regarded as a success against both their own metrics and that of the funders, there needs to be congruence across all areas.

Centres are pushed and pulled in different directions as they navigate student needs, funding cycles, institutional requirements, and the external policy drive to meet employer needs of producing workforce-ready graduates. To appropriately meet all needs is a balancing act, particularly in an increasingly economically driven higher education environment.

The interview findings provided insight into how centres function (RQ1) in relation to meeting the balance of the needs of all stakeholders. However, they also demonstrate that this is challenging for centres. Despite these challenges, the student survey revealed that students are generally satisfied with their experience, are provided with opportunities, value the support they receive and appreciate the level of external engagement provided.

This suggests the centres do achieve a broadly positive experience for students (RQ1). In relation to external engagement, results suggest this is particularly high for students studying within EPSRC-funded centres and less so for those in other academic disciplines. However, due to the small sample size in this study and acknowledging the requirements in the new round of ESRC-funded doctoral centres, there is an opportunity to undertake further research into this to see if an increased exposure to placements and internships accords with a greater perception of opportunity for ESRC-funded students. This needs to be acknowledged and dealt with accordingly at a structural level, providing other UKRI-funded centres with the opportunity to strengthen their external relationships. This will be partially mitigated through the requirements for new Doctoral Training Partnerships to have embedded student placements or internships but needs to be supported with the appropriate resources to facilitate and nurture long-term partnerships.

The findings from this study, when compared with independent commissioned reviews, support the assertion that funded centres do meet their goals, with a set of important caveats primarily pertaining to the development of rigid skills programmes, adding to the literature on doctoral provision (RQ2). Evidence from the study also suggests that for graduates who enter academia following a career or those who undertake a doctorate seeking a career change, structured training programmes and skills development built around the premise of producing 'employer ready' graduates may not be suitable. With respect to delivering additional programmes for students with work experience, previous research by Spronken-Smith (2018) supports this approach. They advocate for *'tailored learning experiences, depending on the existing skills set of students and their planned career pathways.'* (Spronken-Smith, 2018:10). As these individuals exist within many funded centres, institutions could capitalise on the skills and knowledge to enable the students to contribute their skills and expertise to the programme, thus strengthening the value of the offer for these students.

This could also lead to increased engagement of all students in the cohort by affording the opportunity to co-create activity alongside the directive programme from the centre. This also builds in elements of lifelong learning, supporting a changing economic landscape and

labour market. This is acknowledged in the latest call for EPSRC CDTs, suggesting that the data from this study reflects a wider realisation across the sector.

Furthermore, centres should nurture and support student-led activities as the evidence suggests that peer learning occurs within student groups, and the interpersonal relationships developed contribute to communities of practice.

7.8. Conclusion

The research identified several core attributes of centres, which included additional access to opportunities, external engagement, peer support, peer learning and community building. Each of these furthers our understanding of the doctoral landscape, with reference to how learning from CDTs and DTPs could be used to inform wider doctoral provision (RQ2).

Whilst some aspects of the student and staff perspectives in this study also exist across research groups, the critical mass of students within the centres, and the dedicated involvement of centre staff means that the communities are developed and maintained over several years.

The data from the student survey supports the assertion that centres provide a supportive environment for students, with some caveats. It was evident that students found their opportunities to interact with other students beneficial and specifically related this back to feelings of belonging, but also related this to mental wellbeing, particularly pertaining to not feeling isolated.

A key finding was the importance of the friendships forged within these environments, which arose from the student survey and staff interviews, where centre friendships were described as being different to those made outside of that environment. Student responses made several references to centres being a place where being situated with others made the challenging doctoral journey one in which there was a shared understanding with others.

The environment also appeared to be a positive model for the sharing of methods, joint problem solving and peer learning, suggesting this is also an effective model for developing students through their educational journey. However, some students saw forced interaction, multiple events, and other activities as a distraction and, in some instances, a barrier to effectively engaging with other research groups. In these examples, the centre could not be deemed to be entirely effective.

Furthermore, for students who had already built working relationships or who had existing external networks, the data suggested that some of the cohort building activities and researcher development workshops were less relevant. This has implications for building appropriate programmes for those changing careers or returning to study at a later age.

The findings highlighted a number of limitations of the model, supported by external data showing a disparity across the research councils within UKRI. Two key areas that arose from the findings were as follows:

1. Students located across disparate geographies without regular opportunities to engage could impede access to a valuable network.
2. Centres could widen the gap in an already two-tier system if only centre-funded students have access to additional resources, external engagement, and additional educational programmes.

As described in further detail in Chapter 8 – Recommendations, there are several initiatives that could be implemented in higher education institutions; both where centres exist and for those without significant funding. Increasing peer engagement and building opportunities for external engagement are two key areas that could be addressed without significant additional investment.

Chapter 8. Recommendations

The following chapter details recommendations based on the findings from the student survey, interviews with centre staff, and the analysis of centre aims. Recommendations also draw on evidence from external reports published up to 2021 to provide a holistic perspective and pragmatic proposed solutions for a range of actors in this environment. The recommendations are structured according to their proposed audiences, including Higher Education Institutions (Section 7.1), funded centres and UK Research and Innovation (as the key funder).

8.1. Recommendations to Higher Education Institutions for all PGR Students

The following recommendations are provided to higher education institutions. They are intended to be applicable to the whole postgraduate research student cohort, both within and outside funded centre environments. It is acknowledged that the applicability of these recommendations will be of particular benefit to students who do not have access to a funded centre environment or have significant funding from another source.

8.1.1. *Create a Cohort Environment*

A recurring theme in the study data was the importance of peer support, sharing ideas and methodologies and the opportunity to work alongside other students. This supports the assertions made by previous reports and the UK funding councils (Smith, 2010; UKRI, 2018 & 2022).

Student participants cited the importance of this to their wellbeing and overall progress throughout their doctorate, emphasising the formation of friendships as a key factor.

Staff also repeatedly noted the significance of the impact of cohort activities in their centre, drawing on examples relating to social and extra-curricular activities and semi-structured research activities such as seminars. Whilst staff noted that students also self-organised activities, a CDT's institutional support and structure enabled students to do this. Therefore, a key recommendation to higher education institutions is to provide students with

opportunities for cohort-building activities, either leveraging existing internal funding or utilising existing UKRI funding to bring groups of students together in informal cohorts.

As the UK Higher education sector becomes more aware of student wellbeing issues, the issue of social comparison within student cohorts could be addressed by celebrating individual differences within student groups and increasing the understanding of individual timescales within research and across disciplines. By examining and understanding students' perspectives and feelings, staff can implement measures to mitigate this throughout the student journey.

In addition, the students reported significant benefits of being situated in a cohort, with frequent references to their progress, support, and the importance of peers. This environment, supported by additional networking opportunities, could be replicated across departments within universities, even where there are disciplinary differences.

8.1.2. *Engage Students with the Research Landscape and Goals*

Where students are not situated in formal cohorts or funded doctoral centres, higher education institutions could align students to research groups or research themes across their institution. Whilst students are often situated within distinct research groups, they are not exposed, in a structured way, to other research groups in their institution with a reliance on central training programmes or annual PGR events to bring together groups of students from different disciplines. As organisations move towards linking their research themes to, for example, the United Nations Sustainable Development Goals (United Nations, 2023), this affords the opportunity to link students to these themes, across departmental boundaries. As well as providing an environment for student collaboration, this could enable the cross-fertilisation of ideas, and strengthen research and the research environment within institutions.

8.1.3. *Widening Access to Opportunities*

Funding for UKRI doctoral centres is heavily concentrated in Russell Group Institutions, and investment varies across subject areas, creating inequalities across the academic landscape.

Higher education institutions, in their role in delivering education and as anchor institutions within the geographies in which they are situated, have a role in actively addressing these inequalities. Participants reported that they had been given access to a wide range of networks and external engagement opportunities, citing how their funding available to them had enabled this alongside a wide range of extra activities. Whilst some activities will incur a cost, institutions should bear this to fulfil broader goals of capacity building across their postgraduate student population.

Whilst acknowledging the challenges to smaller institutions and those without a significant additional income from UKRI or allocations of Quality Related research funding (QR), a range of actions can be taken at low cost. Potential actions are outlined as follows:

- Learn from the literature on widening access to undergraduate education and postgraduate taught programmes to identify where improvements could be made.
- Where a lack of diversity exists, consider investment in expertise to improve recruitment campaigns and involve students in this process. If centre recruitment is decentralised, work with colleagues in central marketing teams to improve recruitment activity. Where an activity is centralised, consider investing centre resources to buy out the time of central teams to support a targeted campaign.
- Ensure language and imagery are accessible in course promotional materials.
- Use learner journeys and case studies to demonstrate the impact of the programme and how students from a range of backgrounds could access the opportunity (including part-time learners, those with caring responsibilities, mature students and those returning to learning following a career-break).
- Set clear targets to increase participation for students from under-represented groups, even if these are incremental changes.
- Consider longer-term goals beyond the end of the centre and encourage students to work alongside structured widening participation programmes within their institutions to encourage future recruitment. This could include a programme in year 1 of the centre to work with incoming undergraduate students.

- Ensure staff are trained in recognising unconscious bias in selection processes, particularly around the acknowledgement of students from non-Russell Group institutions.

8.1.4. *Activities*

The findings demonstrate that most students value the additional activities that centres provide for them. A core element of this was the value of interaction with other cohorts, research groups and external partners and the learning gained from this.

Whilst many of these activities were made possible through the centres' funded structure, several routes could be made available for all students with smaller internal investments. The development of existing infrastructure could build significant capacity in the doctoral student cohort and afford them additional opportunities to strengthen their skill set.

Activities could include strengthened engagement with the careers service - and maximising the networks they have - to offer structured PGR interactive sessions, including seminar series.

8.1.5. *Supporting Staff to Support Students*

The data from the staff interviews and student surveys revealed that centre staff are invested in all aspects of student development, including their wellbeing, with a sense of responsibility felt by staff to support students. Whilst staff could identify appropriate places to signpost students, they nevertheless felt that, as key contact points for their centres, students came to them for advice and guidance. This topic gained prominence in the interviews conducted during the pandemic due to the enforced physical distancing measures at the time.

Furthermore, the recent call for EPSRC CDTs states that centres applying for funding should demonstrate their commitment to this (as part of a package of activities) *'All CDTs are expected to implement …support for student wellbeing to the highest standard in the design and operation of their CDT.'* (EPSRC via UKRI.org, 2022; accessed December 2022) This was

also a key recommendation of the Universities UK and VITAE (Metcalfe et al., 2020) evaluation report: *'ensure that supervisors, other academics with postgraduate responsibilities and professional staff are given the time, training and appropriate recognition for supporting PGRs' mental health and wellbeing and that it is reflected in workloads and appraisal processes.'* (Metcalfe et al., 2020: 4)

Universities applying for funded centres are expected to provide evidence that they have sufficient infrastructure, research, and technical expertise to host a CDT; I, therefore, suggest that this should be extended to demonstrate a suitable commitment to student wellbeing. The additional benefits to the research environment of hosting a CDT (increased academic outputs, generation of new ideas, industry partnerships) should be leveraged to increase the number of student wellbeing advisers. Implementing this could be realised by a cost-benefit analysis undertaken at the application stage, particularly where institutions have previously held centres and have appropriate impact and outcome data to leverage.

8.2. Recommendations to Funded Centres

The following recommendations are designed to enable funded centres to maximise their positive impact on their students and the wider academic environment. Furthermore, where centres are across multiple institutions, there should be a balance of activities across the geographical areas to avoid some students feeling peripheral to the centre.

8.2.1. *Increase Activities and Student Co-Creation*

The findings from staff and students demonstrated a clear benefit of student interaction and connectedness and the role of centres in facilitating this. However, the number and types of centre-organised activities varied. Whilst retaining the independence and autonomy of the centres to design appropriate activities for students, the number of opportunities for students to engage should be maximised. To mitigate potential fatigue around the frequency and subject matter, centres should continually work with students to co-create events. This also enables students to have an active role in their learning environment, building their autonomy and strengthening their ties with the centre. Whilst more challenging to measure (without continued post-completion monitoring), the

involvement of students could also provide further tangible benefits, such as developing student confidence as students reported the benefit of being able to self-organise events.

8.2.2. *Encourage Inter-cohort and Cross-cohort Activities.*

There was a consensus across the student survey and staff interviews that there was a value to students in interacting with their cohort, but also developing relationships with other cohorts in respect to their understanding; tackling challenging methodological concepts; interdisciplinary learning; forming relationships and progress.

Additionally, best practice around inter-cohort mentoring could be implemented to provide incoming students with support from a peer progressing through their doctorate. This should not substitute formal supervision, but act as an additional contact point for students with regular check-in points throughout the academic year.

8.2.3. *Continue and Increase Interactions with External Organisations*

Many students cited engagement with external organisations, partners, and industry contacts as a key benefit. Therefore, a key recommendation is to continue this activity and increase this where possible. This includes integration with existing career support and career-enhancing activities.

External engagement activities should include teaching and learning workshops, seminars, and paid internships. Critical to this success is ensuring activities are co-created with external partners and students to drive activity and ensure relevance.

8.2.4. *Embrace Feedback Loops and Communication*

Participants in the student survey were asked whether they were given the opportunity to provide feedback to a management board and whether they felt these were addressed. The responses highlighted ambiguity around whether the student feedback was actioned, which could demonstrate a lack of internal communication within centres where this was the case. The findings also showed that students play a key role in developing learning and support

mechanisms within their centres; therefore, their viewpoints are critical to understanding what works within centre structures. There are several ways to address this, including:

- Giving students regular opportunities to provide feedback to the centre management team and provide frequent and transparent updates on how student feedback has been used. It is equally important to communicate where suggested amendments and improvement in the centre weren't possible and, where feasible, provide reasons why.
- Ensure students are sighted on annual reporting procedures and mid-term review reports.
- Encourage students to engage with internal and external reviews of doctoral centres by research funders and external bodies to ensure their voice is adequately represented.

8.3. Recommendations to Policy Makers

The following recommendations are intended for UK Research and Innovation, as the key funder of doctoral centres in the UK, though many have broader applicability to other funders. The recommendations provided here formed part of a submitted response to a UKRI open consultation in 2022.

Higher education institutions that receive additional funding from UKRI have the potential to provide an enhanced student experience for a wider group of doctoral students. However, the requirement to link this to specific research council priority areas could limit this impact significantly. For example, EPSRC Doctoral Training Partnerships allocations are linked to specific research council activity within institutions *'The funding is allocated to UK universities with significant EPSRC research activity, by means of an algorithm'* (UKRI, 2022). Whilst this funding can be used flexibly, a requirement for cross-council, multidisciplinary activities could serve a greater number of individuals and academic disciplines.

Staff in central doctoral colleges, or those running faculty-based training programmes, operate with significantly smaller budgets than those afforded to funded centres. A holistic,

cross-council approach is required if the benefits are to be realised by a larger group of the student population.

During the open consultation period in May 2022, the following recommendations were provided to UKRI as part of their ongoing review of doctoral provision, with details of where the research had been presented.

Question 1: What should be the goals for contemporary postgraduate research training? The goals should be to:

1. Encourage collaboration and cross-learning.
2. Support the development of all students to access external opportunities such as policy fellowships and international opportunities currently limited to UKRI-funded students.
3. Focus on transferable (not just research) skills and highlight the translational aspects of research.
4. Diversify doctoral offerings and promote new models of assessment, including encouragement of the uptake of part-time study.
5. Widen funded postgraduate access to all, including allocation of funding to a wider group of institutions (not just concentrated in Russell Group institutions)
6. There needs to be a closer link made between the skills being provided and how they link with future outcomes for students. Whilst this is often integrated (and should be) in the PGR curriculum and skills programme, it is not always articulated, and instead, students see this as a means to an end to complete their required PG credits.

Cohort-based learning environments (where students can interact with their peers, become embedded into research groups, and learn from other disciplines) can be incredibly beneficial for student learning, wellbeing, and overall outcomes. My own research study, incorporating a survey of 209 UKRI funded PGR students and interviews with 11 staff

members, reflected the importance of doctoral training that incorporates shared learning, and cohort building and opportunities for external engagement.

Whilst these learning opportunities are provided for students in CDTs and DTPs, this is not always the case for PGR students who are part-time or self-funded.

Research councils should work with funded centres and higher education institutions, to ensure the widening of activities and participation to non-funded students so that all students have the opportunity to experience a supportive learning environment.

Question 1a. How different models can support postgraduate research students with diverse backgrounds and experiences, for example, whether some models better support people from diverse cultural, economic or educational backgrounds. We are also interested in whether the models themselves impact researchers' experiences and whether this might contribute to mental health outcomes

1. Encouraged use of placements in all disciplines
2. Embedded partnerships within research
3. More P/T students with linked projects to external organisations
4. Increased investment in UKRI-funded outreach posts in universities to strengthen the networks with external organisations and provide opportunities for non-funded doctoral students to engage externally and apply their work.
5. Flexible approaches to doctorates including encouragement of professional doctorates learning from existing structures within the system
6. Consider funding distribution across disciplines and institutions

As UKRI student funding for PG research is strongly focused on Russell Group institutions (data from UKRI distribution of CDTs/DTPs), students who do not see themselves mirrored in these environments are indirectly discriminated against. Whilst it is important for research funding to be allocated to institutions where there is an active research environment, this continued focus potentially prevents students from engaging fully with funded research opportunities. By widening the number of institutions who receive funding

or encouraging collaborations within regional areas, this could work to increase diversity in the student population.

The literature on widening access to education and attracting diverse talent pools suggests that to attract a wider pool of applicants, individuals need to see themselves reflected in the student population. Where are there not diverse student groups or individuals who share their own backgrounds or experiences, this has the potential to discourage applicants from putting themselves forward for funded opportunities, further exacerbating the divide.

Students without the ability to move due to personal circumstances, or those wishing to study part-time, may be indirectly disadvantaged by models where funding is concentrated in Russell Group institutions.

This could be mitigated through the consideration of wider models of funding or small centres established where there are pockets of expertise.

Whilst the option to study part-time is offered within funded centres, existing structures or combined study periods and structured activities might preclude this and thus disadvantage students who require part-time study provision.

A survey conducted with 209 UK post-graduate research students within CDTs and DTPs showed that the majority of students found the cohort environment, and the peer support that this offers, to be valuable to their overall student experience. In particular, students highlighted examples of working with others in both their own discipline, but also with others working in related research areas as being constructive to their own understanding. They were also able to articulate the advantages of this model in comparison to the standard doctoral journey, citing peer support, enhanced opportunities, and external engagement (placements/internships, events with external speakers) as key factors in this. However, students also noted that these environments can be restrictive and even toxic if dominant voices and obstructive behaviour is not challenged and managed appropriately.

Therefore, it is essential that funded centres are appropriately resourced and integrated with existing university structures.

Question 1b. Whether some models of postgraduate research better support the needs of organisations in various parts of the private, public or third sectors, or in different disciplines.

Providing a wider range of funded part-time provision and structured learning pathways (e.g., DBA, EdD) for individuals already working in their chosen sector would open up the possibility for postgraduate learning for students to gain qualifications and add value within their organisations. It is critical that partners are involved in the formation of these programmes, working with them to develop suitable pathways, and also getting them to recognise the value doctoral-qualified individuals bring.

However, the focus on 'high value' economies and target areas often leads to a disparity in the organisations involved in consultations. It is critical that cultural organisations, educational institutions, and voluntary / community sectors are part of these conversations and given equal weighting in discussions. It would also be beneficial to enable institutions to apply for additional funding to support paid placements and internships within the charitable and voluntary, community and social enterprise (VCSE) sector where organisations could not financially support this directly. This would enable a wider range of organisations to benefit from students' expertise and work to build capacity and evidence within this sector.

Question 1c. What changes are needed so that postgraduate research training is meeting the future needs of the economy, society, and culture?

The disparity in funding across the range of UKRI research councils needs to be addressed and the value of topics under ESRC and AHRC recognised as equal value to that of EPSRC and others. Postgraduate funding is currently concentrated on areas seen as being high value, e.g., artificial intelligence, data science, engineering, and future manufacturing.

Whilst these are undoubtedly important topics, research within the social sciences, medical sciences and arts and humanities should be seen as equal.

The response to the COVID-19 pandemic was varied and multi-disciplinary, drawing heavily on the social and behavioural sciences, and the value of this should be recognised in future funding allocations for post-graduate research.

In addition, the value of the cultural economy in the UK was estimated at £10.47 billion in 2021 (House of Commons Library, 2021), yet only a fraction of postgraduate funding is allocated to these topics.

Cultural and heritage organisations and the voluntary and community sector are unlikely to be able to support as many scholarships and partnerships as high-value industries, further widening the disparity. Whilst doctoral training partnerships work to develop and sustain partnerships with these sectors, they operate under increasingly challenging conditions as funding is directed towards other disciplines.

8.4. Conclusion

This chapter presented recommendations to core stakeholders and audiences for this research: higher education institutions and UK Research and Innovation, with distinct suggestions provided to each. A common theme across all sets of recommendations is the widening of opportunity and embedding external interaction into doctoral study for all students, potentially improving the student experience.

Chapter 9. Conclusion

The following chapter outlines the main conclusions from the research and its contributions to knowledge. It provides a reflection of the research aims and whether these were met considering the chosen methodology and the challenges faced during the delivery of the project. A consideration of the theoretical model, findings and limitations is provided, and suggestions for future research are posited.

9.1. Research Aims

This research examined the model of UKRI-funded doctoral centres in the UK, explored their functions, what they achieve and whether successful components of centres could be replicated across the doctoral landscape. The research identified several key attributes, primarily related to opportunities, external engagement, peer support and community building. I identified where challenges exist and provided recommendations that higher education institutions and funders could implement to mitigate these.

9.2. Contribution to Practice

This thesis presented research on funded doctoral centres with a focus on belonging, support, and access as the key themes that emerged from the data. I analysed the findings through the lens of the community of practice theory posed by Wenger (1999), a social learning model and considered whether doctoral centres had all the components to fit this model. What emerged from the analysis is that the complexities and transiency associated with doctoral centres, and the different structures and models deployed across centres afford the opportunity for the creation of communities of practice, but not all aspects fit neatly into this model.

9.2.1. *Community is Key*

A key and common attribute across the findings was the notion of community, bolstered further by the common thread of friendship and the importance of this for students. This was supported by the findings in staff interviews who had identified that these were unique to the doctoral centres, driven by the shared common activities, co-location, and structured

opportunities. I, therefore, propose that future models of the community of practice take into consideration the importance of social bonds and friendship, particularly within the context of co-located student groups and the impact of this on peer learning.

9.2.2. *The Role of Centre Staff*

The findings from this study also highlighted the significant commitment required from staff within universities, particularly those linked to doctoral centres, to make doctoral centres a success based on a variety of metrics. The evidence from staff interviews showed that staff were dedicated to student wellbeing, their learning and development, and also providing them with significant opportunities to further their external engagement. However, they also raised the issue of institutional structures and the challenge of navigating these alongside the requirements to deliver on centre objectives.

Furthermore, the staff interviews and student survey pointed to staff providing pastoral care as part of a wide range of additional roles they had. This led to reflections from staff about their workload and the impact of this; this appeared to be more of an acute issue in the interviews conducted during the COVID-19 pandemic when staff adjusted their programme for remote working. Higher education institutions should ensure that all funded centres are appropriately resourced, that additional time is allocated in any workload models, and that staff feel they are supported to be able to deliver their roles effectively.

9.2.3. *Opportunities and External Engagement*

The findings clearly show that funded doctoral centres afforded students a wealth of opportunities, both in relation to their educational development and to engage with external organisations. Staff interviews additionally highlighted the importance of this, with some stating this was a core and essential offer which distinguished their centres from other doctoral programmes. This is a significant differential in relation to how students engage throughout their studies, both within and outside of these centres. Where students are provided with opportunities for funded internships through centre partnerships, this undoubtedly strengthens their avenues for future employment, thus potentially widening

the gap for students who are self-funded, funded through other scholarship routes, or for international students who don't have this flexibility.

A further key finding was how students mobilised themselves within their cohorts and across cohorts supported by the autonomy and funding provided by their centres. This included a range of educational and research activities, including peer-led reading groups, self-organised seminars and extended to social activities. Whilst this appears at a surface level to be an overwhelmingly positive aspect of the centre model, there were some students who remained peripheral participants through self-choice, social circumstance or their career level and age, who felt this community was not suitable for them. This suggests that more tailored activities for those returning to learning later in life or career stage may be required, challenging when they are not the dominant group.

9.3. Contribution to Academic Theory and Research

This research contributes to the understanding of the current research and theoretical landscape in the following ways.

Firstly, it builds on the community of practice theory (Wenger, 1999) by introducing the consideration of friendships in the overall research development of PGR students. This research considered the role this plays, not only in supporting wellbeing but in the development of their academic and career identities, particularly in structured environments such as doctoral centres. I, therefore, assert that Wenger's (1999) Community of Practice Theory should be further extended to consider the role of friendship more explicitly in CoPs, particularly in doctoral student environments. However, the research showed that whilst communities of practice were present in some form across centres, this was not explicitly embedded within the design, or language describing this was not present in the small sample of interviews undertaken. However, the evidence on CoPs shows that by incorporating these as a deliberate structure and providing structured support to nurture these within centres, the value of a cohort environment could be fully realised for those engaged. However, the research also revealed how communities of practice can be limiting for students who sit outside of the cohort or who have existing communities and, therefore,

do not engage with their cohort. The findings, therefore, also provide a cautionary recommendation for centres that actively opt to design their centre around a community of practice structure.

Secondly, the findings and analysis demonstrated the importance of tailored programmes for students who are seeking a career change or who bring specific expertise to their doctoral programme. This is an important addition to what is known about doctoral students in relation to wider provision (RQ2). This suggests that doctoral centres should meaningfully engage with practice from the lifelong learning sector and explore whether additional or alternative provision could be provided for these students, whilst encouraging inter-cohort learning.

Thirdly, there is a gap in the current research landscape in relation to doctoral student perspective across research council funded centres, which was missing from previous UKRI reviews at the outset of this research. The perspectives of students are key to understanding how centres function and what they achieve (RQ1). Whilst only a small sample size was gained in this study, it revealed important perspectives of students in relation to learning environments, structures and the PGR student experience within CDTs and DTPs.

The research revealed the positive impact of providing funded and structured support to support external relationship building and career opportunities. It could be argued that these can also be provided in a supportive and well-organised research group / academic department where PGR students are integrated into this. Therefore, future research in this area to build on this is required.

This research, despite the small sample size, demonstrated a number of key benefits of CDTs and DTPs, but also highlighted that whilst significant funding has been invested into this model, there are still limitations to the design, application, and outcomes of these structures for some students. This finding was important in answering RQ1 as it gave insight into how centres function and what could be learned from this. These were not limited to

individual experiences. Rather, they incorporated a broad range of factors also linked to geography (and proximity to others), individual institutional structures, access to opportunities (or lack thereof) and social comparison. This is key to adding to the broader research base on doctoral provision (RQ2).

The research also included the perspectives of staff involved in the design, management and delivery of centres who were able to provide detailed accounts and highlighted a number of key areas to be explored in future research, and also practice. These include an understanding of the level of involvement required to run a successful centre, the impact this has on staff workload and wellbeing and ensuring staff are appropriately equipped to effectively work within a centre environment.

The research also adds to the literature on the value of CDTs and DTPs to the career pathways of other academic staff associated with the centre, with interview respondents citing this as a key benefit. The funded structures served to create research communities and cross-departmental working, where these functioned well and enabled early-career academics opportunities for PGR supervision and to build their research areas. This finding provided insight into what centres achieve (RQ1), and the learning could be applied more broadly to create this environment in research groups (RQ2).

9.4. Reflection on methodological approach and study limitations

I elected to use a mixed-methods approach from the outset and to combine datasets to provide a holistic perspective on the research topic. This enabled the cross-comparison of datasets and elicited further richness through the use of interviews and free-text responses in the survey, upon which the discussion was structured. This, therefore, justified the selected methodological approach.

A key limitation of the study design was the omission of data relating to both ethnicity and socioeconomic status, both important factors in considering issues of access to higher education, particularly in the pipeline from undergraduate studies to postgraduate research.

For example, a report published by Leading Routes in 2019 specifically highlighted issues around black students accessing funding from research councils for post graduate research (Williams et al., 2019).

There were two key changes which were made during the study: in-person focus groups were not possible due to the COVID-19 pandemic; the interviews with staff from the research councils proved challenging to access. Whilst this meant that there were some limitations in terms of the original scope of the research, the data gathered provided a rich source of information.

An unexpected consequence of the research interviews was that, in some instances, they also appeared to offer a moment of reflection and consideration for the staff, with several providing thoughtful and considered positions on how their role in the centres had impacted their own thoughts on how best to provide for the students. One respondent reflected following the interview and requested a copy of their transcript to be able to take forward the ideas they had devised during the research interview.

The lack of voice of the staff from UKRI initially presented me with both methodological and research validity challenges as I had taken a pragmatic approach and wanted to ensure a holistic overview of the research topic. I was able to partially mitigate this by contributing evidence from my study to wider reviews led by UKRI.

9.5. Future research

Future research in this area should explore how external partnerships and connections within funded centres facilitate future graduate outcomes and career pathways. This could be explored as follows:

1. This research study demonstrated clear benefits in relation to opportunities for students within funded centres, including impact on wellbeing, belonging, peer learning and external engagement. However, outside of the scope of this research was whether the wider student cohort realised the benefits of an institution having a funded centre.

Therefore, future work should concentrate on a detailed comparison of the impact of funded centres on non-centre-funded students. This could be done through an anonymous student survey and a series of detailed focus groups. Institutions could use results to extend opportunities beyond funded centres, an expectation of the funding councils.

2. As the student survey was carried out before the COVID-19 pandemic, I do not have the data to support further assertions about whether centre activities were as successful in an online setting; this is an area recommended for further research. I therefore recommend repeating the study with further questions on the impact of the pandemic and focusing on online cohort-building activities. This should be conducted with a larger number of students.

3. A further topic would be to understand whether institutions fully capitalise on the investments they are given, to maximise the benefits and expand their postgraduate training programmes and opportunities for a wider group of students. This would also explore whether centres work closely with their institutions to enable them to leverage their funding for maximum impact, particularly where multiple centres exist in one institution. This would address issues raised surrounding maximising opportunities for all postgraduate research students. This research would require quantifying the financial implications of centres and an economic cost-benefit analysis.

4. A comprehensive study comparing student experiences within, and outside, Centres for Doctoral Training / Doctoral Training Partnerships would be valuable. This would enable an in-depth examination of issues pertaining to opportunities and the two-tier system, which is outside of the scope of this research. This study would further explore issues around peer support, wellbeing, and isolation.

Chapter 10. Appendices

10.1. Appendix 1 - Interview Questions - Managers / Administrators of DTPs / CDTs

Introduction

I'm going to ask you a few questions about Centres for Doctoral Training and how they operate, including the use of cohort building activities. The interview will last around 45 minutes and you are free to choose not to answer any questions.

1. Can you give me a brief background of your involvement with these centres?
2. How is your centre funded?
3. Does it also receive money from industry / external partners?
4. What do you see as being the biggest benefit of the DTC / CDT model?
   - Prompts: funding, student wellbeing, subject focus?
5. Do you think there are any negative aspects of CDTs?
   If yes – What are they?
   Have you observed these in your own CDT?
   What have you done to mitigate this?
6. Are your students located together?
   a. Why did you decide to do this?
      Have you observe any positive or negative effects resulting from this?
      What are they?
      If not, how do you ensure that they benefit from interactions with other students?
   b. Do you use any tools for this?
7. Do you give your students the opportunity to participate in wider research group activities?
   How do you ensure they integrate with the wider research community within your department?
8. Do you run regular cohort building activities?
   How often?
   How do you decide the structure of these?
9. The Postgraduate Research Experience Survey highlighted that many students aren't given the opportunity to interact with their peers? Do you think there are examples

from CDTs/ DTCs which could be used to improve this in the wider context i.e., for students not in CDTs/DTCs?

10. Do you feel that large-scale funding of DTCs/ DTPs/CDTs should continue?
    If not, what do you propose as an alternative model?

Thank you for your time. The interview will be transcribed and analysed. Please let me know if you would like a copy of the transcript and write up of the interview and this can be provided to you.

10.2. Appendix 2 - Interview Questions - Directors

1. Why did you decide to establish a CDT?
2. What do you see as being the biggest benefit of the CDT model?

   - Prompts: funding, student wellbeing, subject focus?
3. Do you think there are any negative aspects of CDTs?

   If yes – What are they?

   Have you observed these in your own CDT?

   What have you done to mitigate this?
4. Are your students located together?

   Why did you decide to do this?

   Have you observed any positive or negative effects resulting from this?

   What are they?

   If not, how do you ensure that they benefit from interactions with other students?
5. Do you give your students the opportunity to participate in wider research group activities?

   How do you ensure they integrate with the wider research community within your department?
6. Do you run regular cohort building activities?

   How often?

   How do you decide the structure of these?
7. Do you feel that large-scale of CDTs should continue?

   If not, what do you propose as an alternative model?

10.3. Appendix 3 - Interview Questions - Funding Councils

Begin with scene setting including amount of money invested to date.

1. What do you see as being the biggest benefit of the CDT model?
2. Following your review of centres in 2016, did you make any changes as to how centres were assessed in 2018?
3. Have you identified any potential drawbacks to the current CDT model?
   If so, what are they?
   How do think these could be mitigated?
4. Do you think UKRI should play a larger role in standardising activities across the CDT networks?
5. Many of the current CDTs are based in Russell Group institutions, do you have any concerns around barriers to entry for disadvantaged students?
6. Do you know if UKRI will continue to fund CDTs?
   Are you planning a further review of investment and the funding model?
7. Do you think co-location of students is important and have you observed any differences in same site and multi-site CDTs?
8. How do you think departments without CDTs could create a similar environment for non-funded students? (prompt – PRES data around student satisfaction with research environment)

10.4. Appendix 4 - Interview Consent Form

Newcastle University

School of Education, Communication & Language Sciences

Declaration of Informed Consent

I agree to participate in this study, the purpose of which is to examine *Cohort Learning in Centres for Doctoral Training in the UK.*

I have read the participant information sheet and understand the information provided.

I have been informed that I may decline to answer any questions or withdraw from the study without penalty of any kind.

I have been informed that data collection will involve the use of recording devices.

I have been informed that all of my responses will be kept confidential and secure, and that I will not be identified in any report or other publication resulting from this research.

I have been informed that the investigator will answer any questions regarding the study and its procedures. The investigator's email is [redacted] and they can be contacted via email or by telephone on [redacted]

I will be provided with a copy of this form for my records.

Any concerns about this study should be addressed to the School of Education, Communication & Language Sciences Ethics Committee, Newcastle University via email to ecls.researchteam@newcastle.ac.uk

Date Participant Name (please print)

Participant Signature

I certify that I have presented the above information to the participant and secured his or her consent.

Date Signature of Investigator

10.5. Appendix 5 - Participant Information Sheet – Interviews

Newcastle University

School of Education, Communication & Language Sciences

Participant Information Sheet

1. You are invited to take part in a research study entitled "An Evaluation of Cohort Learning in Centres for Doctoral Training – A Comparative Analysis of the UK Landscape"
2. Please read this form carefully and ask any questions you may have before agreeing to be in the study.
3. The study is conducted by Oonagh McGee as part of their Doctorate of Education studies at Newcastle University.
4. This research project is supervised by Dr Jill Clark and Dr. Pamela Woolner from the School of Education, Communication & Language Sciences at Newcastle University.
5. The purpose of this study is to research doctoral student experiences and models of education.
6. If you agree to be in this study, you will be asked to take part in a focus group, questionnaire or interview.
7. Your participation in this study will take approximately one hour.
8. You are free to decide whether or not to participate. If you decide to participate, you are free to withdraw at any time without any negative consequences for you.
9. All responses you give or other data collected will be kept confidential. The records of this study will be kept secure and private. All files containing any information you give are password protected. In any research report that may be published, no information will be included that will make it possible to identify you individually. There will be no way to connect your name to your responses at any time during or after the study.
10. The data collected as part of this study will be used in publications and dissemination

of the research, however your anonymity will be guaranteed throughout.

11. Your participation will be explained clearly at the outset, you will be able to clarify any questions you may have throughout the study and will be provided with a debrief at the end of your participation.
12. If you have any questions, requests or concerns regarding this research, please contact me via email at [redacted] or by telephone at [Redacted] or my supervision team [Redacted] or [Redacted]

This study has been reviewed and approved by the School of Education, Communication & Language Sciences Ethics Committee at Newcastle University (date of approval – November 2018).

Faithfully yours

Oonagh McGee

10.6. Appendix 6 - Survey

What institution are you currently studying at? (optional)

What is your chosen subject area?

In what subject area was your first degree?

a. If you do not have a degree, please list your highest qualification prior to enrolment on your doctoral programme.

Were you in employment prior to commencing study?

Yes

No

Still in employment

a. If still in employment how long have you been working?

0-5 years

6-10 years

11-15 years

16-20 years

20 years+

Are you?

Female

Male

Prefer not to say

Non-binary

Other - If you selected 'Other', please feel free to add which gender you identify as

What age are you?

20-25

26-30

31-35

36-40

41-45

46-50

51-55

56-60

61-65

65+

Prefer not to say

Why did you decide to return to study? (Please select all that apply)

My interest in the subject

Opportunity to learn from others

Interested in research career

Improving my career prospects for an academic/research career

Improving my career prospects outside of an academic/research career

I was encouraged by a former academic tutor/supervisor

The funding was available

It felt like a natural step for me

I felt inspired to work with a particular academic

Professional development or training

Interest in a specific project advertised

Other - If you selected Other, please specify:

What year of study are you in?

1

2

3

4

5

6

7

8

8+

Are you?

Full-time?

Part-Time?

How is your study funded?

Fully funded by a Centre for Doctoral Training / Doctoral Training Partnership

Fully funded by your university

Self-Funded

Funded by your employer

Funded by Industry Partner or Sponsor

Other - If you selected Other, please specify:

Does your centre receive funding from any of the following funding councils? (Please select all that apply)

EPSRC

AHRC

NERC

ESRC

STFC

MRC

Wellcome Trust

Don’t know

Other (please state)

Are you located with other members of your cohort?

Yes

No

a. If No, how often do you meet with your cohort? Please select the closest answer.

Daily

2-3 times per week

Weekly

2-3 times per month

Monthly

Quarterly

Twice per year

Annually

i. If Yes, do you find this beneficial?

Yes

No

a. If Y, in what ways?

Opportunity to share ideas

Access to peer support

Sharing methods with other students

Team Building

Opportunity to interact with my cohort

Other - If you selected Other, please specify:

a. If No, why is this?

I prefer to work with other research groups

Work environment is too noisy

Work environment is too quiet

I prefer to work alone

My supervisor is based elsewhere

My research requires me to work alone

Other - If you selected Other, please specify:

Does your CDT organise cohort building activities?

Yes

No

a. If Yes, how often? Please select the closest answer.

Weekly

Monthly

Quarterly

Twice a year

Once a year

b What type of cohort building activities does your Centre run? (Please select all that are relevant)

Team Building

Training Days / Workshops

Seminars

Industry Engagement Events

Other - If you selected Other, please specify:

c. Do students in your cohort self-organise events?

Yes

No

i. If yes, what type of events do you organise?

Training

Seminars

Conferences

Social gatherings (for example, trips to the cinema, restaurants)

Networking events (for example, meet-ups on areas of interest)

Other - If you selected Other, please specify:

Do you think there are any advantages of studying within a cohort environment? Please list all that apply.

Do you think there are any disadvantages of studying within a cohort environment? Please list all that apply.

Do you feel there are any advantages to studying within a Centre for Doctoral Training / Doctoral Training Partnership compared with the traditional doctoral journey?

Do you have a dedicated point of contact to answer queries within your Centre?

Yes

No

a. If Yes, what type of support do they provide?

Do you receive funding to attend conferences and other events?

Yes

No

a. If Yes, how much funding do you receive over the duration of your studies? For example £8000 would equate to an allowance of £2000 per year over a 4-year programme. Please select the closest answer.

£1000-2500

£2501-4000

£4001-5500

£5501-7000

£7000-8500

£8501-10000

Don't know

Other - If you selected Other, please specify:

Please indicate which of the following opportunities you have experienced during your research degree programme (select all that apply):

Receiving training to develop my research skills

Receiving training to develop my transferable skills

Receiving advice on career options

Taking part in a placement or internship

Attending an academic research conference

Presenting a paper or poster at an academic research conference

Submitting a paper for publication in an academic journal or book

Communicating your research to a non-academic audience

Show less

How satisfied are you with the following aspects of your research degree programme?

Very satisfied – Satisfied - Somewhat satisfied - Neither satisfied nor dissatisfied - Somewhat dissatisfied – Dissatisfied - Very dissatisfied

Opportunity to interact with your cohort

Opportunity to undertake placements or internships

Access to external networks e.g. external companies

Opportunity to attend conferences and other research related events

Access to training

Access to additional support from staff

Level of administrative support received

Level of doctoral supervision provided

Access to wider research networks within your institution

The opportunity to interact with students from other CDT cohorts

Opportunity to interact with other students within your institution

Information provided about external opportunities available to you

Level of funding available for activities such as conferences Checkbox

Opportunities to become involved in the wider research community, beyond

Thank you for participating in this study. All of your answers will remain confidential.

10.7. Appendix 7 - Initial Information Relating to CDT /DTC / Funding Landscape

ESRC DTC Review summary and Government Reports

Smith Report, 2010 and Russell Group article:

https://russellgroup.ac.uk/news/postgraduate-review-published/

https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=2ahUKEwiA1tqXn7veAhUsIMAKHRhLBa8QFjAAegQICBAC&url=http%3A%2F%2Fwww.ukcge.ac.uk%2Fmedia%2FDownload.aspx%3FMediaId%3D1300&usg=AOvVaw3hK-3B0B1HFPzIraIeoUju

- Excellent research groups may be formed from the collaboration of several smaller units, often involving multiple disciplines. Bringing research students together in these interdisciplinary centres not only enriches the student experience, but will encourage the knowledge-sharing and interconnectivity required to tackle some of the world's most challenging issues.
- Recommendation: "HEIs should work together with the Research Councils to develop more multi-disciplinary Doctoral Training Centres."

ESRC Report available at:

https://esrc.ukri.org/files/skills-and-careers/doctoral-training/full-report-review-of-the-esrc-doctoral-training-centres-network/

ESRC Terms of Reference for review

https://www.psa.ac.uk/sites/default/files/DTC%20-%20Review%20Terms%20of%20Reference.pdf

Themes

Cohort Benefits and Student Experience

I note that the assessment makes no reference to evaluating the cohort model or the beneficial impact of this on students, whereas this is an opening question on the EPSRC CDT evaluation framework. However, the following quote does identify the benefits of cohorts as a theme.

"Improving student experience

Student led activities, especially the national first year and final year conferences, are also a very encouraging development which is doing much to enhance the student experience, strengthen their commitment, promote a greater exchange of knowledge, and help build a strong sense of being part of a national cohort of new social scientists. One DTC commented that there was nothing like this in place before and the conferences were helping to build a community of postgraduates across the UK to network and receive advice and guidance."

Situating my work in the recent political climate

"12 per cent real terms decrease in the ESRC budget following the 2010 Comprehensive Spending Review. This resulted in a drop in the annual studentship allocation from around 750 to 600 awards." This supports my thinking around particular disciplines and funding councils, within UKRI (formerly RCUK) being negatively impacted by political thinking and perceived attribution of value to more 'scientific' disciplines.

Response from the British Sociological Association and the Heads and Professors of Sociology

https://www.britsoc.co.uk/files/BSA-HaPS_response_to_Review_of_ESRC_DTC_Network_020415.pdf

Key considerations for my study:

- "Furthermore, we believe that studentship competitions operating through the DTCs may be adding to the disadvantages already faced by high achieving students from less advantaged backgrounds, since they tend to be found outside the institutions favoured with DTCs." *This is a key concern for me, as I think this already occurs and unconscious (and indeed conscious) bias by DTC directors and supervisors might impact upon the choice of students based on where they studied, not considering their personal circumstances and social mobility.*
- The disproportionate exclusion of post-1992 universities from the DTC arrangements contributes to making it less likely that high-achieving students from such universities will be attracted to postgraduate study or that the few who are so attracted will get advice and support in making applications.

Response from the Royal Economic Society and Conference of Heads of University Departments of Economics (CHUDE)

http://www.res.org.uk/SpringboardWebApp/userfiles/res/file/CHUDE%20Resources/RESCHUDEResponseToDTCConsultation0314final.pdf

Key considerations for my study:

- Positive aspects of interdisciplinary study.
- Reduced administrative burden for ESRC as this is devolved to the DTC, but "The counterpart of the admin savings for the ESRC is the considerably greater administrative burdens for universities (in addition to initial setting up costs)".
- Disciplinary issues relating to economics, downturn in the number of PhD studentships awarded to students / supervisors in these disciplines. This is potentially an issue I had identified with funding being apportioned to other disciplines. My first thoughts were EPSRC vs ESRC, but it's apparent this happens within DTCs with some other disciplines being framed as others e.g., political science posing as economics.
- Economics students may require a longer timeframe for research and DTCs are restrictive in this sense.

Response from the Royal Geographical Society

https://www.rgs.org/getattachment/Professionals/Consultation/8_2014.pdf/?lang=en-GB

Last accessed 04/11/2018

Key considerations for my study:

- Positive feedback in relation to increased funding for training
- 'Promises' of multi-institutional networking not always realised - "the collaborations promised, particularly beyond institutions, have not materialised.
- Additional administration viewed as an additional burden and cost was referenced in the report. However, these staff are potentially a very positive aspect of the student experience as they manage their doctoral journey, organise cohort building and provide support.
- Strong statements were made that the DTCs have disadvantaged students who are in institutions or departments that are not part of a DTC. *This is a particular issue I plan to explore and hypothesise that some of the benefits on offer could be replicated for non-funded students.*

- "While recognising the benefits of critical mass in research training, once research training is completed, doctoral supervision could take place where the relevant expert in the field is located; i.e., appropriate experts should be able to supervise ESRC studentships whether they are based in a DTC or not"
- Size of DTCs. Encouragement to consider this and to avoid very large DTC networks. Keeping them relatively small allows for genuine multidisciplinary connections to be made and developed, and for the systems to be more responsive to local needs without requiring overly large bureaucratic structures;

WonkHE article on impact of DTCs (November 2018):

https://wonkhe.com/blogs/the-dtc-effect-what-impact-have-esrc-doctoral-training-centres-actually-had/

Richard Budd, 23rd November 2018.

"Doctoral students in insider universities, even those who were part of a DTC, reported feeling little awareness, presence, or benefit of a DTC. They, and some of the returner university students, did seem to have access to more research training, but this was not always seen as very good. What was common for almost all of the students, though, was that they did not feel particularly valued by their institutions or welcomed within their university's research communities."

Full report conducted by Liverpool Hope and Bath Spa universities:

Blog: https://educationstudiesathope.wordpress.com/2018/11/19/esrc-doctoral-training-centres-do-they-work-new-report-on-their-impact/

Report: https://educationstudiesathope.files.wordpress.com/2018/11/the-dtc-effect.pdf

Key for my study:

"Very few of the students in our sample reported feeling included in their institution's academic research environment and there was, for nearly all of our doctoral participants, a notable absence of institutional effort in fostering a doctoral community. Where such communities did exist, they were almost invariably student-led, and this was as much the case for students associated with ESRC DTCs as it was for other students. DTCs seemed not to add much at all to the doctoral student experience for ESRC-sponsored students, who knew relatively little about their precise form and function, while their peers at Insider institutions were barely aware that they existed."

Next steps: contact research team

Search Term	Date of Search (renewed in September 2019)	Number of Results	Relevance to study / Notes
"epsrc+cdt+mid-term review"	05/09/2019	2	Some – both results refer to complaints and freedom of Information requests to the Information Commissioner's Office with regards to the review process and requests for all data to be made publicly available.
epsrc cdt mid-term review	05/09/2019	13,100	Significant - results included reflections from discipline specific magazines, EPSRC results, EPSRC review processes, information on science funding, blog posts and comments with further reading. **Note:** only first 4pages of results considered due to volume and sorted by relevance.
			Note: — The loss of project studentships. Where is the evidence that a doctoral training centre approach, **particularly in the physical sciences**, leads to higher quality PhD students? EPSRC don't have this evidence. But they have lots of ideological zeal about the benefits of more and more top-down management

			and centralisation. (I found it amusing that a couple of years ago they claimed that the Doctoral Training…ooops, sorry… Centre for Doctoral Training (CDT) approach was 'very successful'. Before a single student had graduated from a training centre.) (McLain, 2012)
"EPSRC+CDT + Review"	05/09/2019	2	Minimal – refers to funding round review, not review of centres
ESRC DTC Review			Budd (2018) -relevant findings and good source of data to compare with.

10.8. Appendix 8 - Data Management Plan

Doctoral study on CDTs

A Data Management Plan created using DMPonline

Creator: Oonagh McGee

Affiliation: University of Newcastle

Template: Digital Curation Centre

Last modified: 28-09-2019

Doctoral study on CDTs

10.8.1. *Data Collection*

What data will you collect or create?

I will collect publicly available data from online sources including government reports, blogs, UKRI webpages, open letters published online.

I will also collect confidential data, from interview participants. This will take the form of recorded interviews and the subsequent transcripts and coded transcripts.

I will also collect data from questionnaires which includes open-ended questions, limited demographic information (gender, place of study) and 7-point Likert scale answers on satisfaction levels pertaining to the research environment.

I will collect opinions from focus groups.

How will the data be collected or created?

Downloading web information.

Interviews.

Questionnaires.

Focus Groups.

10.8.2. *Documentation and Metadata*

What documentation and metadata will accompany the data?

Transcripts, interview recordings, downloads from the Online Survey systems.

10.8.3. *Ethics and Legal Compliance*

How will you manage any ethical issues?

I will remain reflective of my position as a researcher throughout, record any ethical issues as they arise and signpost any sensitive issues accordingly.

I will ensure that all ethical issues are reported to my supervisors and institutional ethics board as required.

I will adhere to a strict ethical code of conduct, as issued by the British Educational Research Association (BERA, 2018)

I have received full ethical clearance for my research study.

How will you manage copyright and Intellectual Property Rights (IPR) issues?

I do not anticipate that there will be any copyright or IPR issues and all information used will be appropriately referenced.

10.8.4. *Storage and Backup*

How will the data be stored and backed up during the research?

The data will be stored on Newcastle University's OneDrive and accessed only by a secure password. This data is backed up by the University.

How will you manage access and security?

All data is password protected (both laptop and OneDrive).

10.8.5. *Selection and Preservation*

Which data are of long-term value and should be retained, shared, and/or preserved?

The transcripts of my interviews will be retained for 24 months following the completion of the study, alongside the questionnaire data to allow for any further questions arising from the viva and subsequent publication. Note I am a P/T student and therefore further time has been allocated for this.

All my data from my secondary analysis is publicly available.

What is the long-term preservation plan for the dataset?

The dataset will be deleted 24 months following the completion of my study, to enable completion of publications.

10.8.6. *Data Sharing*

How will you share the data?

N/A

Are any restrictions on data sharing required?

Yes, all data gathered from participants is strictly confidential. Only the general findings will be shared.

10.8.7. *Responsibilities and Resources*

Who will be responsible for data management?

Me, the researcher.

What resources will you require to deliver your plan?

Access to Newcastle University's OneDrive system for the duration of my study and 24 months following the completion of my research.

10.9. Appendix 10 – coding of survey responses - disadvantages

belonging	environment (structural & physical)	competition	wellbeing	general issues	education (including aspects of learning and training	Other
14. Do you think there are any disadvantages of studying within a cohort environment? Please list all that apply.						
Open-plan office can have some drawbacks. (Loud people)						
Sometimes cooperation for the group projects/ assignment is hard						
Sometimes the large open plan office that we work in can be a bit too noisy. It would be good if there were some quiet rooms or areas for us to go to if we need to concentrate on something in silence.						
Sometimes tensions may arise, but none that have personally affected my experience, so no.						
Sometimes feel isolated from everyone else in the building/department.						
sometimes, can be distracting, leads to procrastination						
Only if it's just with your cohort, it must be mixed with other cohorts or it's not a true higher education learning environment and will lead to close-mindedness. It's the only real opportunity in life where you get to be mixed with all sorts of disciplines and this should be heralded. However, it must not dilute your academic discipline as the aim is to be the best in your field so that you can add to the academic environment by being a specialist in a certain area.						
None that I can think of.						
I don't feel in a cohort environment						
The CDT focus is broad so the PhD projects do not necessarily have much in common - still inspirational to see what others are doing though.						

Yes - my focus is on working with colleagues within my department, at other institutions, and with external partners, so being told to attend doctoral cohort events means time away from that focus. I am already an experienced researcher and where there are events organised for my doctoral training cohort these assume I have never had any form of job or research experience before.
too much noise in the office
None.
No
No — possibly less likely to become self reliant?
The amount of training and networking that are available can be overwhelming. Sometimes I feel that I am missing out if I don't leap at every opportunity.
Not all the training/events are relevant but participation is stuff often required - this takes away from time spent on more relevant tasks.
No, it's just insignificant.
One-upmanship, dominated by middle/upper middle class privately educated people from a relatively narrow age group. Should you not fall into this group, you're on the outside.
no
Too early to say
Absolutely not
No
No - it's all the same stuff with a few more interesting eveny invites and the possibility to apply for a few bits of extra funding.
None that spring to mind.
Can't think of any
No
It can be difficult to communicate across all the necessary platforms - there are a lot of partnerships involved and it takes a lot of management. As an example, I recently had a change in Supervisor, which had to be managed within my main HEI, then across HEI's with my second supervisor, and then again with my industry partner. I don't even know if

my graduate school know this has happened, but the constant meetings and presentations involved in communicating it meant that it took around 2 months out my the PhD process which is honestly exhausting and somewhat annoying.
People can compare themselves to others in their cohort who are doing well and it might make them feel worse about themselves and their research.
competitiveness
Depends on the research culture and social culture of the cohort
Can be hard to focus sometimes
- comparing oneself to others
- too much chatting sometimes otherwise, no
No.
Being located with cohort can reduce links to your research group, making it harder to locate technical support.
No
Easier to be distracted or procrastinate
As we are funded by EPSRC, we have more freedom to choose our project, when compared to someone who is funded directly by a professor's grant. That sometimes means that we work on something that is not the primary interest of our supervisor and that we may get a bit less support that way.
Can create a feeling of anxiety when other members of the cohort are making good progress on their projects, but you are having issues. This can further increase the issues as stress builds up.
I feel that although I am a part of a CDT cohort we are researching very different topics and don't have the opportunity to discuss our research in detail or swap ideas. I feel a research group would have advantages over the CDT structure.
N. A.
It feels like we spent a lot of time doing modules that weren't relevent to my work, particularly when I already have a masters and have had to undertake a masters that I am not that interested in

Not really to be honest
Some may be very different from the scope of your degree that they would not be able to help you in any shape or form - this is however very rare.
No
Sometimes is difficult to manage the time with multiple tasks in parallel with the research.
The subject of the CDT is normally vague, so other cohort memebers do not do research in the same topic as I am. Thus it is not like being in a research group where all students focus on a topic
Yes, differences in topics and environment create distance. Not a natural way to make friends. Some people just don't get along.
Not any real issues, although it can occasionally feel a bit like a box ticking exercise at the time - although you then realise that the skills gained are of great benefit later on.
Easier for staff to draw comparatives between students
The first year was quite busy with compulsory training so I wasn't always able to find time to do reading and tasks to do with the PhD topic.
No.
Don't necessarily know what PhD project you're going to be working on.
Although I am part of a cohort - I would not say I study within a cohort environment. I do not live in my place of study, neither do most of my cohort so therefore the act of 'studying' together happens rarely.
Competition
It can be distracting. Once you start your PhD then they don't usually have relevant knowledge to help you with PhD topic related questions
Putting pressure on myself to meet milestones at the same rate as other members of the cohort
- Terrible office environment. The CDT culture supports lazy people, who either do virtually no work and/or are an irritation in the office. It's not a research environment. - Expectation to do too many things/ constantly disturbed from research. - As we are

collocated, we have limited exposure to our research groups so are in some sense isolated from our specific research area, but overexposed to others.
- Can be distracting at times
You are often comparing yourself and are compared to colleagues in your cohort making it a potentially competitive environment.
In my CDT the subject is quite broad so I am a bit isolated from people that might be more directly in my subject area.
-
yes - office space is always busy and loud, can be hard to concentrate
No
The working week is more broken up by lectures, leaving less time for solid blocks of self-study (although this balance would change after end of taught MSc stage).
Can become distracting at times if you need to focus.
No
There seems to be less PostDoc like posts from academics as the research is self funded so no clear funding paths after the research is finished
Much more deadlines to catch. Too many events to attend. Taking modules in the 2nd year does not give enough time to focus in literature review.
Potentially you are more isolated from other PhD students; I'm aware we have more opportunities and financial support compared to other students who may not have this funding opportunity.
It can sometimes be hard not to compare your progress to other people's.
It is more time consuming to participate in all the events that are organised and take time from the PhD.
No
na
often very distracting
You might get stuck talking to the same people all the time and not looking for solutions or approaches outside your subject area.
Nope

Obviously training and support is less specific to your area as it has to cover all individuals.
The distance between everyone is a barrier (but I know that can't be helped).
Certain compulsory events that are unnecessary
Quite a lot of extra admin work - I have personally been told by someone who did not apply for funding that they are glad they did not as the time required to fill forms for extra development/reimbursement purposes is quite substantial.
I don't know yet.
I feel like I need to 'live up to' my cohort - but that's not really a disadvantage as I find it quite motivating.
N/A
None at the moment
Additional admin.
Not in my opinion
Supervision across two universities, quite far apart, isn't always easy to manage. Also the rules change every year, so no-one knows what's going on and it doesn't feel fair. For e.g. my year were given funding to visit our second institution once but now they fund at least four trips, but no-one told us.
Hardly a disadvantage, but there can be too much on offer when taking into account the DTP and the entire consortium of amazing research opportunities. Which can seem a little overwhelming (but, I reiterate, hardly a disadvantage)
Our DTP comprises 8 geographically-distant universities, so in practice it is difficult to work together with students form other HEIs and other disciplines.
None.
Not that I can think of
extra admin
I think the only problem maybe is the low payment because there are a lot of people that need to be paid.
Having to have a supervisor at another institution. Sounds great in theory but in practice that supervisor has much less input. This happens to many student not just me.

Much of the training we are given is (understandably) extremely general. This results in many cohort training days feeling under-baked and unnecessary. For example, the last cohort day I went to consisted of talks given to all three year groups at the same time. The talks were on internship opportunities, which I as a third year am not eligible for. I would have preferred it if some of the content was relevant to me, especially as I had travelled to a different city for this obligatory training day. I also dislike the way "opportunities" are presented to us. For example, we spent two hours of 'training' listening to someone ask us to write for their online publication.
No
It can sometimes be too inward looking.
There is a fair bit of bureaucracy and the cohort days are not always worthwhile.
adds a year. most of the teaching could've been done in 6 months to get people going quicker
Yes, your performance may be measured against students from completely different field
The problem of having events that can be suitable for the wide range of subjects covered.
Sometimes you can feel obliged to attend social events with the cohort when you would rather study. This is a very minor disadvantage though
No, everyone was free to work on their own if they wanted
Meant to feel as though you are a team but you're all working on totally different things so can seem a bit artificial sometimes - would make more sense to be a team within your subject area.
I don't have much in common with most of my cohort and I find the politics within the group is taking up too much time and requiring a lot of emotional work. I would prefer to put more energy into my PhD and the cohort is distracting from it.
Most events based in [redacted] (a long way away). Very redacted centric feel to the process. Also, my own uni, [redacted], doesn't really do anything to bring any of us together, or to even tell us who the other cohort members are.
No
Lots of forms which take time to fill in! But the benefits outweigh this.

You are excluded from some funding opportunities within the uni. For example the uni won't consider providing financial help to attend training and conferences and says I must rely upon the cohort funding.
Only if there is a pressure to interact with others in a specific way (as in, it should feel ok if one doesn't want to engage with the cohort)
Potential reduction of output due to better awareness of when expectations are reasonable and when they are not. This is both an advantage and a disadvantage. There is also a risk of measuring oneself against students of the same level, rather than aspiring to meet the standards of post-doc researchers - again this is both an advantage and a disadvantage.
[redacted]
Difficulties supporting large numbers of students.
None.
Being treated as a unit of production in the manufacturing of knowledge? If you transcribed the CDT evaluation focus groups you could write several phds on this matter!
The cohort model means that supervisors are overloaded we are the 5th cohort and the academics are overloaded with too many students
no
There is a degree of luck involved. A group might only have in common the fact that they're doing PhDs at the same time as each other. Throwing people together on that basis will not necessarily result in a community of research.
Not from my experience so far.
Not particularly.
Can exist in an academic bubble. If situated in a university some of the less attractive aspects of academic life can seem worse.
n/a
My cohort is massively distributed across the uk and so I don't really see them much. In a traditional phd setting I would guess you would share an office or lab and suppose there could be all the usual downfalls of sharing a space in terms of personal conflicts and people always knowing what you are working on. Less personal mental space maybe?

Risk of not exploring avenues outside of cohort (e.g. not attending other doctoral events, because you feel that your needs are covered by the doctoral training centre).
Possibility of work overlapping. Possibility of dominate personality taking over.
Project focus can be limited and there are more stakeholders to please
more distractions
No
No. I feel sorry for the students going it alone.
Can be intense for socialising - issues with social anxiety
No
I have not experienced any. However, if you do not get along with your cohort, I would imagine that could be quite isolating.
We become slightly more disconnected from the remaining doctoral students, but the inter-cohort connection seems more valuable to me.
You could argue that time is spent doing team-building or training events when that time could be spent on individual PhD projects.
No.
My CDT was a scam that the organisers used to win grant funding and get their names on more papers. They had no coherent vision of what research to do, and resorted to micro-managing when this became apparent. The industry sponsors and the students themselves were similarly clueless. We were all expecting someone else to come up with a research question, and we could not avoid doing it ourselves, same as a regular PhD student has to do. The lectures in 0th year were basic, things we could've googled, not deep enough to prepare us for research in any field.
There will be less incentive to socialise with non-CDT students
No
Competitive nature
(whilst this would happen in any workplace) people within the cohort do not always get along, but there is an expectation that we should all gel and work together even though our projects are all independent

10.10. Appendix 11 – Community of Practice coding of survey responses - disadvantages

belonging	environment (structural & physical)	competition	wellbeing	general issues	education (including aspects of learning and training	Other

14. Do you think there are any disadvantages of studying within a cohort environment? Please list all that apply.
1. Open-plan office can have some drawbacks. (Loud people) ***Community***
2. Sometimes cooperation for the group projects/ assignment is hard ***Community***
3. Sometimes the large open plan office that we work in can be a bit too noisy. It would be good if there were some quiet rooms or areas for us to go to if we need to concentrate on something in silence. ***Community***
4. Sometimes tensions may arise, but none that have personally affected my experience, so no. ***Community***
5. Sometimes feel isolated from everyone else in the building/department. ***Community***
6. sometimes, can be distracting, leads to procrastination ***Community***
7. Only if it's just with your cohort, it must be mixed with other cohorts or it's not a true higher education learning environment and will lead to close-mindedness. It's the only real opportunity in life where you get to be mixed with all sorts of disciplines and this should be heralded. However, it must not dilute your academic discipline as the aim is to be the best in your field so that you can add to the academic environment by being a specialist in a certain area. ***Community, domain, practice***
8. I don't feel in a cohort environment ***community***

9. The CDT focus is broad so the PhD projects do not necessarily have much in common - still inspirational to see what others are doing though. ***Domain***
10. Yes - my focus is on working with colleagues within my department, at other institutions, and with external partners, so being told to attend doctoral cohort events means time away from that focus. I am already an experienced researcher and where there are events organised for my doctoral training cohort these assume I have never had any form of job or research experience before. ***11. Domain, practice, community***
12. No — possibly less likely to become self reliant?
13. The amount of training and networking that are available can be overwhelming. Sometimes I feel that I am missing out if I don't leap at every opportunity.
14. Not all the training/events are relevant but participation is stuff often required - this takes away from time spent on more relevant tasks. ***Domain, practice***
15. No, it's just insignificant. ***Community***
16. One-upmanship, dominated by middle/upper middle class privately educated people from a relatively narrow age group. Should you not fall into this group, you're on the outside. ***community***
17. No - it's all the same stuff with a few more interesting eveny invites and the possibility to apply for a few bits of extra funding.
18. It can be difficult to communicate across all the necessary platforms - there are a lot of partnerships involved and it takes a lot of management. As an example, I recently had a change in Supervisor, which had to be managed within my main HEI, then across HEI's with my second supervisor, and then again with my industry partner. I don't even know if my graduate school know this has happened, but the constant meetings and presentations involved in communicating it meant that it took around 2 months out my the PhD process which is honestly exhausting and somewhat annoying. ***community***
19. People can compare themselves to others in their cohort who are doing well and it might make them feel worse about themselves and their research. ***community***
20. Competitiveness ***community***

21. Depends on the research culture and social culture of the cohort ***Community***
22. Can be hard to focus sometimes
23. - comparing oneself to others ***community, practice***
24. - too much chatting sometimes otherwise, no
25. Being located with cohort can reduce links to your research group, making it harder to locate technical support. ***domain***
26. Easier to be distracted or procrastinate
27. As we are funded by EPSRC, we have more freedom to choose our project, when compared to someone who is funded directly by a professor's grant. That sometimes means that we work on something that is not the primary interest of our supervisor and that we may get a bit less support that way. ***Domain, practice***
28. Can create a feeling of anxiety when other members of the cohort are making good progress on their projects, but you are having issues. This can further increase the issues as stress builds up. ***community***
29. I feel that although I am a part of a CDT cohort we are researching very different topics and don't have the opportunity to discuss our research in detail or swap ideas. I feel a research group would have advantages over the CDT structure. ***Community, domain, practice***
30. It feels like we spent a lot of time doing modules that weren't relevent to my work, particularly when I already have a masters and have had to undertake a masters that I am not that interested in ***domain***
31. Some may be very different from the scope of your degree that they would not be able to help you in any shape or form - this is however very rare. ***Domain, practice but added as a potential concern***
32. Sometimes is difficult to manage the time with multiple tasks in parallel with the research. ***Community, domain***
33. The subject of the CDT is normally vague, so other cohort memebers do not do research in the same topic as I am. Thus it is not like being in a research group where all students focus on a topic ***Community, domain***

34. Yes, differences in topics and environment create distance. Not a natural way to make friends. Some people just don't get along. ***Community, domain***
35. Not any real issues, although it can occasionally feel a bit like a box ticking exercise at the time - although you then realise that the skills gained are of great benefit later on.
36. ***Community, domain, practice – reflects on realisation of later value***
37. Easier for staff to draw comparatives between students
38. The first year was quite busy with compulsory training so I wasn't always able to find time to do reading and tasks to do with the PhD topic. ***Domain, practice***
39. Don't necessarily know what PhD project you're going to be working on.
40. Although I am part of a cohort - I would not say I study within a cohort environment. I do not live in my place of study, neither do most of my cohort so therefore the act of 'studying' together happens rarely. ***Community, domain, practice***
41. Competition ***Community***
42. It can be distracting. Once you start your PhD then they don't usually have relevant knowledge to help you with PhD topic related questions ***domain, practice***
43. Putting pressure on myself to meet milestones at the same rate as other members of the cohort ***Community***
44. - Terrible office environment. The CDT culture supports lazy people, who either do virtually no work and/or are an irritation in the office. It's not a research environment. - Expectation to do too many things/ constantly disturbed from research. - As we are collocated, we have limited exposure to our research groups so are in some sense isolated from our specific research area, but overexposed to others. ***Community, domain, practice***
45. - Can be distracting at times. ***Community***
46. You are often comparing yourself and are compared to colleagues in your cohort making it a potentially competitive environment. ***Community***
47. In my CDT the subject is quite broad so I am a bit isolated from people that might be more directly in my subject area. ***Community, domain, practice***

48. yes - office space is always busy and loud, can be hard to concentrate ***Community (?)***
49. Can become distracting at times if you need to focus. ***Community***
50. Much more deadlines to catch. Too many events to attend. Taking modules in the 2nd year does not give enough time to focus in literature review. ***Community***
51. Potentially you are more isolated from other PhD students; I'm aware we have more opportunities and financial support compared to other students who may not have this funding opportunity. ***Community***
52. It can sometimes be hard not to compare your progress to other people's. ***Community***
53. It is more time consuming to participate in all the events that are organised and take time from the PhD. ***domain***
54. You might get stuck talking to the same people all the time and not looking for solutions or approaches outside your subject area. ***Community, domain, practice***
55. Obviously training and support is less specific to your area as it has to cover all individuals. ***domain***
56. The distance between everyone is a barrier (but I know that can't be helped). ***Community,***
57. Certain compulsory events that are unnecessary ***Community***
58. I feel like I need to 'live up to' my cohort - but that's not really a disadvantage as I find it quite motivating. ***Community***
59. Supervision across two universities, quite far apart, isn't always easy to manage. Also the rules change every year, so no-one knows what's going on and it doesn't feel fair. For e.g. my year were given funding to visit our second institution once but now they fund at least four trips, but no-one told us. ***Community***
60. Hardly a disadvantage, but there can be too much on offer when taking into account the DTP and the entire consortium of amazing research opportunities. Which can seem a little overwhelming (but, I reiterate, hardly a disadvantage) ***Community***

61. Our DTP comprises **redacted** geographically-distant universities, so in practice it is difficult to work together with students form other HEIs and other disciplines. ***Community, domain, practice***
62. Much of the training we are given is (understandably) extremely general. This results in many cohort training days feeling under-baked and unnecessary. For example, the last cohort day I went to consisted of talks given to all three year groups at the same time. The talks were on internship opportunities, which I as a third year am not eligible for. I would have preferred it if some of the content was relevant to me, especially as I had travelled to a different city for this obligatory training day. [redacted]. ***Community, domain, practice***
63. It can sometimes be too inward looking. ***Community, domain, practice (?)***
64. There is a fair bit of bureaucracy and the cohort days are not always worthwhile. ***Community***
65. Yes, your performance may be measured against students from completely different field 66. ***Community, domain***
67. The problem of having events that can be suitable for the wide range of subjects covered. 68. ***Community, domain***
69. Sometimes you can feel obliged to attend social events with the cohort when you would rather study. This is a very minor disadvantage though ***Community, domain***
70. No, everyone was free to work on their own if they wanted ***Community***
71. Meant to feel as though you are a team but you're all working on totally different things so can seem a bit artificial sometimes - would make more sense to be a team within your subject area. ***Community, domain, practice***
72. I don't have much in common with most of my cohort and I find the politics within the group is taking up too much time and requiring a lot of emotional work. I would prefer to put more energy into my PhD and the cohort is distracting from it. ***Community, domain, practice***

73. Most events based in [redacted] (a long way away). Very [redacted]-centric feel to the process. Also, my own uni, [redacted] doesn't really do anything to bring any of us together, or to even tell us who the other cohort members are. ***Community, domain, practice***
74. Only if there is a pressure to interact with others in a specific way (as in, it should feel ok if one doesn't want to engage with the cohort) ***Community***
75. Potential reduction of output due to better awareness of when expectations are reasonable and when they are not. This is both an advantage and a disadvantage. There is also a risk of measuring oneself against students of the same level, rather than aspiring to meet the standards of post-doc researchers - again this is both an advantage and a disadvantage. ***Community***
76. Being treated as a unit of production in the manufacturing of knowledge? If you transcribed the CDT evaluation focus groups you could write several phds on this matter!
77. The cohort model means that supervisors are overloaded we are the 5th cohort and the academics are overloaded with too many students
78. There is a degree of luck involved. A group might only have in common the fact that they're doing PhDs at the same time as each other. Throwing people together on that basis will not necessarily result in a community of research. ***Community, domain, practice***
79. Can exist in an academic bubble. If situated in a university some of the less attractive aspects of academic life can seem worse. ***Community, domain***
80. My cohort is massively distributed across the uk and so I don't really see them much. In a traditional phd setting I would guess you would share an office or lab and suppose there could be all the usual downfalls of sharing a space in terms of personal conflicts and people always knowing what you are working on. Less personal mental space maybe?
81. ***Community, domain, practice***

82. Risk of not exploring avenues outside of cohort (e.g. not attending other doctoral events, because you feel that your needs are covered by the doctoral training centre). ***Community, domain, practice***
83. Possibility of work overlapping. Possibility of dominate personality taking over. 84. ***Community, domain, practice***
85. Project focus can be limited and there are more stakeholders to please
86. Can be intense for socialising - issues with social anxiety
87. We become slightly more disconnected from the remaining doctoral students, but the inter-cohort connection seems more valuable to me. 88. ***Community (example outside of their cohort)***
89. You could argue that time is spent doing team-building or training events when that time could be spent on individual PhD projects. ***Community, domain, practice***
90. There will be less incentive to socialise with non-CDT students ***Community (outside of the cohort)***
91. Competitive nature ***Community***
92. (whilst this would happen in any workplace) people within the cohort do not always get along, but there is an expectation that we should all gel and work together even though our projects are all independent ***Community***

10.11. Appendix 12 - Community of Practice Mapping

Community	Domain	Practice	Differences	Notes
Y- Joint activities in almost all centres	More prevalent in centres with tighter themes? e.g., CDTs in specific areas	Y- Examples of student self-organised learning activities e.g., seminars, peer reviewing of work.		Can a CDT be a CoP but not DTPS due to distributed themes?
Y - Joint discussions in almost all instances	Y- but does size influence this?	Y – through organised learning opportunities.		CoPs need cultivation - Are the Centre staff acting as agents of change and influence in their role organising and delivering activities?
Y – Strong notion of supporting and helping one another		Y- examples of students sharing methods across disciplinary boundaries and reflecting on problem solving as a result.		CoPs are dynamic and require learning on the part of everyone – are less engaged members of the cohort therefore

				excluded from the community of practice?
Y- Social activities			Are these part of COPs? Friendships featured in student survey and staff interviews.	Where do COPs in professional circles end and friendships begin?
Y- Share information				Mentioned in both survey and by staff

10.12. Appendix 13 – Notes on Interviews During Pandemic

- Hard maintaining a community in the pandemic.
- Early-career researchers given opportunities to supervise.
- Early-career researchers involved to build research profile
- Sometimes the vision isn't always realised – D2
- Needs holistic buy-in across department – D2
- Essential all in team want the cohort model to work– D2 ***noted in other interviews and by students that some see activities as a distraction and not all supervisors are bought into it.***
- Buddy schemes
- Hard to quantify the value, especially of diversity using quantitative methods – ***UKRI ask for reports on diversity against set characteristics which doesn't allow for further exploration of e.g., background of students or disadvantages some might have faced.***
- Not all centres have placements / internships – ***interesting given focus on industry-***

ready graduates, what's the added value then?

- Not all CDTs Co-locate for the duration; many split students into research groups
- Some devolve funding and decision making to individual supervisors once student is allocated
- Workloads mentioned – big time investment; staff are exhausted - ***pandemic***
- Wellbeing as a theme; hard during pandemic to support all students -***pandemic***
- All mentioned value of industry involvement; some 50/50 sponsored or match-funded.

Benefits

- Cohort is a "stronger and cohesive workforce" – D1
- "Drives a research environment" – D1
- One place to go for industry – D1
- Mental health – students don't feel alone – D1
- "Friends in the CDT are different as they understand" – D1
- Use CDTs to build collaboration – D1
- ***"Beating heart; if we lost the CDT it would lose the beating heart of the department"*** *risk?*
- Students realise they have it good in comparison – D2 ***Could this also be a two-tier system issue?***
- Students feel valued – D2
- Academics get a lot from it – D2
- Lots of collaboration outside the department – D2
- Students who've left now realise the value too – D2
- Student cohort bonding – D3
- Commonality in the research group – D3
- Value of bringing disciplines together – D3

Disadvantages

- Spoon fed training, doesn't always promote independence – D1
- No one size fits all; not all students are suited to the CDT -D1
- Huge workload for staff – D2

- Concentration of funding; haves and have nots ***two-tier system***
- Reliant on getting another CDT – D2
- Non-CDT students don't get the same experience – D3
- Playing field isn't level – D4
- Can create a two-tier model – D4 ***two-tier system***
- Can be a burden on academic leadership teams – D4 ***workload***
- If students have issues it can be challenging if supervision teams have control of aspects of student experience; harder to swap supervisors. – D4
- Negative students can impact whole cohort – D4 ***common theme around environment***

Future suggestions

- Align studentships to a bigger strategic area – D1 ***common theme and suggestion across interviews***
- Transparency around where funding is directed
- More commonality across centres
- DTP model works well as more students involved as long as minimum DTP involvement
- Less defined pathways
- Wider use of interdisciplinary areas

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