Knowledge production and disciplinary practices in a British University: A qualitative cross-disciplinary case study

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Abstract

Knowledge is a controversial matter in UK Higher Education (HE). The increasing regulation of universities' research focus and outputs, and the balance of applied and pure research are highly contested. Funders and government call increasingly for research that is co-produced with non-academic partners, and that demonstrates impact beyond HE. Many academics also support these calls. Yet at grass-roots level, there are epistemological tensions such as researchers' rights to academic freedom. Moreover, there is a lack of literature exploring current research practices from a cross-disciplinary perspective.

This cross-sectional, qualitative case study aimed to explore researchers' experiences to understand if, why and how, these pressures have changed disciplinary working practices and knowledge types, and what researchers think of these changes. The study took place in one research-intensive UK University using group interviews in four disciplinary areas. Data was analysed at a semantic level, using thematic analysis. The theoretical lens of "social realism" provided a philosophical basis to the research and aided understanding of the data.

Researchers reported changes to working practices because of emphasis on research relevance, technological advances and pressures to work across disciplines. There was a broadening of knowledge types and a simultaneous narrowing of research topics in some disciplinary areas. Depending on the types of knowledge they worked with, researchers had different perspectives on peer-review, the right to absolute academic freedom and newer forms of research evaluation. There were differences in the data relating to discipline and academic rank.

The conclusions advocate a social realist position, with four recommendations: maintenance of impact in the REF and the introduction and monitoring of the effect of "responsible metrics" to protect disciplinary research; the tailoring of professional learning opportunities regarding research practice to disciplinary contexts; future research in relation to Basil Bernstein's work on the trajectory of singular and regional knowledge forms.

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1.1 Introduction

In recent years, higher education (HE) has been accused of "veriphobia" (Bailey, 2001, p.159) or "knowledge-blindness" (Maton & Moore, 2010, p.7). With notable exceptions (Trowler, 2014; Williams, 2016; Young & Muller, 2010a) HE research concerning disciplinary knowledge and its production, is not a popular research topic. Currently in UK HE, collaborative research either across disciplines or with groups outside HE is fashionable, and popular with research funding bodies (Campbell et al, 2016). The requirement for research to have an impact outside HE is pervasive and mandated through the Research Excellence Framework (REF) Impact Case Study (ICS) and funders' criteria. There is also an ongoing parallel debate in the UK regarding academic freedom and what is taught in our universities. Arguments about these tensions regarding knowledge are polarised and sometimes inaccurate and generalised. This debate gathered pace to such an extent in 2017 that it briefly featured on the UK national news, after the then, Minister for Universities, Jo Johnson, suggested in a broadcast on BBC Radio 4's Today programme (Sands, 2017) that universities would be fined if contravening free speech policies.

As an HE professional, I have been confounded by the gap between a culture of impact and co-production and the day-to-day business of disciplinary research, a lot of which is not impactful at all. I have sought answers and found many in a jigsaw of evidence from different perspectives but did not find a study that addressed my central concern about the gap between the business of the disciplines and the publicity regarding impactful and collaborative research. I therefore designed this study to address this problem and reassert a

disciplinary perspective in current debates. I have contributed to the field of HE research by building on and extending previous work in this cross-sectional study, focussed on four different disciplinary areas.

Before reporting on my research, it is important to describe the context in which it was conducted and the key debates and concepts that are of interest in the literature. Chapter 2: 'The Disciplines, Knowledge and Contentions' focuses on the theoretical and empirical literature relevant to my research questions. In this chapter, I explore the policy context and broad concepts that locate the study in the HE sector. I will begin by introducing recent policy changes that affect UK HE and provide definitions of key terms used in the field of HE research.

Whilst not wishing to repeat well-rehearsed arguments, facts and figures to readers in the field of HE research, neo-liberalism is important to define and discuss, as it was in this context that the allocation of research funding was changed in the UK. This change came about with the introduction of the Research Assessment Exercise (RAE, which later became the REF). Research governance measures, particularly the REF are relevant to this study as they impact daily on the research environment and disciplinary knowledge universities produce. As such, I provide a brief description of the REF, the concept of research impact and highlight the key criticisms of the REF system. This study is not concerned with student-facing debates such as the co-construction of the curriculum, pressures to increase doctoral student through-put or academic freedom as it intersects with students' rights. However, where appropriate, I have referred to student / teaching related concerns to aid the exposition of my argument. Contextual material forms the main body of this chapter. To complement this work, I also include the aims and objectives of the study, the research questions and how they were developed, and a précis of the methodology and methods. The chapter will conclude

with a summary of my contribution to knowledge and an overview of the thesis structure.

1.2 Context of the Study

In this section I begin by summarising the significant, recent changes to the regulation of HE. The most significant policy change is the Higher Education and Research Act (2017) which introduced the Office for Students (OfS). This body has responsibility for the quality assessment of teaching in the Teaching Excellence Framework (TEF) and aims to improve the quality of university education for students. An example of this work is a recent survey of a group of students' unions in the UK to find out what students constituted as value for money in a university education. The OfS report that ninety-four percent of those surveyed cited the quality of teaching and feedback as important to them (Dandridge, 2018). Privileging a student centred focus, it is thought that the OfS will link student fees to TEF results after 2020 (Morris, 2017). The Higher Education and Research Act (2017) also instituted the creation of a new funding agency. This saw the merging of seven disciplinary research councils, Innovate UK and the quality–related funding branch of the Higher Education Funding Council for England (HEFCE) into one body: UK Research and Innovation (UKRI) (Wilsdon, 2016b). UKRI has a budget of over six billion pounds and is the national funding agency in the UK for research (GOV.UK, 2018). Advance HE, a new over-arching professional development agency, also came into being in 2018. This is the product of the merger of the Higher Education Academy, Equality Challenge Unit and the Leadership Foundation (AdvanceHE, 2018).

Of particular relevance to this study, is the 2016 review of the REF conducted by Lord Stern. Two key recommendations from his review were that the work of all research active staff was to be returned in

the exercise and that research impact should be defined more broadly. This should include impact on pedagogy, curricula and increased "public understanding" (Reed, 2016, para. 4). The Stern review also adopted the recommendations from an investigation of the use of metrics in research evaluation (Wilsdon et al, 2015). This report, "The Metric Tide", recommended peer review to remain as the dominant means of assessment of quality in research, alongside the judicious use of metrics. This judicious use is part of the notion of "responsible metrics" coined by Wilsdon and his team (2015). They describe several characteristics that underpin this concept that I paraphrase in the following summary. I have highlighted the key qualities in the text.

Ideally when metrics are used they will be **robust** and based on the best data available. They will also be **diverse**, using a variety of ways to measure different types of research across the disciplines. They know their place, and an element of **humility** should accompany the use of metrics, as one piece of the jigsaw of evidence used in the assessment of research. The process should be conducted in a scientific manner and be **transparent** allowing for the research community to understand and critique the process. Finally, the process should be **reflexive**, with constant surveillance of the effects of the indicators used so that they can be adapted and improved as necessary (after Wilsden et al, 2015).

Whilst these policy developments are UK specific, the wider debates that underpin them, such as the rise of "knowledge capitalism" (Davidson-Harden, 2010, p.575) are not. I will now address these issues, beginning with a short historical summary. Higher education in the UK has moved from what Trow (1970) classified as an elite to a mass system. This massification of HE means that in the academic year 2015/16 for example, forty-nine percent of young people under 30 years old were estimated to have entered university in England (Adams, 2017). There were also 2.32 million students studying at UK

HE institutions in 2016/17 (Universities UK [UUK], 2018). Students are now largely self-funded and required to pay course fees, with the final state-funded student grants abolished and replaced by loans in 2015. Undergraduate students typically emerge from university with a high level of debt, averaging in excess of £50,000 (Shepherd, 2011). The expansion of UK universities in the late 1980s and early 1990s under earlier Conservative governments (1979-1992) was due mainly to the removal (in 1992) of the division between universities and polytechnics (Mayhew, Deer & Dua, 2004). This expansion was not well funded and coincided with the introduction of an efficiency model approach to the public sector, where more diverse and increased services are offered without a correlated increase in resources (Deem & Brehony, 2005). This efficiency model, variously termed managerialism or new public management (NPM) is the process of applying private sector organisation, values and methods to public sector services. It is characterised in HE by increased competitiveness between institutions, recasting students as customers and an emphasis on knowledge translation and collaboration with industry (Mangeol, 2014).

Whilst the two terms "managerialism" and "NPM" have become synonymous, Deem & Brehony (2005) note that those theorists allied to NPM regard it as apolitical and focus on its practical utilisation. They point to its use by various nation states with a diversity of political positions as evidence of this. Managerialism also refers to the organisation of services but does not see management as a value free activity; it is not just a technical act but also one that is inherently political. Whilst there are clear differences in the foci of the two theories, both are seeking to understand the reorganisation of public sector services using private sector principles and practices.

One of the hallmarks of managerialism is the change in the relationship between higher education institutions (HEIs) and the state. In one model of HE, known colloquially as the 'ivory tower',

funding is mainly derived from government through taxation. This affords greater freedom for researchers to pursue knowledge without boundaries or constraints, what Etzkowitz & Leydesdorff term the "endless frontier" (2000, p.110). In NPM, a model that sets competition between institutions at its centre, funding is drawn largely from student fees and funding from industry as well as government contracts for research. In this setting, charities and other third sector funding bodies are also becoming more instrumental in their requirements for policy-related outputs. This means that, paradoxically, HE institutions are more divorced from the state (so in theory freer to determine their own destiny) yet, due to this separation, are also required to undertake numerous benchmarking and quality exercises in order to prove the quality of what they do (Scott, 2014).

For some critics, the constant need to prove that work undertaken is 'good', is anathema to the concept of professionalism, which is characterised by greater autonomy and adherence to professional codes of conduct (Striano, 2018). In the managerialism model, quality is seen to be achieved through competition, with the best performing institutions flourishing while those of a lower standard remain static or ultimately fail. Critics of managerialism (Smythe, 2017) believe that this performative culture drives academic standards down and massively increases levels of stress and anxiety in university staff and students. The introduction of managerialism into public services is seen by some as ideological (Deem & Brehony, 2005). The model of a high taxation state, offering services to educate and take care of its citizens, is in contradistinction to managerialism that advocates the roll back of the state and the rights of the individual to be paramount, with intervention into people's lives seen as unwanted (Olssen & Peters, 2005). However, this dichotomy is problematised as government funded research is centred on increasing economic productivity and social justice.

The introduction of managerialism to public services and its overlap with a further application of free market economics in western societies, often termed neo-liberalism, has been well-charted. For example, Olssen & Peters (2005) provide an in-depth analysis of neo-liberalism and HE, focussing on the underlying theories to this economic approach. One of the key differences in the shift from classic liberal economics to neo-liberalism is the emphasis on entrepreneurialism. Where classic liberalism was about the rights of the individual to generate knowledge away from government constraints, neo-liberalism involves an element of state intervention within the process to actively seek and promote knowledge generation. UK HE institutions are primarily government funded which has implications for the role of the state in intervening in the largest area of growth in the global economy. This area is termed knowledge as capital, knowledge capitalism or a knowledge economy.

Knowledge capitalism is about generating income through research and innovation, typically in businesses involved in software, biotechnology and telecommunications. For example, in my own institution, The Centre for Assistive Technology and Connected Healthcare (CATCH) was set up to develop technological solutions to support good mental health in later life. The World Bank Institute has developed a toolkit to enable developing countries to assess their readiness to succeed in knowledge capitalism. This toolkit (the Knowledge Assessment Methodology) sets out four areas, known as the "knowledge economy pillars" which are essential for a country to make the transition into a knowledge economy. They are useful here as they provide an insight into the factors that are important in developing and maintaining knowledge capitalism.

The four pillars are:

- ❖ **An economic incentive and institutional regime** that provides good economic policies and institutions that permit efficient mobilization and allocation of resources and stimulate creativity and incentives for the efficient creation, dissemination, and use of existing knowledge.

- ❖ **Educated and skilled workers** who can continuously upgrade and adapt their skills to efficiently create and use knowledge.

- ❖ **An effective innovation system** of firms, research centers, universities, consultants, and other organizations that can keep up with the knowledge revolution and tap into the growing stock of global knowledge and assimilate and adapt it to local needs.

- ❖ **A modern and adequate information infrastructure** that can facilitate the effective communication, dissemination, and processing of information and knowledge.

(Chen & Dahlman, 2005, p.4)

With an increasing number of countries pushing to move their economies to one based on knowledge, or to maintain this as the dominant element in their domestic economy, the role of the university has been reviewed and recast by the state and industry. Commentators suggest that a new organisational model for HE has emerged that will best suit the universities' new role in a knowledge economy. This role is to supply an adequate number of graduates to work in suitable industries and to be able to work more closely with industry in a number of ways. Olssen & Peters (2005) point to the rise in professional and vocational courses, and changes within existing

areas of vocational education such as teaching, as one significant place in which the curriculum has altered in response to the changing global economy.

Neo-liberalism is important in understanding contemporary HE as it is not just about the external factors which impact on the organisation and funding of teaching and research but also about how day-to-day work practices are organised – the internal structure of organisations and professional practice – and the more pervasive way in which every-day academic communication has changed. This is characterised by agency theory (AT). As Olssen & Peters define it "AT theorizes work relations hierarchically in terms of chains of authority and command which can be used to characterize authority relations at all levels of the management hierarchy" (2005, p. 320). This is clearly juxtaposed to employment modelled on professional autonomy that is subject to much less regulation and performance monitoring techniques.

AT diagnoses one of a number of practices that permeate all areas of work activity, sometimes colloquially termed an audit culture (Power, 1997). It is characterised by the language of performativity where inputs and outputs are key, and everything can be commodified and therefore measured. This extends from an individual's performance at work to the output of an academic department or the quality of the teaching on a degree course. According to Olssen & Peters (2005) the application of external quality measurement systems to teaching and research and associated pressure to achieve funding derived from commissioner-defined research calls has led to the diminution of academic freedom, which is "increasingly compromised" (p.326). This raises the question of whether this organisational model provides enough space for researchers to express and follow personal research interests.

It is commonly accepted that funds generated from large applied research departments such as engineering and business schools maintain funding for other disciplinary areas, such as the arts and humanities (Collini, 2012). However, all disciplines are subject to demonstrating the societal impact of their research and of making their courses responsive to the needs of employers by explicitly incorporating and marketing academic and professional skills in their curricula. For example, The University of Sheffield (TUOS), similarly to other universities, presents a set of attributes that students have the opportunity to develop throughout their undergraduate studies. Alongside acquiring knowledge and developing as a scholar, headings of "application of knowledge" and "development" are listed and include attributes such as being "professional and adaptable, resilient and flexible in their approach" and being "experienced at working in partnership with others, including communities and external partners" (TUOS, 2005). These things are also presented and believed by some to be about social mobility and education as a deliverer of social justice rather than as a purely economic imperative (Young & Muller, 2010a).

In relation to developments in the organisation of research, the audit culture, with its underlying neo-liberal economic approach, is clearly manifest in the current system of grant funding from government to HEIs: the REF. Its predecessor the RAE was introduced in 1986 and was the first formal assessment of research quality in the UK (Research Assessment Exercise [RAE], 2008). The aim was to produce "quality profiles" of each HEI's research that would be used to determine the amount of funding each institution received. The REF followed in 2014 and for the first time, institutions were asked to provide additional evidence of the impact of their research on the economy and wider society. This was an additional criterion used to determine allocation of funds. Other countries have modelled similar quality exercises based on the UK model (Watermeyer, 2012). In 2021,

the impact element of the REF will rise from twenty percent to twenty-five percent (Higher Education Funding Council for England [HEFCE], 2017).

The REF has been criticised for being expensive and time consuming and for encouraging short term and conservative research (Watermeyer, 2012). The introduction of the concept of impact has also been criticised as being difficult to measure and for encouraging particular types of research (Wilkinson, 2017). However, despite such criticism it has become increasingly important and highly prioritised in all types of HE institution. In a recent summary of responses to the consultation for the 2016 Stern review of the framework, numerous institutions stated their support for the impact element of the REF (Wilsdon, 2016a).

Impact is a more complex concept than is at first apparent, as it encompasses many ways in which research influences or changes policy, practice and academic thought, some of which are part of a neo-liberal economic context and some of which relate to pre-existing traditions such as the civic university. Here, for example, the ethos of the civic university has long been to work with the local community, provide education and training and communicate its research in a transparent and accessible way. These characteristics are not dissimilar to the current role of the university in the UK, but tensions exist through differing interpretations of the underlying ethos and purpose of the university. As Barnett (2007) points out:

Public service does not, it may seem, sit easily with entrepreneurialism or individualisation. The idea of the civic university is in difficulty not because the university is too distant from society but because it is too much bound into society on terms that run counter to the very idea of the civic university. (Barnett, 2007, p.24).

In relation to impact, the organisation of public engagement events such as public lectures may similarly be motivated by different reasons, and this lack of shared values can emerge in tension between staff delivering them and their institutions (Watermeyer, 2015).

Definitions of impact include both academic impact and the impact of research on society. There are also disciplinary differences to take into account. Clearly it is difficult for some disciplines to show an impact on the National Health Service and for others to show an impact on the environment or cultural life of the public. This plurality of research types is seen in the definitions of impact given by UKRI. This organisation defines academic impact as "…the demonstrable contribution that excellent research makes to scientific advances, across and within disciplines, including significant advances in understanding, method, theory and application." And economic and social impact as "…the demonstrable contribution that excellent research makes to society and the economy, of benefit to individuals, organisations and nations" (UKRI, 2018, "Excellence with impact", para.3).

To receive funding from one of the UKRI funding research councils, candidates must create a "pathways to impact" statement, to demonstrate precisely and in detail, how they will ensure that their research has impact. This statement presents the impact objectives that the candidate will deliver in order to meet the impact aims of their research. This might include public engagement activities or partnering with another community agency, such as a school.

In her lecture on impact (2014), Professor Trish Greenhalgh, a campaigner for evidence-based medicine and professor of primary care health sciences at the Nuffield Institute, University of Oxford, highlighted another way to understand impact from a disciplinary perspective. She referred to the European Union's research programme, Horizon 2020 description of impact as either "ex ante"

or "post ante". Post ante is more easily aligned with 'pure' disciplines and a model of knowledge production where the research is done and then translated or applied by practitioners or policymakers, while in an ex ante approach, impact is considered right from the start of the research and is part of the design, research questions and every aspect of the process. Meeting the impact element of the REF is conceivably more difficult for researchers in pure disciplines than for those in applied disciplines where the utility of their research is more explicit and therefore easier to demonstrate.

Observing the extensive changes I have described, one could perceive that a quiet revolution is ongoing, powered by the REF, within the realm of the neo-liberal university. Indeed, some scholars suggest that one of the unintended consequences of the REF is a deep change in researchers' behaviours (Wilsdon et al, 2015). However, others suggest that universities are gliding swan-like over this underlying turbulence. Scott (2014) for example, suggests that there is a dual reality in modern HE life. That is, amidst the trappings of the audit culture, it is still "business as usual" with teaching and research going on in the same manner that it has always done in the post-war period. In areas of applied research where the focus of knowledge transfer and external partnerships lie, new models of knowledge production such as "Mode 2" (Gibbons et al, 1994) and "entrepreneurialism" (Etzkowitz, 2013) suggest that knowledge production has distinctly changed. As the knowledge produced in the disciplines is markedly different, the changes in the sector must play out in different ways in different knowledge areas. How these changes are manifest across the disciplines, both explicitly and implicitly is the central question of this thesis. Before I go onto explain the development of my research questions, I will give more details on the purpose of the study and its aims and objectives. Finally, this chapter will conclude with a précis of the methodology and methods that I have used to answer these questions, followed by a summary of my findings.

1.3 Purpose of the Study

I designed the study to allow me to have insight into how the disciplines work and observe changes in working methods and knowledge production. The question formulation was informed and framed by existing research about the disciplines and my own experience of working in HE. I felt that there was a need for an exploration of current research practices from a cross-disciplinary perspective. Therefore, I designed a qualitative study to ask the questions of researchers themselves. I wanted to find out how people worked in the light of changes I had observed in HE as a possible consequence of the neo-liberal environment and the knowledge economy. I chose a cross-sectional study design to get a snapshot of current practice and gain exposure to what researchers are experiencing, how they work, what factors affect change and what the implications of these changes are. Some findings were anticipated and some new, some new findings reinforced insights from the literature and some presented a divergence from existing ideas.

I looked at a range of disciplines and this allowed me to compare if changes were unique to a type of knowledge or found in all groups. I was also able to observe where a change was present in all areas but manifest differently according to one aspect of knowledge, such as applied/pure or soft/hard. This observation allowed me to draw some inferences about the characteristics of different knowledge types. As early career researchers (ECRs) and senior / mid-career researchers participated in the study, I also gained insight into the future direction of the disciplines, at least as far as can be inferred from a limited range of disciplinary areas and participants in the sample. I was also able to compare if the experience of ECRs was the same across the board or only in specific areas. A cross-rank and cross-discipline examination of the data allowed me to answer the

questions from a broader perspective. The purpose and operation of the study is summarised below in the aim and objectives.

1.4 Study Aim and Objectives

Aim:

To explore researchers' experiences and identify if, why and how working practices and knowledge types have changed in the disciplines.

Objectives:

To conduct a single site qualitative case study in one British University

To recruit a sample of research staff from early career, mid-career and senior positions using a non-probability purposive sampling approach

To collect qualitative data from a variety of disciplines by conducting five focus groups to reflect hard/soft/pure and applied disciplinary areas.

To analyse the data using a thematic analysis approach facilitated by NVivo software in order to manage, reduce, describe and interpret the unstructured data.

To present the results and interpretations of the data in order to answer the research questions set for this study.

1.5 Development of Research Questions

I developed the research questions iteratively, re-working and refining them in response to the literature and my own experience, and in discussions with my supervisor. At the outset of the study, one spark was the prevalence and use of the terms "Mode 1" and "Mode 2" (Gibbons et al, 1994) in the literature, combined with my own reflections on this model and observations of my own university. Initially, one of the research questions was framed around the notion of whether there was a shift towards "Mode 2" as a system of knowledge production. On further investigation of the characteristics of these modes, they proved to be an unsuitable basis for my study, as I will later explain in the methodology chapter. In truth, the characteristics described in the "Mode 1 / 2" model forms only part of the story of this study, and the model proved a useful device to stimulate discussion with participants. As such, it no longer features explicitly in my research questions, which are deliberately inclusive and exploratory.

The research environment, epistemic practices, disciplinary culture and knowledge are interlaced with each other within the institutional world I have investigated. My research questions aim to pull apart the strands of this world, to separate them artificially in order to give each element space and attention. I have sustained this approach throughout the study with each strand of data presented separately before all the elements are brought together to create a full picture in the conclusion chapter. The story builds, with interesting insights having space to emerge through the imposition of this artificial partition between ways of working, and knowledge produced. This allowed for meta-themes to emerge in the discussion of research question two (research environment) and research question three (knowledge produced).

By contrast, I have treated the data and my interpretation of the data related to research question one in an opposing way, as it is threaded throughout the study. I decided to present my work comparing researchers' practices across the disciplinary groups in this manner to avoid over-complicating an already complex set of data. In addition, isolating these data would be a less fruitful approach than retaining them within the themes I had chosen, therefore allowing greater contextualisation for the reader. I have complemented this integrated approach to answering question one with a visual summary at the beginning of the discussion chapter. My final research questions are presented below:

1. What are the commonalities and differences in researchers' practices in response to demands for instrumental research?

2. What is the extent and nature of change in disciplinary ways of working in different types of fields and disciplines?

3. What factors impact on the development and production of disciplinary knowledge in different types of fields and disciplines and how do they manifest themselves?

4. What are the implications of this research for the future of the disciplines?

1.6 Précis of Methodology and Methods

The study presented in this thesis is a qualitative, single site case study, conducted in one UK University in 2016/17. Researchers from four different knowledge areas were invited to participate in the study using a purposive sampling approach. The broad knowledge typology: hard applied, soft applied, soft pure, hard pure (after

Becher, 1989) was used as a framework to organise the data collection and analysis. The method of data collection was group interviews with a total of 29 participants. I managed and analysed the data using an approach informed by Braun & Clarke's thematic analysis (2006) and underpinned by a realist ontological position. The work of social realists such as Michael Young and Johan Muller significantly informed my epistemological perspective. Taking the work of social realists further than a sensitising role in the study, I employed the work of Basil Bernstein (1999; 2000) in interpreting the data. In the final chapter I also offer suggestions on how his theory on the organisation of research teams might be manifested in the future, based on the data I have collected and the existing evidence I have reviewed in this project.

1.7 Summary of Contribution and Implications of Findings

In this study, I have used an existing framework (Becher, 1994) to reassert a disciplinary perspective to current debates about knowledge production. I have also illuminated existing theory by linking empirical data to theories of knowledge development. I tentatively suggest the development of Bernstein's (2000) theory of new regional discourses and how they may develop based on the study's findings. I have suggested how the findings may be useful to institutional managers in designing professional learning opportunities for their research community and I advocate for the protection of the disciplines in future research governance.

1.8 Overview of Thesis Structure

The structure of the thesis follows a traditional presentation namely: introduction of the context of the study, review of the literature, methodology and methods used to answer the research questions, presentation of the research findings, discussion and interpretation

of the findings in the context of the literature and final drawing together of these interpretations in the conclusion chapter where the contribution to knowledge is given along with the implications and limitations of these claims. This chapter has introduced the topic of the thesis and given an overview of its main elements including research questions, aim and objectives, key findings and conclusions. The next chapter is a literature review where I discuss theoretical and empirical evidence that impact on this project.

Chapter 2 | The Disciplines, Knowledge and Contentions

2.1 Preamble

At the outset of this literature review, I endeavoured to focus the research questions, establish the scope for the review and how I would identify and use the literature in the study. However, as I described in the opening chapter, my initial fixing of the research questions became the first of several iterations. Methods for identifying literature varied throughout the study, with a more responsive approach being typical in the latter stages of the project as compared with more systematic methods that characterised the earlier stages. Initially I built on the ideas and materials I had generated from the research proposal and first part of my Doctor of Education (EdD) programme. I then moved on to more definite scoping and mapping activities, identifying different bodies of literature to inform the context to the study and its theoretical underpinnings. I also investigated literature regarding knowledge production systems, the history of the disciplines and current studies where the disciplines and epistemology were the focus of enquiry. At the end of the project, a more iterative approach to identifying literature became a necessity as I worked with the data and developed my ideas and argument, producing a more nuanced picture. I also could not anticipate the importance that some topics would take before I had conducted my fieldwork. For example, literature on researcher identity and the HE workforce is touched on in this chapter but revisited in more detail in the discussion chapter. Below I briefly describe my work to gather evidence for this chapter and how I have organised the literature herein.

Each piece of writing included in the review had to do some work; most importantly, to inform the development of the research

questions, methodology and map out the context in which the study would take place. As such, I did not aim to identify and report on every published paper on the topic of knowledge production in higher education in the manner of a systematic review. However, each paper had to inform the research questions and provide the evidence I would use in stating a rationale for the study. As Maxwell (2006) argues, relevance is of primary importance when conducting a literature review to inform a doctoral thesis. He cites Locke and colleagues on the topic of the scope of the review, "A relevant research report contributes an important concept, finding, or method to the study's conceptual framework or design, provides a necessary piece of the argument that explains and justifies this study, or both*" (*Locke, Spirduso, & Silverman, 1999, p. 69). Quoted in Maxwell, 2006). Three concepts of the study topic informed my initial literature searching activities. This was informed by the "Who, What, How" framework cited by Booth, Papaioannou and Sutton, (2011, p.55) to establish **Who** the research is about (HE researchers), **What** must be analysed (disciplinary research methods and knowledge) and **How** does this impact on the "who" (how are research methods and knowledge types changed).

2.1.1 Literature searching activities and organisation of evidence

For the contextual literature discussed in the introduction chapter, I used simple reference and citation searching as my main methods. For the literature on knowledge systems, the disciplines, social realism and knowledge types discussed in this chapter, I began with the material I had amassed during the research proposal stage of the project. I had established who the key authors and journals relevant to the research question were. In order to explore the topic further, I conducted some author searches, along with citation and reference checking. I then extended beyond these authors to explore the theoretical knowledge, which underpins Michael Young's theories of

social realism (2008) to provide a conceptual lens for my work. I compiled a list of the key HE journals I had used in my research proposal and used this to identify a suitable educational database that indexed these publications. I then conducted a topic search in my chosen source: British Educational Index, to supplement the activities described above, using terms for HE (for example, HEI, triple helix, university) combined with terms for knowledge types and mode of production (for example, disciplinary, Mode 2, co-production).

In the rest of this chapter, I will present the literature in three themes. In the first theme, **knowledge forms and organising structures**, I will describe knowledge types that are distinct to disciplinary knowledge such as professional knowledge, personal experience and everyday knowledge referring to classical and medieval descriptions of knowledge. These examples also highlight different ways in which scholarly knowledge has been organised. In this first theme, I will introduce theoretical ideas from Bernstein (1999; 1990) and Durkheim (1977) that I have found useful in understanding the disciplines and how they generate knowledge in twenty-first century Britain. I will revisit and expand upon their ideas later in the thesis to aid understanding and interpretation of the data. I hope to present their ideas with enough clarity for the reader to understand and follow how I have interpreted the data in my study and made my final conclusions. I also endeavour to facilitate the reader to draw their own conclusions on my work through the use of these ideas.

In the second theme, **researching the disciplines: definitions and positionality**, I will provide a definition of a discipline and other key concepts used in my research. I will locate and define the model of "soft/hard/pure/applied" knowledge (Becher, 1989) and how this is used in my study. In relation to the disciplines, I will explore the notion of researchers' positionality, including epistemological and

ontological beliefs; here I will also introduce and expound the ideas of social realism as configured by Young & Muller (2013).

The third and final theme considers **modes and gaps: contentions with knowledge**, where I outline key factors that have challenged disciplinary forms of knowledge such as the rise in importance of research utility, the way research is evaluated and, I suggest, the potentially deleterious influence of social constructivist perceptions of knowledge. I will discuss these ideas from a social realist position, arguing for the benefits of this perspective to research practice. I will close the chapter by presenting my rationale for this doctoral study by summarising the critical questions that I identified from this literature review that informed the development of my research questions.

2.2 Knowledge Forms and Organising Structures

2.2.1 Aristotle's classification of knowledge

Scholars have been classifying knowledge and processes of knowledge production for millennia. There are numerous models or typologies of knowledge. These differ in terms of their context, date of origin and intended use. The early Greek philosophers wrote extensively on the nature of knowledge and Aristotle (384–322 B.C.E), provided concepts to explain different types of knowledge that are still commonly used today. I will refer to these knowledge types later in the thesis so I now provide a basic interpretation of these terms with reference to Allan (1970) and Parry (2014).

Aristotle explained the mind as having two elements, a calculating part and a scientific part. In the calculating part, we find practical thinking and in the scientific part theoretical. Within the mind, Aristotle provides a detailed categorisation of knowledge, which comprises five virtues: episteme, nous, praxis, phronesis and sophia. Episteme can be approximately described as theoretical knowledge and techne as craft or skills learnt through experience, like riding a bike. Phronesis is commonly understood as practical wisdom such as judging a situation and how to proceed appropriately. The other parts of the classification are not as widely used (outside of philosophical circles) in their original sense. Nous is often used in common parlance to mean 'common sense' and Aristotle used it to mean (as far as scholars can interpret) as an initial understanding or impression of something, before episteme is reached. Equating praxis with practical skills is not an accurate reading of this term. Aristotle wrote that praxis was also episteme as it was grounded in theoretical knowledge (Shields, 2016). Therefore, a more accurate understanding is what would now be called professional or practitioner knowledge, which is characterised by "formal and

codified specialized knowledge that training centers transmit which marks out a particular field or profession." (Freidson, 2001, p.459).

As well as different knowledge types, the organisation of disciplinary knowledge that Aristotle described is a useful reminder of how our current systems are not a given, but something we have constructed. He described science in three categories: theoretical sciences, practical sciences and productive sciences. Theoretical sciences include mathematics, practical sciences look at how societies and individuals act and interact such as politics and ethics – roughly modern-day social sciences. Productive sciences include things such as dancing, music and theatre (Shields, 2016).

In today's language, the study of any of these areas would be considered theoretical learning or an examination of episteme. However, Aristotle did not consider the arts episteme at all. This was restricted to 'hard' sciences that had a certainty of rules. This differentiation between different types of non-everyday knowledge is one of the earliest statements of the fact that science, social science and the arts and humanities are different types of knowledge. That is, science is "less subject to change" (Parry, 2014, "Aristotle", para.1) as it is abstract, not about changing the social world or creating something either useful or beautiful - a product as diverse as a song or a set of cutlery. The fact that these last two manifestations of productive science can be together seems strange when compared to the way subjects are organised in a disciplinary structure in contemporary HE. In this structure, music and engineering would be removed to separate faculties.

I have chosen to present these concepts from the many typologies of knowledge that exist because it is useful to have the Aristotelean knowledge types phronesis, episteme, praxis in mind alongside the differentiation of theoretical, practical and productive science when looking at contemporary debates on knowledge in HE. This is not to

complicate matters with various knowledge frameworks and structures, but because it is a reminder of the constructed nature of the disciplines, that there are other ways to organise knowledge production in HE. It also reminds us that research knowledge is only one knowledge form and has limitations to its use and application, with other forms such as phronesis and praxis being necessary parts of private and public life.

Recognising different types of knowledge is important in this study as my focus is research knowledge and this is different to phronesis or everyday knowledge. The British sociologist Basil Bernstein provides a useful and clearly articulated theory on different knowledge types and how knowledge progresses in different disciplines. In his essay, Bernstein (1999) describes different types of knowledge and asserts a comprehensive theory on how knowledge is generated. I present this here as the framework for how I understand the disciplines generate knowledge and the type of knowledge present within them.

2.2.2 Bernstein's forms of knowledge

Bernstein begins the essay (1999) by delineating two types of knowledge: a horizontal discourse, which is everyday knowledge, and a vertical discourse, which is formal, official knowledge. Horizontal discourse is characterised as tacit, oral and context dependent. It is also split horizontally into different categories or "segments" (p.159) reflecting different everyday competencies such as dressing. Each person has a number of repertoires of knowledge and together these form a reservoir of repertoires (Bernstein, 1999). These are passed on in the individual segments of learning, with people choosing from different repertoires of knowledge as appropriate for the context. In social research, this type of knowledge is valued as participants are experts on their own experience, such as, living with a health

condition, being a parent. In a contemporary research context this type of subjective knowledge, is often termed a person's "lived experience" (Ellis & Flaherty, 1992, p.1) and allows researchers to prioritise an "emic" viewpoint, that is, the participants' perspective on a phenomena (Reid, Flowers & Larkin, 2005, p.22). Vertical discourse (formal knowledge) differs from horizontal discourse in that it is less context dependent; horizontal discourse is knowledge that fits particular cultural and class settings. Knowledge in vertical discourse interrelates in a system of meaning, rather than in contextual segments. It is built on and referred to over time. It has two parts namely horizontal knowledge structures and hierarchical knowledge structures (Bernstein, 1999).

In horizontal knowledge structures, new languages emerge to challenge old ones. They cannot be subsumed, as in hierarchical knowledge structures, but the new voices can create a new language, a new explanation to challenge the other voices and languages. Within horizontal knowledge structures, actors are concerned with either learning the dominant language or marketing a new language to challenge it. Some horizontal knowledge structures have "strong grammars" (1999, p.166) where the languages (i.e. bodies of theory or ideas) are precise enough to explain and inform the empirical. A knowledge structure (a discipline) possessing "weak grammars" (or weak grammaticality) (1999, p.166), have less explicit languages. In a horizontal knowledge structure with a strong grammar it will have typically have fewer languages compared to a discipline with a weak grammar. Those knowledge structures that have weak grammars can tend to develop constant new languages that are characterised by a built-in obsolescence and weak empirical powers. In times of social and technological change, more languages develop alongside more procedures of inquiry i.e. research methods. In a knowledge structure with a weak grammar (here, for example, Bernstein suggests sociology), the beginning student must get to know the languages, the

arguments, the key theorists and, to do this, must take on a sociological perspective, write and speak using the language, see things through this lens, have this "gaze" (Bernstein, 1999, p.165). Horizontal knowledge structures are, by the nature of their language structure, inherently irrelevant after a certain time because theories reflect on what has been, rooted in a particular time and experience. However, the idea of a new language offering a "fresh perspective" (Bernstein, 1999, p. 163) hints at how grand theories such as Marxism are re-interpreted and applied in different contexts and for different generations.

In vertical knowledge structures, new theories are voiced and tested empirically before superseding old theories or being rejected. Theory builds upon itself and extends explanation, rather than several competing explanations co-existing. In hierarchical (vertical) structures, Bernstein argues that it may be possible to be proficient in a language purely by learning the theory and empirical procedures, that is, without developing a particular perspective: what he terms a "gaze" (1999, p.165). Although in both knowledge structures there would be a social element to evaluate truth claims, the horizontal knowledge structure would be limited to this process. Within individual disciplines with a "strong grammar" (1999, p.166), the social debate is reduced as the body of knowledge is stronger, with a stronger conceptual base. In this essay (1999), Bernstein offers a useful framework to understand different knowledge types and how different disciplines generate knowledge. Having put this framework in place, I want to move the focus back temporarily, from the internal characteristics of knowledge to the notion of the discipline as a construct. This is to aid understanding of the data I gathered on the disciplines in 2016/17 that I present later in this thesis.

2.2.3 The disciplines as a construct

The disciplines have been the dominant method of organising knowledge within higher education in Europe from the mid-twentieth century, what Becher (1994) referred to as "the life-blood of higher education" (p.151) as they create the structure upon which academic life is built. However, one of the earliest demarcations of academic knowledge germane to this thesis is the organisation of knowledge in the universities of medieval Europe. Pre-enlightenment, scholarly knowledge was intrinsically linked to the Catholic Church and, as such, subjects were divided into those that reflected the word of God (Trivium) and those concerned with the world God created (Quadrivium) (Williams, 2016). This division is of particular interest to those researching the disciplines (Bernstein, 1990; Durkheim, 1977; Williams, 2016; Young, 2008), as it provides a clear historical link to the contemporary university model of separating knowledge into what Becher (1989) describes as pure and applied disciplines.

What has also been established is the significance of this split and the order in which the subjects were studied was passed down. Therefore, the idea of the knowledge of the Trivium being "sacred" (Durkheim, 1977) is not wholly to do with its religious context, it is knowledge that a community shared, which was not dependent upon its historical context (Trowler, 2012a). This indicates a gap between knower and the subjective production of knowledge and hence, there are ideas that are not context dependent within that knowledge (Young & Muller, 2013). This aids its objectivity (Young & Muller, 2013) and the knowledge retains a cogent quality, sustained regardless of temporal or contextual domains. The religious connotation to the descriptor 'sacred' comes in Durkheim's tracing the origins of this type of knowledge back to shared religious beliefs (Williams, 2016).

The idea of knowledge being objective because it is socially created and known underpins one current perspective on academic knowledge known as social realism, that I will unpack in more detail in the next section of this review. Going back to the Trivium and Quadrivium, the order in which they were studied is highlighted by Bernstein (2000) who argues that developing understanding of the Trivium (such as logic and rhetoric) "is a necessary precondition that the understanding of the world [Quadrivium] be valid, will also be true" (Bernstein, 2000, p.83). Here he highlights the link between theory and practice, where theory informs practice, just as in Christianity developing a personal relationship with God, through reading scripture and prayer manifests in actions of goodwill such as almsgiving. Taking the analogy further, in Christianity, bread and wine, a product of the world, is distributed to the congregation as Corpus Christi - the body and blood of Christ, in order to reinvigorate the inner Christian self. Likewise, in research, the world also feeds back to the word as empirical data modifies, reinforces or diverges from theory.

In this theme, I have presented different ways in which disciplinary knowledge has been organised in universities and ways in which different knowledge forms have been categorised. These categories include phronesis, episteme and praxis from classical writings, and later examples of the medieval university system of the Trivium and Quadrivium as "sacred" and "profane" knowledge (Durkheim, 1977). I have also introduced the idea of the relationship between these two forms of scholarly knowledge, with Bernstein's (2000) idea of knowledge of the word being necessary to understand the world. In the next theme, I will present literature on researchers' philosophical beliefs that come from and form part of their disciplinary identity. I will also present the model I use to inform the organisation of data collection activities and structure the data organisation.

2.3 Researching the Disciplines: Definitions and Positionality

2.3.1 What is a discipline?

In HE research the most influential study on the disciplines is the "Academic Tribes and Territories" study conducted by Tony Becher (1989), later updated with Paul Trowler (2001). Although the academic tribes metaphor has been criticised as being colonialist and outdated (Manathunga & Brew, 2012), the preface to the first edition indicates the intention of the author to uncover the complexity and dynamism of the disciplines rather than reinforce rigid and erroneous boundaries. The initial research involved data collection across 12 disciplines, interviewing over 220 academics; this is a sizeable study and, as such, reports a number of useful findings about the disciplines, and how to research the disciplines.

One important part of Becher and Trowler's (2001) work is the reminder that the disciplines comprise a social system *and* a body of knowledge and that it is necessary to take a holistic view in order to understand critical questions about the disciplines. This holistic view takes in the disciplinary environment: such as disciplinary journals, conferences, physical departments and teaching spaces; the ways of being or cultural dispositions of a discipline, such as specific use of language; the body of disciplinary knowledge; and the behaviour and agency of the researchers. Also important are Becher and Trowler's (2001) discussions of the epistemological properties of the disciplines and suggested ways of characterising and categorising knowledge. Drawing on the work of Biglan (1973) and Kolb (1981), they use categories of "soft pure/soft applied/hard pure/hard applied" to create an organising framework for the disciplinary areas they investigated (Becher & Trowler, 2001, p.36).

In Academic Tribes, the authors make links between the social context and the types of knowledge produced and describe the way ideas are developed in hard and soft knowledge areas. "Hard" areas are characterised as having "contextual imperatives" with clear "sequences of explanation", and "soft" areas as having "contextual associations" which are loose clusters of ideas with no clearly defined "framework of development" (Becher & Trowler, 2001, p.29). These phrases describe the manifestations of different knowledge types and suggest parallel social practices that are linked to these different knowledge types. The academic tribes study highlights the difficulties inherent in studying the disciplines, as they are not fixed, but dynamic social systems. To add to the difficulty of researching this complex area, the use of a framework to classify knowledge is difficult to employ in practice as; clearly, researchers' imagination does not work within such boundaries. Rather, ideas flow to different questions and solutions, methodological approaches and methods that cross disciplinary boundaries and sometimes lead to new sub-fields or disciplines developing. In the Academic Tribes study, respondents talked about how their discipline bordered or spilled into another. The authors draw on Bernstein's (1999) theory that some disciplines are tightly knit and have strong framing so that any invasions (to use the tribes metaphor) from others will be absorbed into the dominant paradigm. In other disciplines that are more loosely configured, members may join other disciplinary groups' conferences or disciplinary events or find it easier to move into inter and multi-disciplinary groupings (Becher and Trowler, 2001, p.59).

The use of Becher's (1989) framework "soft pure/soft applied/hard pure/hard applied" was key in the design of my study. I have used it as suggested by Trowler (2012a, p.11) to develop "simple heuristic categories for research purposes". This level of categorisation was enough to facilitate the study, and other categories developed by Becher (1989), namely: urban/rural, convergent/divergent were not

employed. However, in developing and carrying out the study, the context and social process of creating knowledge was of equal importance as the epistemological nature of the disciplines.

It is important to establish what I define as a discipline, field and subject in this study. I have benefited from the diligent and clearly delineated critique of various definitions of a discipline given in Trowler (2012a). As such, I base the following attempt on my understanding of the literature, including Trowler's model of creating his own definition (2012a, p.5-9), and my own modest foray into the field:

A discipline is two things. It is an intellectual system that contains a dynamic body of knowledge that includes a developed theoretical base. It is also a social structure that enables this knowledge to be generated and shared through the generations, allowing the body of knowledge to develop. New members to a disciplinary community are enculturated into specific ways of working, language use and ontological and epistemological views.

Other commonly used terms when discussing the disciplines are field and subject, so I give definitions of them here. A field is a sub-area of a discipline, such as information retrieval as a field of information science. A field may develop to become a discipline or may remain a smaller sub-section. A subject is a recontextualisation of disciplinary knowledge so that it can be taught in a university or school and differs from the body of knowledge as a discipline (Bernstein, 1999).

To summarise, there are several reasons for the continued success of the disciplines as the organising structure of knowledge in HE:

❖ They enable the development of knowledge to produce knowledge paradigms and the application of deductive and inductive reasoning and other generative processes.

- ❖ They have their own cultural identity that facilitates learning of epistemic rules that pertain to each discipline.

- ❖ They develop a clearly defined set of knowledge in each discipline that is renewed and informed as new knowledge is generated and made accessible to educate the population.

- ❖ They are utilitarian, the sum of the above forces.

Having outlined how I understand the term discipline and provided definitions of discipline, field and subject, I will continue this part of the literature review chapter with a focus on researchers' views on the nature of knowledge and reality. Different disciplines and sometimes fields within a discipline have particular attitudes and beliefs about these concepts. In this section, I draw on some earlier EdD work on values in research (Woods, 2013).

2.3.2 Researchers' positionality

At the outset, it is important to say that researchers take their professional identity from a number of places, not only from their discipline. In a study investigating university teachers' views on education, Fanghanel (2009) found that ideological views on the purpose of education, such as to produce employable graduates, or as a vehicle for personal growth, impacted on how they viewed their discipline. Researchers also have varied perspectives on what is meant by research, and these views are not all rooted in disciplinary origins (Brew, 2001). Studies such as these suggest that, rather than being the dominant factor in professional identity the discipline is part of the picture. A researcher's professional identity or positionality comprises views emanating from their biography, such as class, gender, race, nationality, beliefs about the purpose of

research, (for example as emancipatory) and their epistemological and ontological positions.

Ontology can be defined as how we view the world, that is, whether there is a world (either social or natural) that exists outside us.   Epistemology is the nature of knowledge, and this knowledge can only reside in the world that we believe exists, so if we do not believe in an objective reality, that we cannot study or generate knowledge in this domain, all knowledge is subjective. This is commonly known as idealism, with those believing in an objective world beyond human experience occupying a realist position. Another way of describing realism is the "acceptance of a reality which is independent of our senses, but which we can only discover through our senses" (Pawson & Tilley, 1997, p.5). Views on epistemology (what is knowledge?) and ontology (what is real?) form the basis of a disciplinary research paradigm and, from this basis, a methodology is formed, which in turn leads to the development of appropriate methods.

In some types of (usually), qualitative research, it is expected that a researcher's position, will be shared as part of the dissemination process as their views are seen to impact on the research process. In other areas, such as policy research, this is not part of the tradition. For example, some scholars in education, such as Gerwitz & Cribb (2006, p.141), call for a renewal of "ethical reflexivity" in social research, concurring with Hammersley (2008) that not enough awareness is given to the impact of values on research. The act of being reflexive is the researcher turning inwards and reflecting on how their values, beliefs, and biography affect the research process (Wellington & Szczerbinski, 2007).

Such is the significance of the disciplines in higher education and the beliefs that researchers hold as members of these communities, that disciplinary perspectives emerge in all kinds of higher education research that is not ostensibly rooted in or about the disciplines. For

example, research on research methods pedagogy reveals different preferences in how research methods should be taught, what should be taught (Earley, 2013) and how it should be assessed (Kendall, 2013). In a study about the REF, Watermeyer & Chubb (2018) found that there were disciplinary differences in how researchers viewed public engagement activities. These examples illustrate that beliefs and opinions about knowledge and how research should be conducted and evaluated are formed early in a researcher's career and are implicit in their work. These beliefs and opinions are both conscious and unconscious, sometimes expressed but often not discussed.

In order to understand some of the challenges facing the disciplines, which I address in the final section of this literature review, I am now going to expand on specific philosophical views associated with disciplinary knowledge. I will focus this exposition by introducing social realism as the positionality that resonates with me and, I will argue, provides the most practically beneficial and theoretically sound position on knowledge in the current HE context.

2.3.3 Social realism

Social realism is a collection of theories and approaches that are applied to knowledge in the field of the sociology of education. The philosophical basis of social realism is critical realism, which combines realist ontology with idealist epistemology, developed by the sociologist Ray Bhaskar (2013). The critical realist view can be characterised as the belief that there is an objective reality that can be measured, where research hypotheses are unable to be completely proven and are always subject to interpretation (Pickard, 2013).

The aim of social realism is to refocus debate about research on knowledge in higher education, rather than about who is producing it. Its aim is to provide a basis for equality of access to knowledge in

educational institutions and a sound basis for methodological development. Social realist scholars such as Michael Young have synthesised critical realism with other knowledge theories, notably the work of Basil Bernstein, particularly on vertical and horizontal discourses (1999), and Emile Durkheim's ideas on sacred and profane knowledge, set out as part of his published course on the history of education in France: "The Evolution of Educational Thought" (1938, English Translation, 1977).

Through re-examination and synthesis of these bodies of work, social realism seeks to establish a different perspective on knowledge. Rather than taking a choice between knowledge as objective and value free or socially constructed, it argues a theoretical middle ground between "positivist absolutism and constructivist relativism" (Maton & Moore, 2010, p. 1). Other similar positions have been suggested in the literature such as "subtle realism" (Seale, 1999, p.469). However, the significance of social realism is that it is situated in the sociology of education and therefore focussed on production of research knowledge and knowledge in the curriculum. This includes how teachers are trained to view knowledge and what is included in the school curriculum.

The idea of "powerful knowledge" (Young & Muller, 2013, p.229) is key to social realism and differentiates disciplinary knowledge from other knowledge forms, such as experience or opinion. It has a number of characteristics, firstly it is specialised, and therefore produced mainly in universities and research institutions. It is also produced as the result of particular disciplinary methods that have been developed within these knowledge communities (Toulmin, 1996 cited in Young, 2008). These communities also develop their own methods of evaluating truth claims, in order to critically assess the production methods and outputs of the research process. Young & Muller (2013) stress that a belief in powerful knowledge does not infer a devaluing of common-sense knowledge or other knowledge

forms, rather powerful knowledge has a different purpose and structure.

Objectivity and context are central concepts in social realism. Scientific knowledge is more objective than social science and humanities disciplines as it is less context specific. This objective characteristic of scientific knowledge is the established way to define objectivity in the disciplines and presents a 'deficit model' for evaluating social science and humanities knowledge. For example, viewing study designs using a clinical research lens, qualitative research would be relegated to the bottom of a knowledge hierarchy, designated as 'descriptive'. Using a different disciplinary lens, qualitative research would dominate and be present in a variety of forms. The point is that scientific research is greatly valued by governments, funders and employers, as it should be, but the current dominance of science, technology, engineering and maths (STEM) disciplines relegates other disciplines to a lesser status. Despite a more plural approach to the use of evidence in policy formation, this perception is dominant (Bell & Pahl, 2018). Using this 'deficit model' perspective social science and humanities knowledge has less explanatory power, because it is situated in particular contexts and involves much more subjective interpretation in its development. This lessens its transferability to other contexts, threatening its universality, which in turn deems it as having inferior explanatory power. There are a number of things to say about this perceived imbalance between social knowledge and scientific knowledge.

Where Bernstein describes a way that disciplinary knowledge emerges in his horizontal and vertical discourses, social realists suggest that it does not go far enough to explain how disciplinary knowledge develops (Young, 2008). This is because using scientific knowledge as the default way of defining objectivity leads to a bifurcation of subjective (humanities and social science) and objective (scientific) knowledge. This bifurcation can be softened by considering the work

of Thomas Kuhn (1962), who highlighted the social aspect of knowledge creation in science, that peer review and collaboration is part of the scientific method. The theories of the German philosopher Ernst Cassirer are also most helpful in challenging this bifurcation, mainly, I think, because they offer a completely different perspective on ways to understand and evaluate knowledge. This disruptive effect is helpful to reappraise knowledge and its different properties. His work on objectivity of knowledge is a supporting pillar of social realism (Young, 2008). I will briefly summarise Cassirer's ideas here with reference to Friedman (2018).

In his "philosophy of symbolic forms" (cited in Friedman, 2018, para.4.), Cassirer proposes that there are not separate categories of subjective and objective knowledge, rather that some types of knowledge are easier to comprehend than others. Cassirer saw all knowledge as mediated through symbols (language), so that we are "symbolic animals" (Friedman, 2018) understanding and relating to the world through a meaning system that he named "symbolic forms" (Friedman, 2018).

His system encompasses the ways in which we use language to mediate between us and the world around us, and the different levels of abstraction between what we express in words and the object (or phenomena) we are describing. Cassirer believed that there are different levels of distance, semantically, between symbols and their objects and what they denoted. The first level is a completely subjective emotional meaning such as whether something is fun, threatening or boring; here, the symbol apes the knowledge so that they are close together and perhaps indistinguishable. In the second level, a gap (which indicates the degree to which we understand) is to be found between symbol (how we understand the thing) and what it denotes. The third level is the purest form of abstraction, where there is most freedom and distance between the object and the signifier. This distance is so great that the sign is not tied to any particular

instances, concrete examples, or systems of time or space. It is disassociated, a number or symbol such as 3. He suggests that knowledge claims are always provisional, always subject to change; nothing is wholly fixed or transient:

We find connections, which hold their ground through all further experimental testing, and through apparently contrary instances, and remain steadfast in the flux of experience while others dissolve and vanish. It is the former, that we call "objective" in a pregnant sense, while we designate the latter by the term "subjective."... The result of thus deriving the distinction between the subjective and objective is that it has merely relative significance. For there are no absolutely changeable elements of experience at any stage of knowledge we have reached, any more than there are absolutely constant elements (Cassirer 1953, as cited by Moynahan, 1999).

In relation to Cassirer's position on objective and subjective knowledge, the place of Durkheim's ideas in the social realist argument (Young, 2008) should not be underplayed. Durkheim's work (1977) exploring knowledge as social and the temporal sustainability of 'sacred' knowledge is important because it accords social knowledge objectivity. These ideas start to free up the definition of objectivity by making it easier to begin to consider the idea of unifying knowledge, as the objective is not now synonymous with science. He opens up the possibility of a different way of thinking about objectivity and the role of context in the production of powerful knowledge, which are expanded by social realists using Cassirer's work.

Cassirer does not assess the objectivity of knowledge through the lens of knowledge development as in Bernstein's vertical and horizontal languages. As I have outlined above, he proposes a different view of objectivity, based on his symbolic forms. As Young

(2008) suggests "...the natural sciences for Cassirer are a special case of objectification, not a model for objectivity itself" (p.217).

To recapitulate, the objectivity of powerful knowledge is important. Social realists argue that it is possible to realise this kind of objectivity in social knowledge in two ways, one in the application of non-contextual rules that govern how the knowledge is produced and the other through the realisation that there is an element of powerful social science and humanities knowledge that can be detached. That is, the context of its production does not preclude the creation of objective knowledge. Social knowledge is objective if it has been produced to the accepted rules of a discipline and contains ideas that will stand the test of time. This latter point is what Young & Muller term "emergent" meaning that the value of the knowledge is independent of its original context (2013, p. 237).

In this theme, I have discussed empirical and theoretical studies that have provided important and perhaps often overlooked insights into the disciplines as an object of inquiry. I gave a definition of a discipline, field and subject. Researchers' positionality and views on knowledge were also presented, with a focus on social realism as a movement that champions a particular view on knowledge that I suggest is useful and theoretically cogent.

So far, in this chapter I have described different forms of knowledge and ways in which research knowledge has been organised. I have also referred to earlier research on the disciplines and what can be learned from this work, such as the model I will use to inform the collection and management of data in this study. In this theme, I discussed researcher positionality, and the philosophical underpinnings of disciplinary knowledge through the conceptual lens of social realism. In the final section of this review I want to discuss two highly influential challenges to disciplinary knowledge that have emerged from the literature, namely social constructivism and voice

discourses (Moore, 2013) and the increasing pressure on UK universities to produce instrumental knowledge (Williams, 2016).

2.4 Modes and Gaps: Contentions with Knowledge

2.4.1 Social constructivism and voice discourses

Social constructivism is based on an idealist or interpretivist view of knowledge. An idealist position presupposes a relativist ontology and subjectivist epistemology (Cohen & Crabtree, 2006). If a positivist view of knowledge is at one end of the metaphysical spectrum, a view that all knowledge is socially constructed is at the other. Moore (2013, p. 337) clearly describes these two positions, which I paraphrase here: positivism characterises knowledge as certain, as it is a reliable portrayal of an external reality by a detached and disinterested viewer. A social view of knowledge, such as post-modern, critical or social constructivist perspectives, characterises knowledge as socially constructed and inherently reflecting the creator of that knowledge. From a social constructivist position, an objective view of knowledge is unattainable. Moreover, from more radical constructivist standpoints, according some knowledge higher status is only really promoting a certain type of knower: moneyed, privileged, white, western, male. In current educational debates, these knowers are often pejoratively termed "dead white men" (Pett, 2015).

I would argue that there are two problems with social constructivist views of knowledge. The first is that if all knowledge is relative, there is no more weight to the claim that knowledge is relative than any other, as there is no such thing as truth. As Moore (2013) wryly suggests "Because we have devoted for so long so much attention to demonstrating how knowledge is *not* knowledge, we have lost sight of the fact that the precondition for any such demonstration is that there is *in fact* knowledge" (p.339 emphasis in original).

The second is regarding its claims to foster social justice through disciplinary research and teaching. This is problematic because of the lack of a gap between knowledge and knower. To illustrate the problem, I need to go back to Hume's guillotine (Black, 1969), in which he highlighted the gap between facts and values. This is the idea that 'you can't get an ought from an is' or, in other words, although the right answer can be arrived at from reason or research methods, that answer does not suggest an action to take. In social constructivism the 'is' and 'ought' are one because there is no external reference point for knowledge claims. Following the implications of this position through, there is no way to establish a right answer or best explanation from research evidence, as all knowledge claims are relative. In social research, the extent of this perspective varies, but is typified in 'standpoint' research such as espoused by Acker et al, (1983) which aims to empower research participants. Here, a researcher's attempt to "bracket out" (Gearing, 2004 p.1439) their own experience from the research process would seem reactionary, or even oppressive, practice.

The fusing of personal values and professional research practices makes it difficult to debate truth claims. As Campbell (2012) suggests, if a person's views and identity are intertwined, and their views are criticized, their very identity is breached. From a social realist perspective discouraging debate threatens the development of disciplinary knowledge. This is because peer review is an essential part of the quality assessment process of research and truth claims. This is especially acute in horizontal knowledge structures (Bernstein, 1999) where knowledge progresses by dominant ideas being challenged by debate. I would argue that if knowledge does not progress as it should, then a greater amount of poor-quality research could be promoted, published and enter university curricula. This does not bring about a more inclusive curricula or more ethical research processes.

In line with a social constructivist view of knowledge, there has been a shift in emphasis in university education from trying to create equal opportunities to embracing diversity (Ahmed & Swan, 2006). Bernstein (1999) sees one manifestation of this shift in the curriculum through an appropriation of horizontal discourse by vertical discourse "this…raises an interesting question of the implications for equality by the recognition and institutionalisation of diversity. There may be more at stake here than is revealed by attacks on the so-called elitism, authoritarianism, alienations of vertical discourse" (1999, p.169).

In stark contrast to the dominance of the social constructivist and relativist perspectives outlined above, social realism seeks to illuminate the problems with a social constructivist position on knowledge and argues for a different way of creating conditions for people to access knowledge (equality) rather than intersecting disciplinary knowledge with everyday knowledge as Bernstein presciently reported (1999). In the first part of this theme I have described and critiqued a key challenge to disciplinary knowledge, characterised as 'voice discourse' or social approaches to knowledge. I endeavoured to use a social realist perspective to draw out some problems with this position: namely, that there is a fault in the logical construction of this perspective, and secondly, this position does not deliver what it sets out to do, in terms of distributive epistemic justice. That is, the fair "distribution of epistemic goods such as education or information" (Fricker, 2013, p 1318). In the second part of this theme, I will address the second key challenge to disciplinary knowledge to emerge from the literature, the increasing pressure for universities to produce instrumental knowledge.

2.4.2 The need for instrumental knowledge

Clearly, research does not take place within a hermetically sealed environment. There is an ongoing relationship between research institutions, their funders and political masters, and the wider public. This is often characterised in the literature as a contract between science and society (Hessels et al, 2009). The desire for research to provide certain types of knowledge for society in return for funding is part of this contract, which Hessels et al (2009, p.390) term the "identity" of science. This aspect of the contract is interesting as it shows where governance systems exert pressure on the disciplinary system to produce particular types of knowledge. These requirements vary over time, as evidenced by Bush's (1945) well-known report calling for financial support and autonomy for science after the Second World War, in order to protect basic science. His report on "Science: the endless frontier" defined research as either "basic" (addressing fundamental problems) or "applied" (concerned with real-world questions) (1945, p.233). A third optimised type of research which addresses both these aspects has been termed "strategic research" (Rip, 2004, p.153) or "Pasteur's quadrant" (Stokes, 1997, p.196).

The changing relationship between research institutions and society and its effect on research production has been explored empirically and theoretically. Ideas such as the "entrepreneurial university" (Etzkowitz, 2013, p.486), the "triple helix of university-industry-government relations" (Etzkowitz & Leydesdorff, 2000, p.109) and "Mode 2" knowledge production (Gibbons et al, 1994) are more recent examples of this type of research. They attempt to make sense of current changes observed in knowledge production systems. This literature is focussed at a systems level, so different in nature to material discussed earlier in this review, such as that investigating the internal properties of disciplinary knowledge, or the individual

actor's perspective from within the system. Nevertheless, it is necessary to refer to this research here as it provides a background for an important challenge to disciplinary knowledge, namely the increasing demand made on universities for instrumental research.

In a useful review, Hessels & van Lente (2008) summarised various diagnoses of the current relationship between science and society. They highlight various models that suggest a new mode of knowledge production (NMKP) is emerging alongside established ways of working in the disciplines. This mode is characterised by engaged research, which is researchers engaged with external partners and the public. For the purposes of this review I will outline two such models in order to illuminate the impact of external forces upon disciplinary knowledge: "the entrepreneurial university" (Etzkowitz, 2013) and "Mode 2" (Gibbons et al, 1994).

Etzkowitz (2013) charts the development of universities' engagement with industry to full entrepreneurial status. He suggests that being entrepreneurial is now universities' "third mission" (p.492) alongside teaching and research. He describes the process in three incremental stages. The first stage is for universities to move away from complete state funding, with the effect that they can set their own targets and direction. This is problematic, as, because of neo-liberalism, extra freedom comes with a cost of extra bureaucracy (Deem & Brehony, 2005). Political control comes from a combination of increased surveillance and monitoring to evaluate quality in research and teaching and also a renewed interest in the purpose and usefulness of universities in the knowledge economy, for example, the production of research to inform policy and professional practice such as in evidence-based practice. Etzkowitz' (2013) next two stages are less entangled in funding processes and regulatory administration, so in theory easier to realise. The second stage is that a university would conduct a review of its knowledge transfer activities, both pushing out from the institution and pulling in from industry. Teams are then

set up to administer these activities such as knowledge transfer / innovation teams or teams to act as a liaison between businesses that want to work in partnership with researchers. The third stage is to capitalise on these formalised partnerships and networks to create a strategic plan to advance the economy of the region. This includes the use of "boundary spanners" (Adams, 2014, p.113) namely, people who can provide a link between the different organisational spheres and interested parties from each institution. In the entrepreneurial model, these new activities are gradually incorporated into universities' remit in order to respond to the increasing importance of knowledge-based commodities in the world economy.

Another model, the most popular diagnoses of current modes of knowledge production is that of "Mode 1" and "Mode 2" knowledge (Gibbons, et al, 1994). Where the entrepreneurial model is focussed on interaction with industry, "Mode 2" has a wider remit and has a number of characteristics.

Mode 1	Mode 2
Academic context	Context of application
Disciplinary	Trans-disciplinary
Homogeneity	Heterogeneity
Autonomy	Reflexivity/social accountability
Traditional quality control (peer review)	Novel quality control

Table 1: Mode 1 and Mode 2 Attributes

From: Hessels & van Lente (2008).

It is clear from the above characteristics that "Mode 1" represents basic research and "Mode 2" applied. However, "Mode 2" is intended to describe a new way of working that goes beyond applied research in two ways. In its level of engagement with stakeholders beyond the university setting, and in the type of knowledge produced. "Mode 2" is research where its impact on society is considered at the outset

and it is evaluated by many stakeholders, not just the disciplinary community. It is also conducted in the site of its application, not just in universities but many different types of organisation and is typically inter-disciplinary in nature (Gibbons et al, 1994). It also claims to produce "socially robust knowledge", meaning that the applicability and relevance of the knowledge is high, due to the reflexivity of the researchers in incorporating practitioner and lay views on a topic (Hessels & van Lente, 2008, p. 742).

Both the models I have described are compared by their authors with basic research in order to highlight their characteristics. For example, Etzkowitz (2013) suggests that now HEIs "interact[s] closely with industry and government" (p.491), as opposed to an earlier model where the university was isolated from society. This is a reference to the protection of science originating in the late nineteenth century, which became dominant in the 1940s and 1950s (Williams, 2016). However, in an earlier paper, Etzkowitz & Leysdesdorff (2000) correct their readers' view on this 'ivory tower' model, reminding them that is a construct, originating in the USA in order to particularly protect science research, from overbearing interference from industry funders on the choice of research topics, the university curriculum and who was to be employed in HE institutions. They suggest, therefore, that knowledge has always been produced in a "Mode 2" fashion, with researchers coming together to discuss a particular problem, share ideas and spark new ones. They comment that "the so-called Mode 2 is not new: rather, it is the original format of science before its academic institutionalisation in the 19th Century" (p.116). Other authors cited in Hessels & van Lente's review (2008) also refer to "Mode 2" research as the original format of research, existing as far back as the renaissance (Rip, 2000, cited in Hessels & van Lente, p.753) with universities having always being in dialogue with governments' requirements' of research (Pestre, 2003, cited in Hessels & van Lente, p.753)

Support for this idea can also be found outside the academic literature. For example, in his TED talk, popular science writer Steven Johnson investigates "where good ideas come from" (2010). Focussing on ideas rather than the role of universities, he suggests that, contrary to popular opinion, ideas arrive through discussion with others and are the product of a long period of gestation. He calls this the "liquid network". He cites numerous examples of how ideas in science and technology were arrived at, not in isolation but through discussions and sharing with colleagues. He harks back to the early coffee houses of England where people from different backgrounds met and suggests that this was the ideal environment within which to work and those networks are the key to new ideas and innovation (Johnson, 2010).

Despite this historical knowledge, the idea that a societally engaged model of research production is somehow novel prevails. Another criticism of "Mode 2" is that it is generalised to all research, when in fact its characteristics only apply to some types of research that are close to practice and policy (Hessels & van Lente, 2008). Nonetheless, the popularity of "Mode 2" is still great, I repeated the information retrieval method described in Hessels & van Lente's review (2008) and identified 5701 papers distinctly referring to "Mode 2". The best use of the model is as a heuristic and discussion point and, as the Hessels & van Lente (2008) review concluded, it is important to regard the elements of "Mode 2" as separate phenomena, worth investigating further, rather than together as a new mode of knowledge production.

The emergence of research describing new modes of knowledge production reflects the institutional conception of research, which is strongly mediated by governmental agendas on the knowledge economy, discussed in the introduction to this study. With a need to operate successfully in economies increasingly dominated by knowledge as capital, higher education institutions are mandated to

complete a certain amount of research that addresses practical rather than critical questions. It can speak to policy, show impact at its inception, inform service planning, be conducted in the context of application and demonstrate an impact on society in a number of ways. It is not discovery research but research that prizes synthesis and application of ideas to solve problems (Campbell, 2012). The problems are not academic puzzles that advance a discipline, but practical problems or those which result in a commercial gain through producing a marketable patented product or idea (Knuuttila, 2013).

This kind of research is laudable and necessary as part of the contract with society. However, there is increasing emphasis on this type of research, particularly in the UK with the announcement of massive funding streams committed to relevant research and the impact element of the REF increasing for the 2021 exercise. There is also the ever-enduring tension between government requirements for single disciplinary, robust knowledge measured by peer review and bibliometrics, *and* societal relevant knowledge, as it is difficult to achieve both successfully in one study. There is always give and take between relevance and rigour.

In this context, in current higher education debates, it is telling that referring to the 'ivory tower', for example in popular websites such as "The Conversation" (Liboiron & Molloy, 2017), has become shorthand for, and synonymous with a related set of negative associations. These associations are redolent of the idea of outdated, irrelevant, self-regarding, elitist and profligate institutions rather than noble, public serving advancers of knowledge for the good of society, social justice and the economy. Instead, both in the literature and translated into everyday debate in universities, it is now a quick and unchallengeable device to support the argument for a more external-collaborative mode of working. In a context where little detail is given to what constitutes an 'ivory tower' model, a blank space is left for

people to fill in with images of lone researchers wasting money by 'just' sitting around thinking, which, particularly in times of austerity, can appear wasteful and pointless and make arguments for other, more inclusive and participatory forms of knowledge and knowledge production more persuasive. Research that sets out to make a difference will always be needed, but relevance is not the only characteristic that should be valued in research. Michael Young (2008) reminds us that debates about impact and the worth of research are only the current iteration of the rigour versus relevance debate and as Durkheim suggested in response to the twentieth century French pragmatists, because something works, does not indicate that it is true, just that it has utility (p.207). This is only one characteristic of research knowledge.

In this theme, I have discussed two challenges to the disciplines, social constructivist arguments, which focus on the knower and power relations within knowledge production, and the current governmental demand for societally relevant knowledge, manifested in research governance. These two challenges reinvigorate each other as different types of instrumentalism in a context where HEIs require impactful research and where those seeking to work in a constructivist way are able to secure more funding under the banner of co-production or innovation and knowledge transfer activities.

The disciplines are a construct, one way of organising knowledge and making it possible to conduct research and teach students on a global scale. Yet one of the difficulties in the changes in knowledge production is that considerations of what the disciplines offer as a positive and important way of working are lost or overlooked. I would argue that this advantage is outside other organisational benefits such as ways of physically housing groups of researchers and students, disseminating research through peer-reviewed journals, conferences and financing of such activities. Arguments for NMKP focus on the benefits of co-production and inter-disciplinarity. They

describe the disciplines as static and restrictive, rooted in elitist 'ivory towers', not producing the kind of research we need now and reject the linear model of upstream research - applied research - evidence based practice. They also use pejorative language and suggest that those that do not involve themselves with this kind of research are profligate and self-indulgent (Campbell et al, 2016). This type of argument plays out especially well in current times of austerity and cuts to public services and resonates with more radical constructivist standpoints. Viewed at this broad level, traditional organisation and development of the disciplines appear to offer little, but as those that have studied them remark, "granularity is everything" (Trowler, 2012b). It is therefore important to view the way in which the disciplines work to create new knowledge, in order that they are not neglected in an unheeding enthusiasm for new modes of working and producing knowledge.

2.5 Conclusion and Proposed Empirical Work

This chapter has introduced the disciplines as an object of inquiry, and the current challenges to them. I introduced social realism as a tool to be able to understand and critically assess the role of the disciplines in the complex picture of knowledge production in UK higher education. I hope to have argued that a social realist approach to knowledge provides the most useful way of comprehending how disciplinary knowledge develops and what is distinct about it. In a context of profound challenges to disciplinary knowledge, bringing together realist ontology with subjective epistemology is an enabling philosophical position applicable to theoretical and empirical research from science to the humanities and has several benefits in practice. Firstly, it is important for understanding the philosophical underpinnings of knowledge and this provides clarity on how knowledge is used and developed in higher education. Secondly, it guards against relativism by maintaining a gap between the knower

and the knowledge. This is an enabling perspective as it creates a gap between researcher and the object of enquiry. This means that inquirers are striving to achieve the truth and put mechanisms and processes in place to achieve this no matter how partial the final understanding may be. Social realism is also inclusive of the social aspect of scientific procedures as expounded by Kuhn (1962) and acknowledged by the scientific community (National Academy of Science, 1995). Finally, social realism reawakens Basil Bernstein's work (1999) on disciplinary development of knowledge that presents a useful theoretical model to help make sense of observations and data collected about disciplinary knowledge practices. Despite the many benefits of powerful knowledge, it is important to stress that it is but one knowledge form and there are limits to these benefits in different contexts (Young, 2008).

This chapter was organised as three themes. In the first section, I described different knowledge forms and characterised the disciplines and the knowledge they produce. I gave definitions of a discipline, field and subject and introduced theoretical ideas from Durkheim (1977) and Bernstein (1999) to aid understanding of how the disciplines generate knowledge. In the second theme, I focussed on the notion of research positionality and the philosophical underpinnings of the disciplines. I centred this section on social realism as a beneficial perspective for research practice. Finally, I discussed two key challenges to the disciplines emanating from philosophical and economic origins using social realism as a lens to problematise these challenges.

In reviewing the literature for this chapter, I have made a number of critical observations. To close this chapter, I list them below, together with my research questions and a rationale for my proposed study.

❖ The disciplines provide a space to produce specialised knowledge that is beneficial to society.

- ❖ Social constructivist perspectives on knowledge deny the differentiated nature and objectivity of disciplinary knowledge. These implications are hidden under calls for a more inclusive curriculum, and research that addresses questions of social justice.
- ❖ Disciplinary knowledge production has been mis-described as an isolated, disengaged practice (Hessels & van Lente, 2008) (May, 2004) in order to present the idea of a shift towards a new mode of knowledge production "Mode 2" (Gibbons et al, 1994).
- ❖ There is a lack of empirical evidence from a cross-disciplinary perspective to explore the effects of voice discourses and the demand for impactful knowledge on researchers' practice.

Few studies on disciplinary knowledge production look across different knowledge areas and include applied and pure areas of research in their investigation. This study is designed to look across a number of areas, taking a case study approach to achieve a snapshot of how disciplinary knowledge practices have been affected both implicitly and explicitly, by various factors, namely the social constructivist / critical perspective of disciplinary research and the increasing demand for instrumental knowledge in our universities. The study is an opportunity to investigate how disciplinary knowledge practices have changed and how this plays out across different disciplinary areas.

Questions arising from the literature have been framed into the following research questions to enable empirical investigation:

1. What are the commonalities and differences in researchers' practices in response to demands for instrumental research?

2. What is the extent and nature of change in disciplinary ways of working in different types of fields and disciplines?

3. What factors impact on the development and production of disciplinary knowledge in different types of fields and disciplines and how do they manifest themselves?

4. What are the implications of this research for the future of the disciplines?

The methodology and methods for answering the research questions will be outlined in the next chapter.

Chapter 3 | Methodology and Methods

3.1 Introduction

In this chapter, I present the methodology and methods used to conduct this study. It is structured around suggestions given in Trowler (2016). The aims and objectives are presented below, followed by the research questions and an overview of the research design. I then describe the study type and my rationale for this choice, explaining how I have worked to maximise the quality of the study by use of the concepts of rich data and thick description. This includes measures I have taken to improve the internal validity of the study and I suggest how generalisable or transferable the knowledge claims can be (external validity) in relation to the study design.

After this, I provide a detailed account of the study setting, sampling strategy, recruitment, data collection and analysis methods. I then move to address broader issues that impact on the study design such as researcher values, epistemology and ontology and I provide a comprehensive account of how my views impact the study. Finally, I include information regarding the research ethics governance process, to give a full account of the underpinning methodology and methods used in this study and the decisions I have made about these aspects of this work.

I begin with the aims and objectives of the study, research questions and overview of methodology/methods.

3.2 Aim and Objectives

Aim:

To explore researchers' experiences and identify if, why and how working practices and knowledge types have changed in the disciplines.

Objectives:

❖ To conduct a single site qualitative case study in one British University

❖ To recruit a sample of research staff from early career, mid-career and senior positions using a non-probability purposive sampling approach

❖ To collect qualitative data from a variety of disciplines by conducting five focus groups to reflect hard/soft/pure and applied disciplinary areas.

❖ To analyse the data using a thematic analysis approach facilitated by NVivo software in order to manage, reduce, describe and interpret the unstructured data.

❖ To present the results and interpretations of the data in order to answer the research questions set for this study.

3.3 Research Questions

1. What are the commonalities and differences in researchers' practices in response to demands for instrumental research?

2. What is the extent and nature of change in disciplinary ways of working in different types of fields and disciplines?

3. What factors impact on the development and production of disciplinary knowledge in different types of fields and disciplines and how do they manifest themselves?

4. What are the implications of this research for the future of the disciplines?

3.4 Overview of Research Design

I conducted a qualitative single site case study, in one research intensive British University in 2016/17. Using purposive sampling, researchers were invited to participate in group interviews that were designed to reflect different knowledge types. These were hard applied, soft applied, soft pure, hard pure (after Becher, 1989) and a final multi-disciplinary group. The data was transcribed and downloaded into NVivo software. The data was organised, reduced and clustered into themes that would address the research questions using an approach based on Braun & Clarke's thematic analysis (2006). The themes were then reviewed to identify interactions between them, and places where data coalesced or diverged according to disciplinary area or academic rank. I discussed the findings with reference to the literature reviewed in Chapter 2 and new literature on the same topics. Comparing the data with ideas from the literature showed where the findings reinforced existing ideas or opened up a "discursive gap" (McClean et al, 2013, p.265) that offered a different

perspective. This process enabled new meta-themes to emerge that were brought together in the final chapter of the thesis. In the final chapter, I present the knowledge claims from the study, conclusions and implications for research. The research questions refer to the disciplines as both a social system and as a body of knowledge. Consequently, the research design provides an opportunity to learn more about the factors that affect the disciplines and how these factors change researchers' practice and the knowledge they produce.

3.5 Study Design

3.5.1 Rich data and thick description

The study is a single site qualitative case study. The meaning of case in this study is no more than the setting or "empirical unit" (Ragin & Becker, 1992, p.9). Qualitative research methods are designed to elicit participants' views, feelings and opinions on a given topic. The strengths of a qualitative approach are that the researcher can gain knowledge that is immediate and personal as it comes directly from those who are experiencing the phenomena of interest. This provides authoritative knowledge on a particular area and insight into a topic. Two characteristics that are commonly cited as markers of quality in qualitative research are 'thick description' and 'rich data'. I will discuss each concept in turn here.

Qualitative research is expected to produce a 'thick description' (Grandy, 2010, p.501) which has been described as a well-rounded and detailed description of events (Schwandt, 2007). In a briefing article on this topic, Ponterotto (2006) suggests a way that thick description can be practically employed in a "common interview study" (p.546). He cites evocative descriptions produced in longitudinal qualitative studies such as ethnographic and life-story investigations and suggests these are not commensurate with all qualitative study types. Such visceral descriptions do not lend

themselves to a small case study. Nonetheless, in my study, I have made efforts to describe the setting, participants and procedures in as much detail as possible in order to make the link between thick description and thick interpretation (Ponterotto, 2006). For example, in the findings section I have aimed to present the findings from the participants' perspectives and give detailed quotations of their contributions and group discussions. This is in the hope that "...a sense of verisimilitude is achieved as the reader can visualize the participant-interviewer interactions and gets a sense of the cognitive and emotive state of the interviewee (and interviewer)" (Ponterotto, 2006, p.547). With the aim of producing a thickly described (Ponterotto, 2006) discussion I have merged the participants' perspective with my own interpretation, framed by the existing literature. I have aimed to go beyond mere description of the study methods to follow the concept of thick description (Grandy, 2010) throughout the analysis and reporting of the study.

However, whilst it is important to describe the setting and participants as fully as possible, this should not be at the expense of respect for individual participant's anonymity. By following the concept of thick description (Grandy, 2010) I have aimed to give authenticity to the project, such as communicating that the interviews really happened. I also used the concept to improve transferability of the findings, that is to provide enough description of the setting, sample and participants for others to apply in, or at least relate to their own setting. A good description of the study procedures also aids internal validity as it provides a transparent account of the methods used and the thinking behind these methods. It also enables the reader to make a judgement on how believable the findings are and how far they are based on the data.

Another expectation from qualitative research is that it will produce rich data. In this study, the data collection methods were chosen to get an overview of four knowledge areas by having four groups. As

with the concept of thick description, focus groups did not lend themselves to the same level of rich data that would be found in an ethnography or observational study, but this was not the aim of the study or necessary to answer the research questions. There was sufficient depth in the data from each group and particularly in the pure groups; by that, I mean detailed discussion of the questions. In addition, as Bryman et al (2008) suggest, there are no standardised quality criteria for qualitative research and debate exists in the qualitative community as to what constitutes good quality research. Given that rich data and thick description are difficult concepts to define and therefore problematic to demonstrate in qualitative research, I hope to have explained and demonstrated how I have interpreted and used these concepts in this study.

Data saturation is another important idea in qualitative research that is often linked with quality. However, although important, it is also contested and suffers from a lack of clarity in its definition (O'Reilly & Parker, 2013). Although the idea emanates from grounded theory (Glaser & Strauss, 1967), it is now used widely across most qualitative studies. Guest et al (2006) offer a broad definition that fits in any qualitative study type, namely "the point at which no new information or themes are observed in the data" (p.59) but suggest that it is difficult to translate into practice given a lack of guidance. As data saturation is regarded as a key element of a study's quality, I want to offer a description of how I addressed this concept and give evidence of how it was attained.

After I had analysed data from the first four groups, I decided to put together a final multi-disciplinary (MD) group to conclude the data collection for the study, instead of setting up more groups in each vertical segment. Increasing the sample in each vertical segment would reflect a more quantitative idea of data saturation, expanding the number of groups in each section in order to increase the validity of the study. Increasing the sample in each vertical segment would

place more emphasis on the groups and the segmented nature of the sampling rather than the ideas, concepts and themes arising from the whole sample. For this reason, I decided to do one final group, bringing together new participants from all the departments/disciplines represented in the first four segments. This decision provided the opportunity to establish data saturation on particular ideas, as they were expressed again by participants from the same segments as earlier, such as ideas on "Mode 1" and "Mode 2" knowledge (Gibbons et al, 1994). The final group produced a different type of data that gave an overview of the topics. This was explained by the make-up of the groups. In the earlier groups, deeper discussions were enabled, as people knew each other and worked in the same field, discipline and department. In the final (MD) group, people automatically gave more context or spoke with more distance as they had to make themselves understandable in the group. In this way, there was not only a confirmation or restating of ideas expressed earlier in the study (data saturation); it also provided the same ideas from a different, more objective perspective, but still presented as personal experiences. Earlier in the study, these ideas had been expressed at a more subjective level, framed more personally.

3.5.2 Internal validity

Internal validity in qualitative research is about ensuring the quality of the research and its proper conduct. That is, demonstrating the measures the researcher(s) have put in place to conduct research ethically, using an appropriate study design to answer the research questions. As Bazeley (2013) puts it, researchers "[need to] demonstrate that there is a sound basis for [their] … inferences about the phenomenon being investigated" (p.402). I have explained above the choice of study design and efforts made to conduct a good quality study, that is, transparently reported following established

educational research methods. With reference to the data collection methods, the group interview format, questions and coding process were tested in a pilot exercise in order to establish the internal validity of this data collection method. This allowed the questions to be constructed clearly and asked in the most appropriate order. It also allowed me to clarify the concepts in my own mind and ensure that the questions would elicit the information needed to answer the research questions.

3.5.3 External validity

External validity means how well the findings can be transferred or generalised to another context. The findings from this study can give insight about other similar contexts, but it was not designed so that the outcomes could be generalised to other populations. Rather, the collection and analysis of qualitative data provides a unique insight into the disciplines and would not be accessible using quantitative methods. A limitation to a qualitative case study design in that working with a small purposively selected sample it is not possible to gain a reliable overview. As the sampling is non-probability, findings are not generalisable outside of the specific study context. However, as described in the study design section above, if a clear enough description of the context of a qualitative study is given, this provides a good basis for transferability of the findings in a new context. As Wellington & Scerbinzki (2007) suggest "People reading case studies can often relate to them, even if they cannot always generalize from them. This ability to relate to a case and learn from it is perhaps more important than being able to generalize from it" (p. 95).

3.5.4 Rationale for choice of study design

I chose a qualitative approach for the study for two reasons. Firstly, because a qualitative approach provides the best way of answering the research questions. There is no better way to find out about the

disciplines than to speak to researchers themselves who are working daily to further the disciplines through research and teaching. Secondly, it is pragmatic; it is a better choice for a small-scale solo study and allowed me to focus on learning one research approach and one data analysis package. This allowed me to develop a clearer focus and understanding of the stages of the study and more time was available for the analysis and reporting stages. It also gave greater space for the exposition of the study within the constraints of the thesis format.

At the outset of this project, I considered a mixed-methods approach. This was to provide two forms of complementary empirical evidence to test claims in the literature (Hessels and van Lente, 2008) that the disciplines were shifting towards a different type of knowledge production method, commonly termed "Mode 2" (Gibbons et al, 1994). An analysis of secondary data sets was considered for the quantitative element. On investigation of the "Mode 2" attributes, I found that the concepts were too broad and each aspect too large to examine in this manner in one small study.

Following the investigation into new modes of knowledge concepts, I refocussed the study on the disciplines as an organising structure of knowledge, which was always my central interest. The research questions and study design were realigned to fit this focus and become a mono-method qualitative study. Incorporating quantitative studies in the literature review provided context and an overview of the phenomena in question, the characteristics of knowledge production and the disciplines in UK HE. This material provided a backdrop to the empirical element of this study that drew on individual's and disciplinary groups' views and experiences in conducting research. This resonates with Becher's (1994) landmark research on the disciplines in HE, which advocates that empirical research in this area should mirror the two sides of the disciplines themselves. That is, the core characteristics of knowledge itself and

the social and cultural habitat in which it is created. With this in mind, the research questions explore these different perspectives on the topic, and the literature review includes a variety of evidence, to aid understanding of the field of inquiry.

3.6 Setting, Sampling Strategy, Recruitment and Data Collection Methods

3.6.1 Setting and data collection methods

The study took place in one research intensive British university. Participants were staff employed to undertake research, either in a research or academic role. I invited university researchers to participate in one of the four groups, which reflected a variety of disciplinary practices. The disciplinary location of the four groups were based on a published typology of disciplinary knowledge, (Becher & Trowler, 2001, p.36). One group was drawn from each part of the framework as indicated below:

Group One	Group Two	Group Three	Group Four	Group Five
Soft Applied (social science based professions)	Soft Pure (humanities and social sciences)	Hard Applied (science based professions)	Hard Pure (natural sciences)	Multi-disciplinary

Table 2: Disciplinary Typology Used to Establish Focus Groups

There were 29 participants in the study, from four disciplinary areas. In each group, staff with different levels of experience were sought, within each disciplinary area. Other demographic characteristics such as race or gender were not recruited to, but not actively recruited against, so for example most groups had a mix of men and women. Career ranks were defined as Early Career Researcher (ECR), Mid-Career and Senior Academic. These categories were defined by job

title and length of experience in a research role, with ECRs being defined as those with 0>5 years' post-doctoral work and Mid-Career academics typically 5>15, anyone with >15   experience was described as a senior academic. A summary table is given at the end of this section (Table 3). I took care to choose disciplines that were clearly located within the knowledge areas. A fifth group was undertaken in order to pursue any gaps in evidence from the initial groups or to probe or explore emerging themes that needed expanding. The fifth group consisted of new study participants from the four original disciplinary areas with the same mix of career ranks. The final group was devised in order to give a fresh, but not new perspective on the data and bring a sense of completion to the data collection activities.

Knowledge Area	Breakdown of Participants by Academic Rank	Total number of participants by group
Soft Applied	ECR (n= 1) Mid-Career (n=1) Senior n=1)	total (n= 3)
Soft Pure	Mid-Career (n=3) Senior (n=2)	TOTAL (n=5)
Hard Applied	ECR (n=3) Mid-Career (n=1) Senior(n=2)	total = (n=6)
Hard Pure	ECR (n=1) Mid-Career (n=3) Senior (n=3)	total = (n=7)
Multi-disciplinary	ECR (n=3) SP, HA, SA Mid-Career (n=1) HP Senior (n=4)(HP n=2), HA, SA,	total=(n=8)

Table 3: Summary Table of Participant Characteristics

I collected qualitative data by conducting four focus groups. Focus groups are defined as "...group discussions exploring a specific set of issues" (Kitzinger & Barbour, 1999, p.5). They were chosen in order to bring together researchers from specific research teams. Creating homogenous groups facilitated easier discussion and allowed the conversation to be unfettered by additional explanation of subject

terminology or concepts to others in the group (Morgan, 1998). The groups had enough diversity in terms of role and sub-fields to not be reduced to shorthand between group members or participants not fully explaining their contributions due to an established way of sharing information. The most diverse group was the hard applied group in terms of participant's disciplinary background, but participants knew each other well enough to share their views. However, the group was not as fluid as some of the other groups that possibly knew each other better. The final group benefited from diversity of participant department and disciplinary background, as well as career rank. In the final group, homogeneity was found at a higher level of granularity as all had a role that was focussed on research and all were employed by the same institution. Before the final group I reviewed the interview schedule based on data collection needs after candidate themes and sub-themes had been developed from analysing data from the first four groups. The final group was multi-disciplinary and as such particularly enabled the commonalities and differences across the disciplinary areas to be additionally explored through the discussion.

3.6.2 Sampling and recruitment

I used a non-probability sampling strategy in the study. The aim was to recruit 4-6 participants for four stratified groups and for each group to be demographically diverse, that is, a mix of career stage and types of research undertaken. As such, the sample was purposively chosen, in order to elicit a range of views and experiences on conducting research and the choice and variety of methods used (Wellington & Szczerbinski, 2007). I drew up a shortlist of departments, reflecting the areas of Becher's framework (1994) (see Table 2). I booked suitable rooms in or near to the chosen departments in order to minimise barriers to participation. I designed a recruitment poster and created text for an email to communicate

the purpose and practical arrangements for each group (see Appendix A to view email text). After this, I made an introductory phone call to candidate departments to ask research administrators if the recruitment email could be sent out to research staff, which was agreed.

These activities were only with two departments at first in order to recruit to the first two groups (planned for November/December 2016). After a week I asked for the email to be sent out again as I had no responses for either of the first two groups. After phoning a researcher in the first group and not getting much further, it seemed that the groups would not get going for lack of participants. Two things happened to change this. One person came forward from the soft applied group and suggested someone else who might be interested. I spoke to the recommended person who was keen to be involved. This mini "snowball" recruitment (Frey, 2018, p.1532) increased my confidence to send targeted emails to others in this department and I eventually ran this group first with three participants.

After gathering advice, I also created a script to use when recruiting via the phone and set about recruiting to three other groups using this method. I 'cold called' researchers, setting aside periods of time to dedicate to this activity following up requests for more information or to call back later as required. This proved a successful approach and I had good group numbers (between five - seven people) in each subsequent group. Before each group, I sent a follow up email reminding people about the date/venue and asking them to think about the opening question. I also attached the participant information sheet and the consent form. I often stressed the unique importance of their attendance. As Morgan, (1998) points out a common failure of focus groups is lack of attendance (not to be confused with lack of recruitment). He suggests that this is chiefly because participants believe that their attendance is not needed, that

is, that someone else in the group will represent their views. He posits that if people are convinced that what they have to say is important and will not be captured by others, they are more likely to attend. I had one-hundred percent attendance at all the focus group sessions.

<u>3.6.3 Research instrument and pilot group</u>

I developed a draft interview schedule by reviewing the research questions and mapping how evidence would be found for each question. Some evidence had already been found through the literature and other published information sources which were included in the literature review chapter. Once I identified what was to be collected through the groups, I developed questions mapping onto these areas. The questions were in three main areas: research methods, academic freedom and modes of knowledge production. I also planned the sequence of the questions in order to include an introduction and 'warm up' question before leading into the substantive questions, followed by a concluding question and opportunity for final comment. Follow up questions were also devised in order to help me explore an area more easily by having a number of 'ready-made' extra questions to hand. I also noted a list of probes such as 'could you give me an example of that' or 'could you explain further' to help out the moderation process. I referred to the work of Morgan & Krueger (1998) at different stages of the data collection process, their work was particularly helpful in developing questions and planning the focus groups.

When I had developed a draft interview schedule, I conducted a pilot group interview. The pilot group interview was used as part of preparations for data collection. It was used to address practical, instrument design and moderation questions, allowing me to pilot the interview schedule and experience the dynamic of the interview situation. It gave me the opportunity to try out my new role as moderator and to see how it felt, in order to replicate or change how I

presented the session. It also provided an opportunity for me to receive feedback from participants as to what worked and suggestions on how to improve things. The following objectives were fulfilled in the pilot group:

❖ To experience the role of being an interviewer and what persona to adopt (Miles, Huberman & Saldana, 2014)

❖ To test out the order of questions and activities: for example, welcome and housekeeping comments, different types of questions and responses to stimulus materials.

❖ To ascertain if particular questions worked / did not work, and the reasons why, in order that they could be amended before the groups began. This could entail changing the wording, how they were introduced, or the order in which they were presented.

❖ To try out techniques to moderate discussion for example, encouraging people to speak, making sure one person did not dominate; making sure everyone had a chance to speak.

❖ To test the recording device and increase familiarity with it.

With these objectives in mind, I ran the pilot focus group in my department with my immediate colleagues. I tried to replicate everything I intended to do in a focus group proper. After the group, I recorded the feedback from the participants and any reflection I had on the session. I then went back to methods textbooks such as Krueger, (1998) to read more about creating an interview schedule, prompted by feedback from participants. For example, in one question I used on university initiatives to encourage research impact, I gave an example and shared an email advertising such an event. The participants naturally focussed on the example rather than the more

general idea of the existence of these types of groups. Looking at Krueger, (1998) he suggested that best practice was to ask the question and then give the example if the group was struggling after a certain point. As a result of the pilot, I made other changes before the first group, such as changing my presentation to that of facilitator and listener - I was previously taking up too much time describing the study and the topic. I also reversed the order on one question giving the description of something and then giving their labels, such as "Mode 1". I presented more of the material as written prompts, such as the characteristics of "Mode 1" and "Mode 2" in a table. This meant that I did not have to say as much, and I provided a stimulus for participants' discussion. I also took on practical ideas, which can be easily overlooked, such as printing out extra copies of any stimulus materials so people did not have to share.

3.6.4 Group interview procedure

I facilitated each group. The group were greeted, and I introduced consent forms before the session began. I also provided lunch at the beginning of the session. The interviews ran for approximately one to one and a half hours and took the following format:

❖ A warm up question where people introduced themselves and talked about the most exciting piece of research of which they had been a part.

❖ A number of questions and statements were presented to the group for them to consider and respond. These were in three phases: methods development, types of knowledge and modes of production. The group shared their experiences, anecdotes and views. I observed genuine enjoyment of the interview process, with lots of contributions, smiles and interactions.

❖ I moderated the group discussion and encouraged participation. I introduced follow up questions, managed the time and made sure

all the topics were covered. Lessons were learned about the facilitation process such as how to manage a dominant speaker, the importance of using participant's names and how to bring out shyer participants. I reflected on these experiences and took my learning forward into the into the final multi-disciplinary research group. The data collection work also gave me useful experiences to build on in future projects.

❖ A typical question was "Do you think research methods have changed in (x discipline) over the last 20 years?". The interview schedule is in Appendix B.

3.6.5 Data collection and management

I asked the same questions, in a similar way to each group in order to have a consistent approach with each segment of the sample and aid data saturation (Guest et al, 2006). The groups were moderated by me alone and recorded using a digital recording device. I then uploaded the data to a secure University drive and immediately deleted the interviews from the recording device. The data was then accessible by me and the transcriber, a University employee, trained in the University's information governance policies. Only the two of us had access to the folder. After a transcript was produced, I checked it against the original recording and improved accuracy due to knowledge of the subject and having been present at the discussion groups. I also found and noted mistakes in my moderation such as failing to follow up a useful line of questioning or a question presented in a way which was not fitting with the group atmosphere. At this stage the anonymised transcripts were sent to group participants in order that they could check them for accuracy and add any other comments should they choose to do so. A record of this email is included in Appendix C. I then made clarifications to the

transcripts and I also received some additional comments from one participant.

3.6.6 Overview of groups

Group One: Soft Applied

This social science group had people from two neighbouring disciplines present. There were three researchers in the group, one senior, one mid-career and one early career researcher. The participants knew each other and had enough understanding of each other's work to able to discuss the questions fluently, responding to each other's comments. There was a friendly and respectful atmosphere in the group, one participant spoke at some length, but all participants had their turn to speak and made valuable contributions to the session.

Group Two: Soft Pure

This humanities group comprised people from one department. There were five researchers in the group: two senior academics, two mid-career and one early career researcher. This group knew each other well and it was a comfortable atmosphere. There were a number of jokes between the participants and people used first names easily to address each other. There did not appear to be any restriction in how people contributed due to concern for academic hierarchy or rank.

Group Three: Hard Applied

This group of researchers comprised people from one department, but from different disciplinary backgrounds. There were six researchers in the group: two senior academics, one mid-career and three early career researchers. The group knew each other, with some people having worked together before. As the participants were from different backgrounds, questions on methods and their discipline were answered from individual perspectives. Questions on

dissemination of research and academic freedom were easily shared as a group.

Group Four: Hard Pure

This group of scientists comprised people from various fields from one department. There were seven researchers in the group: three senior academics, three mid-career, and one early career researcher. The group knew each other and there was a relaxed atmosphere in the room with the group sharing a few light-hearted moments as part of the session. Despite working in different fields, participants were from the same disciplinary background and department so there was enough shared experience to allow them to pick up on each other's comments and overall the discussion flowed well.

Group Five: Multi-disciplinary

This group of researchers comprised new participants from all the departments that had participated in the study. This was to arrive at a mix of people from the four knowledge areas. There were eight researchers in the group: four senior academics, one mid-career and three early career researchers. The spread of knowledge areas was: two hard applied, two soft applied, three hard pure, one soft pure. The group knew their colleagues from their own departments, but they did not necessarily work together. Due to the heterogeneity of the group, the discussion was a little more stilted. However, there was still a good discussion of the topics, because as the group were all researchers in the same institution, there was a lot of shared ground. The group settled into the interview quite quickly and there was a respectful atmosphere in the room. Participants shared experiences and there was some humour, and genuine interest in the different disciplinary perspectives that were shared. When I analysed the data, I found that the level of heterogeneity of the group enabled a different kind of data to emerge, that was framed by greater distance and context.

I reflected at the time:

It was difficult to get any line of discussion going as people didn't pick up as much on each other. So it felt like a series of statements "in my area x yz" "Well in my area it's a b c" ... difficulty was the heterogeneity of the group, but will see what has come up when I analyse it. Definitely some repeated ideas, technology, Mode 1/2 criticisms, pure researchers felt their work undervalued. Hard to get more depth on anything though and felt very surface, but some agreement at this level amongst participants.

3.7 Data Analysis Methods

Data analysis followed the phases as outlined by Creswell (2009): preparing the data for analysis by transcribing the data; reading through and listening to the recordings to get a general sense of the data; coding the data. I considered two methods for data analysis, thematic analysis (Braun & Clarke, 2006), and framework analysis (Ritchie & Spencer, 1994). I chose thematic analysis as, although it is "poorly demarcated, rarely-acknowledge, yet widely-used" (Braun & Clarke, 2006, p.2), some form of the process is used in most qualitative research; consequently it is regarded as a basic method which every researcher should have some familiarity with. I found Braun and Clarke's (2006) article useful as it explained the method and provided a step-by-step guide to using it. From a personal perspective, I felt it was important to learn basic qualitative skills before moving onto other methods such as framework analysis, which are built on key elements of thematic analysis such as reducing and describing data and creating categories and themes. It is also easy to understand, if not necessarily easy to employ in practice. Thematic analysis can also be tailored to different qualitative study types and used as an analysis tool for studies with any philosophical

underpinning. I viewed the data from a social realist view, describing the "experiences, meanings and the reality of participants... and the way the broader social context impinges on those meanings" (Braun & Clarke, 2006). In alignment with this view, I identified and examined themes at a "semantic level" (Boyatzis, 1998, cited in Braun & Clark, 2006 p.13). That is, I identified patterns and themes in the testimony of the participants, beginning by describing the data and presenting their ideas in the results chapters before moving to interpret these themes in the discussion and conclusion chapters.

In this study, the *content* of the interviews was the main focus, rather than the *context*, where body language and group interaction become central (Wilkinson, 2011). However, these things were noted where distinctive in the findings chapters, such a sense of energy being present after a certain question, or a generally cohesive or quiet group. The analysis began by taking a deductive approach, mapping from research questions to interview schedule to participant answers. However, I also identified other ideas from the data inductively, as the analysis process continued. As Bazeley (2009) suggests:

There is no problem with a priori categories or themes as long as they are recognised and declared as such, and they are actually supported in the data; the analyst can still retain flexibility and be open to the presence of finer nuances or different emphasis in the data (p.9).

3.7.1 Stages of analysis

Stage One (Familiarisation)

The audio recordings of the group interviews were transcribed by a professional transcriber, employed by my institution. I checked the transcripts for accuracy and edited them where appropriate. This was done in conjunction with repeated close listening to the focus group recordings. It also helped me gain more familiarity with the data. I compiled an Excel spreadsheet detailing the demographic

information of participants. This had information on name of group, such as Focus Group 1 (FG1), participant indicator such as Participant 1 Group 1 (P1G1), discipline area such as. soft applied, soft pure, hard applied, hard pure SA, SP, HA, HP, and level of research experience. For level of experience, I used the categories: Early Career Researcher (ECR), Mid-Career, or Senior Academic. The transcripts were formatted with clear headings to indicate speakers using a naming convention P1G1, P2G1, P1G2, P2G2 etcetera, based on both the order in which the groups were conducted, and people spoke. At this stage, the transcripts were sent to group participants. This gave them the opportunity to add any further comments and/or correct any mistakes in the transcription, for example, where an utterance was misheard or inaudible on the recording. Participants were also able to highlight any inaccuracies in assigning contributions to speakers. Once the transcripts were approved, I read and re-read the paper transcripts in accordance with the familiarisation phase of thematic analysis. I annotated the text with initial ideas and noted interesting words and phrases in the data; notes and thoughts were also recorded for later use. After each transcript was examined as described above, it was uploaded into qualitative analytic software (NVivo Pro 11). The Excel spreadsheet and audio recordings were also uploaded.

Stage Two (Generating Initial Codes)

I coded the transcripts using a flat non-hierarchical structure of labels to describe both participants' thoughts and obvious links to the data collection instrument. This in turn linked back to the research questions. The open coding stage comprised one initial pass of the data to create the codes, which focused on broad areas such as 'research methods stayed same' or 'academic freedom'. This was followed by a second pass to review the codes by using the 'coding stripes' feature of the software to check that everything had been coded to my satisfaction, that no sections had been missed. At this

stage, additional codes were added, codes merged and sections of text coded to existing codes. Annotations and stand out words and phrases noted in stage one were now added into the software using the 'Annotations' function. I also used the project journal feature in NVivo to capture ideas as they occurred, in order to facilitate later analysis and capture analysis decisions as they happened. This helped to make the research process as transparent as possible.

Stage Three (Searching for Themes)

Initial categories and codes were created using a handwritten mind map, using mind maps of nodes created in NVivo. I printed out a codebook of the open coding (stage two) and used this paper codebook as a checklist and notepad. This enabled me to review all the initial codes and rename or merge them. At the end of this stage, there were five categories with underlying sub-themes. The stage two open codebook and a screenshot of the stage three codes can be seen in Appendix D.

Stage Four (Reviewing Themes)

I completed this stage in two sub-phases:

In this stage I reviewed individual participant's contributions underlying each category and some categories were found to be too diverse and not constituting a potential theme. One category had to be split into three new ones and the technology category was conceptualised as impacting on each stage of the research cycle. I referred to the project literature review to refresh my mind on particular concepts such as academic freedom and "Mode 1" and "Mode 2". At this point, I had a feeling that this stage of the process was becoming increasingly redundant, that I was moving codes around for the sake of it, so this first part of stage four was concluded.

The second part of this stage consisted of going back to the transcripts and reading through the data again in paper format to make sure that everything had been coded appropriately and nothing had been missed. Some items were flagged to be potentially dropped from the analysis. Notable quotes were also coded as a node to enable easier identification later in the project.

At this point, I reflected on the data and decided to conduct a final focus group to complete the data collection. This was to seek a sense of completion by revealing similar themes and ideas in the final group and to attempt to fill in any gaps that emerged from the data analysis so far. In order to prepare for further data collection, I checked certain 'hunches' or gut feelings to see if there was a lack of data from certain groups about different types of knowledge. In addition, the source of data for each category was checked to get a feeling of where there was a lack of evidence in the data set using the 'summary' tab. For example, of the data coded to the theme 'academic freedom' the least data for this theme came from the soft pure group.

I reflected at the time:

"thinking about it so far, might have been better to do autocoding on questions and create four categories based on different questions and then code for sub-themes from there. Seemed to spend a lot of time messing about."

However, a benefit of working through the early stages line by line meant that I had massively increased my familiarity with the data. Before stage five, the results of the final focus group were coded at Phase four and incorporated into the data set in NVivo. I decided to move away from NVivo and use writing and mind maps to create better potential categories. I reflected at the time that, although Braun & Clarke (2006) state that thematic analysis is easy and does not need particular skills, it was impossible to know if it was being done

correctly and required an element of bravery to plough on and see what happened. I noted in my research diary:

"There is definitely an emotional element to doing research which I hadn't thought of before... feel like I am jumping into an abyss and I hope the parachute works. Diving into the data?"

I reviewed annotations and notes to refresh my mind of these 'soft data'. I also reviewed any project notes, notepads, mind maps, and diagrams on the transcripts. Practically, these were brought together in the project journal or using other NVivo tools where possible in order to keep ideas together.

The analysis then continued with a preliminary writing of a narrative account (first summarising and then synthesising) of each potential theme, which I named 'ingénue themes' pre-Phase Five. This is because without writing it was impossible to move forward with the analysis as it had gone as far as it could with reading extracts, coding and merging and creating nodes and categories. The ingénue themes were also mapped to the research questions to see an overall view of how they would provide evidence and link from RQs through data collection to analysis and presentation. I also found that I needed more information on data reduction methods that I found in two articles (Burnard, 1991; Burnard et al, 2008) which give advice on data reduction in a very practical way.

Phase Five (Defining and Naming Themes)

At this stage, I created themes using a concept map and the summarised categories of the stage four 'ingénue themes'. I printed them out and cut up the text (the categories) which I then put together and wrote a narrative. At first, I kept it descriptive and explanatory with some interpretation, I also gave an introduction as to what the theme was reporting and what stage the data had come from, for example in response to which interview questions and

which earlier phase four categories. After this exercise, I had a findings chapter, but the data was still not presented as I would like it, so I reworked all the themes again using a series of mind maps (see Appendix E) and began rewriting into what became the final findings chapter.

3.8 Researcher Values, Epistemology and Ontology

A researcher's own values impinge on their research throughout the process, in the planning and motivation to conduct the research, in its administration, and dissemination. If research is reported transparently and with sufficient detail on how and why it was conducted, it aids the reader's understanding of the research. A useful framework to examine the impact of researcher values is the research paradigm, which prompts reflection on ontological and epistemological beliefs, methodology and methods. Aspects of a researcher's own biography and their attitude to the place of research in society are also important to reflect upon, as they can affect how research is conducted. May (2001) suggests values impinge on research across its course from funding to dissemination. This linear view provides a very inclusive way to reflect on research and consider how values have influenced a project. In the following section I briefly present how my values have impinged on my research, using May's (2001) linear approach and begin with a summary table.

Research Stage		
Pre-Research motivations	**Research in progress**	**Post research**

❖ Choice of topic
❖ Choice of research questions
❖ Philosophical beliefs: What is reality? What is knowledge?
❖ Choice of Methodology and Methods
	❖ Relationship with participants
	❖ Data collection in action: choice of questions, persona in interviews, tone of voice
	❖ Respondent validation
	❖ Interpretation of data (Semantic or latent analysis)
	❖ Ethical Issues in practice
	❖ Recording of methods (audit trail, reflection/reflexion)
		❖ Writing for multiple audiences
		   ➢ examiners
		   ➢ research community
		
		❖ Further dissemination -
		   ➢ Choice of communication methods
		   ➢ Interpretation of research by others

Values		
⟵⟶		

Table 4: Researcher Values in the Research Process

(Adapted from Woods, 2013)

Choice of Topic and Research Questions

I have degrees in the humanities and social sciences and have worked for nearly 20 years as an information scientist, latterly in a multi-disciplinary research department at the University of Sheffield. The experiences of belonging to different professional and academic communities led me to notice different approaches to knowledge within these groups. Through study and conducting my own research on the EdD programme, I became fascinated by the philosophy of science and how different perspectives are manifest implicitly and explicitly in research practice. I also recognise that the social realist position on knowledge has particular resonance with my own working-class background. This is because, in differentiating between knowledge forms, their importance becomes clear. As Young & Muller (2010a) state:

…recognising the differentiation of knowledge makes explicit that concepts, skills and content are all important and must be stipulated in the curriculum. Failure to do so means a slowing down of any progress that has so far been made towards equalising epistemological access (p.23).

Philosophy of Science

My positionality, in terms of ontological and epistemological views, is that of a realist. I believe that there is an external reality outside of our thinking. In terms of knowledge creation, I believe this is created socially, building and sharing on other's work. Social realism provides a theoretical basis for conducting and critiquing research. This has informed my methodological thinking and methods. Cohen & Crabtree (2006) describe the benefits of this position clearly:

By positing a reality that can be separate from our knowledge of it (separation of subject and object), the realist paradigm provides an

objective reality against which researchers can compare their claims and the extent to which they ascertain truth. This is sometime called credibility or trustworthiness of an account *("Critical or subtle realist", para. 2)*.

They go on to suggest how it may inform research practice "However, the realist paradigm also recognizes that researchers' values are inherent in all phases of the research process... 'Objectivity' is an ideal to strive for and can be achieved through the use of rigorous qualitative research methods*" ("Critical or subtle realist", para. 2).*

As Wellington & Szczerbinski, (2007) suggest, it is now widely accepted that the researcher has an impact on the research they are conducting. It is not possible to be completely objective. Acknowledging this effect, I believe it is important to avoid bias. Hammersley, (2008) defines bias as "...error resulting from a conscious or unconscious tendency on the part of the researcher to produce data, and/or to interpret them, in ways that are in line with his or her commitments or prior assumptions" (p.551). As such, a reflexive approach is crucial to identifying any areas that could skew or lead the research project away from its intended aims and objectives (Watt, 2007). In this research, I have aimed to be as objective as possible in order to avoid bias and provide credible findings. I have put a number of measures in place, such as this reflexive account in order to put this into action. I describe this further in the rest of this section on values.

Methodology and Methods

The project aimed to achieve an overview of different disciplinary areas. This sacrificed a level of depth in the data obtained but achieved breadth that was the hallmark of the study and aim of the research questions. Commensurate with my desire to be objective, is my aim to have clear boundaries between myself and the research participants. This meant taking sole responsibility for my work and treating the participants ethically. My personal presentation was to be professional and friendly. The data collection involved working with 29 different participants over five different groups; as such, it was easier to maintain a distance from those participating, as there was limited contact between us.

In order to conduct the research, I had to obtain ethical approval from my institution. This process enabled me to outline in practical terms how I would work ethically with my participants. I have documented this in the appropriate sections below. Where ethics intersects most with values is in the taking of consent, validation of data and transparent reporting. In this study, participants gave their consent to be part of the study using a standard university consent form, tailored to this project. An information sheet was also provided. This process was clear and appropriate to the respondent's role in the study. The participants' role was the most important role in the study, but at the same time limited in its duration and requirements. The manner in which I gained the participants' consent did not jar with the philosophy of the project or the way the data collection was conducted.

The data was validated by the respondents as they had the opportunity to check the transcription of their interview and make comments or ask for something they said to be removed from the

analysis process. By signing the consent form, they agreed to participate in the study and have their data used in it, but they could also withdraw from the study at any time. The findings and discussion chapters (i.e. the results of the analysis) were not shared with the respondents to give their comments or to input into the analysis, as this was not part of their role in the study. The requirements of the role were made clear at the outset of the study in recruitment and in the ethics information to participants. In reporting the study, it was not possible to give all the details of examples participants gave about their research or to say which discipline they were from. This is because having a small sample it would have been possible to identify who the participants were. In this instance ethical values prevailed over the issue of transparency of reporting, sacrificing greater contextualisation and credibility of the study.

Participants were drawn from a variety of different disciplinary groups, and from different stages of their career. This was an attempt to gain a wide variety of views on the topics of interest, not just those that would concur with my own. An interview schedule was developed and used in every group, so at least five questions were the same throughout. There were some variations depending on how the discussion developed and some extra pre-prepared questions were available if the session was progressing quickly. This helped to keep the discussion on track, ensure I collected the appropriate data and ensured that all the groups were conducted in the same way. Through the pilot, I became conscious of my role in the focus groups, primarily to ask questions and listen. It was not my role to give my opinions, but to hear the opinions of others. I was conscious to try and not lead the discussion by agreeing with participants views, only to encourage everyone to speak.

Interpretation of Data, Semantic or Latent Analysis

Thematic analysis as described by Braun & Clarke (2006) was used in this study. At the outset, a semantic rather than latent approach to analysis was taken. This was in alignment with a realist position and fitted the type of data obtained from the focus groups, which were chosen to answer the research questions. That is, to provide a cross-section of views on the ways of working and knowledge produced in the disciplines in this case study.

Recording of Methods

In order to report my methods clearly, I kept an audit trail during the stages of data analysis. This was to achieve as transparent a report as possible and to aid the analysis process. Writing externalises the process, aiding reflection and problem-solving activities. I also kept a project journal and wrote a reflection after the pilot focus group and after the discussion groups had been concluded. I referred to these notes taken after each group and anything pertinent was taken forward to help run the next one. There are limitations to these methods in that they do not allow any inter-rater concordance on how the data was managed and analysed as only one person was involved. However, I discussed my decisions with my supervisor and was able to discuss plans for additional data collection with my critical friend (a senior research colleague). Both these relationships provided useful opportunities for me to explain my ideas and gain advice and feedback that aided reflection and helped me plan my work.

<u>3.8.3 Post-research</u>

Audience and Dissemination

Any thesis is written primarily for those who will examine it, and this is no exception. It is also written for a wider audience, in this instance, the academic community in the field of higher education research. With this audience in mind, implications for practice and research were considered alongside how the study will fit within and contribute to a body of literature. The process involves interpretation, which is inherently subjective, nonetheless, interpretations are drawn from the data and how that data has been collected, managed and analysed is reported clearly.

<u>3.8.4 Summary</u>

This section has put forward my positionality and the philosophical underpinning of this study. I have shared my motivations to explore the topic. From a realist position, I aimed to minimise bias when undertaking the study. This had implications before, during and after the research was conducted and measures were put in place to ameliorate these factors. These structures have been described and reviewed as to their effectiveness. In a doctoral study, personal interest in the topic is essential as this drives through the completion of the research, instrumental factors are not enough. Understanding and acknowledging motivational factors and philosophical beliefs greatly assists in being aware of how values impact on the study and helps plan an approach that is aligned with these foundations.

3.9 Ethical Governance

The study was approved by the University of Sheffield Ethics Committee for the School of Education. Full information on the study and the role of participants was shared with all those who expressed

interest during an initial phone call. Before the interviews, informed consent was gained from participants using a standard consent form. Data was recorded and deleted from the recording device after being saved on a secure computer drive. All data was anonymised in data transcriptions and in subsequent reporting of the findings. Permission to conduct an additional focus group (not in the original ethics application) was sought from the School of Education ethics committee chair, who approved this action.

3.10 Conclusion

In this chapter, I have described the methods and underlying methodology of this study. After summarising how I conducted the study, I provided information about the study design, the setting and data collection and analysis methods. I then presented a section on broader issues that affect how a study is conducted by including a section on my values as a researcher and my positionality. I organised this material using a linear timeline from pre to post research (May, 2001). Finally, in this chapter, I presented details of the research ethics governance process.

The findings from the study will be presented in the next chapter. These results will be then be interpreted in a discussion in the context of existing research literature (Chapter 5).

Chapter 4 | Research Findings

4.1 Overview

The data presented in this chapter has been collected in order to gain a snapshot of academic practice across four disciplinary areas. The study design means that it is possible to compare and contrast the effects of changes in the HE environment and focus on researchers' lived experience of working in their discipline. Views from early, mid-career and senior researchers were gathered in order to gain insight into how the changes were distributed within a disciplinary area. Whilst there is existing research on specific disciplines (Cownie, 2012; Furlong, 2013) there are fewer studies that take a cross-case perspective by gathering experiences across disciplinary groups. There is also little cross-disciplinary empirical evidence regarding claims that higher education research is operating in a new form (Hessels & van Lente, 2008; Fuller, 2002). The findings chapter presents data on these claims and represent views from researchers across a number of fields and disciplines ranging from 'applied' to 'pure', 'soft' and 'hard' research areas (Becher & Trowler, 2001). Data from the final multi-disciplinary discussion group are interwoven throughout the findings chapter, to consolidate the findings and add weight to earlier emerging themes. The data were derived from group discussions conducted in 2016/17 in one UK university.

The findings of the project will be presented in a narrative format in the following three sections. As I commented in the introductory chapter, my research questions separate out intertwined elements of the research process and I decided to continue this separation in the presentation of the findings. The data are organised into three themes. The first theme **Changes in research practices** (4.2) is the largest theme and illuminates how researchers' working practices have changed. It is clustered into three common sub-themes:

'Research methods', 'Collaboration', and 'Structural changes and pressures'. Data unique to the four disciplinary areas are then presented in a series of short narrative accounts. The second theme **Knowledge as product** (4.3) presents data on changes in the type of knowledge produced in the four disciplinary areas. This theme is clustered into four sub-themes: 'Researchers' freedom and knowledge development', 'The discipline and knowledge development', and 'Research relevance and knowledge development'. The final sub-theme presents data on types of knowledge and how that knowledge is valued. The third theme **Traditional and new forms of research** (4.4) is the final theme and is concerned with peer review processes and other forms of evaluation. Data on the role and impact of technology in research evaluation is also presented here.

The findings map to the research questions in the following way. The first theme, Changes in research practice, maps onto the second research question: 'What is the extent and nature of change in disciplinary ways of working in different types of fields and disciplines?'. The second theme maps onto the third research question 'What factors impact on the development and production of disciplinary knowledge in different types of fields and disciplines and how do they manifest themselves?' Both of these themes and the third theme on research evaluation will provide data to answer the remaining research questions: 'What are the commonalities and differences in researchers' practices in response to demands for instrumental research?' and 'What are the implications of this research for the future of the disciplines?'. Throughout this chapter, data will be compared from a cross-case and cross-rank perspective, comparing findings from staff with different lengths of research experience.

4.2 Changes in Research Practices: Theme 1

4.2.1 Introduction

Researchers reported changes in research methods that they related to an emphasis on research relevance outside the academic world. Technology was also reported as changing research practices; in part, technology augmented ways of working already in place, such as searching for information when scoping out a research problem. In part, it changed the knowledge produced, as technology facilitated collection, analysis and sharing of much larger data sets. Researchers also described pressure to work across disciplines and shared their experiences of inter-disciplinary (ID) and multi-disciplinary (MD) research. Structural changes to the way the discipline operated that were related to research impact outside the academic world were also reported, for example additional impact related skills criteria to recruit academic staff.

In Chapter 3, I described the process of managing and analysing data using a thematic analysis approach based on the work of Braun & Clarke (2006). Phase Four of that process involved reviewing categories and creating preliminary themes, which I called 'ingénue themes'. This chapter consists of data from the Phase Four category 'research methods' and underlying codes 'research methods stay same', 'diverse practices across discipline' and 'field work shock'. Data from the phase four category 'technology' is also reported here. The majority of the data was derived from responses to the primary question 'Do you think that research methods in your discipline have changed over the last 20 years?' and supplementary interview questions (which varied between groups) such as 'To what extent are researchers autonomous or responding to external demands from commissioners/government etcetera?'. This theme is also populated with data from across the data set, derived from other interview

questions and organic discussions generated by participants' responses to each other's contributions.

To begin, I will present three overarching sub-themes that are common across the four disciplinary areas: 'Research methods', 'Collaboration', and 'Structural changes and pressures'. A series of brief narrative accounts presenting data unique to each disciplinary area will then follow. Abbreviations for the researchers' disciplines and groups are as follows: Hard Applied (HA), Soft Applied (SA), Soft Pure (SP), Hard Pure (HP), Multi-disciplinary Focus Group (MD). I use the naming structure: academic rank / discipline / participant number and group number after each illustrative quotation.

4.2.2 Research methods

In this sub-theme I will present data on research relevance and the impact of technology on research methods.

Research Relevance

Researchers in all groups reported pressure to change how they worked in response to research impact (impact outside the academic world). There were many examples, such as this comment regarding grant applications:

"...if we're under external pressure... to get more funding if we can...then you have to shape what you're going to do to what's feasible within various funding bodies...to that extent...some of the projects... have been tailored to wherever I could get money to do them." (Senior Academic / Soft Pure / P1G2)

Two groups (SA and SP) reported changes in research methods that they linked to pressure to produce research that has direct relevance to the economy or society. In the SP group, for example, the move to empirical work in some fields was recognised and seen as the result of external pressures:

"...there's a lot more interest now in applied [work] in a way that fifty years ago there wasn't and this interest in applied [work] might be related to pressures to go empirical or to be in touch with empirical data, I'm not sure, I don't know, but it's possible, there's certainly shifting in fields of interest within [discipline] and that's a matter of fact I guess or there may be other reasons – external pressures?" (Mid-Career Researcher / Soft Pure / P4G2)

A colleague agreed that those applied fields were enhanced in their development due to outside influences:

"...but then...there's further impetus now because of things like...governmental pressures in relation to things like policy and...impact type of stuff has also pushed that forward as well so... yes...there's definitely sometimes external pressures like that, changing things." (Mid-Career Researcher / Soft Pure / P2G2)

An SP participant in the final MD group also spoke about a move to empirical research. When asked about the effect of external influences on ways of working in their discipline they readily responded:

"Oh yes...certainly the publication pressure, and then there's a little bit more, people trying to do inter-disciplinary work to get the empirical on board, or put the empirical and theoretical together to get funding, so that people can have jobs, those are the kind of things happening right now." (Early Career Researcher / Soft Pure / P5G5)

Participants in the SA group also described a move towards the broadening out of methods to include a variety of social science methods:

"...any given [department] is likely to have a broader range of methods and methodological approaches represented in it now than perhaps would once have been the case. There seems to be an increasing range of approaches which we recognise as being valid and worthwhile ways

of analysing [disciplinary] phenomenon." (Senior Academic / Soft Applied / P3G1)

Moreover, one ECR felt that s/he was under pressure to incorporate a quantitative approach into their work:

"My doctoral research was all you know semi-structured interviews ... I definitely had the sense that it wouldn't be able to have any sort of policy impact at the time...because they're looking for something that is much more generalisable in a quantitative sense, so... I want to go back ...and almost treat that as like a pilot study for a ... quantitative investigation...and that's very much been externally driven, I mean like [name] I find it difficult to speak to a more quantitative audience...I've always been more interested in the 'how come' questions rather than the 'how much' questions..." (Early Career Researcher / Soft Applied / P2G1)

S/he goes on to state the benefits of this diversion, citing increased skills, becoming a more flexible researcher and improvement of career prospects:

"... whilst it's not the first thing I would have been interested in, it's not something I dislike thinking about... as someone who needs to be research flexible in future...if I can expand my competence in a range of different methodologies that's only going to benefit me" (Early Career Researcher / Soft Applied / P2G1)

Being required to change research approach was an idea echoed by a colleague in the same knowledge area, in the last MD focus group. They described how they changed their topic area in order to open up a new and potentially fruitful line of continued funding, but this also meant moving from theoretical to empirical research:

"...my initial research agenda was extremely theoretical and as [name] said, there was this movement towards, if you want to get promoted you need funding and then certain projects lend themselves better

towards funding than others, so then rather than just working on [topic], from a theoretical perspective, I sort of took the turn towards [topic] ... it's much easier to attract funding and that of course requires a different set of skills, you know beyond the theoretical...So, I had to change my approach, the way in which I explained things, the evidence I relied upon and the way things were formulated." (Early Career Researcher / Soft Applied / P8G5)

Earlier in the interview, the same participant had described a memorable piece of work. The use of the words "in the field, as it were" in the extract below suggests the relative newness of this change:

"So, I was involved in a project [describes study]...until that point I had done primarily ... theoretical research, ... so out in the field, as it were, speaking to people involved, speaking to victim's groups. There were various dimensions of the conflict...it was difficult but enlightening." (Early Career Researcher / Soft Applied / MD Group / P8G5)

Another ECR from the SP area also described how s/he had moved from a completely theoretical orientation to an empirical way of working:

"... I think certainly the most challenging thing that I've done...I got a post-doctoral fellowship on a project, which meant that I had to do empirical work, I had to read empirical work, I had to engage with ... patients and their experience of ...illness so it was quite a shock and a serious adjustment which I'm still going through as part of my current post..." (Early Career Researcher / Soft Pure / MD Group / P5G5)

However, the pressure to make these changes in research orientation varied according to academic rank. In the SA group, a senior researcher suggested that academics have agency in how much they bend to pressures to change their research:

"I would suggest that it is possible to continue to…pursue a particular self-selected methodology…I think that when people don't do that, when they change their methodological approach…due to external pressures, in my experience it is usually because they have wanted to do something that they can only achieve if they moderate their approach to take account of those sort of pressures … So, I think I would resist the implication that external pressure is necessarily a bad thing and I think I would also resist any…claim that it is an overwhelming external pressure. I think the extent to which people accede to it is particularly indicative of what they themselves want to achieve as academics." (Senior Academic / Soft Applied / P3G1)

This comment was qualified by a junior colleague in their discussion. S/he referred to academic rank and how much difference this made to the ability to withstand pressures to change methods or topics:

"But also I think where they are in their career trajectory…I can see it being much easier to pressure someone in my position, just…coming in, really needs to get some good publications out, really needs to get some good projects on the ground … if they want to progress… through the career… that sort of soft pressure if you like, where it's not a compulsion but it is more of …direction of travel which is much more difficult to swim against." (Early Career Researcher / Soft Applied / P2G1)

In the SA and SP area, ECRs conveyed the difficulties in adapting from what they had trained for during their earlier careers. They expressed the challenges of moving into fieldwork with vulnerable participants and of researching sensitive topics:

"…I'm at the interface between the highly theoretical world which I've inhabited almost my entire research career and now I'm being confronted with not just actual people, but people in particularly vulnerable states as well…there's a certain kind of particular difficulty that I'm faced with routinely, that I otherwise I would not have been, if

I had remained so wholly in my very abstracted world." (Early Career Researcher / Soft Pure / MD Group / P5G5)

On a similar note, this ECR from the SA area spoke about how s/he felt about beginning empirical research on a sensitive topic:

"Engaging with different disciplines, specialist technologists, which is something that I found quite difficult initially and in particular... [topic] where I had to have much more interaction with [professional group] which I found extremely difficult...quite hostile sometimes." (Early Career Researcher / Soft Applied / MD Group / P8G5)

From both these individuals, there was a sense of their careers being re-directed as they took on completely new types of research practices. This was in juxtaposition to the testimony of another ECR (in the HA group) who started out and remained in an empirical field and spoke with complete ease about their research practice in response to the question "What was the most exciting piece of research you have been a part of?":

"I did a piece of research about modifying [name of organisation] for people with learning disabilities.... And it was... fun, it was so much fun...to talk to these great and interesting people and also it felt like it was important, that we could do something that would help and make it better, and subsequently [name of organisation] have adopted...some of our recommendations and are producing new leaflets, new booklets, new training for members of staff, so they are modifying what they are doing to make it more accessible. So it really feels like we made a difference and that was exciting." (Early Career Researcher / Hard Applied / MD Group / P2G5)

Overall, Mid-career and Senior Academics in the study spoke about tailoring their research methods or highlighting certain research outcomes in grant proposals in order to achieve funding. A more personal and conscious change in research methods and topic areas

was notably reported by ECRs or those at earlier stages in their careers across the discussion groups. The SA group reported conducting various types of research, some that were not applied. There were also fewer representatives in this knowledge area than in HA. This meant that there was a variety of responses regarding the use of research methods as I have reported so far in this chapter.

The HA group's work is intrinsically impactful on society and as such, this group reported other outcomes of the relationship between the impact phenomena and their research methods. In the HA group, methods were employed which were particularly useful for policy makers and practitioners. One participant commented that whilst this made the research area strong, as it was flexible enough to adapt to what commissioners wanted, it was also under threat, as research knowledge could be disregarded in decision-making processes:

"I think to a certain extent [name of field] is strong in that it's quite flexible and has adapted to the changing needs of commissioners, however, it does worry me because of politics and the sort of post-truth society, that maybe evidence won't be so important anymore... People don't always use evidence to make decisions; in fact, sometimes they do exactly the opposite from [what] the evidence shows." (Senior Academic / Hard Applied / P2G3)

One HA participant expressed the tension between methods innovations and commissioners' expectations. Whilst improvements or innovations in methods were developed by researchers, there could be mistrust by funders of something unfamiliar:

"In terms of research methods we get the message that "innovative" methods are welcome but in practice it can be difficult to publish stuff that appears to drift away from the mainstream...we are continuing to innovate but we have to consider how this fits with expectations in the real world." (Mid-Career Researcher / Hard Applied / P6G3)

A senior colleague concurred with these views later in the same discussion:

"...very much it's responding to commissioners...you have to produce a product or what's needed and sometimes you have to modify your methods. I think there's very little time and energy for doing your own thing." (Senior Academic / Hard Applied / P2G3)

The HP group reported that their methods were not influenced by a new emphasis on research relevance and cited technology as having the most direct effect on their methods. The HP group described how funders influence ended with the topic or research questions:

"... it's more the topics and not the methods... that are dictated from on high and...nobody from [funding body] or the government is going to dictate how I analyse my...data, but the particular type of data I have to analyse and explain how I took it, that is dictated by which grant proposals the research council chooses to fund, so it's more what, than how." (Senior Academic / Hard Pure / P3G4)

So far, in this sub-theme I have reported on changes to research methods presented by researchers in four disciplinary areas with different research roles. The focus of this section has been on changes to methods as a result of external pressures to establish research as having impact outside the academic world. I am going to continue the sub-theme of research methods, but with a change of focus to the impact of technology, which was voiced in all the groups. After this, I will move on to the second sub-theme that is about collaborative working.

The Impact of Technology on Research Methods

All disciplinary areas reported that technology had had an effect on how they work. They referred to changes in information gathering and to data collection and analysis. Literature searching was singled

out as an area that had vastly changed, giving the researcher much more autonomy over the process.

In the data, I found that use of the literature had not changed, but access to published research had, unsurprisingly, been vastly changed by the digital revolution of the World Wide Web (WWW). Researchers valued the greater convenience, speed and autonomy this gave them when working with literature. For example, a researcher in the HP group commented:

"I would certainly say one major advantage is the use of specialized databases, which I'd say both in terms of the literature and also information ...I don't have to ... read individual journals because it's all in one place more or less... There used to be an era before that ... and basically if I wanted to very efficiently search [I had to search] by the object, subject, all different types of things. It has made research much more efficient from what we used to have to do." (Senior Academic / Hard Pure / P7G4)

This idea comes through again in a comment from another participant in the same group. In their quote below, I interpreted the comments about digital versus physical as being not just about convenience, words such as "forever" and "get at it" belie a feeling of independence, of having something in your own control. The researcher is empowered.

... I actually did, for my PhD, go to a library once, but I remember going there, getting the book out, putting it on the photocopier, running out… of money on the last page so I didn't have any references [laughter in room] and then realizing I needed them. And now every couple of days I do a search, I have a programme on my computer and I might type in a person or something I'm interested in and it lists those people and I just click on them on my computer. I might not ever even read that paper… but it will go into my library

and then it will be on my computer forever and I can always get it.
(Mid-Career Researcher / Hard Pure / P5G4)

The HA group concurred with this perception and reported that it was now much easier to access research literature both in terms of literature searching software and delivery to the user's desktop:

"I mean the technology has hugely changed what we do, I mean when I started if I wanted to do a review of a subject I had to go down and look at [arcane database name] [laughter] ... and find the word and find these reference numbers and cross reference all these numbers. You know to do a literature search was a huge undertaking and now you type a couple of words into Google Scholar and get two thousand results out and you can...go through them..." (Senior Academic / Hard Applied / P1G3)

The SP group concurred with the HP and HA groups about how the WWW had completely changed how they accessed research literature. In this aspect they also included access to other materials such as rare texts, which presumably through digitisation techniques were available through a web search. This freed up more time and enriched their research, as they were more likely to quickly scan the materials when there was a slight chance something was relevant:

"I do quite a lot of work in [name of field]*, so fairly text based and... across... wide periods of history... so...you'd have to go to some library and...take a lot of time and effort and you couldn't be bothered because it wasn't clear that it mattered so much...now you can get an awful lot of this stuff just online at your desk within a second or two of searching for it, so it means that it's much easier for me to read things that... are fairly obscure or would have been hard to get hold of and I'm more likely to read them..."* (Senior Academic / Soft Pure / P1G2)

Interestingly none of the researchers associated any of the digital information resources with the University library service, which was

only referred to as a physical space that was no longer necessary to visit, as evidenced by this quote from a HP researcher:

"I never went to the library in my scientific career because of the internet, but 20 years ago this would not have been the case." (Mid-Career Researcher / Hard Pure / P1G4)

Within the findings on technology, researchers also reported changes in data collection and analysis methods. The HP group reported a number of changes in relation to the impact of technology on data collection and analysis. Remote working was cited as much more usual, rather than researchers going out to particular sites to collect data. Large cross-institution research teams and big data were also cited as newer developments:

"... there've been a couple of major changes in the last twenty years...one is that...twenty years ago, [we] used to go and [collect data] from physically going to ... locations ...around the world and that used to be the way you could get your hands on ... data and now it's much more done through [remote technology] or through ... people doing it on our behalf... the second thing is that... it's switched from one person having an idea and going off [to collect data] ... to actually the whole team of people getting together... so much more large-scale collaborations I would say." (Senior Academic / Hard Pure / P7G4)

The HP group reported that in some fields, data requests were dealt with centrally which increased speed, enabling handling of data sets that were unthinkable in the past. There was also an increase in the amount of data that could be identified and analysed due to advances in research instruments and computer power. In a circular manner, large data sets had also created a need for new technological solutions to facilitate their processing and analysis:

"And there's also the...much greater use of the internet, so data sets that used to be physically transported on...tape to individual

institutes…are now centrally held and your analysis job may be running in seventeen different countries at once, via the grid and the results returned to you and you don't even have to know which computers … your analysis actually ran on so… it's not only greater power in taking the data, it's also much greater power and much greater connectivity in analysing data which has made data sets that you couldn't previously even thought of analysing, quite tractable." (Senior Academic / Hard Pure / P3G4)

A similar experience was reported from the HA group where some forms of data analysis were affected by the advent of supercomputers:

"…And the sort of thing that we're doing at the moment with the [name] data, you know even now some of the data analysis that we're trying to do, you have to write it in R, and it takes a long time to write, but you know, you never could have done that even five years ago because the computers wouldn't have [coped] with a fifty million record data set …. So, the sort of things that you can do have changed quite dramatically." (Senior Academic / Hard Applied / P1G3)

An HP researcher in the final MD group also commented that the use of big data was becoming the norm. It was also expected that work should be conducted in this way, in contrast to the work of earlier generations of scientists:

"… So now, you've just got to be handling big data… And [producing] huge amounts of data and there's also things like machine led statistics which come into the field in order to handle all this stuff…it used to be, you'd just have a few grad students looking at the data, the small amounts of data that would come in every now and again, you know, and now we're seeing this kind of change over to machine learning algorithms… being deployed on a large scale to handle all of that data… I think when I started out…I mean as an undergraduate there were papers where people…just manipulated a few equations and

[found] out something amazing. And they did all the kind of ground work and now … if you want to compete on the theoretical level, you have to be doing large scale computations. You just can't do pencil and paper stuff anymore." (Mid-Career Researcher / Hard Pure / MD Group / P7G5)

As well as changes in data collection wrought by the WWW, the HP group reported other technological changes. Two researchers from different sub-fields in the HP group talked about changes in instruments that had led to new discoveries, as more sophisticated experiments were conducted:

"I think one big change must be in electronics and computing, but electronics is much more compact. Integrated circuits can deal with loads of channels very quickly so things that would just have been impossible to trigger or analyse…in the past you can now… build much more complicated experiments and look for much more subtle effects, in [field] *at least."* (Senior Academic / Hard Pure / P4G4)

As well as facilitating new discoveries, the advances in technology were moving so fast that methods were in a constant state of flux:

"…my specific part of my field didn't exist ten years ago. It was people… who were cleverer than me who came up with techniques that allow us to do what we do now…and I think…it changes every year… the ability to do something now we'll be better at in a year's time…so I often go to talks where the opening phrase is that 'what we're going to show you now will change the way the textbooks are written next year' … So…the methodology has only been around for a while but it's constantly changing." (Mid-Career Researcher / Hard Pure / P5G4)

Some of the HA group also mentioned "big data" as beginning to have an impact and how they were beginning to see more computing solutions to analysis, over traditional paper and pencil mathematics:

"…the computational power and what we can do in our simulations is completely different to… what we could do with a floppy disc in 1997. And, big data is kind of coming. It isn't quite … but that's definitely coming and…we are thinking about…machine learning and those kind of methods …" (Senior Academic / Hard Applied /MD Group / P1G5)

A colleague, also from the HA knowledge area, had made similar comments in the earlier HA discussion group:

"…as a statistician in terms of what data we have available…like big [name] *data sets…there's a lot…more big data available so there's a lot more emphasis on computing…"* (Early Career Researcher / Hard Applied / P3G3)

S/he goes on to say how methods have changed in response to a change in research questions, where the data is already available, rather than having to be sought out. So the order of work had changed:

"…just research questions changing slightly in terms of…you try to get information out of big data sets rather than sitting…doing maths to solve problems. I feel like I do a lot of programming." (Early Career Researcher / Hard Applied / P3G3)

There were much fewer comments on technology from SA participants, with only one comment from an SA researcher in the MD Group discussion. S/he emphasised that methods had not changed *"that much"* but that there were two pressures, to use *"big data"* and to work in an inter-disciplinary fashion. (Senior Academic / Soft Applied / MD Group / P3G5)

This section has reported on the effect of technology on researchers' practice. Along with data on the impact of external pressures to produce instrumental research, it formed the first of three sub-themes in this theme about changes in research practices. I will now present the second sub-theme on collaboration and team working

which includes data on ID and MD working. I will begin with data on other forms of collaboration.

4.2.3 Collaboration

Team working

Data on team working was stimulated largely through an interview question exploring the type of knowledge that is produced in HE. The question referenced institutional schemes and workshops to encourage ID working as an example of how "impactful" research practices are formally encouraged. Despite this stimulation, the amount of data, and its source from different parts of the interviews, indicates that the notion of working across disciplines is something that researchers were aware of, participated in and sometimes felt pressure to do. It became clear quite quickly that there were many different forms of collaborative working which researchers used in their day-to-day practice. Whilst collaboration has become synonymous with MD or ID working, this obscured a number of other practices that happened within a discipline, such as the joy of finding a collaborator in order to bring together a theoretical model with empirical data. For example, in response to the question "what is the most exciting piece of research you have been a part of" one HP researcher said:

"I think mine was my PhD where I had this problem, we couldn't solve it with experimental data and we were trying to work out what was going on. And there was a theoretician I got in touch with on the other side of the world and he had just come up with a theory but didn't have any experimental data and we put the two things together and it …was really exciting, talking over email, and…getting it sorted out. Quite a small problem but getting that small problem sorted out and working it out was really enjoyable." (Mid-Career Researcher / Hard Pure / P6G4)

Across the groups, participants emphasised collaborations happening organically, based on the need to solve a problem. The need to collaborate came from the discipline or from the research question:

"I was going to say...[in a particular field] *it's probably hard to think of a very inter-disciplinary collaboration but the...research often depends on all sorts of ... things ... and I've had very good collaborations, ... and the people I've met have always been very happy to talk and do extra work and help me solve the problem and have interesting discussions, but it's come...bottom up. If you've got a problem there and you find people are interested in it, rather than thinking 'can we set up a collaboration?' It's 'we want to solve this problem, where are the good ideas going to come from?'."* (Senior Academic / Hard Pure / P4G4)

A colleague concurred with the idea that collaborative projects work best if created organically, humorously stressing the importance of the interpersonal aspect of any such project:

"...we have collaborations with every department in the faculty and ...most, well lots of them are funded but the only reason we actually work together is because we get on...universities always have a problem with getting people to work together and I think that's because it assumes they need to drop in money and resources to get them to work together but actually you have to do it by meeting someone, having a coffee with them, getting along with them... I think trying to force collaborations never works and I think all universities are really desperate to improve collaborations ... and that's probably best done by having cheaper coffee." (laughter in room). (Mid-Career Researcher / Hard Pure / P5G4)

Schemes (e.g. "Masterclasses" or workshops) to facilitate ID or MD working were not well regarded by any group in the study. For example, this senior researcher from the SA area was unconvinced of their effectiveness. The idea of collaborations naturally or organically forming was again voiced:

"mm, I'm sceptic [sic] I think there's going to be something very good there, but… my experience of people trying to take advantage of these kind of things is… they've been limited in their effectiveness. The most concrete example is a series of PhD scholarships that I was involved in and I'm not sure they achieved anything…when it came down to it. They weren't proper inter-disciplinary scholarships, what they tended to do was to drift towards one department and it became very very difficult and I wonder whether we are spending a little too much time, trying to force feed this, rather than let it naturally evolve." [Senior Academic / Soft Applied / MD group / P3G5)

Similarly, a senior researcher from the HA group made the following observation in response to stimulus material I used in the interview, advertising a "masterclass":

"So I get put off by this sort of thing as soon as I read the title you know…sounds like something that's been set up in order to tick some boxes on the next REF exercise…and you know it immediately raises hackles I'm afraid… the context of calling something a 'public engagement master-class' and the idea that you get these experts together to tell you how to do this sort of thing, I'm sceptical about it." (Senior researcher / Hard Applied / P1G3)

Levels of multi-disciplinary working were different across the groups. In the HA group, MD work was commonplace, for example:

"Perhaps it fits some fields better than others because [in department] *multi-disciplinarity is the name of the game. I mean we all rub along with people from a wide variety of different disciplines and backgrounds and that's just how we do things. But that wasn't because anybody… tried to initiative us into doing it. It's just, that's how we work, because that's what the field is like."* (Early Career Researcher / Hard Applied / MD Group / P2G5)

Teamwork was associated with enjoyment, whether the team was across disciplines or within a discipline. People spoke about having

fun and the satisfaction of solving a problem and completing a project:

"I do like working in…multi-disciplinary teams, we've got multi-disciplinary teams [within] the place" (Senior Academic / Hard Applied / P1G3)

There was also a sense of camaraderie reported in team working:

"…it was a very short experiment and so we were working for twenty-four hours, taking shifts, taking data, fixing things on the go and that's where the excitement comes in." (Mid-Career Researcher / Hard Pure / P5G4)

The SA group discussed the ease with which they could work together as researchers from different neighbouring disciplines within one department, as they shared a joint theoretical perspective and also used a number of the same methodological approaches and shared methods:

"…there was never really that big of a gap between the subject matter…[and] the way we talk about these issues to begin with. I mean in the end, there's a certain amount of shared theory and a certain amount of shared assumptions about the nature of society…" (Early Career Researcher / Soft Applied / P2G1)

Unsurprisingly, SP researchers did not speak about collaborative or group working as a usual occurrence as evidenced in this testimony about collaborative writing:

"…first of all it was new, I'd never done anything like that before… the fact that you could, usually if you write something you can show it to colleagues and they're really nice and they look at it and give you comments, but it's always a burden on them and there's a limit to how many times you can go back and forth and annoy the colleague…" (Mid-Career Researcher / Soft Pure / P4G2)

However, a sense of connection was apparent between researchers from different sub-fields in the SP group and one senior researcher set this in a more objective context with this comment:

"I think [discipline] has kept a kind of disciplinary integrity even though nobody, I don't think any of us could give you a quick definition of what [discipline] is and what it is we do and all the rest of it. But … we all roughly know what we're doing, we can see how what others are doing connects with what we're doing" (Senior Academic / Soft Pure / P1G2)

Although not the norm, a number of collaborative projects were cited in the SP group. These were successful ID / MD collaborations. Interestingly, the group concurred that it was not necessarily easier to collaborate with those in disciplines closest to their own. I asked *"It's not necessarily easier with someone in the humanities?"* :

"No, not at all." *[others agreeing with this]* (Senior Academic / Soft Pure / P1G2)

As well as experiences of teamwork in general, researchers conveyed their views on cross-disciplinary working that I present below.

Barriers, Drawbacks and Benefits of Multi-disciplinary and Inter-disciplinary Working

To conclude this sub-theme on collaboration, I will report on data concerning cross-disciplinary research collaborations. There were a number of barriers to MD or ID collaborations articulated by researchers. The types of barriers and benefits discussed reflected how much of this work was being done by the group or individual researcher. If heavily engaged in MD or ID research, the novel aspect was not reported. Practical drawbacks such as finding a journal to publish a MD article (SA) or funding bid (HA) were reported. I am speculating here that where the drawbacks voiced were practical, it was a result of greater experience of this type of work. HP researchers

also referred to structural barriers with funding MD / ID research, but this was in addition to other evidence on the topic from the HP group. If MD / ID research did not fit the field then no drawbacks were reported from the researcher's point of view, only the feeling of pressure or anxiety placed upon them to try and work in this manner. There was also a difference in how ECRs spoke about this type of research; in fields where MD/ID research was not commonplace they appeared more likely than senior colleagues to actively seek out this kind of work.

One practical barrier to MD/ID research is the problem of finding backing for the work from funding councils who have a particular discipline or field as their remit. This was evidenced by an HP researcher who spoke about instances of selecting the 'purer' project as it would fit directly into one of a funder's subject areas, rather than something which may be more interesting, but difficult to pitch as it straddled two areas. This was true even of two neighbouring fields:

" *there's also the money problem as well, that if…it crosses the boundaries between research councils…so a lot of things that could be inter-disciplinary, even just inside the …sciences just fall through that gap between the two research councils and then it's a case of 'I need to write a grant proposal that actually has a chance of getting funded', so therefore I will pick the pure* [disciplinary] *thing over something that might be a bit broader in scope but would be inter-disciplinary.*" (Mid-Career Researcher / Hard Pure / MD Group / P7G5)

The issue of finding a suitable funding body for cross-disciplinary work was echoed by an HA researcher:

"*yes, absolutely, send a million-pound grant to x, argue, argue, argue, this belongs to the y, they won't fund that kind of thing. Send half a million-pound grant to the y, with about a tenth of the chance that you had with the x because it's so competitive and why would that be good*

for the UK PLC economy in research. Very difficult when really what you are doing is joining [several disciplines] together. Which is what everyone says they want to do in all their strategic documents…" (Senior Academic / Hard Applied / MD Group / P1G5)

A similar problem is finding a suitable outlet that will publish MD or ID research. One Early Career SA researcher reported on the trials of navigating the publications world and tailoring a paper to fit for a particular disciplinary audience:

"I mean a practical example of this is I have written an article which has…bounced around various different areas because it's…in both houses at once, so no one journal really wants it." (Early Career Researcher / Soft Applied / P2G1)

Highlighting another factor that confounds the dissemination of cross-disciplinary work, s/he goes on to say that journal peer reviewers may be dismissive of work not tailored completely to their audience:

"that sounds much more of a dismissive… attitude for peer reviewers than is out there but…you do have a sense, I think, of coming at it from very different methodological perspectives" (Early Career Researcher / Soft Applied / P2G1*)*

Aside from practical barriers to cross-disciplinary working, some researchers voiced the idea that an emphasis on cross-disciplinary work led to single discipline research being undervalued. This ECR from the SA area had moved from theoretical to empirical work and shared a view that I found a number of times in the data:

"…I mean in the field of [name]…you can … find a piece of [documentary evidence] and you can find that there's a problem with it and you have to identify the problems and the particular [scenarios] that may or may not fit in there appropriately. And to be honest…you can pursue that research agenda with quite a significant output

without the help of the political scientists or the philosophers or economists, or even other [researchers from your discipline] outside of your area…So, I think that's worthwhile research in and by itself. And the University, or the academy in generally should realise that yes, inter-disciplinary research is good, multi-disciplinary research is good, but there are other forms of research that's more focussed and strategic…" (Early Career Researcher / Soft Applied / MD group / P8G5)

This point relates to evidence I present in the later knowledge theme (4.3) from researchers in the pure groups. They felt that their work was undervalued, due to it having a perceived lack of impact outside the academic world. This feeling of work being undervalued could lead to a lack of motivation to investigate how their work might fit with that of other disciplines, especially when pursuing this kind of research was an extra activity. This idea was voiced by an ECR from the pure discipline area in the study. S/he described how she would seek out possible links with other disciplines, and put colleagues in touch with each other, creating connections between their own area and other disciplines. S/he described (with some frustration) how bodies of conceptual work could be of great use to other researchers if they were known about and gave a specific example:

"certainly … in my field I've seen this, there is all this contextual leg work that's been done which could be valuable in other places and yet we don't pay attention to that, those connections, because … we also buy into the idea that 'we are useless in terms of what we do' and it's very insular, you know… 'who cares about what we do'?'" (Early Career Researcher / Soft Pure / MD Group / P5G5)

Other pure knowledge researchers voiced concerns about cross-disciplinary work. One senior researcher highlighted the idea that in their field this would be work 'on top' of the day job:

"I think there is a horrible tension and I've complained about this to a couple [of] people in senior management, they keep going on about 'you should do inter-disciplinary work' but they're also going, you also need to publish and get grants [agreement in background]. Inter-disciplinary work, takes time, and you've got to learn new stuff, and [do]… all those other things, something's got to give…they seem to be wanting us to do all of this without accepting that that means time…" (Senior Academic / Hard Pure / MD Group / P4G5)

S/he goes on to highlight other misgivings about cross disciplinary research. From their perspective, it is not just additional work, but requires an additional level of trust between partners that is implicit when working in one's own field:

"There's also a problem I think with inter-disciplinary research and trust. I know in my area the people that I trust…If they say 'I've done this' and they give me some answer, I can trust it, and when they write their bit in the paper I go well, yes, I don't really understand this but I know they know what they're on, so that's fine …that's … research adding together and their different expertise. You move out of your area and I don't know if someone's a fruitcake or slapdash or if everyone else in their field thinks that they're completely rubbish or brilliant, I have no idea. So, you are taking a big risk there as well." (Senior Academic / Hard Pure / MD Group / P4G5)

In contrast to these views, in the HA area, working in cross-disciplinary teams most of the time meant that there was no anxiety or tension exhibited about this way of working, for example:

"I think everyone comes with their own training, everyone's got their own background, what they were initially trained in. I don't think everyone can do everything it's just that it's good to get everyone together and…look at their expertise." (Mid-Career Researcher / Hard Applied / P6G3)

In later comments I received by email after the group discussion this researcher added:

"I think with disciplinary structures there is always going to be the debate about specialising or working across boundaries. And it depends on the research questions as to how best to answer them - I think that is always the key. I think the problem can be in trying to work across boundaries where funding issues creep in but generally speaking it's good to get different perspectives on board, otherwise the research can feel one dimensional." (Mid-Career Researcher / Hard Applied / P6G3)

In the SP knowledge area, one senior researcher commented that despite there now being more dialogue between the disciplines, there were still limits to how far you could take cross-disciplinary work. S/he characterised it as a moment of perplexity:

"you still don't get the feeling that they understand quite where we're coming from and we understand where they're coming from…you want to talk to them and learn from them and you can think what they are doing is valuable, but… there's always a bind to it, where they… look at you in puzzlement and you look at them in puzzlement." (Senior Academic / Soft Pure / P1G2)

Other SP researchers described how MD/ID research was taking off in some sub-fields of the discipline and one Mid-Career researcher described that although s/he enjoyed this kind of work, it was not without difficulty:

"Yes, definitely been encouraged to… collaborate more with other people and I enjoy that and I enjoy working with people from different disciplines, although I don't always find it easy. I think that's definitely changed what I do, 'cause I've got that in mind as a thing that I should… aim for…that's definitely a change." (Mid-Career Researcher / Soft Pure / P5G2)

An ECR from the SP area reported seeking out possible collaborations:

"I go to non- [name of discipline] events, so that's something that I actively do as a researcher...I'm like, this isn't my field, but I'm going to go and see what happens because there's enough... language here that looks like it's something that might be contiguous... but that's just me on my own." (Early Career Researcher / Soft Pure / MD Group / P5G5)

Finally, the SP group mentioned that there was external pressure to get involved in this type of collaboration but efforts to make a project ID for the sake of it could lead to non-productive outcomes:

"...I like working with people from other disciplines but then I'm always getting involved in projects where it's... 'make this inter-disciplinary for the sake of it', and it's quite a hard thing to negotiate... talking about it without talking past each other... a pointless exercise, like we're all here just for the sake of... ticking some boxes..." (Mid-Career Researcher / Soft Pure / P5G2)

In this sub-theme, I presented data on collaborative working, firstly within a discipline before moving onto the data pertaining to the barriers, drawbacks and benefits of cross-disciplinary teamwork. It was the second of three sub-themes in this theme on changes to research practices. The final sub-theme is about structural changes to the disciplines, namely changes in the practical organisation of the disciplines that researchers reported in our group discussions.

4.2.4 Structural changes and pressures

This is the final sub-theme in this theme, which is followed by a number of summary accounts to bring together the data presented. I have added different types of summary in order to aid the reader in navigating this large findings chapter and the complex data presented

within it. Before moving to these summaries, I present the data on structural changes.

A number of structural changes to the organisation of the disciplines were noted in the group discussions. This data concerned changes and pressures to change practices in recruitment, career pathways and physical location of disciplinary and subject groups. For example, it was noted in both the SP and SA group that researchers were now publishing much earlier in their career, even as early as the second year of their PhD. In the SP group, there were comments about students being noticeably aware of their career at a very early stage, looking to publish and having a 'five-year plan' as there were fewer jobs for them to apply for in academia:

"So...typically, now, quite rightly, our current graduate students will start pestering you as a supervisor about advice on what to publish, year two of their PhD. I don't blame them because... they're probably right, that's what they need to be doing, but in terms of what makes any sort of sense, it's crazy... it adds to this avalanche of journals... because people are doing all this, whereas ... as it were 'in my day' ... you didn't think about publishing until after your PhD and sometime after your PhD..., and that's the external pressure in the effect of the job markets and the limited job opportunities. That's not [happened] *through direct funding... it's just the structure of the profession that's changed."* (Mid-Career Researcher / Soft Pure / P2G2)

Resonating with this testimony a researcher in the HP area also commented on the changing make-up of their discipline, with many more graduate students going into industry roles as opposed to academic positions:

"... when I started my PhD studies... the guy in [name]...who runs the [name] post-grad programme ... said... 'the reason why your PhD place is funded is because at the end of your PhD some of you are going to go into academia, and that's great, but we want most of you to go into

business, and that's why these places are funded'. And this is a message that's now becoming much louder from the current batch of PhD students, more so now than when I started." (Mid-Career Researcher / Hard Pure / P7G5)

In the SP group, a senior academic spoke in general terms about academic careers being under severe pressure:

"…I do worry about the…situation of junior researchers, not just from [discipline] but from the whole sector… it seems to have come pretty close to breaking point…[with an]… endless series of temporary positions and unable to settle anywhere…we're lucky in a sense that people still find it a desirable profession and are still interested enough… but at certain points people are going to say…it's not worth [it]… " (Senior Academic / Soft Pure / P1G2)

Within this discussion, one Mid-Career researcher (SP) presented an academic career pathway as one that now has many restrictions:

"… there's a…grey thing all round…kind of strategic thinking, so…people, graduates…they have a… narrative that makes it clear where they're going over the next five to ten years and so why they'd be a strong person to hire…When applying for funding you have to have some sort of tale you're telling about how the next three or four years you're going to do this, this, this and this. So people get locked into these…stories they have to tell people for various sorts of purposes and that is… kind of straitjacketing actually." (Senior Academic / Soft Pure / P1G2)

The SP group also commented on changes in recruitment to academic roles, with people being recruited not just because of their academic profile, but because they had experience in other ancillary areas such as impact or public engagement:

"…I definitely noticed sitting on interview panels for example a change from people going 'we just need to find the best [disciplinarian]' to

*going, 'right we need to find the best [disciplinarian] relative to this...
specific thing' be that impact or...public engagement."* (Mid-Career
Academic / Soft Pure / P5G2)

Their colleague concurred with this point, suggesting these structural
changes were impacting upon their profession:

"There's another way in which if affects, that you don't necessarily go
[from the] *individual but it affects the profession. So... if impact is
important it means that we are going to   look to hire people that
have impact. They might not feel the pressure because maybe that's
what they've been doing anyway but it means that the profession goes
in a certain direction where people are doing impact stuff."* (Senior
Academic / Soft Pure / P3G2)

The group responded in unison to the above comment: *"that's
happening"* (SP Group Participants)

Despite the changes reported in working practices and the pressure
emanating from them, researchers did not feel that they were now
working in a new mode of knowledge production or that they were
shifting into a new way of working. Despite the prevalence of the
"Mode 1" and "Mode 2" model of knowledge production (Gibbons et
al, 1994) in education and social policy literature, participants were
not familiar with the concepts. In response to a presentation of the
model in question, (see Table 1), all the groups rejected the idea of
there being a "Mode 1" and a "Mode 2". The set of characteristics
were not seen as exclusive to either "Mode 1" or "Mode 2". One
researcher described moving between the different characteristics in
the modes:

*"... from my point of view... I'm sure I wear both hats at different
times and I don't feel as though [I am] letting go of Mode 1 and
moving...irresistibly towards Mode 2."* (Mid-Career Researcher / Soft
Applied /P1G1)

In the final MD group researchers expressed the idea that the theory lacked verisimilitude:

"It not sure it has any reality" (Senior Academic / Hard Applied / MD Group / P1G5) and in a similar vein:

"I think this distinction is entirely contrived" (Senior Academic / Hard Pure / MD Group/ P6G5)

The problems with the model were discussed in the final MD group, with one researcher suggesting that "Mode 1" knowledge was portrayed (perhaps disingenuously) as research conducted in a completely socially disengaged way in order to make a distinction between the characteristics of itself and "Mode 2":

"Mode 2" is propping up "Mode 1" to make it seem like an actual mode" (Early Career Researcher / Soft Pure / MD Group / P5G5)

Another participant's comment supported this position, saying that while "Mode 2" characteristics are all about engagement, s/he supposed "Mode 1" disciplines have these elements too:

"... I'm not sure that Mode 1 actually has been in existence all the time for everything...Because most of Mode 2 is ...about engagement, and, but even... [name], one of the great mathematicians of life was trying to work out what happened to... astronomy... and to me ... it's not... autonomous, it's not a Mode 1 discipline, it's engaging... it's got quite a lot of Mode 2, and interaction with industry in terms of the technology that is going into it...the methods, machine learning, of learning across engaged ways and all the rest of it. Autonomy, I'm not sure it's ever existed really, even something as apparently as autonomous as pure maths..." (Senior Academic / Hard Applied / MD Group / P1G5)

Researchers in the SA group had similar views, for example, one senior researcher commented that:

"the idea that research was ever in Mode 1 was not plausible…people have always worked independently and with others and in both forms of working can move between Mode 1 and 2 [characteristics]" (Senior Academic / Soft Applied / P3G1)

The idea of a shift from "Mode 1" to "Mode 2" was discussed at some length in the HP group. Two points came from the data: one that it was easy to find examples of research from one hundred and fifty years ago which could be considered "Mode 2", and there was one given citing all the "Mode 2" characteristics, so this was not a new concept. Secondly, there were numerous examples of a pure research field developing from an applied field, or an applied field now being a site of pure research. This suggested more complexity than a single direction move:

"…some things that we now regard as extremely applied were…pure, were [a] pure [discipline] in their genesis. Others are the other way round, that means that nowadays [fields]…increasingly studying the abstract started as very concrete, problem solving [discipline], such as [gives examples]…so things move." (Senior Academic / Hard Pure / P3G4)

To return to the SA researcher I cited earlier who described the research process as having two distinct parts, the academic work and the application of that work. They likened this to "Mode 1" and "Mode 2".

"…I think sometimes, certainly at the beginning of the project you're just in "Mode 1" and you're thinking about an interesting puzzle that you want to solve … and you think about the journals that you want to publish in. And there's all the stuff relating to application and impact… that's another hat…maybe even in careerist terms….when you know impact coordinators come knocking you have to put that hat on …but

you just wear two hats and you wear them for different audiences. I think you just have to develop different identities." (Mid-Career Researcher / Soft Applied /P1G1)

Finally, one researcher from the SA group likened the "Mode 1 / Mode 2" construct to modernity and post-modernity, suggesting that researchers operating now are *"stalled somewhere in the middle"* as *"late moderns".* (Early Career Researcher / Soft Applied / P2G1)

This is the last in three sub-themes I have presented on changes in research practices, based on data I collected from researchers across four disciplinary areas. The sub-themes covered data on 'Research methods', 'Collaboration' and 'Structural changes and pressures'. In the next section, I will draw these sub-themes together in the closing part of this theme.

4.2.5 View of the data from each disciplinary area

As this is a substantial theme, I have decided to present the data in different ways to aid the readers' understanding. Hence, I offer a 'sliced' view of the data below, by disciplinary area. So far, in this chapter, the data on research practices have been presented as common sub-themes. Each disciplinary area also had its own unique data that did not coalesce into one of these sub-themes but did indicate a change in research practices. I have presented these ideas below along with a brief reprise of data from the common sub-themes under each heading, thereby allowing the reader to access all the data in this theme, for each disciplinary area, in one section.

The Hard Applied Knowledge Area

From the common themes above, the HA group highlighted the impact of technology upon their ways of working. Information discovery and data analysis were cited as areas of change. Research methods were subject to change based on commissioners' needs and

funders had the opportunity to contribute throughout the research process. MD collaboration was routine, and the group composition brought together researchers from different backgrounds. However, workshops to encourage MD and ID research were not seen as useful unless they were somehow bespoke to the individual's field of research. Finding a suitable funder for ID research was cited as a barrier to it being conducted.

Unlike the other groups, the HA group spoke about innovations in relation to commissioners and the standardisation of methods. Alongside this there was a proliferation of methods, chiefly through an inclusion of more qualitative methods which, as one Mid-Career researcher pointed out, were *"not so well regarded"* (P6G3) in the past. The pace and amount of research being produced in their field was commented on, with research from even five years ago being seen as out dated. Overall, the group felt that their research area was in a strong position, as the methodology was so responsive to commissioners' needs. However, the corollary of this position was that as funders had a strong influence in how studies were designed and conducted this restricted which method could be used and where new methods could be tested.

The HA group were connected by the application of their expertise to answer applied questions, rather than sharing theoretical or ontological roots. As one researcher said: *"I don't know what my discipline is"* (Early Career Researcher / Hard Applied / P5G3). Researchers identified with their research role rather than a discipline per se and tended to self-identify more with their methodological expertise rather than a disciplinary area, reflected in comments such as: '*I'm a qualitative researcher'* rather than 'I work in x department' or 'I'm a scientist/social-scientist'.

The Hard Pure Knowledge Area

There was a large variety of research methods used in the various sub-fields represented in the group. Technology was reported as having the most impact upon ways of working amongst researchers present. This was in information retrieval, data collection and data analysis.

The HP group described numerous examples of collaborative working, both within a field and in a multi-disciplinary manner. Although the group cited 'impact' as having no effect on their methods, it was reported as affecting structural parts of the discipline, such as PhD funding. When speaking about collaboration that stemmed from solving a problem, this was associated with a positive and enthusiastic manner. In contrast, external initiatives or pressures to work collaboratively were associated with a negative or fatigued manner. Researchers from a wide variety of sub-fields were represented in the group and these fields had varying ways of working. Despite the variety of fields represented in the room, it was clear that the researchers themselves, and their views about what was good practice in their discipline, were the critical influences on how to produce research. This was enhanced or expedited by technology. If MD or ID team working was not relevant to the field, it was not going to happen.

The Soft Pure Knowledge Area

From the common themes, this group credited technology with changing their ways of working particularly in the areas of literature searching and accessing rare materials online. The impact phenomenon was also cited as changing ways of working in a number of areas, with the idea of an 'empirical turn' being cited as a current trend. My interpretation was that, for this group, 'impact' was something illusory and manufactured rather than a tangible and obvious output to report. A number of structural changes were noted,

such as people being hired for skills related to impact, including enhanced knowledge of the REF. Corporate type narratives of 'five-year plans' and protracted schemas of potential future research studies were cited as restrictive to researchers.

The discussion topic of collaboration focussed on ID and MD research. This was taking off in some sub-fields but was viewed not to work in all areas. One ECR felt that the impact agenda created barriers to ID working, as pure researchers felt that their work was not valuable and not suitable to be used in this manner.

The question of whether research methods had changed stimulated a fairly lengthy discussion in this group, taking up a quarter of the hour. The word 'methods' is most commonly associated with empirical research and the group reflected on how 'methods' related to their research.

They spoke about there being no explicit methods, and definitely not something that was taught; rather, you learnt by doing. Methods were *"not avert and it's not agreed, it's implicit and quite unclear,"* (Mid-Career Researcher / Soft Pure / P4G2). They group agreed that it was impossible to pick apart a method and a particular field at the time it was happening because they were fused together. It was only possible to observe some trends or particular practices in retrospect:

"[the] boundaries between the substantive views and the methods is a bit muddled, so it's very hard to tell apart the difference between the methods and the particular [disciplinary] *views…only in retrospect is it possible to point to…clear streams of method that unify the field at one time."* (Mid-Career Researcher / Soft Pure / P2G2)

The group spoke about various practices and there was little consensus on whether these had gone out of use or not, with group members contradicting each other. A variety of different ways of writing and use of language were discussed, for example how much a

piece of writing would move between abstract and concrete language. In terms of the drivers for change, some participants thought that certain practices were used *"to show prowess"* (Mid-Career Researcher / Soft Pure / P4G2) yet when asked "what do you think causes methodological change?" the group all agreed *"fashion",* with one person saying *"Yes, I would say just fashion, nothing more interesting than that."* (Mid-Career Researcher / Soft Pure / P5G2)

It was clear that 'methods' or ways of working were diverse and also that fashion played an influencing role, with some practices still being used but no longer highlighted as they were no longer fashionable.   Another trend reported in common themes was an 'empirical turn.' Changes in practices were largely driven from within the discipline - the fashions or preferred practices of the time. External places were also cited as origins of these changes, one being pressure from another discipline to incorporate more of their subject within the research in order to create a more well-rounded ID product. This was derided as something that was done and then waned:

"…then it became a bit ridiculous, [laughs] *like any method can become ridiculous"* (Senior Academic / Soft Pure / P1G2). The SP researchers described freedom to use and try different methods and then abandon them when they proved no longer useful to their research. Particular practices were not so essential or necessary; instead, there were a number of approaches that one could take:

"…in the contemporary setting there's…so many different ways to go about doing it. It's kind of accepted that you can…be a little bit, even capricious maybe…in your method." (Early Career Researcher / Soft Pure / MD Group /P5G5)

The Soft Applied Knowledge Area

Unlike the other disciplinary areas, there was little data on technology from this group. It is possible to speculate that some impact must have been felt on literature searching but it is not possible to speculate beyond this with any degree of certainty.

In terms of impact, although this was reported as influencing ways of working, there was a difference in the degree of effect experienced by ECRs and Senior Academics. Some structural changes were noted: for example, PhD students were publishing earlier than was usual in the past.

In the findings on collaboration, there was a discussion on how well the group worked together when they were actually from two different disciplines. This was attributed to emerging from the same theoretical bedrock and having a good overlap in the methodologies and methods used. There were barriers to ID research in that it was time consuming to keep tailoring research to fit with a single discipline journal. One ECR also commented that the emphasis on MD/ID work led to mono-method research being undervalued.

Researchers in this group all concurred that, whilst traditional research methods continued, they had witnessed a broadening out within their area to include various social science methods, both qualitative and quantitative. One researcher described how the discipline had at one time *"held off"* (P2G1) from both humanities and other social science disciplines, but now people were more and more interested in pursuing a greater portfolio of methods for their research. Nevertheless, traditional methods, which originated hundreds of years ago, were agreed to be very important to the discipline and always needed.

In the final MD group, two researchers from the SA area participated. One mid-career researcher in this group concurred with the earlier group's observation that a traditionally conservative approach to

research was now broadening out to include wider social science methods. S/he qualified this further to say that this had been precipitated by external influences such as the need to get funding and the introduction of new types of promotion criteria.

4.2.6 Summary

This theme (4.2) reported on findings based on researchers' experiences of working in four disciplinary areas: hard applied, hard pure, soft applied and soft pure. This was derived from data collected from five focus groups. Material was organised into three common sub-themes: 'Research methods', 'Collaboration' and 'Structural changes and pressures'. Unique data to each group was then presented in a series of short narrative accounts. This chapter maps onto the research question 'What is the extent and nature of change in disciplinary ways of working in different types of fields and disciplines?'

In general, the data show that ways of working have changed because of technology. However, there was a mixed picture in the degree of change attributed to technology according to disciplinary area, with most change being reported in the data driven, hard knowledge areas. This had noticeably led to 'paper and pencil' methods being less common and reported as unsuitable to the new ways of working with big data sets.

An emphasis on research relevance has also affected ways of working. Three groups (SA, SP, HA) in the study reported changes in methods that they linked to pressure to produce research which has direct relevance to the economy or society. Data from the soft areas described movement from theoretical to empirical research or from qualitative to quantitative. In an opposing directional flow from hard to soft knowledge, the HA group reported a broadening out of methods to include qualitative research, and non-research evidence

from the public and service users in their research. In the soft areas, the ability to resist pressure to make these changes varied according to academic rank.

The HA group reported that their methods were responsive but innovation had to be measured against requirements of funders and journal editors. Both applied groups spoke about the difficulties of finding a receptive audience for their research that had political relevance and usage: for example, research was sometimes disregarded in decision-making processes by commissioners. HP researchers cited that their methods were not affected by impact and reported much less influence on the research process from funders. However, I speculate that innovations in methods would mainly happen in those areas that are funded, with infrequent and shorter amounts of time available to work on un-funded researcher driven projects. Collaboration is a routine practice for a lot of researchers in the study, with evidence of this from all groups. Multi-modal collaborations were reported with theoreticians collaborating with empirical researchers and vice versa. This was reported in both the pure areas.

Institutional schemes to encourage ID and MD working were not well regarded by any group in the study, with researchers preferring an organic or 'bottom up' approach to this way of working. Any training activity had to be completely relevant and specific to their work, and so, as a consequence, general sessions on 'collaboration is good' were resented as taking up precious time.

Researchers enjoyed working in teams and this was reported mostly by HA, SA and HP participants. Within the SA and HP groups, some researchers worked less in groups, some more so. SP researchers did not present collaborative working as a usual occurrence but were not isolated from each other's work or the wider disciplinary community.

A number of barriers to MD/ID research were reported, including practical barriers, lack of trust, inappropriateness of methodology to research questions and a lack of awareness of how one's disciplinary knowledge would fit with another's. Researchers in pure areas also reported that an emphasis on impact and MD/ID research led to a feeling that their research was not of as much value as applied research. This led to less interest in MD/ID research collaborations, especially in areas where it was already difficult to identify an obvious point for collaboration. In the SP area ECRs reported seeking out collaborations beyond their discipline, which was not reported by senior academics. Researchers recognised certain characteristics of their working practices as new, (as evidenced in the data in this chapter) with some researchers suggesting a movement between "Mode 1" and "Mode 2" practices within a research project.

The findings in this theme present a partial picture of the disciplines in the context of the case study boundaries. The focus of this theme was how researchers work within their disciplines, drawn from the data collected for this case study. Key changes in ways of working were presented such as the impact of technology, an emphasis on research relevance outside of academia and a pressure to work across disciplines. A presentation of these common themes was supported by an exploration of how ways of working had changed in the four specific areas. Differences reported based on academic rank such as pressure to change to a different research methodology or method were incorporated into the chapter. This chapter links the methodology and methods for this study presented in chapter three to a series of three themes presenting the findings for the study. In this theme data was presented on changes in ways of working in the disciplines, based on data collected in 2016/17 from four disciplinary areas. However, it does not fully explore ideas on what knowledge is being produced and how that knowledge is valued. This will be presented in the next theme (4.3). Ideas on changes in knowledge

produced and ways of working will be drawn together in the discussion chapter, (Chapter 5) in order to show the relationship between method and product and how the changes reported interact with each other, both across and within the groups. For example, how does a call for research relevance affect the type of knowledge produced and what is the implication of this?

4.3 Knowledge as Product: Theme 2

4.3.1 Introduction

This theme is concerned with the what, rather than the how of the research process. It focuses on topic choice, the value of knowledge produced, types of knowledge and the factors that drive these phenomena. As ways of working and knowledge produced are intertwined, there is an overlap in the data presented in these two themes. The data in this theme are clustered into four sub-themes, the first three present factors that impact on knowledge production identified in the data, namely: 'Researchers' freedom and knowledge development', 'The discipline and knowledge development' and 'Research relevance and knowledge development'. These sub-themes are complemented by a fourth sub-theme entitled 'Types and value of knowledge', which presents data on the different types of knowledge being produced and how knowledge is valued by different stakeholders. The data presented in this theme (4.3) will map onto the question "What factors impact on the development and production of disciplinary knowledge in different types of fields and disciplines and how do they manifest themselves?" This overarching theme 'Knowledge as product' draws together evidence from previous categories in Phase Four of the analysis 'Disciplinary housing', 'Research topics', 'Types of knowledge', 'Value', 'Impact', 'Academic freedom' and 'Personal perspectives'. Evidence is mainly derived from responses to questions about institutional schemes to encourage impactful research practices and modes of knowledge production.

Data was also drawn from participants' responses to a question on academic freedom and the interview warm up question, as described below.

4.3.2 Researchers' freedom and knowledge development

Before each interview, researchers were asked to consider "what was the most exciting piece of research that you have been a part of?". This was the first question asked of each group, used as a warm up to enable everyone to contribute as we went around the table in turn. The question was also chosen in order to give the interviewer some idea of the areas people worked in, and to make the rest of the interview more understandable. It gave an overview of the different disciplinary areas chosen and their soft/hard/applied/pure axes and gave an insight into how the researchers felt about their work, what they enjoyed about it and why. Some of the responses to this question are reported below as relevant to the overarching theme of 'Knowledge as product'.

In response to the question, researchers cited both mode of working and topic and referred to learning new skills, the satisfaction of solving a puzzle or seeing a particular result, and of being at the vanguard of their field:

"…one particular result that stands out…[describes study] for the first time ever we were able to go back and say "oh yes," there's actually something missing from this image. And the moment of seeing something new, and then you have to go through the whole process of analysis and writing up and that's a little bit laborious, but you know that one moment of just seeing it, that result just appearing on the screen, that was really good." (Mid-Career Researcher / Hard Pure / P7G5)

As reported in the previous chapter, collaboration was also mentioned a number of times in different guises. There were also

comments about a research project being fun and enjoyment of the research process:

"…I was going to echo what [name] was saying. I look at…systems and I spend a lot of time writing at how they should operate and looking at it from…the institution's perspective that's organising the … system. But I'm currently involved in a piece of research which is doing the opposite and looking at the users. And that's quite interesting as that's led me to present a couple of presentations where I'm actually talking to the users themselves who don't believe a word of what I'm saying, so trying to get that sort of match-up between expectations and how the process works is, well, it's fascinating." (Senior Academic / Soft Applied / P3G5)

Data derived from other parts of the interviews demonstrated that largely, and unsurprisingly topics of research were driven and prescribed by what was funded:

"…very much it's responding to commissioners, you know you have to produce a product or what's needed… I think there's very little time and energy for doing your own thing." (Senior Academic / Hard Applied / P2G3)

The same idea was expressed in the HP group:

"… it's more the topics and not the methods that are… dictated from on high … the particular type of data I have to analyse and explain how I took it, that is dictated by which grant proposals the research council chooses to fund, so it's more what than how." (Senior Academic/ Hard Pure /P3G4)

Although all groups mentioned that they were restricted by what funders wanted, no negative comments were made about this:

"I've never felt restricted, only by funders, no one else" (Senior Academic / Hard Pure /P4G4)

If personal research interests fitted in with funded areas that was good, but there was often a moulding of research interests into what was available, or a sense of just getting on with it:

"*I think my research is very, very much driven by…forces above me, so if they say we're going to put ten million into [x topic] my first interest is [x topic].* (Mid-Career Researcher / Hard Pure /P5G4)

This sentiment was echoed in the SA group by an early career researcher:

"*If you say…here are the five things and we're going to have funding that requires you to say which of these five things that you do…actually the idea that my research fits into any of those categories is a little bit tricky*" (Early Career Researcher / Soft Applied /P2G1)

In the HP group, there was a discussion about researcher-led work and some researchers described "pet projects" that they would fund through fragments of funding, topics they would revisit, as evidenced in the two comments below:

"*…almost everybody has used… pet projects here and there …that you scratch money from here and there…normally it is for fun or just liking to do something secret…*" (Mid-Career Researcher / Hard Pure / P1G4)

A colleague in the same group echoed this practice:

"*… some of the techniques that we've developed are my pet projects, and funding those is done by bits and pieces that we've scraped together. Whereas if I want to study [names topics] those are not difficult ones to get generally.*" (Mid-Career / Hard Pure/ P5G4)

One HP participant expressed researchers' sustained curiosity evocatively:

"Curiosity? Curiosity, it's an addiction, you've got a problem, you know how to solve it but no one else wants to solve it." (Senior Academic / Hard Pure/ P7G4)

I used questions on methodological change and academic freedom to explore the limitations of researchers' autonomy. The idea of research being organic or of being autonomous was mentioned by all five groups. For example, there were comments from all the disciplinary areas about the pleasure of solving a problem or puzzle or of coming up with research questions that had not been thought of, described by one SA researcher as "organic interests". For example:

"...I think that good research has to be organic and it has to come through interested academics who are still...after a good puzzle to solve" (Mid-Career Researcher / Soft Applied/ P1G1)

A number of people spoke about researcher autonomy in the form of leading a project, or the topic or question emanating from an organic interest or problem they had discovered:

"...I was involved in an EU...project some time ago now [describes study]...and we got money to go and had various meetings in various different places and I found that a very exciting time because I was relatively new to it, and it was quite a big deal for me because I was PI on a big European project. I got to go and talk to lots of people about stuff that I was really interested in at the time and I found that genuinely really rather exciting." (Senior Academic / Soft Applied /P3G1)

A similar sentiment was voiced by a senior academic in the SP area:

"...finding your own problems is always fun as well so in a sense of seeing questions that I would [not] have otherwise asked? ...yes...new problems coming up, seeing things that you haven't seen before, you

get a sense of things opening up before you, which is good." (Senior Academic / Soft Pure /P3G2)

An HA researcher remarked on the autonomy s/he had experienced during an early research project and the satisfaction that manifested:

"*... my dissertation which was [describes topic] was the most exciting piece of research for me. I think, because it was something that I had absolute control over and I wasn't following anybody else's agenda and it was a topic that was close to what I was doing [in practice].*" (Early Career Researcher / Hard Applied /P5G3)

In response to these questions, it was clear to see the role of the respondents' discipline in both facilitating and narrowing their personal freedom as researchers within the constraints and pressures discussed in the previous chapter. This was the first of three sub-themes. The effects of the discipline on knowledge development are reported in the next part of this theme.

4.3.3 The discipline and knowledge development

As reported in the previous sub-theme, research topics were decided by what would be funded, with commissioned calls rather than researcher-led topics dominating. The discipline also played a role in what researchers would pursue themselves, with HA and SP researchers reporting that research had to fit in with current interest and fashions in the discipline and therefore in what would be published:

"*I think you tend to look for the commissioned calls now... I mean people do still try and do [their] own studies, but it has to be...aligned with what is going on... it has to be aligned with...things that are hot topics.*" (Mid-Career Researcher / Hard Applied / P6G3)

In relation to 'hot' topics and their opposite, unacceptable topics, the phenomena of academics being banned from speaking at some higher

education institutions, sometimes referred to as being 'no platformed' was introduced in one of the discussion questions. I invited participants to share their views on this in relation to research knowledge and ways of working. Several high profile examples were discussed (such as the Germaine Greer case), with each group offering their own examples. I asked a follow-up question in the SP group: 'Would this prevent anyone present from researching particular topics?' Two key points emerged, namely: that certain topics may be out of bounds if you held particular views, and that you may have to be willing to take a particular perspective or position on a given topic. In relation to this, the views required were not necessarily what is commonly described as 'politically correct (PC)', the often left-wing/liberal motivated perspective on diversity alleged to be dominant in HE institutions. There were also the idiosyncrasies of the discipline to consider and what was acceptable there may not be the same as a 'politically correct' doctrine. For example, one participant in the SP group commented:

"It has a chilling effect, even if it doesn't affect what you do it's going to affect which field you're going [to] write on. In certain areas of [discipline] [they] are related to certain areas of political debates that are known to be PC and if you don't have these views you're just going to take a step away from them." (Mid-Career Researcher / Soft Pure / P4G2)

S/he spoke about pressure from within the individual and external pressure, but also a 'third way' pressure from within the discipline. This pressure curtailed what was or was not to be researched and in a related, but different effect, what views or arguments were to be made. This second point was also voiced in the MD group by a colleague from the same disciplinary area, suggesting that s/he had felt pressure to take a particular line of argument:

"...so there is a sense in which, if I want to have an argument about [topic], the expectation is that I will [fall] on a certain side...I mean I have a certain theoretical commitment and ...and how I argue follows from there but I won't necessarily be appealing to facts." (Early Career Researcher / Soft Pure / P5G5)

The idea of pressure from within the discipline was extended by another SP researcher. S/he challenged the view that certain 'PC' standpoints were promoted and that publishing on these topics lead to an easier career path. S/he responds here to a comment that journals would not publish research because of political reasons:

"...for years it's been really difficult to get feminist work published and many [discipline] journals have just rejected it on the grounds that it's feminist work, so whilst there might be a perception that feminist work's so 'PC', so surely they're having an easy time actually the opposite has been true for ages in [discipline] and it's still not changed. So colleagues who supervise feminist PhD's for example, we're still advising our students you need a side interest, 'cause you can't expect to make your career doing feminist [work] and such is the state of the discipline that even though it's changing, lots of people don't take that seriously ... so I'm not sure I'd agree that there's this 'PC' pressure. There is a kind of stereotype that you find that, and there are cases such as ... Germaine Greer and stuff, like the big cases, but then you don't maybe hear about the sort of pressure from ... a different direction, a sort of conservative pressure and I think [discipline] has often been quite a conservative discipline in some ways, with a small c,..." (Mid-Career Researcher / Soft Pure / P5G2)

As can be seen from researchers' testimony above, the determinants of what topics were to be researched emerged from the data. The SP group continued to debate the notion of why certain arguments or

topics were not published in particular journals, with one researcher expressing the complexity of possible motives:

"…in some of those cases it's not clear what the pressure is though, so you get a similar thing with [name of field] right and there I think it's not, it's not a political thing that's creating the pressure, just, so much, as just that people work on certain things and don't tend to regard things outside of a relatively small range of things that should be published…I mean in some ways it's not clear … what pressures are that are shaping the situation actually… so it might well be that there's not a great deal of relatively right wing political [work] published in certain journal…that might not be because it is explicit thoughts that it's wrong, in terms of political views, just so much that it's not for some reason taken intellectually as seriously. But then again that might be a response to certain political pressures and if it is, it might be kind of self-conscious, so it all gets very messy." (Senior Academic / Soft Pure / P1G2)

I reported in the previous theme that a number of ECRs shared how they had had to change their research methods and/or topic in order to have a viable career. Those findings are reinforced with data from this sub-theme (as reported above) with researchers sharing how a conservative pressure from within their discipline had a direct effect on their career and that of PhD students they knew. This theme also relates to the ways in which dissemination of research can be restricted by controversy, and researchers' views on this phenomenon is reported in the final part of this chapter (4.4) 'Traditional and new forms of research evaluation'. This was the second of four sub-themes on knowledge as product. The next sub-theme presents data regarding the call for instrumental knowledge and how this affects the knowledge that is produced.

4.3.4 Research relevance and knowledge development

One way in which institutional commitments to the knowledge economy are manifested are by the existence of workshops and schemes to promote 'impactful' research. As discussed in the previous theme 'Changes in research practices', these schemes include sessions on ID working, co-production of knowledge and public engagement. The discussion groups were asked to give their opinion of how they felt about the existence of these opportunities. Most discussion groups focussed on collaboration, which was given as an example, but some more general comments on these schemes emerged from the groups. The SA group for example, made a number of observations that were ostensibly in favour of these type of schemes. They were seen as necessary in order to keep the University going, but difficult to communicate given academics' resistance to anything perceived as management 'control'. In terms of the effect on knowledge produced, one researcher described the difficulty of fitting into prescribed categories of knowledge:

"... I particularly feel this with regard to the [name of faculty]...because they have these...core themes that every... project ought to be fitting into... Really I only feel like one of those can potentially encapsulate my research interests because they are a bit more theoretical, a bit more philosophical...I think it's useful that they exist but one has to very careful about how they're packaged, particularly how they're communicated...given the sort of the typical academic culture of resistance to managerial control and a sense of individual choice and individual freedom..." (Early Career Researcher / Soft Applied / P2G1)

It was also noted by the discussants in the SA group that those administering these schemes were academics themselves. There could be a sense of dissonance experienced by those delivering the message

of non-academic impact if their definition of HE was at variance with a governmental perspective of the sector:

"I think a lot of it is to do at a much higher level, the government's insistence upon...let's get value for money out of education...which essentially means let's make sure that it generates wealth or generates something of value and society at large..Rather than having more of an enlightenment approach where actually you've just got to run along with these things and the impact might be a hundred years off or it maybe tomorrow but it's not for you to select... which direction you take." (Mid-Career Researcher /Soft Applied /P1G1)

This resonates with a comment from the HP discussion about the restrictions of REF/impact requirements on research:

"... things that might have impact in thirty years that aren't going to produce anything of commercial value in the next three years [are]... not seen as impact, well, we don't know, but if you don't do the research you'll never find out." (Senior Academic / Hard Pure / P4G4)

As noted in the previous chapter, researchers described tailoring research proposals with regards to the topic in order to get funding. I give some more examples here as they pertain to the effect on the knowledge produced. In this example, the research was ostensibly the same, but aspects which referenced impact were emphasised or added to:

"I think it [impact] also, it also makes it less easy to be brutally honest in your science so I think [for example]...if there's a one percent chance that your research will understand [x phenomena], one percent is a massive overstatement then it's very easy to put in the grant 'this will lead to an understanding of [x phenomena]' and ... that shouldn't be in the grant but if you don't put it in the grant, it won't get funded." (Mid-Career Researcher / Hard Pure / P5G4)

The idea of research being restricted and funders' desire for a priori surety of outputs emerges again in the comments of a mid-career (HP) researcher in the final group. S/he reflects on how their initial optimism as a researcher has given way to a more circumspect perspective of the research process, suggesting that researchers should be willing to be clear about the limitations of their research:

"people should be writing stuff that they are sure about or at least... be willing to express the uncertainties and I don't think people [are] quite as honest as they should be in my field." (Mid-Career Researcher / Hard Pure / P7G5)

In another example of how research impact affected a project, one senior researcher in the SP group described where one condition of getting the funding was linked to conditions about dissemination:

"I'm sure the project I'm currently funded on, there's more impact in it than I would have put in left to myself... and also... the funding I got, ridiculously...wants you to spend loads of public money travelling the world and stuff like that and you won't get a grant unless you agree, so, I've wasted...endless amounts of taxpayers' money because that was the only way of getting the money in the first place... I wouldn't have done all that travelling left to myself... it's not that it's turned out to be bad, but I couldn't do anything about it, the project probably could have lived without it but that was purely external, so I ended up going to Australia because I had to say, well I've done something exciting and adventurous to get the money in the first place. I wouldn't have gone to Australia on my own devices...funding structures do make a difference and obviously the REF hype, the impact type agenda has made a huge difference." (Senior Academic / Soft Pure / P1G2)

For some researchers in the HP group, their work fitted more easily into defined 'impact' categories, for others not so much; and if there were not obvious links it was difficult to make these connections. One researcher highlighted how the governmental requirement to

demonstrate or identify how research impacts on society has had some interesting and contradictory effects, producing a narrowing of output. 'Pure' scientific research often creates ideas that are quickly taken to become commercial spin-offs (such as WiFi and memory foam), but these innovations are not as common in pure fields any more:

"… from the perspective of [discipline] as a blue skies…a lot of the things…are traditionally in the remit of blue skies research…ten years ago…the reason why we would justify our research is that you would see what an application might be or we might stumble across something … Whereas now…companies like Google they are now… going to do…self-driving cars or whatever, just to see what happens… Let's just see what we can do, throw a whole lot of money at the problem, because traditional companies won't do it, universities aren't funded well enough to do it. So, now…machine learning, that's now the … domain of companies, they are leading the way, whereas I think ten years ago that's the kind of thing that [researchers] would have been at the leading edge of." (Mid-Career Researcher / Hard Pure / P7G5)

Career pressure also led to a limitation on research outputs, as seen in this example from the HA group where one researcher describes how, even when given a funded opportunity to conduct their choice of topic, the choice is not unfettered. S/he was still focussed on doing something to fit in with their career and to boost skills or knowledge required for funded projects:

"… I'm thinking about what would be useful for other bits that I'm doing. So, I feel like I'm restricting myself more … than I have done previously perhaps, and not thinking about [more] generally wide what…would be great to look at." (Early Career Researcher / Hard Applied / P3G3)

In the SP area, programmes to facilitate non-academic research impact that were suitable for the REF were reported to encourage a

pointless repetition of research. One researcher spoke evocatively about the result of this:

" *a lot of dry, technical and tedious work, a lot of books that nobody's going to read… probably also a larger volume, (this is also perhaps to do with the REF), …of publications…there are new [disciplinary] journals springing up like mushrooms all over the place and the top journals have very low acceptance rates because they're getting hundreds and hundreds of submissions and it's just increasing, not because the number of [researchers] is increasing but because the pressure to publish more and more stuff is increasing from outside.*"
(Senior Academic / Soft Pure /P3G2)

S/he later goes on to say:

"*…there are also a lot of external factors that encourage people to write more and more obscure papers because that's the only way you can get a grant, which you need for your career is to hold a conference on some topic, so you get people who've written about x, and you invite them to come and say more about x, even though they might not have anything that's important or new to say about it otherwise they would have already, and you get another volume about x which is just, very technical and tedious and a bit pointless really.*" (Senior Academic / Soft Pure / P3G2)

The point that this yields very few theoretical advances but produces work which self-perpetuates what has gone before in more and more papers suitable for the REF was also supported in the final discussion group. Here a SP colleague talked about a lack of currently published papers that took an overview or "*broad brushstroke*" approach:

"*There's much less of that kind of work, the sort of painting the big picture, the landscape or setting the scene in that way. Partly I think that may be a consequence of the journal culture… taking over, where people can only make a very …narrow point that's acceptable within*

the culture, but I certainly found... that you don't get as much, of this kind of broad brushstroke, big change, paradigm stuff happening. At the same level it's more focussed on particular people and their texts. I mean certainly the junior people aren't engaging in that." (Early Career Researcher / Soft Pure / MD Group / P5G5)

As reported in the previous theme, SP researchers reported that there was more MD work and, in certain sub-fields some researchers working with empirical data. This was seen as a mixed blessing, resulting in some good collaborations and some which were not successful or appropriate for the discipline. For example, whilst one Mid-Career Researcher spoke about having to diversify from their (feminist) theoretical standpoint to survive, (reported above), they also spoke with real positivity and lightness in their voice about the new opportunities that they saw in the discipline:

"...there's more interesting stuff happening now, there's more of a proliferation of subjects discussed so whilst...I'm sure you're right about [the narrowing of topics]...I feel there's more stuff now that I think's interesting and some of the old things that people are interested in I just think that was a black hole. It's good that everybody's pulled themselves...out of that." (Mid-Career Researcher / Soft Pure / P5G2)

A senior colleague also spoke positively about some of the new knowledge being produced through disciplinary collaborations that were not common in the past:

"...the boundaries between [discipline] and other disciplines are a lot more fluid, a lot less clear now than they were, I think, twenty years ago...the difference between say [taking a science or humanities perspective on the same topic e.g. two different subject areas studying film], there's not an assured boundary and I think in a way that is a good thing because some of that...work anyway is very, very interesting. They didn't do it so much when I was a student." (Mid-Career Researcher / Soft Pure / P4G2)

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This sub-theme reported on the impact of external pressures to produce relevant knowledge on the disciplines as reported by researchers across hard, pure, soft and applied knowledge areas. It was the third in four sub-themes in this theme on 'Knowledge as product'. The final sub-theme in this section presents data on types of knowledge and how that knowledge is valued.

4.3.5 Types and value of knowledge

Both a broadening of knowledge types such as qualitative and quantitative research, professional and lay knowledge, and a simultaneous narrowing of topics was found in the data. Applied researchers talked about an increase in the inclusion of the service users' or the publics' perspective on topics and how the public was much more involved in the research process:

"There's a lot more emphasis on [user] involvement...public involvement in research... far more projects... start off with a qualitative element and have mixed methods and...work from ... the beginning from trying to understand the issues for [users]" (Senior Academic / Hard Applied / P1G3)

As noted earlier, this was often a prerequisite of funders awarding grants:

"...we have to include [a user] component in research bids" (Senior Academic / Hard Applied / P2G3)

The HA group also discussed the decline of practitioner research in their field, with a shift towards universities taking on practice-located work. This was not seen as a good thing as researchers may lack the detailed subject knowledge needed to produce a piece of work that is credible to the practitioner community:

"...[researchers] are very good at [method] but they may not understand the intricacies of some of the subject areas that they're [researching]..., so it would be very good to have a [practitioner]...who

understood [research method]...and these sort of things, so I think we do need to break down some of the disciplinary structures." (Senior Academic / Hard Applied / P1G3)

A colleague voiced the idea that a lot of studies were integrated, with contributions from practice incorporated within them:

"But I think that's already happening no good [study]... would ever be done without involving experts in the field, that's not a good quality [study]....you have to have experts ... the disciplinary structure means that they [the studies] have to be inter-disciplinary to be of good quality..." (Senior Academic / Hard Applied) (P2G3)

It is notable that 'disciplinary' is used here as an inclusive term, beyond academic disciplines to include professional groups. This indicates an inclusion of both research knowledge and professional knowledge in research studies. Another approach to include practitioners in university research was for researchers to be seconded or embedded within the research setting:

"I've just completed... a secondment with [name of organisation] and that was really useful, so ... just that step further, not just talking to people, but actually visiting settings and...having...seminars etc...I had the freedom to...really explore the setting... I think that's...the way it might be going...and that's really useful, 'cause sitting at your desk trying to understand a topic that you're not familiar with can be quite difficult, when you're trying to do a [study] and...make it meaningful." (Mid-Career Researcher / Hard Applied / P6G3)

In the HP group, there was a comment regarding another movement of research from one setting to another, from industry to universities. One researcher commented that companies are closing down research and development departments, resulting in university departments being pushed to do *"near-market research"*. Again this was seen as a negative development for a number of reasons: university researchers

were not best placed to do this kind of work as they do not know the market properly, it would take up time when they could be concentrating their efforts on something that they do excel in, and in the example of pharmaceutical companies, prevents genuine discoveries and new products being developed in industry, for example:

"...I feel that in some respects, trying to push university departments towards near market research is likely to be counterproductive in that you will get poorer quality near market research because you've got it being done by people who don't really understand the market, but because you're making those people do it, you give industry shareholders who are driven by short term dividends ... a good excuse to cut their R and D departments." (Senior Academic / Hard Pure / P3G4)

As I reported in an earlier theme (4.2.4) on structural changes to the disciplines, the HP group discussed how fields change, exemplifying how topics move from being studied in a conceptual sense to an application of this knowledge in society and vice versa, with some fields even fluctuating back and forth over time:

"...some things that we now regard as extremely applied were...pure [discipline] in their genesis. Others are the other way round, that means that nowadays [areas] are increasingly studied as abstract started as very concrete, problem solving [discipline] such as early [field] which was very problem solving, leading to [field] which is a much more of a traditional academic discipline; so things move." (Senior Academic / Hard Pure / P3G4)

As reported in the previous theme there was also a diversification of methods in some disciplines. For example, in the HA group there was more qualitative research. This indicates a shift in the HA knowledge area to include people's perspectives on why something works or

their experience of particular phenomena. One researcher described it as:

"...the gradual recognition of how important qualitative research [and other methods] can be in contributing to our understanding" (Mid-Career Researcher / Hard Applied / P6G3)

Having presented data on the changes to the types of knowledge being produced in the different disciplinary areas included in the study, this theme will conclude with a section on how different knowledge types are valued.

In the pure groups, research 'impact' that is, impact of research outside academic measures, appeared to be something that, in most cases, did not fit in and therefore did not really mean anything, rendered instead, to a series of bureaucratic tasks. This could be observed in comments that contest the definition of 'impact' and the lack of familiarity with the language of impact:

"If you apply for an x grant you have to have an impact, I don't know what you call it, programme of impact or something, plans for impact, pathway to impact or something like that" (Senior Academic / Soft Pure / P1G2)

"I don't know what means impact, if impact is commercial impact. It's not necessary that impact is equal to commercial impact...[describes example of a breakthrough in fundamental knowledge]... This has a huge impact on humanity so the problem is not the impact for me it's the fact that you write impact but you mean commercial impact." (Mid-Career Researcher / Hard Pure / P1G4)

 When reminded about the definitions of impact (societal, commercial and academic) by a colleague, the participant went on to say that researchers do have a responsibility to explain why they are researching something, but did not agree that the only reason you can research something is because it has impact, concluding that

"*knowledge is just as important an outcome*" (Mid-Career Researcher / Hard Pure / P1G4)

In a different way, evidence of the irrelevance of 'impact' was also provided by overt comments from participants on what a waste of time some things were or how pure research was less valued. There were a number of critical comments on the value of knowledge:

"*…I just get a feeling from all the push we've had from government over the last 10 – 15 years that blues skies, it's just not important. [Names pure knowledge areas] you know, don't care. If it's not putting money into UK PLC in some measurable way, forget it.*" (Senior Academic / Hard Pure /P4G5)

In the HP discussion group, one ECR was hesitant to say that s/he felt their work wasn't valued, with a senior colleague filling in the gap with the word "value" for them in the interaction from the interview below:

32.40 **P2G4:**

> "*The other part of the question was…the impact. I have often felt and, certainly the more you get into the university, that you need to maximize your impact which is this slightly mysterious concept of something which is not always applicable to certain projects…certain projects have a massive impact in terms of everyday life and others really, really don't and I think sometimes the pressure to connect certain things with impact can be detrimental rather than positive. But at the same time, you don't want to forget, if something is impactful you don't want to forget to make those connections.*"

32.43

Interviewer:

"*How is it detrimental?*"

32.47

P2G4:

"I guess it; it can be…you can feel like what you're doing isn't…" [pause]

32.56

P3G4:

"Valued"

32.56

P2G4:

"Isn't valued because it's not going to… make solar panels cheaper in Africa or whatever it is and maybe you know, that's a bit more of a moral philosophical question about what research we should do but…I think maybe people forget that not everything has impact."

One mid-career researcher in the HP group talked about how s/he did not think it was the role of their discipline to do impact, rather to lay the groundwork for others. S/he joked *"but I don't know if I'm allowed to say that"* (P5G4). Of course, while this is tongue in cheek, jokes about impact and comments about work not being valued, demonstrate an uneasy relationship with this demand for some researchers.

This notion of value also emerged in the previous theme with one SP researcher suggesting that an emphasis on impact equalling value had contributed to less cross-disciplinary collaborations:

"We also buy into the idea that 'we are useless in terms of what we do and it's very insular, you know and who cares about what we do?'" (Early Career Researcher / Soft Pure / P5G5)

This section on the value of disciplinary knowledge concludes the sub-themes within 'Knowledge as product'. The final section of this theme comprises a summary of the data.

4.3.6 Summary

The findings in this theme (4.3) present a partial picture of the data on the disciplines in this case. The focus of this theme was the knowledge produced within the disciplines, drawn from data collected in 2016/17 from researchers in four disciplinary areas. The research environment, the methods used and the research output are intertwined. This theme detailed findings on the product of the research process, how the product has changed and what researchers think of these changes. It built on the previous theme by isolating and presenting data on a number of factors that impact on knowledge development, what this knowledge consists of and how it is regarded.

I think it is important here to isolate specific themes arising from the data on knowledge and research practices before considering the links between them; as such I have presented data on the types of knowledge produced in HE. I have also presented data on how knowledge is changing and the factors that affect those changes. Researchers cited autonomy as one of the characteristics of enjoyment in the research process, yet they also reported limited funding for researcher-led projects. Where these projects did take place, choice of topic was restricted to what would be published as dictated by the respondents' discipline and the REF. This led to a narrowing of topics being researched and fewer commercial spin-offs. Applied researchers reported a broadening out of knowledge types in their work to include qualitative, quantitative and non-research knowledge such as service users' views. The SP group reported an inclusion of empirical knowledge in some fields. Both pure groups and the SA group reported their research was not always valued. This view was more prevalent and more overt in the pure groups. It did

not appear to be felt as acutely in the SA fields, where the requirement to demonstrate the impact of their research was treated as good, at least in parts.

This is the second in a series of three themes presenting the findings for the study. The first two themes have provided data on a large part of the research process, but this is not the whole picture. Once research is completed, it needs to be evaluated and disseminated. The disciplines have processes to ensure the quality of the knowledge produced, and new methods to assess quality have also emerged. This is related to new types of knowledge being incorporated into the disciplines and new research methods being employed. These themes have been organised in the order of: environment / product / evaluation as it is easier to understand findings on evaluation and dissemination processes once findings on the earlier stages have been digested. The next theme 'Traditional and new forms of research evaluation' (4.4) is the final theme in the findings chapter of this thesis.

4.4 Traditional and New Forms of Research Evaluation: Theme 3

4.4.1 Introduction

The focus of this theme is research dissemination and evaluation. It includes data on academic evaluation such as peer review processes and other forms of evaluation from stakeholders outside the academic world. I will also present findings on the role of technology in research evaluation. Data was derived from questions on academic freedom, research methods and new modes of knowledge production. Phase Four categories of 'Academic freedom', 'Research methods' and 'Disciplinary development' were the main sources of data for this theme. There are two sub-themes in this theme: 'Presentation and dissemination of research' and 'Technology, communication and collaboration'.

4.4.2 Presentation and dissemination of research

It goes without saying that presentation and dissemination of research is a critical part of the research process. Participants spoke about a number of activities that happen at this stage of the research cycle: the peer review process, speaking at conferences and online debate.

As I described in the last theme, I framed a question on academic freedom by introducing the phenomena of academics being banned from speaking at some HE institutions, sometimes referred to as being 'no platformed'. As part of this discussion on academic freedom and freedom of speech on university campuses, both HA and HP groups talked about the importance of research being presented at conferences or other public fora. The HA group focused on the dissemination aspect of public speaking:

"... if someone had personal opinions that were offensive or not based on evidence like holocaust deniers or someone then I think that's one thing, but if someone's done research and it's found to be highly controversial but it's good quality research and they're refused a platform to speak, that to me is significantly more worrying." (Senior Academic / Hard Applied / P2G3)

The HP group discussion centred on the peer review element of research dissemination:

"...having...controversial statements made in the open allows them to be refuted...given what we have been talking about earlier about the internet and the easy open access to everything, if you prevent somebody from giving a controversial opinion in the open, they will just post it on the internet where it is very much more difficult to challenge and refute so I think it's counterproductive." (Senior Academic / Hard Pure /P3G4)

The HP group discussed the importance of formal peer review within the process of academic publishing or conference submission and the difference between repressing someone's work, (such as gagging orders) and something being rejected as poor quality work. One participant asserted the difference:

"No, I mean if your paper is rejected by the reviewers because your evidence is not what it should have been, then that's not gagging, that's saying go away and come back with believable evidence and then we will publish your paper." (Senior Academic / Hard Pure / P3G4)

Researchers' views reflected the type of knowledge that they worked with and the context in which it was produced. For example, there was a strong account from the HP and HA groups about the value of their research being data driven and the benefits this gave them. HP researchers talked about the discipline being self-regulating; if

research was not conducted properly, or you did not have the evidence to substantiate your knowledge claims, it would be thrown out by the research community. This researcher was responding to a follow-up question as part of a discussion on academic freedom and speakers being banned from speaking on university campuses. I asked the group: *"Has it ever affected anyone's choice of research topic or question, that they think it might be too controversial?"*

"We're not very controversial. [laughter in room] I think the nice thing about [discipline], unlike other subjects, is that it self-regulates actually… and I guess this should probably go for all the fundamental sciences, but if you're going to say something that's outrageous, the community will always reject that until there's enough evidence to make it correct…we're very self-limiting and we're supposed to be data driven, we don't… come out with statements about…we're quite isolated from those things. I don't think any [researcher] *has ever been silenced.* (Senior Academic / Hard Pure / P7G4)

This idea of self-regulation in the discipline was reiterated later in the discussion. As part of the disciplinary culture and research process, people were waiting to be 'put right'. Decisions on any unclear results were usually made within a research team, before they were made public to the wider research community and anything uncertain or wrong would be picked up in some form of peer review, for example at a conference or in reviewers' comments in a paper.

"I think in [discipline] it's actually good to be wrong. Once you've gone through the process that's correct, we generally assume that we're wrong and wait for someone to correct our papers…so if you…stop people saying the wrong thing, and this is at a very scientific level, if you stop people saying the wrong thing you disrupt the process that we go through." (Mid-Career Researcher / Hard Pure / P5G4)

This idea was also voiced in the final MD group by an HP researcher:

"…it's that whole process of… peer review or the response you get at a conference … and the feedback you get that might…restrict what you do. I just remember a rather senior person in my field being at a conference just shouting down a graduate student as he didn't believe the statistical analysis they were doing. And, that was actually quite upsetting for that student. But you know, now a few years later he is a complete convert to that, to that methodology, which is a little bit, you know, annoying, because he was willing to tear down a PhD student. But I think that is the… way in [discipline] where, it's the… community itself… governs itself." (Mid-Career Researcher / Hard Pure / MD Group / P7G5)

In response to the comment on controversial statements being refuted, another colleague added:

"Well there can be controversies, though…[in] the field we work in biggish collaborations and they [are] usually fought out within the collaboration rather than having to be corrected from outside, but things which are on the edge of statistical significance where you know your prejudices come in as to whether you believe them or not…" (Senior Academic / Hard Pure /P3G4)

In a discussion on alternative forms of evaluation, such as 'Altmetrics' (evaluation using social media metrics) one researcher commented on the importance of traditional peer review, such as in academic publishing:

"I would be worried about any move away from peer review, because basically that's specialists who know what they are talking about looking at your stuff sensibly. Are there any obvious flaws in it?" (Senior Academic / Hard Pure /MD Group / P4G5)

The nature of the disciplinary area (HP) meant that there was less ambiguity about the conclusions drawn from research results, where a right and a wrong exist:

"I would say the advantage of [scientific discipline] is that it is relatively easy to show that it is wrong." (Mid-Career Researcher / Hard Pure / P1G4)

The HA group also voiced the idea that working with hard knowledge afforded more confidence in peer review decisions:

"I think you have to be careful about what you're thinking of as knowledge, there's a big difference between data and knowledge and interpretation and...I wouldn't want anyone to obstruct people getting data out there, but sometimes what we see as knowledge and the way that people present it is actually the interpretation of data and can be very distorted by political views...if you go back a few years... measuring the weights of brains in different ethnic minorities, could be presented as...scientific research, showing how... coloured people are less intelligent...I think you have to be very careful to distinguish between what's value free data and what's interpretation maybe." (Senior Academic / Hard Applied /P1G3)

Finally, in this section, the SA group discussed freedom to disseminate research, using the example of the writer and academic Germaine Greer being initially banned from speaking at Cardiff University Students' Union:

"It's just bonkers [Germaine Greer example]*...when I read that I just couldn't understand what they were trying to do. They are becoming more oppressive. I thought the position that the Union took, that giving no platform was a better way of respecting people's rights, was actually so disrespectful of freedom [of] ...speech...so yes, it frustrates me immensely.* (Mid-Career Researcher / Soft Applied / P1G1)

One SA participant spoke at some length about dissemination of research and, whilst in agreement with this sentiment, was keen to stress the importance of academics' responsibility and their role in society. His/her comments also reveal that the speaker is more

familiar with the debates about identity politics, which are more relevant to social science and humanities knowledge areas:

"I think it definitely is dangerous, but I think there are countervailing issues in the context...it's very difficult to put myself from the point of view of a trans-gendered person... it's very difficult for me to have an understanding of everything about that, the circumstances in which it would or wouldn't be appropriate. I think in [this case]...that's clearly a bridge too far... but does it spell the end of academic freedom? Does it mean that certain forms of knowledge aren't going to be opened up? No, I don't see that at all, I think it particularly moves the discussion into another sphere ...[to] various different foras... I don't think that instance really changed things and I don't think most of these instances really change things... The idea that one can...sit in one's office and do whatever one wants to then have the opportunity to spread that out wherever one wants ... that doesn't seem right to me and I think ... that's often used in a way to avoid responsibility and to avoid accountability within academic mechanisms. That's not what academic freedom means and I think most of the time when we talk about academic freedom we're not talking about that, sometimes it can be used as a way of attempting to avoid scrutiny and avoid criticism...." (Early Career Researcher / Soft Applied / P2G1)

So far, I have presented data on peer review and dissemination of academic work. This data was also about researchers' academic freedom to be able to share work and how this impacts on disciplinary processes. The second part of the sub-theme focusses on other types of research dissemination.

The HA group spoke a lot about the topic of dissemination and their discussion revealed a familiarity with dealing with the press. It appeared to be a more common occurrence than that experienced by the pure groups. There was evidence from HP researchers and SP researchers that their interactions with the press were of a more

limited and less frequent nature. HP researchers also appeared to have more latitude in the research process as the knowledge they produced was not applied:

"I guess it's a plus side for doing...something that has absolutely no impact [some laughter in room] *I've never felt at all constrained, never felt like anyone else is telling me what I should research, what views I should have on any of this stuff"* (Senior Academic / Hard Pure / MD Group / P4G5)

Working with the press or engaging in public engagement activity was mentioned once from the SP and HP groups, and as a positive and interesting experience:

"...a project I lead...it got quite a lot of media attention where it was a good thing to communicate it to a kind of wider audience... in a way that the public can understand, it's quite an interesting challenge, but exciting getting your enthusiasm over whether it be on TV or audio, good." (Senior Academic / Hard Pure / P7G4)

One SP participant espoused a view that public engagement activities were a very partial silver lining to an otherwise dark cloud of 'impact' - a good thing, but s/he was very cautious about seeming singularly approving of this effect of the impact phenomena:

"...insofar as that whole impact thing has pushed people out of the academy a little bit and we get out there and meet the public..., I don't wholly deplore it. I don't think we would have done it had we not been pushed, but...having said all that, you could be pushed in the wrong direction and pushed too hard." (Mid-Career Researcher / Soft Pure / P2G2)

Unsurprisingly, those in the applied groups spoke with more familiarity about impactful research and what goes with it. This involved the whole research process being scrutinised by the public and various stakeholders, rather than this type of attention appearing

only at the dissemination stage. Evidence from the HA researchers especially, conveyed how involved they were not just with the press, but also with other stakeholders such as advocacy groups, lobbyists, policy makers, politicians and so on. Commenting on a piece of research seen as controversial, one researcher observed:

"I think it makes it more interesting because you've... got to keep that [laughter in room], you've got to keep control away from any negative because it tends to...draw comment from afar, especially now we've got social media etc., it's just keeping focused on the data and... keep the negatives out of it, unless there are some negatives obviously, but you... don't want to... be driven by the... negative side and controversy that might... perpetuate itself out of proportion." (Mid-Career Researcher / Hard Applied / P6G3)

The idea of 'novel quality control', that is outside academic peer review (taken from the "Mode 1" / "Mode 2" model), was championed as a good idea by one junior researcher in the HA group:

"I think I like this idea of novel quality control. I was reading recently about something about post publication review because normally when you send the papers, two or three people...provide you with the review and sometimes they are very biased and sometimes they can pick up the mistakes in the paper with the methodology. But I think open access is a very good way of picking up things... if there's a comments section where people can update and comment. I mean traditionally they used to write a letter to the editor, but they have to be bothered to write the letter and post it...but now there's this commenting..." (Early Career Researcher / Hard Applied / P4G3)

In contrast, when asked if censorship was any threat to academic freedom, to the scientific process, two HP researchers reported the occasional communications they receive from the public:

"...we do get the odd strange email, from people, but they are kind of isolated whack-jobs who are ...wanting to ... revise everything you know about the universe..." (Mid-Career Researcher / Hard Pure / MD Group / P7G5)

Working with the press could also be difficult. One HA researcher talked about having to be guarded when speaking to the press, in case anything they said was misinterpreted:

"I think as researchers that's what the worrying thing is if you're confronted by journalists. They have a tendency to...want you to say certain things, so if you were to just suddenly slip something out that could be misinterpreted, and it wasn't actually what you wanted to say." (Mid-Career Researcher / Hard Applied /P6G3)

In the final MD group, a senior academic (HA) described the difficulties inherent in promoting research in public fora. Making a comment in public about your research which concurred with another's opinion could see you unwittingly cast as supporter of their cause. This reframing of the researcher's views would then distance them from their role of researcher and the protection they had in occupying that role:

"...in the field of [topic] research...there's ... three groups...and as a researcher you've got to be evidence led and impartial ... The industry have invested a huge amount of money in denigrating research, rubbishing evidence, buying up researchers to focus on other issues...Then there are [topic] advocates who do care about the research, but really care about ... especially more disadvantaged people and are advocates or lobbyists... And it's quite hard as a researcher when this side says "your research is all garbage", attack, attack, attack, attack; you have to stand up and defend the research. And...they also say... the policy that your research is about is rubbish and shouldn't be done. You suddenly find yourself having to say 'well, the research suggests that the policy should be done' and now you're

an advocate. And suddenly you're an advocate, so you're attackable as an advocate, which you weren't, when you started out, you weren't an advocate you were a researcher, independently looking at the pros and cons of a policy... And all that dynamic I think is happening, not just in the field that I am in, but across the piece, because there is a whole culture of what is ok and not ok and which side you've got to be on like Palestine Israel..." (Senior Academic / Hard Applied / MD Group / P1G5)

The scientific process is under tension here. Researchers are trying to do their job but the research process that should allow them to do this effectively is under political pressure. One interpretation is that the research process is so close or has become part of the crucible of practice and advocacy politics that it is very difficult to express completely impartial views and what one HA research termed *"keeping focused on the data"* (P6G3). This situation is exacerbated when press representatives are looking for something interesting to print and policymakers want a definite result to support their viewpoint. The HA group spoke about political decisions being made without review of any research evidence and one senior academic referred to concerns about the *"post-truth society"* (P2G3). Applied researchers also spoke about difficulties with how their research was received when the results of their research may not concur with the preferred political message. This led to research being rejected, despite the rigorous work conducted. Here the political complexities and dilemmas emerge again:

"...one thing that's particularly difficult... is in [the] social sciences your impact is often mediated by both the supply side and the demand side. So, you need to speak in a certain language and provide certain outputs...that suits a particular audience but also you need to think about where the audience lies...Because a lot of my research is politically active... the most impact audience are policy makers, potential policy makers, political parties and civil society organisations.

But actually, there's a certain amount of give and take …you have to have fidelity to your own viewpoint and your own outlook and the results of your study …but you also then need to have somebody who's interested. [So, for example] … you need to put yourself out there…to find out that actually [political party] … wouldn't touch this with a forty-foot barge pole and that really I think restricts your ability to become impactful." (Early Career Researcher / Soft Applied / P2G1)

These complexities and dilemmas also appeared in the HA area:

"…to a certain extent [name of field] is strong in that it's quite flexible and has adapted to the changing needs of commissioners. However, it does worry me because of politics and the sort of post-truth society that maybe evidence won't be so important anymore you know. People don't always use evidence to make decisions, in fact sometimes they do exactly the opposite from [what] the evidence shows" (Senior Researcher / Hard Applied /P2G3)

In applied fields, sometimes political expediency was blatant:

"…we tried to work out…tried to simulate what would happen [describes study]…And…we made a whole series of reports to the government and … there was a point, about six weeks of engagement, which was a bit testy, and then the minister had to stand up and say what he was going to do, about this stuff. So, we actually gathered in the room and watched the minister… trash our research and say…in parliament…that there was no evidence for all the things we had spent years doing…" (Senior Academic / Hard Pure /MD Group /P1G5)

This section on the press and public engagement concludes the sub-theme 'Presentation and dissemination of research'. I will now present findings on the use of technology in communication and collaboration. After presenting this short sub-theme, I will summarise and conclude this theme (4.4).

4.4.3 Technology communication and collaboration

Three groups (HP, HA, SP) reported the impact of technology in communication and collaboration. Social media had made an impact on practice in dissemination of research and by linking researchers both formally and informally. The figure (1) below indicates the spread of coding on technology related codes across the disciplinary areas. There is more prevalence of coding on dissemination and collaboration for the HA group:
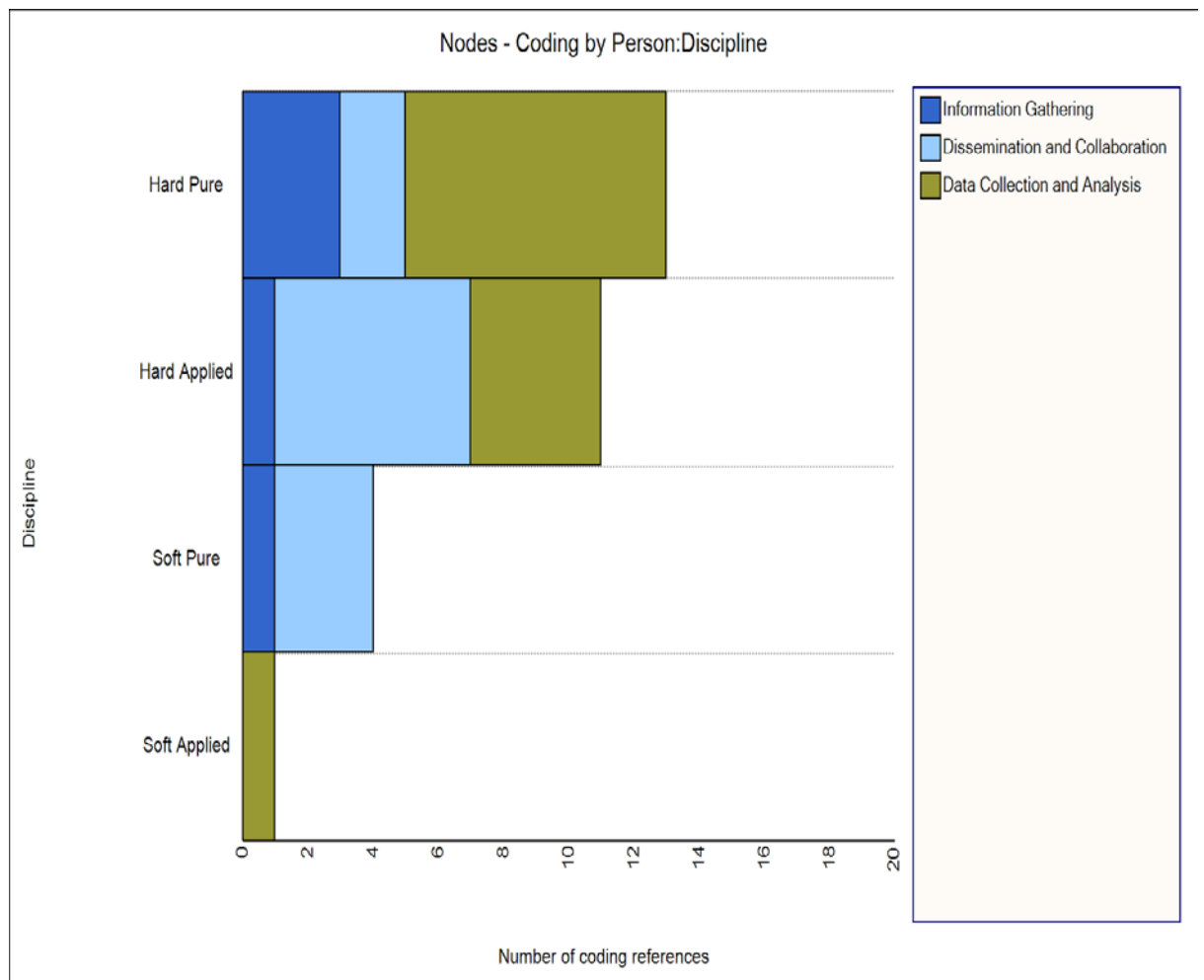
Figure 1: Coding on the Sub-theme of Technology by Discipline

The HA group reported how technology had increased communication with research colleagues, for example in facilitating international collaborations:

"It's easier to work across different groups and even across different countries…because of technology changing…I was working in New Zealand and I was still working with people back here, and then carried on working with New Zealand from back in the UK because we could, because of how the computers were set up, but a few years ago that would have been different." (Early Career Researcher / Hard Applied / P3G3)

One researcher in the SP group was particularly enthusiastic about how technological advances had affected their writing and communication. S/he shared their experience of using collaborative web-based writing tools (e.g. Google Docs) which led to an easier and fun way to write with a co-author:

"…recently the most exciting piece of research was done, … exciting because it was exciting content, but…the mode was exciting…I had some idea and I talked to a grad student… it turned out he had very similar ideas and… we started working on it together. It was a lot of fun…first of all it was new, I'd never done anything like that before and it was fun on many, many levels…we discovered Google docs which was amazing. It turns out, I didn't know that but you can work on Google docs simultaneously from different parts of the world so we were sitting at two o'clock in the morning, each one in his own bedroom… and you can see what he's writing about and then you can go and delete what he just wrote to be annoying [laughter in room] *but it's really cool."* (Mid-Career Researcher / Soft Pure / P4G2)

In the HP group, a participant spoke about how it was easier to find answers to queries by accessing the broader science community

through social media. These informal communication channels allowed access to this information by the facility to post a question on a blog, discussion board or Twitter to get an answer. The group contrasted this with formal collaborations which had also increased due to the WWW:

"...these are not even collaborations right, these are people…out there and you say "okay, who knows the answer or the solution to this equation?" and you have…a note spacecowboy55 that tells you the solution and you don't put him in your collaboration right?" (Mid-Career Researcher / Hard Pure /P1G4)

The SP group concurred with this experience of how ICT has enhanced collaboration, noting that it was now possible to access experts outside a local / national geographical range by sending a speculative enquiry. The comment also highlights the point that it is now common for institutions to have staff contact details published online or for researchers to have a webpage or presence on academic social media sites, such as ResearchGate:

" … with technology, email and all the rest of it it's much easier to talk to people about the work and get comments and the rest of it, and get in contact with people who are at…[the] cutting edge of whatever it is you're interested in. Whereas in the past [you spoke to] people who happened to be local or you happened to know, but I think it's just so much easier to send somebody an email out of the blue and say I'm interested in this topic, you've written on it could we get into some sort of discussion about it…" (Mid-Career Academic / Soft Pure /P2G2)

4.4.4 Summary

This theme (4.4) covered data on research dissemination and evaluation, including traditional peer review and new forms of evaluation outside the academy, often facilitated by information and communication technology such as social media. The findings in this

theme present a partial picture of the disciplines in the context of the case study boundaries. It links the two previous themes by providing the final part of the picture in this case study. Researchers took different perspectives and had differing experiences depending upon the type of knowledge they worked with and the context in which it was commissioned. For example, if work was commissioned to inform policy, involved a much higher degree of input from other stakeholders or, contrasting with hard knowledge areas, if knowledge was soft, it was much more difficult to have a definitive right and wrong on a study's conclusions. This is reflected in views on knowledge being data driven, the right to absolute academic freedom and the degree of interaction with the press and public that researchers experience.

4.5 Conclusion

I have now presented data on how knowledge is produced, what is produced and how it is evaluated. The three themes in this chapter present examples of the data verbatim to illustrate the clusters of meaning I identified in the data set. Organising the data into themes and choosing illustrative quotations is both part of the output and the process of reduction and interpretation of the data. Presenting the themes separately allows the reader to see a clear structure to the data. It also allows the reader to see the movement in data presentation, which begins proximally close to the participants' perspective, to a more interpretative, abstracted presentation at the end of the thesis. This involved a process of drawing the themes together, considering how they interact, how they answer the research questions and how they relate to literature in the field. I present the output from this process in the next chapter (5) and the thesis conclusion (Chapter 6).

Chapter 5 | Discussion

5.1 Introduction

In the previous chapter, the findings of the study were described and presented in three themes: 'Changes in research practices'; 'Knowledge as product'; and 'Traditional and new forms of research evaluation'. The purpose of these themes was to present the results of the study and observe any patterns or connections that emerged from the data. In this chapter, I will take my observations further by interpreting these findings in relation to the research literature reviewed in Chapter 2 and to new literature in the same topic areas. This enables a more enriched or nuanced understanding of the data and answers to the research questions. The conclusion chapter will bring together the various strands of the discussion to answer the question 'What are the implications of this research for the future of the disciplines?'

5.2 Research Question 1: What are the Commonalities and Differences in Researchers' Practices in Response to Demands for Instrumental Research?

The following tables provide a summary of the results. I have separated the data into four key drivers for change in ways of working and knowledge produced: 'Demand for relevance'; 'Technology'; 'Discipline'; and 'Individual'. Four tables present a cross-case perspective to where data over-laps or is unique to a group. They provide a response to the question: 'What are the commonalities and differences in researchers' practices in response to demands for instrumental research?' This question is also answered within my responses to the other research questions given in this chapter and in the conclusion chapter.

Relevance: Data Summary				
	Hard Applied	Hard Pure	Soft Pure	Soft Applied
Data				
Bids tailored	✓	✓	✓	✓
Tick box exercise		✓	✓	
Research less valued		✓	✓	✓
Opportunities for some		✓	✓	✓
Move to empirical			✓	
Repetition of work/topics			✓	
Narrowing of topics			✓	
Little time for own unfunded topics	✓	✓	✓	✓
Conceptual barriers to trans-disciplinary research			✓	
Structural Changes		✓	✓	
Slowed down spin off innovations		✓		
Industry R and D pushed back to them		✓		
Impact = broadening of methods	✓		✓	✓
Practical barriers to cross-disciplinary research	✓			✓
Political expediency is an issue	✓			✓
More types of knowledge seen as legitimate	✓			✓
Restrains the use of new methods	✓			
Responsive	✓			
Increased user / public involvement	✓			
Funders very involved in research process	✓			

Table 5: Data Summary Relevance as Driver for Change

Technology: Data Summary				
	Hard Applied	Hard Pure	Soft Pure	Soft Applied
Data				
Augmented collaboration in communication and writing	✓	✓	✓	✓
Big effect on research methods	✓	✓		
Changed how processed data	✓	✓		
Big data work on the horizon	✓			

Table 6: Data Summary Technology as Driver for Change

Discipline as Driver: Data Summary				
	Hard Applied	**Hard Pure**	**Soft Pure**	**Soft Applied**
Data				
Collaboration not usual			✓	
Dominant determiner of research approaches			✓	
Mode 1 / Mode 2 seen as artificial, fields and researchers move between these things.	✓	✓	✓	✓
Limits what is current topics of interest			✓	
Less consensus on academic freedom due to interpretative research outcomes			✓	✓
Particular lines of argument			✓	
Peer review valued and central to discipline	✓	✓		
Collaboration in some fields		✓		✓

Table 7: Data Summary Discipline as Driver for Change

Individual as Driver: Data Summary				
	Hard Applied	**Hard Pure**	**Soft Pure**	**Soft Applied**
Data				
Early career researchers more likely to seek collaborations or move to different methods			✓	✓

Table 8: Data Summary Individual as Driver for Change

5.3 Research Question 2: What is the Extent and Nature of Change in Disciplinary Ways of Working, in Different Types of Fields and Disciplines?

The first theme 'Changes in research practices' maps onto this research question. In the first part of this chapter I will discuss the key findings from this theme contextualised by the literature discussed in Chapter 2.

Some of the findings in this theme confirmed what is known as common practices of the disciplines as traditional social science, humanities and scientific processes were described, such as: conducting experiments; conducting qualitative interviews; developing a theoretical argument; or solving a logical problem. Furthermore, participants also referred to usual practices of academic life such as formal peer-review, writing articles and books and obtaining grants. The data gathered renewed earlier cross-disciplinary empirical work (Becher, 1989; Becher & Trowler, 2001). For example, I found some changes to disciplinary practices co-existing with established ways of working. Throughout the study, I also observed patches of change in ways of working and the knowledge produced. Some scholars have suggested that the social and political changes affecting higher education and the rise of "knowledge capitalism" (Peters & Besley, 2006, p.51) have completely changed the way knowledge is produced. In this context, seeing the disciplines as central to knowledge production in HE is hinted as being somewhat passé, "a focus on discipline as the main or the key way of understanding academic work and organisation is in tension with the constantly changing dynamic disciplinary and inter-disciplinary areas of the contemporary university" (Manathunga & Brew, 2012, p. 45).

An alternative perspective, espoused by Scott (2014), is also present in the literature, suggesting that, despite great changes in the HE environment, not a lot has changed in research practice, that it is

"business as usual" (p.16). In a current overview article on university governance (2018), Scott returns to this topic to suggest both tighter government regulation on what is researched, and a broadening of knowledge types produced in HE. These observations concur with the data found in my study but, Scott's overview does not give details of how ways of working have changed for researchers. In his review of the higher education literature, Trowler (2012a) found numerous references to the disciplines as a powerful and strong force in HE but argued that often these claims would be left "untheorised and unsupported" (p.22). From an albeit small sample, I found evidence that disciplinary ways of working are changing but are not revolutionised amidst what Barnett (2000, p.409) calls "an age of supercomplexity" in HE.

The most commonly stated underlying factor for change in my study was the need to show relevance of research. This data confirms evidence from the literature on neo-liberalism, specifically the interventionist nature of it, with governments actively involved in knowledge generation, and in guiding the process and areas of research (Olssen & Peters, 2005; Scott, 2018; Thornton, 2009). The variation in how academics resist this pressure links to individuals' agency; for example, I observed senior researchers who have more autonomy in how far they comply or embrace changes to working practices.

In this study, researchers conveyed multiple factors that guided their decision-making in changing their practices. There was an element of extrinsic motivation to consider, such as wishing to remain employed, or seek promotion. Intrinsic motivation was also a factor, as suggested in the SA group, where making changes to how one worked also brought opportunities. These opportunities could be personally useful, such as learning how to use a software package, or present a more complex development opportunity, such as learning how two

different methodological approaches fit together to address a problem.

In her study of sociology academics, Spurling (2012, p.87) refers to the work of MacIntryre (1981) to illuminate this decision-making process. She uses MacIntryre's idea of "internal and external goods" in an investigation of how academics navigate through the complex, competing priorities of the contemporary academy. The metaphor of internal and external goods characterises the type of consequences returned on particular actions. External goods are cross-discipline factors such as promotion, money, plaudits, while internal goods linked to individual disciplines such as measures of quality or validity in a particular research tradition. In my study, I observed that external and internal goods are more aligned in applied fields, while divergence from internal goods such as researchers from singular discourses taking on empirical work, created a misalignment and therefore a compromise. In these compromise scenarios, researchers also found themselves experiencing the internal goods of the discipline they had borrowed from and some characterised these as opportunities.

Participants' responses to the concepts of "Mode 1" and "Mode 2" knowledge are related to the data on ways of working and I discuss them here. This theory, described by one of its authors as "now largely discredited" (Scott, 2016), nevertheless continues to have considerable traction in the research literature. At the time of writing (February 2018), a simple search on Google Scholar finds 15327 citations of Gibbons et al's 1994 work, where the model was first introduced. The model is often referred to uncritically and without examining the detail of the two modes' characteristics in relation to researchers' day to day working practices. I thought it would be useful to present the model, as an archetype of similar theories to capture researchers' views and stimulate discussion. The aim was to move from a conceptual view back to a practice view to help gain a

better understanding of researchers' ways of working. This is in sympathy with calls in the literature to examine the detail of work practices, for example "in an ethnography of the disciplines" (Becher, as quoted in Cownie, 2012, p.63) and to conduct research to help us understand current phenomena or "zeitdiagnose" (Välimaa & Hoffman, 2008, p.271).

The findings on "Mode 1" / "Mode 2" are interesting in that very similar views were captured in the single discipline groups (SA, SP, HA, HP) and the mixed group of new representatives from all initial teams sampled. The same perspectives were voiced in the mixed group where, for example, an SP researcher echoed what his/her colleagues had said in the single discipline SP group. Participants felt that the two modes did not have a water tight fit to how they worked and even the applied groups did not wholly identify with "Mode 2" as a complete description of how they worked. However, pure groups did roughly locate themselves within "Mode 1" and SA with "Mode 1" and 2. The HA group, despite most strongly displaying the characteristics of this mode from all the groups, did not identify with the "Mode 2" label. This indicates that perhaps HE is some way from having pure "Mode 2" research groups.

The "Mode 1" / "Mode 2" model sets up a divide between applied and pure knowledge producers. How these research groups respond to the demand to demonstrate impact as part of the REF provides an insight into the external validity of the "Mode 1" / "Mode 2" model. In the UK's higher education system the REF is the focus for measuring and demonstrating research relevance, as well as the key measure of academic quality of research. I observed that although researchers from all areas were conscious of the need to link their research to REF impact measures in an ex-ante fashion, this was more meaningful in the applied areas. However, even in applied areas, post-ante approaches were described such as the idea of having two identities (SA researcher), indicating a linear approach to impact.

Another interesting response to the "Mode 1" and "Mode 2" notion was from the HP group: a senior researcher asserted how particular fields in HP had moved from applied to theoretical enquiry and back again. This supports the idea that knowledge produced in HE has never been produced in a purely "Mode 1" manner (Etzkowitz & Leysdesdorff, 2000). It also reflects the constant ebb and flow between the state and universities; in terms of levels of governance and independence (Clark, 1983). I did not find evidence from participants that indicated a trend, movement or shift to a "Mode 2" way of working, only that "Mode 2" characteristics are present at the same time as traditional practices that were most predominantly, but not exclusively, found in soft and pure areas. My data align with evidence from the literature on "Mode 1" / "Mode 2" (Fuller, 2002; Knuuttila, 2013) and support key criticisms of the model summarised in Hessels & van Lente's 2008 review.

As I indicated in the literature review chapter, I used Becher's (1989) framework to develop the data collection activities, coding and analysis. I endeavoured to be cognisant of the context and social process of creating knowledge as well as the epistemological nature of the disciplines. In the study, I found that some of the characteristics suggested by Biglan & Feishman (1973) that were linked to the soft/pure/hard/applied categories did resonate with my data, for example, the SP group talked about the different fashions in writing and approach in their discipline. It was a useful framework and facilitated a variety of views being gathered across knowledge areas. The groups who participated in the study were from very different disciplinary areas and, as such, presented different ways of working, cultures, and epistemic practices i.e. ways of conducting research.

Following the culture and epistemic rules of their discipline, participants spoke about which methods were available to use, would work and were acceptable culturally, both within the discipline and by

commissioners of research. In the SP group, researchers spoke about a large array of both new and well-established methods or approaches from which they could choose. In HP, researchers worked in a variety of sub-fields, some with well-established methods that were expedited by technology; some were new and reported as linked closely to technological innovation, with methods in constant change. In both pure groups, researchers had a higher level of autonomy than in the applied groups in terms of what methods they chose and how they analysed data or presented their writing. The pure groups seemed to have strong boundaries, clear cultural identities and epistemic rules. In this way, they map onto Bernstein's idea of a singular discourse (2000).

In contrast, the HA group, with members drawn from several underlying disciplines was much more fragmented and did not have one set of epistemic rules. The underlying disciplines represented in the HA group were examples of singular discourses, with the research the group conducted better described as an example of a regional discourse (Bernstein, 2000). Regionals draw on singulars and re-contextualise that knowledge to create new bodies of knowledge. For example, nursing draws on biology, psychology and sociology but also has its own body of knowledge. Regionals are at the interface between the singular discourse and the practice world, concerned with recontextualising singular knowledge to apply in practice. Singular and regional disciplinary areas can collaborate with each other, so there are interesting connections to be made if a regional connects with a singular discipline that shares some of the same underlying theory and philosophical roots, as in the SA group.

In my study, the two applied groups were an inversion of each other. The HA group shared a commonality of purpose while the SA group shared a common history and theoretical roots, with one strand of the group arguably being an application or recontextualisation of the knowledge of the other. Neither applied group could be termed a

"singular" disciplinary group. The HA group is an example of what Williams (2016) calls "a new inter-disciplinary subject grouping" (p. 126) and is a newer development in ways of working in HEIs. It is a multi-disciplinary configuration brought together for the purposes of addressing applied research questions. The SA group is another example of how the disciplines are increasingly organised in HE, particularly in newer universities, with similar disciplines brought together under one roof such as a sociology and psychology department. Ways of working are different in these two examples, with the HA group being thoroughly integrated on a day-to-day basis and the SA groups operating as separate entities within one department. However, disciplinary researchers are the foundations of both these configurations.

The difficulty with these kinds of MD organisations of staff is a loss of strength in the disciplines and perhaps some loss of identity as disciplinary researchers. Disciplinary identity, both of individuals and of groups, was displayed strongly in the pure groups and less so in the applied groups. In the applied groups, there were several clues to both these forms of identity being different to how they existed in the pure groups, as they were effectively multi-disciplinary groupings as described above. There was a sense that a disciplinary identity had been disrupted or quietened for the purpose of working in a multi-disciplinary way. In the HA group, an increasingly plural approach to methods and what counted as knowledge was reported, with the methods being the glue that tied the group together rather than an epistemological or ontological approach or extant researcher positionality. In both applied groups, I would suggest that, from the varied roles and variety of methodologies/methods described, epistemological and ontological positions were varied, and tolerated within a multi- method / disciplinary, task-focussed environment.

In pure knowledge disciplines, taking on methods and approaches from other areas suggests a transition to an outward looking

orientation, typical of a regional discourse. In a regional discourse, the outer environment drives change, so that as many different methods and types of knowledge can be added as required, with the right people added to bring this knowledge as necessary, from singular or regional knowledge areas. For example, an SA researcher spoke about his/her subject not being able to "hold off" the humanities and sciences, any more. In order to answer complex questions required by government and relevant to society, different knowledge types are brought together. As a regional discourse is driven from the outside in, it will draw on whichever knowledge types are necessary, from other regionals or singulars. The need to generate this new knowledge form then drives the adoption of new methods. If the scope of enquiry changes, by, for example engineering taking on ground from a neighbouring discipline, the field of application is increased, and two or more regionals could merge, such as the joining of allied health professions into a super-regional configuration.

As singulars are inward looking, the situation of diversifying knowledge types necessitating new methods is different. In this case, such as reported in the SP group, the discipline is not inward looking and is beginning to be influenced by external factors. This is a change from Bernstein's (2000) observation that: "…regions are different to singulars. Singulars address only themselves" (p. 9). In the pure groups, the move away from theoretical to empirical work felt like a breach of the usual epistemic rules and practices that could potentially change, or at least widen what counts as knowledge in these areas. This, in turn, could affect the university curriculum by introducing a formal research methods curriculum and therefore changing how this discipline develops in the future.

I did not anticipate gathering data on the notion of group and individual disciplinary identity, but nevertheless this emerged in my observations of the data and in working with the groups. I observed that HA participants were more likely to self-identify with particular

methodologies / methods as opposed to disciplinary areas, with one HA researcher saying that they didn't know what their discipline was. In a similar way, I observed that an SA researcher did not feel the need to label him/herself as a disciplinary researcher.

In discussing the disciplines and social practice theory, Bamber (2012) refers to the increasing variety of routes staff have taken into academic roles and to combinations of academic roles with an existing practice role such as an artist or nurse. In addition, new roles, such as academic developers, are increasing in HE as are jobs that combine academic work, such as teaching, with other support services, sometimes termed blended professionals or para-academics (Whitchurch, 2009).

Publications about these roles reveal their incumbents trying to make sense of their place in the academy. For example, Kinash & Wood (2013) explore the professional identity of academic developers, whilst Anonymous (2017) writes about the tensions in occupying a hybrid professional / academic role. This diversification of roles and matching of identity to contexts is reflected in the testimony of researchers in the applied groups. They had a variety of backgrounds and were addressing policy and practice related questions that often took the form of multi-disciplinary research.

Demands for different types of knowledge to address policy and practice questions necessitates that researchers are multi-skilled or that those with different methodological expertise are brought together in one group. Bernstein (1999) suggests that, in times of technological and social change, new methods of inquiry develop in horizontal knowledge structures. This is borne out in the data as all the groups, except for the HP one, spoke about expanding their methods to take on, or borrow from other disciplinary areas such as moving to an empirical orientation, or taking on quantitative or co-production methods. Despite changes that technology brought in the

HP group, the fundamental methods remained the same. The more applied sub-fields represented in the HP group reported that methods had changed as a result of technological advances in instruments and, across this group technology, had changed how they worked, giving access to different types of data and different ways of analysing it. How this was done was directed by researchers themselves.

Although the use of technology was not a key concern of this project, I found it interesting that the reality of technology use as reported by researchers in the study, and some of the reports in the literature, were very wide apart. For example, a lot of the tools mentioned in Kramer & Bosman's 2016 survey of researchers' use of technology seemed way beyond anyone's experience as discussed in the interviews, with the use of Google and social media applications being cited as collaboratory tools. The impact of technology on research methods in the data-driven hard knowledge areas appears of less interest in the literature on researchers' use of technology, with the focus being on Web 2.0 and research dissemination/communication, rather than methods.

One newer methodological approach "co-production" has been increasingly discussed in the literature (Bell & Pahl, 2018; Campbell et al, 2016). It can be described as any research that partners academics with non-academic collaborators (Campbell et al, 2016). It has similarities to participatory action research (PAR) rooted in health disciplines and aims to transform participants' lives through research, both those directly involved or others in the same situation (Minkler, 2000). This type of approach is often suffused with a strong critical or 'standpoint' theoretical approach, such as race or gender perspectives. Like another methodological approach which is increasing in popularity, qualitative evidence synthesis, it has a dual heritage (Booth, 2013) in that it draws from diverging epistemological and ontological positions as a product of the demand for academic

teams to answer real world questions. Typically, co-production protagonists are those who see research as needing to be overtly and actively political and empowering to respondents (linked to PAR and standpoint theories) and those motivated by a desire to make an impact on society or the economy, beyond the academy. Whilst these motivations overlap to an extent, they diverge on definitions of knowledge and what constitutes quality in research. As Bell & Pahl (2018) assert "An implemented neoliberalism threatens co-production's utopian value: marketization leads to the assessment and ranking of research's 'quality' and 'impact'" (p.112). The HA group hinted at co-production approaches when speaking about service users being much more involved in the research process. I observed that co-production had produced changes to how people worked across the groups, mostly in the incorporation of different knowledge types in their research and the related adoption of different research methods.

Another change identified in the HA group was the instance of practice research being pushed back to universities in some fields, with practitioner advisers contributing to research projects. Practitioner research, namely, "research carried out by practitioners for the purpose of advancing their own practice" (McLeod, 1999, p. 8) is seen as a laudable pursuit. As Shaw (2005) puts it:

Whether the practice is teaching, nursing, primary health care, public and sustainable health, occupational therapy, pharmacy, counselling, psychotherapy, the various branches of applied psychology, the penal services, medicine or the social services, the desirability of practitioner research is for the most part unquestioned (p.1232).

As a consequence, the idea that practitioner research is in decline, or that at least the site of production has changed in some researchers' experience, is an interesting notion. It contrasts with Furlong's (2013) perspective on this matter. Writing in the discipline of education, he

points to Hargreaves' (1999) paper "The Knowledge Creating School" which concluded that university researchers were not addressing practitioners' concerns adequately, thereby shifting the onus to practitioners to conduct their own research relevant to their needs. In a recent review of practitioner engagement with research, in another applied social science discipline, Library and Information Science, Woods & Booth (2014) found that practitioner research was thriving across different fields. Practitioners were also collaborating with academics, but this was a less frequent occurrence than conducting their own research.

Without a close look at the practitioners' field referred to in the HA group, it is difficult to comment with authority on the ideas conveyed in the interview and there will be obvious variation across different fields of practice. However, in areas where practice questions are now the domain of university research teams, this may reflect the increase in the importance of such questions and impact, alongside a squeeze on resources that discourages practitioner research. This pushes back some practice-relevant research to HE. It also reflects the intermingling of different types of knowledge in applied areas, in this case, vertical discourse (Bernstein, 1999) with practice knowledge.

Due to its prevalence, collaborative working is also an important theme in all groups. The nature of collaborative working reported and barriers to this approach were anticipated to some extent through the literature. For example, humanities scholars are likely to work alone and that scientists often work in large collaborative groups, across institutions (Trowler, 2012a; Becher & Trowler, 2001). In the current context of increased demand for research to have instrumental application, institutions present researcher collaboration as MD and ID working. Although some structural barriers exist to this kind of research, such as the management of budgets across departments, these approaches are encouraged and incentivised.

Researchers across the groups reported pressure to work in this way and saw schemes to encourage this kind of practice as unhelpful and time wasting. This gave an insight into the ways in which successful collaborations happen through organic methods, from the ground up. However, some researchers in the SP area actively sought out opportunities where conceptual work could be usefully employed by another discipline. This notion of a broker or someone who can see opportunities for useful cross-disciplinary work is also suggested by Gasper (2010). For the researchers I spoke to, this approach appeared to be less common: most often, researchers would seek out others to solve a problem in their research, or they were brought together to work on a specific research project that required a multi-disciplinary approach.

Some scholars refer to inter-disciplinary and multi-disciplinary research as usual and always better. For example, Manathunga & Brew (2012), suggest that in the nineteenth and twentieth centuries, "work that crossed disciplinary boundaries was regarded as deviant, problematic or risky" (p.45). From the evidence of my study, I would argue that in some disciplines this is still the case. For example, some HP researchers articulated the view that there were risks to one's reputation and that the work produced might not be of a good enough standard. There is also a tendency for promoters of multi-disciplinary and inter-disciplinary research to over claim its occurrence and prevalence across disciplinary areas, citing the demand for relevant knowledge (Brew & Lucas, 2009). From the data in this study, collaborative research is usually motivated by the need to address a particular research question or resolve a problem occurring within a study by drawing on another's expertise. Without these grounds, there is no need to do this kind of research. It is not always necessary to address a research question effectively. An SA researcher voiced support for this idea, asserting the worth of

theoretical research and the significant contribution that could be made conducting solo, single disciplinary research.

<u>5.3.1 Summary</u>

The key findings for this question can be grouped into two new themes: the mixing of different types of knowledge and the pressures on academic identity. Firstly, the mixing of knowledge types can be seen in numerous examples: in the flexible nature of the disciplines to use both "Mode 1" and "Mode 2" characteristics; in the use of co-production methods; integration of practice research and expert views; in the collaboration between singular and regional discourses and the increased use of multi-disciplinary and inter-disciplinary methods in some research areas. Secondly, in relation to research identity, I found from the earliest readings of the transcripts, notions that I labelled 'navigation' and 'negotiation', particularly from ECRs, but also from other participants, as they made choices between what research projects they chose to do and what career decisions they made, balancing extrinsic and intrinsic motivations. These two themes will be brought together with the key discussion points from question two in the conclusion chapter. Here I address the final research question by presenting the importance and implications of the findings.

5.4. Research Question 3: What Factors Impact on the Development and Production of Disciplinary Knowledge in Different Types of Fields and Disciplines and How Do They Manifest Themselves?

From the results, I have identified numerous factors that impact on the production of disciplinary knowledge. Unsurprisingly, I found the most reported factor to describe why knowledge has changed to be the demand for research relevance. I also found data on researchers' autonomy and the role of the discipline in determining what kind of

knowledge is produced. In this section, I will present these factors by discussing how they are manifested in the research process. I will discuss changes in the site of knowledge production and the ever-present debate about the best way to drive innovation, freedom for researchers' curiosity to be unrestricted or the close governance and management of research topics and methods.

All the groups I worked with, except for the HP group reported a broadening of knowledge types. I will discuss the types of knowledge being produced and how this affects the disciplinary areas in question. In the interviews, the groups discussed the concept of academic freedom, mainly focussing on peer review and dissemination of knowledge. The responses to my questions and the subsequent discussions revealed interesting ideas about different knowledge types and how researchers from different disciplines respond to research governance methods, especially the REF. Indeed, one of the recognised unintended consequences of the REF is the change it has wrought on researchers' behaviour (Wilsdon et al, 2015) and the knowledge that is being produced in HE. Data on peer review from the theme 'Traditional and new forms of research evaluation' will be discussed as part of this section on knowledge as it spans both a change in ways of working and knowledge produced. The section will begin by considering data on the site of research production.

As recorded in the literature for example (Willetts, 2017; Collini, 2017) there is always movement in the site of research between private and public sector providers. Researchers in my study reported that the sites of knowledge production are changing as more market-orientated research is commissioned by industry and government. In HE, the mixture of two different research objectives has proved problematic, in both producing a product to sell and producing an explanation or enhanced understanding of phenomena.

One common problem arising from the coexistence of commercial and academic objectives in a research department is researchers' conflicts of interest. There is obvious vested interest in the planning and output of research to create a marketable product as opposed to research funded by public money that, in theory, aims to be disinterested and objective. Although governments have their own agendas with particular types of knowledge required and incentivised by tools such as the REF, there is still a distinction to be made between research funded by a private company and government funded research. The latter type of research aims to maintain a level of independence from its commissioner, especially in its conduct and production of objective findings.

Exploring the issue of dual objectives Knuuttila (2013), reported on a case study of a Finnish language technology group that was both commercially and academically successful. It had led to three spin-off companies and numerous academic awards. However, the dual goals of the group led to various problems such as contested allocation of both academic credit and financial reward for commercial sales. After 18 years, the increasing commercialisation of their work eroded the amount and quality of the academic research that had been present at the inception of the group and it broke up. The consumers of academic research and commercial products are very different and getting something ready to be sold was a mammoth task, requiring different skills and knowledge beyond the creation of the software or knowledge product. The differences in academic and commercial marketplaces are highlighted by one of Knuuttila's respondents who talks about the disparate choices to be made dependent upon the desired type of output. Projects that could easily produce something commercially viable, were not of interest academically and academically 'hot topics' were light years away from anything marketable (Knuttilla, 2013).

One of the unwelcome outcomes of the REF and governments'
increasing desire for impactful research is a move away from
curiosity driven research. Some researchers in my study felt that it
lessened the chances of innovation and was a short-sighted approach,
and all said that it restricted the topics they could legitimately work
on. From this perspective, producing commercially viable products is
not the main objective of university research departments and can
therefore result in a less successful outcome than if this kind of
research had taken place in industry, free from conflict of interest
and diffuse goals. Research tailored to a market ready product, is
one type of impactful research. Research impact takes other forms
such as impact on the public's health and wellbeing and enhanced
access to cultural opportunities. The best way to govern research to
allow ideas to lead to applications that help humankind has long been
debated. Discussion about innovation is closely linked to science, but
the concept of limiting curiosity and choice of topic has much wider
application as I elaborate below.

Across the data I collected for this study, all the groups cited
autonomy, curiosity and the challenge of solving a problem as
pleasurable parts of doing research. Curiosity has always been the
driving force behind the development of new knowledge. It is most
notably triumphed in Abraham Flexner's 1939 essay "The Usefulness
of Useless Knowledge" (Flexner, 2017). His argument is that the more
researchers' freedom to satisfy their curiosity is limited to matters of
use and application, the fewer outputs of successful application and
use will be generated. As he puts it:

...throughout the whole of history of science most of the really great
discoveries which had ultimately proved to be beneficial to mankind
had been made by men and women who were driven not by the desire
to be useful but merely the desire to satisfy their curiosity.
(p.56)

Flexner believed that researchers' curiosity should be untrammelled and argued that this counter-intuitive approach had been proved time and time again to produce scientific innovations for the good of society. One key example he cites is the invention of the radio and it is a classic example of what would now be termed post-ante impact. This is because, without the basic research, its application would not have been possible. In this linear model, the impact of the research is downstream.

In my study, restriction on basic science and conceptual development was reported in both pure groups. The HP group spoke about a lack of 'spin off' innovations, due to restrictions in research funding. That is, a lack of freedom for scientists to pursue their own ideas, ideas that could ultimately lead to the type of discoveries that Flexner (2017) described. 'Blue skies' research was also reported as becoming more common in industry. In an unlikely swap, respondents described how companies such as Google are driving innovation, by funding researchers to pursue ideas, whilst at the same time university researchers are expanding their portfolio to provide market ready products and patents. Product research and development has always happened in universities but more commonly as a spin off from other research (Etkowitz, 2013). However, there currently exists a much more fluid movement in uses and types of knowledge produced. This is seen in the testimony of the HP group who resisted the idea of "Mode 1" and "Mode 2", seeing it as a rigid view of knowledge and suggesting that, in the history of their discipline, some fields had moved from areas of theoretical study to practical application and back again, making the idea of "Mode 2" erroneous. Knuuttila (2013) also described how scientists may reverse engineer a practice case to solve a theoretical problem as much as producing a practical application from a conceptual base.

History shows periods of greater and lesser intervention and control from government and fluctuating demands for instrumental research

(Willets, 2017). At present, the operation of the REF is pervasive across HE culture and, as Watermeyer (2012) suggests, the REF is criticised for encouraging a short term and conservative approach to research. I found strong evidence for this in my study across the research groups, such as the SP testimony on the need to add to existing areas of knowledge in an ever-narrower fashion, or the restriction in hard pure knowledge on the development of research without surety of relevant output.

Across the study, each area was broadening out the types of knowledge they produced. At the same time, there was a narrowing of the topic areas that were researched. In the knowledge economy, knowledge is a product and researchers are required to produce particular types of knowledge, making pragmatic and responsive decisions in this process. In order to produce knowledge required for relevance, researchers reported a change in the methods that were required. Relevance also means different things in different disciplinary areas and so, in this study, the new knowledge type required and corresponding methods were different across the sample.

The degree to which the disciplines changed revealed the power that different knowledge types have and how they are valued and regarded by governments. For example, I found similar perspectives amongst the pure groups, but the groups diverged in the value assigned to the knowledge they produced, with the SP group reporting that in some fields there was a broadening of what knowledge could be considered legitimate in their discipline. This was concurrent with a reported narrowing of topics and repetition of work in pursuit of REF-suitable products. In contrast, the HP group reported no pressure to change methods and no interference in how they analysed data. Although, as discussed earlier in this section, there have been changes in science due to the REF and external environment, I thought that the HP area had the most defence against

external influences, due to the combination of pure knowledge that was not immediately of interest outside the academy and hard knowledge that was more broadly respected and more heavily funded by government.

The applied part of SA and HA means that the influence of commissioners is strong, so all types of empirical knowledge have to be produced: primary, secondary, quantitative, qualitative, mixed methods. Researchers in the HA group reported a new focus on non-research knowledge and qualitative research which was now seen as more acceptable. However, one researcher reported having to defend his/her methods to a commissioner; such was the ignorance of a qualitative approach. The inclusion of qualitative and quantitative knowledge draws soft knowledge into an area that was once solely the domain of hard research, using what might be called the 'scientific method'. In order to illuminate complex real-world problems, both hard and soft knowledge were required as questions moved from "what works" to "what works for whom in what circumstances and how?" (Pawson & Tilley, 1997).

There is also a requirement for other forms of knowledge to be used such as expert and service users' views and secondary documents such as local reports and ephemera. These are very different knowledge forms and emanate from both horizontal (day-to-day knowledge) and vertical (official) knowledge structures (Bernstein, 1999). Professional knowledge falls outside every-day and official knowledge structures, but its specialised nature makes it more akin to knowledge forms found in vertical knowledge structures. From a social realist perspective, a 2005 paper, by John Beck and Michael Young develops Bernstein's work to theorise the development of expert professional knowledge, which they refer to as "clearly defined knowledge traditions that 'partook of the sacred' yet…were linked to practices in 'the world'." (p.191); meaning that the knowledge was

situated in a professional context but drew on disciplinary knowledge.

I have already discussed changes in singular and regional areas; professional knowledge is also subject to changes in late capitalist western society. For example, Mühlfried (2018) argues that there is a rise in distrust of experts which is championed by current populist politicians, such as Donald Trump, and cites the current post truth era "which is characterized by apprehension and loss of trust in experts, and, by implication, a loss of faith in 'truth'" (p.16). In a research context, the incorporation of user testimony and expert knowledge draws in non-research knowledge. This mixture of knowledge types is also the basis of evidence based practice (EBP), utilised in many professional domains such as librarianship, health care and teaching. Critics of EBP suggest that it undermines professional knowledge and restricts professional freedom (Hammersley, 2001). This is because the evidence part of EBP is often misinterpreted to mean only research evidence, therefore placing too much emphasis (and expectation) on research and less on the context (user views) and professional opinion (expert views) elements of EBP. As Hammersley (2006) suggests "Neither policymaking nor practice can be proceduralised or made transparent, in the sense of being shown to be in line with evidence that is open to assessment by lay audiences. There is inevitable reliance on experience, wisdom, and judgment" (p.1).

Researchers from the SA area also observed that a broadening out of knowledge and methods had occurred in their various fields. Applied work was not commonplace to everyone in this group since some participants worked in theoretical areas, so this was a different configuration to the HA group. Given this mix of fields and career trajectories, a balanced response presented both positive and negative aspects of the pressures of the REF and instrumental research. Interestingly, this was similarly reported by the other soft

group who also noted the opportunities that had transpired for researchers (due to the REF/requirement for impact), particularly ECRs. This revealed how a change in research method orientation was more likely for researchers in a soft knowledge area, as opposed to the HA group where researchers with different expertise came together as needed. The HP group also reported pressure to change the knowledge they produced to become more impactful, but their testimony also revealed the power to resist this pressure if they chose to. The main change to knowledge in HP was the impact of technology in augmenting and expanding the scope of their research, such as in the impact of "big data", but also in the organisation of research. HP researchers reported less exploratory research being undertaken with industry related work on the increase. As Thornton, (2009) observed "As ... [industry partners'] interest is invariably on specific problems, it is technocratic, 'how to' knowledge that is valued" (p.28).

The SP group reported a strong effect of the REF on knowledge production in their discipline. As discussed earlier in this chapter, there was also an increase in the use of data, either in collaborative research or in SP researchers moving into empirical research. It had also led to a proliferation of particular topics and repetition of research that detracted from advancing disciplinary knowledge. This is problematic, particularly in younger disciplines where there is a need to develop a theoretical basis to give a strong foundation to a discipline. A conceptual body of knowledge is a characteristic cited as a hallmark of a discipline: for example, Krishnan (2009) suggests "disciplines have theories and concepts that can organise the accumulated specialist knowledge effectively" (p.9).

The repetition of topics in conjunction with the move into empirical research indicates a change in the type of knowledge and methods used in the soft pure area. Nussbaum (2010) suggests that there is a "silent crisis" (p.1) in the displacement of humanities education and cites numerous examples in higher education and government policy

where humanities research is sidelined and replaced by scientific or social scientific thought and education. She argues that whilst science and technology knowledge are essential, so too is humanities knowledge that engenders key skills such as critical thinking, empathy and the ability to think beyond one's own frame of reference (Nussbaum, 2010).

Fewer students are applying and entering humanities undergraduate programmes (UUK, 2017; American Academy of Arts & Sciences, 2017). This decline in student numbers was also mentioned in my discussion groups. However, Collini (2017) suggests that a change in the proportion of students undertaking humanities degrees does not signal the end of great scholarship in these disciplines, just a reflection of a change in the "deeper character of our societies" (2017, p.229). Researchers from both pure groups were not so sanguine reporting that institutional and government messages of impact had a detrimental effect on them and, in the SP group, one researcher noted that others in her/his discipline espoused a lack of worth in their own discipline's knowledge. The change in knowledge orientation and its perceived worth reported by the SP group needs to be seen in context with more widespread debates about a decline in humanities education and the possible consequences of this.

The broadening out of knowledge types was reported across the board, as was a constraint on researchers' freedom in pursuing their own choice of topic, unless their interests coincided with what was funded. As reported in the last chapter, the SP group reported the most pressure where they were required to steer away from some subjects if they did not take a particular position on something. For example, work using feminist theory was cited as being more difficult to get published. These are all examples of limits on academic freedom, which was a major theme in explaining the changes in the development and production of disciplinary knowledge. I will now present the main debates in this area in the context of the interview

data on peer review and research engagement activities. This discussion on academic freedom concludes this section on knowledge.

Researchers in my study presented different types of limits on their academic freedom. Williams (2016) interprets academic freedom in HE in a broad sense, namely that "academics should have all the same rights to free speech enshrined within law as other citizens" (p.7). She also references Fish (2014) who gives a more specific focus for the scope of academic freedom: having the freedom to research and pursue scholarship in accordance with disciplinary standards. The general principle of academic freedom is to be able to pursue knowledge without fear, in order to advance the body of knowledge within a discipline. This does not mean without ethics or appropriate method/ology, which is where the disciplinary standards part of Fish's definition fits in.

There are many examples from the literature of academic freedom being curtailed in the pursuit and dissemination of research. This takes several different forms, a number of which were identified by Hoepner (2017) in her recent thesis investigating ways that researchers have been silenced in dissemination of their research. In science, there can be a conflict of interests between research results and what companies want to hear. If these companies are benefactors to a university or are funding the research (or other research) in the same institution, researchers can be called to rethink the interpretation of their findings (Hoepner, 2017). In many disciplinary areas there is also another form of academic silencing, where certain debates are deemed to be settled and put beyond debate, such as climate change. This means that any new research challenging the established status quo is denigrated and suppressed (Hoepner, 2017; Williams, 2016). As one of Hoepner's researcher participants expresses "A moral position [is] turned into a statement of research orthodoxy" (Michael Mair, Scientist, cited in Hoepner, 2016, p. 50).

In areas of research that affect health services such as screening, vaccinations and other public health issues, there is always a translation of research in order to present a health promotion message to the general public or a particular target population. If new research suggests a more nuanced response or a completely different response, this may not be accepted by the research community. For example, research on body weight (Flegal, Kit & Orpana, 2013, cited in Hoepner, 2017, p.24) a meta-analysis of 97 studies, demonstrated that being in the category of "overweight" was associated with lower mortality than being a normal weight and that being slightly overweight did not make any difference to a person's life expectancy. Yet, a simpler public health message is that being overweight is bad for your health, so this research can be seen as unnecessary to promote to the public or, as in Flegal's case attacked and denigrated by fellow researchers as rubbish.

In the humanities and social sciences there is less scope for academic freedom to be curtailed through interaction with economic or health and social care issues, but much more scope for moral trepidation. However, the ways that researchers are silenced are the same. This can be seen, for example in public lectures where research on religion, party politics, ethics and other potentially contentious topics are prevented from being discussed in order to protect the public or particular groups such as those from a particular faith, or having been a victim of domestic abuse (Williams, 2016).

In this context, Williams (2016) argues that academic freedom has been reinterpreted as "academic justice" which means protecting people from views they would find offensive, with the attendant idea that certain debates or areas of research are settled and therefore do not need further discussion. There are a number of high profile cases where people were "no platformed" or where events were cancelled at Students' Unions in the UK and America. These high profile cases (such as one I cited earlier, the near-cancellation of Germaine Greer's

talk at Cardiff Students' Union in 2015) are highlighted in debates on free speech and academic freedom in the mainstream press, as well as in HE publications and events such as the Battle of Ideas. These discussions are focused around student concerns, student union policies and teaching spaces. Certain well-worn words and phrases have come to dominate the debates such as the 'snowflake' student, 'safe spaces' and 'trigger warnings'. Recent moves by the British government to compel universities to promote freedom of speech provide a background to the topic of academic freedom in relation to research, but although it is largely beyond the scope of this thesis, any discussion of research silencing or restrictions on research amongst my interviewees needs to be understood in this wider HE context.

Technology, such as the WWW and social media platforms also affects how people receive and interpret information. Researchers in applied linguistics Philip Sergeant and Caroline Tagg (2018) report on their expert witness accounts to a UK government select committee on fake news:

…propaganda and misinformation campaigns…are being waged by groups (or nations) trying to influence the public conversation around key public policy issues. This is partly a technology problem – propaganda, after all, has been around for a long time, and thus the issue is more around the way it's being carried out in today's world, rather than the mere fact that it's happening. ("What is fake news…" para 2)

Thus, the current instances of fake news and propaganda are different because they are supercharged by the web and exacerbated by social media 'bubbles', where people retain only those contacts they agree with, creating the illusion that everybody thinks the same way as themselves on any given issue. This kind of confirmation bias behaviour is an inherent part of the human condition, as Peter

Salovey, Professor of social psychology at Yale University suggests "All of us are strongly predisposed to accept accounts that align with the opinions we already hold, and to ignore or dismiss those that do not." (Salovey, 2016, cited in Chartered Institute of Library and Information Professionals, (CILIP), 2017).

The communication of misinformation, the role of emotion within that process and its empowerment by information communications technology are factors that need to be recognised in order to understand the current nature of academic freedom. Williams (2016) argues that academic freedom is worthless unless it is related to the production of knowledge and I agree with this. She also suggests that debate will lead to the best answer being found. For a number of reasons, I do not think that debate alone will lead to the truth surviving unvanquished. This is because humans are prone to rejecting ideas that do not corroborate their own, the need to present an argument to appeal to emotion as well as reason, and the restrictions of government policy in knowledge application.

However, the freedom to undertake and disseminate research freely, even if it does offend someone, or does appear controversial, will only strengthen our decision-making at both population and at individual level. In a similar way to the use of a social realist perspective in research, where a belief in truth and objectivity supports the research process, striving for an ideal, although unattainable, supports the promotion of knowledge and debate. The difficulties in pursuing academic freedom (using Fish's 2014 definition) are not just cause to relinquish this goal. As one of my participants suggested, restricting someone from voicing controversial ideas will only lead to them being expressed online, where it may be more difficult to challenge them effectively.

In the wider context summarised above, my data indicates that different disciplines provide varying levels of protection and recourse

for researchers to protect their academic freedom. The SP group discussed the idea of a "chilling effect", with one researcher suggesting that if you do not have politically correct views or particular views on certain topics, you had to stay away from them. This resonates with Hoepner's (2017) findings that it was difficult for researchers to undertake research that was against a normative position. One SP researcher also spoke about the conservative nature of their discipline and how some widely accepted 'politically correct' fields in the humanities were not acceptable in his/her discipline. This suggests that the discipline still has some power in directing the topics chosen. However, without further investigation it is not possible to untangle whether this was due to certain topics being most likely to be funded and published or something different, a different direction coming from the growth of the discipline that meant certain topics needed to be explored and particular questions answered.

The disciplines have their own structure (bodies of knowledge and ways of working), customs and practice that go beyond institutional and country borders. The quality assessment of research comes from the community members, drawing on established markers of what quality is. These methods provide the backbone to knowledge production, what is right and wrong, in the face of external influences. The direction of disciplinary research topics is driven largely by quality-related (REF) and industry funding, but a strength of any discipline is in its own quality assurance practices. However, these too have been affected by the advance of the knowledge economy and related requirement for knowledge to be instrumental. This trend is most strongly demonstrated in the area of academic freedom, peer review and newer methods of research evaluation.

Across the sample, researchers took different perspectives on quality assurance methods and had differing experiences depending upon the type of knowledge they worked with and the context in which it

was commissioned. Formal, peer review was still seen as having a central role in the workings of the disciplines in order to assure quality. Interestingly, this was reported most by the HP group. This was not unexpected but it reveals the divergence between the applied and pure hard groups, with the latter also reporting much less interaction with the public on social media or other informal methods of communication. Barnett (2000, p.410) suggests that there is a shift towards "quicker forms of accountability", with peer review being less rigorous and less common in academics' day to day lives and manifested mostly in the peer review of electronic journal articles. Saunders (2012) also suggests that peer review has been externalised, so that a disciplinary community does not sign off the quality of its work. This has become part of other extraneous research governance and quality assurance practices enforced at institutional level.

In my study, views on the merits of peer review varied according to disciplinary area. Those from the HP area spoke about regular peer review activities and gave examples of how assessment of truth claims was part of the disciplinary process. According to them, this was alive and well and manifested not only in review of articles and conference papers but also within teams, pre-publication, before results were reported to commissioners. I also interpreted the data to indicate that, in this broad knowledge area, the process was effective and fundamental but sometimes flawed. Contrary to the dominant view in the literature referenced above, my data suggests that this type of peer review is strong and thriving in the HP knowledge area. My study suggests that this is for three reasons: because it is so deeply rooted in the scientific methods of knowledge production, and because the knowledge is data driven, it is easier to give a definitive judgement on knowledge claims. Thirdly, in pure knowledge areas the work is largely of little interest to the public, so evaluation processes remain within a close disciplinary network, beginning with individuals

reviewing their own work and within immediate teams, only moving out to other experts in that knowledge field.

Further on the topic of peer review, Barnett (2000) goes on to suggest "It is also that we are perhaps moving towards a situation in which the motto is: 'buyer beware'. In other words, knowledge becomes simply a commodity, the test of which is consumer reaction" (p.410). From this perspective, the site of quality assurance would depend upon the intended audience; in applied research this is always a much larger contingent of people, with many more interested stakeholders. This provides an added layer of review, which is often facilitated by social media, comments on online journal articles and blogs. I would also include here less formal written articles summarising research, some aimed at an academic audience, some for the public; in short, a much more varied "consumer reaction".

There is a parallel between the diversification of knowledge types in applied research to include lay knowledge and expert opinion, and the corresponding newer forms of review. There is a diversification of knowledge types and evaluation processes. However, some forms of review are very informal and sometimes nothing more than an emotional response. In the data, discussions of peer review revealed a tension between the practice of presenting evidence-based knowledge claims to be challenged by peers (the science) and the evaluation of knowledge claims by non-academics, be they other professionals, members of the public, or particular lobby groups as part of the imperative for wider impact. For example, I reported on the challenge, voiced by an HA researcher, of communicating only the results of research to avoid being drawn into any related public controversy.

A scientist in Hoepner's (2017) study on academic silencing reported a similar sentiment: "So if you kind of keep it to the science and leave it at that there's nothing much they can do because they're not attempting to understand the science" (as quoted in Hoepner, p.135).

Within my study, researchers reported participating in both research and impact / public engagement activities. In appraising these engagement activities and trying to make sense of the current way research is done, the focus in the literature has been on the use of technology, a focus on the methods of use, rather than the underlying activities, such as, the "open science research cycle" (Bueno de la Fuente, n.d.). In addition to a traditional research cycle, I think there is another layer of processes, related to public engagement and impact, which require extra work at different stages of the research process. Not all disciplinary areas would engage in all points of the cycle and I suggest this is dependent on the nature of the research (applied / pure) and the nature of the knowledge produced (hard / soft). However, these observations are based on a small sample of researchers, with fewer respondents in the SA area. A figure below gives examples (from the data) of how the 'engagement cycle' overlays the tradition research cycle.
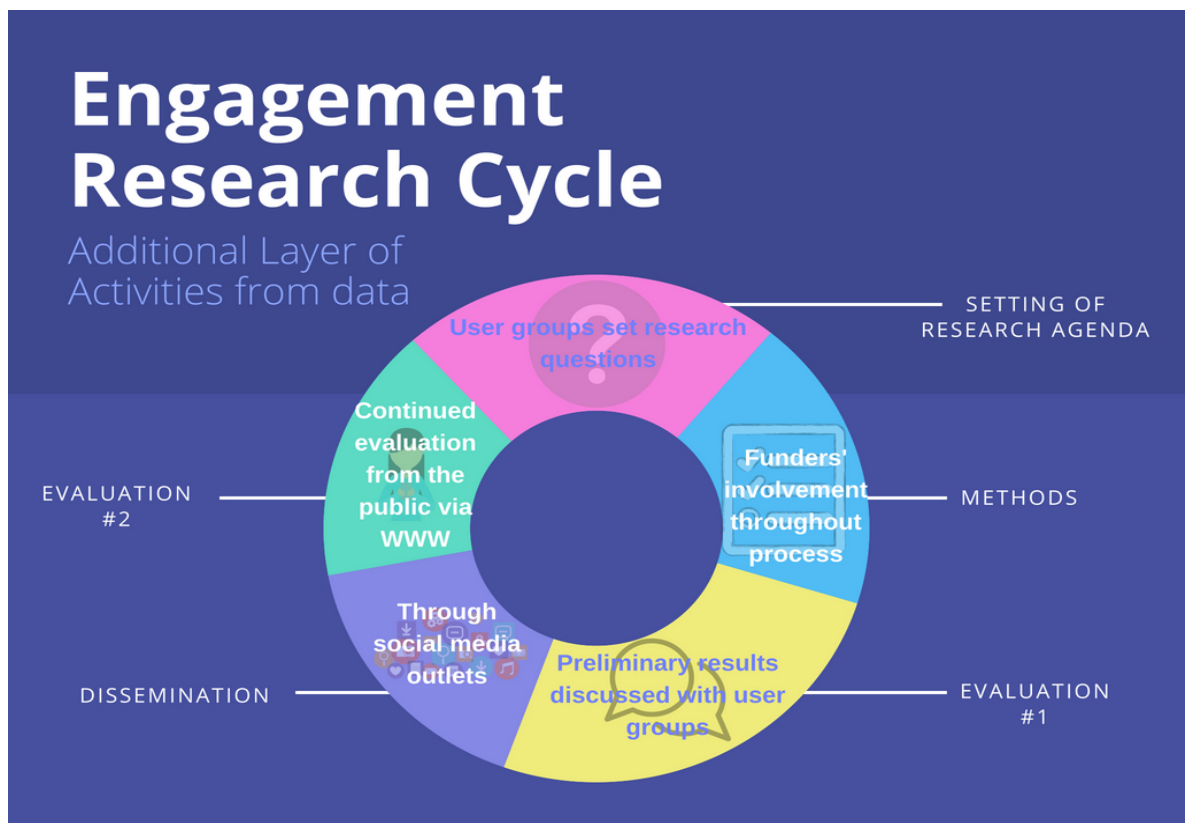
Figure 2: Engagement Cycle of Activities

During this process, it is very difficult for researchers to keep a neutral persona, and only represent their research in a disinterested manner. It is interesting to note the similarity in responses between a researcher from my study, who described how easy it was to be cast as an advocate of a particular perspective and becoming unwittingly drawn into a partisan position, and this quote from one of Hoepner's (2017) participants:

They never bother to read what I write, including papers in which I've made a case for reconsidering the current prohibition while acknowledging there are harms associated with cannabis use So it's very hard in that sort of framing to avoid being pigeonholed If you claim to be neutral, people don't believe you. You're seen as either a closet supporter and if you're not wholeheartedly in favour of or sympathetic to the view of the person you are interviewing then clearly you're a closet supporter of the opposition (p.135).

In my study, these reports concerning post publication evaluation by the public were not found in pure knowledge areas. One HP researcher described this as a benefit of doing research that was of little interest to the public, thereby increasing their sense of freedom in the research process.

There is a constant tension between these two parallel processes, with clashes that manifest themselves in, for example, the need to promote knowledge to the public and the need to remain impartial, the need to provide knowledge that is both rigorous and relevant. At some points in the process, the engagement activities are more to the fore, at others the research activities, with conflicts arising as indicated above.

5.4.1 Summary

The key discussion theme for this question is the interplay between the disciplines and the impact of disciplinary knowledge on society.

All disciplinary areas are subject to the same institutional demands and operate in the same broader context but respond in different ways due to the generation of knowledge in a horizontal or vertical discourse and the level of abstraction or application of the research generated. In this section, I presented the interplay between the different knowledge areas sampled and developments in wider society, in a discussion on the broadening out of knowledge types, academic freedom and the role of the discipline in quality assuring its own research. I have compared different elements of data to see where groups' views concurred and diverged in an attempt to make the nature of the different knowledge types more apparent. An example of this is in my comparison of peer review in hard knowledge areas.

5.5. Conclusion

In this chapter, I have discussed the findings from group interviews conducted with researchers from hard, pure, soft and applied knowledge areas. I have addressed three research questions, beginning with 'What are the commonalities and differences in researchers' practices in response to demands for instrumental research?'. This question was answered in a visual format to aid the reader to see where data coalesced, diverged or was common to all groups. A comparative approach was also taken throughout the rest of the chapter in answering the other research questions.

I then addressed questions two and three 'What is the extent and nature of change in disciplinary ways of working such as research methods, in different types of fields and disciplines?' and 'What factors impact on the development and production of disciplinary knowledge in different types of fields and discipline and how do they manifest themselves?'. Here I provided a discussion interpreting the key findings from the study, integrating these findings with the

literature discussed earlier in this thesis and new literature to give further insight into the data.

In the final chapter of this thesis, I will draw together the themes discussed in this chapter on different knowledge types, academic identity, and the interplay between disciplinary knowledge and society. This will be framed in the concluding chapter by addressing the final research question 'What are the implications of this research for the future of the disciplines?'. The final chapter will also state what this thesis contributes to knowledge and how its findings can inform future research.

Chapter 6 | Conclusion

6.1 Introduction

This chapter has two purposes. Chiefly it is to provide the reader with the implications of this research, but it is also a place to resolve the reporting of the study. I have achieved these goals via two processes. Firstly, by following my argument established at the outset of the study to assert the benefits of a social realist approach to knowledge. This began with the critical questions I identified at the end of my review of the literature. I pursued these through formulating research questions and conducting a cross-disciplinary case study. I answered the research questions by presenting my results in Chapter 4 and interpreted these results in Chapter 5. To complete this process, I examined my interpretations and the meta-themes I presented in the discussion chapter and synthesised these to answer my final research question: 'What are the implications of this research for the future of the disciplines?' Secondly, I reflect on different parts of the thesis and the process of doing the research to present the strengths and limitations of this work and its knowledge claims. I also provide specific recommendations for different audiences based on the evidence presented in this thesis. Finally, I state potential dissemination channels for the study's findings, before making my closing remarks. To arc back to the introductory chapter of this thesis, I begin with a brief revisit to my original motivation for this study.

6.2 Original Motivation for This Study

It goes without saying that public policy and debate about research funding and the organisation of knowledge production takes place in a particular context. The contemporary context in British universities

is dominated by the demands of the knowledge economy and the increasing request for instrumental research, be that economically or socially impactful. As I outlined in Chapter 1, as an HE professional, working in a research context in a Russell Group University, I became increasingly aware that a disciplinary perspective on knowledge production was either absent, underplayed or misrepresented in debates on the management of research. Additionally, I perceived that disciplinary research was seen as old-fashioned and of limited use to address current complex research questions. In particular, disciplinary research is labelled as elitist, removed from what taxpayers want and promoting vested, or even arcane interests. Those that promote disciplinary research are consequently seen as out of step with current ideas. Whilst the benefits of disciplinary working are minimised, applied research and co-produced research are seen as the answer to current problems such as poverty, inequality, global warming, and anti-biotic resistance. What is also required by government is research that produces marketable, economically viable products.

In the study framed by this context, my aim was: 'To explore researchers' experiences and identify if, why and how working practices and knowledge types have changed in the disciplines'. I believe that it is important to understand what changes have been made to disciplinary work and the subtle and overt ways in which this has manifest itself, as this has important implications for knowledge production in the future. It is also important to have insight into researchers' perspectives across disciplines and academic rank in order to understand their motivations and what they perceive as strengths and weaknesses of particular ways of working or knowledge practices. Insight into the nature of different types of knowledge and to epistemic practices provides evidence to help inform decision making about future funding allocation, what counts as excellence in research and how to measure this. I addressed three

questions in this study, and by providing a narrative account to my earlier tabular summary of results (5.2), I will now summarise the findings to demonstrate how I have met the study's aim.

6.3 Summary of Findings

Research question one 'What are the commonalities and differences in researchers' practices in response to demands for instrumental research?' provided an opportunity to compare across academic rank and discipline to see where data overlapped or diverged in the different groups. I answered this question throughout the discussion chapter, and in three data summary tables. I give a narrative summary of these below.

6.3.1 Relevance as a driver for change

In the relevance table (5.2), there are some clear areas of agreement across the groups, such as researchers tailoring bids to include impact friendly content and a lack of time for researcher-lead unfunded projects. There was little data in this summary from the HP group, as I did not find relevance was a major factor driving change in this area, but what was significant were the pressures for instrumental research slowing down innovation, and more industry/market research being undertaken in their discipline. Data from soft knowledge groups coalesced in some areas, such as seeing their work as being less valued than other research, having to move to empirical research if they were in a theoretical field and some participants regarding this move as an opportunity. The SP group reported a narrowing of research topics and a repetition of work on certain topics that they linked to demands for instrumental research. Both applied groups reported a broadening of methods to include various empirical approaches, with a wider remit of knowledge types regarded as legitimate in their discipline. The applied groups reported practical barriers to cross-disciplinary work and political

expediency being a factor in how their work was received. Moreover, the HA group reported other factors linked to relevance as a driver, that diverged from the other groups, such as: restraints on the development of new methods, the responsiveness of their work to commissioners' needs, the increased involvement of the public in their research and the heavy involvement of funders in the research process.

6.3.2 Technology as a driver for change

This driver mostly affected the hard knowledge areas as it changed how they conducted their research, both in collection and processing of data. All groups reported that technology had augmented collaboration in communication and writing.

6.3.4 Discipline as a driver for change

Data coalesced across all groups that fields and researchers move between types of knowledge that are characterised as "Mode 1" and "Mode 2". This driver for change was strongest in the SP group where collaboration was not usual and the discipline was the dominant determiner of research approaches. The discipline limited or controlled the current topics of interest but this was not the same as broader popular topics or instrumentally viable topics. The right to academic freedom was regarded as more problematic in the SA and SP group. This was due to the type of knowledge being produced in these disciplines, which is of a more interpretative nature. In the hard knowledge areas, both groups indicated that peer review was of value and central to their work.

6.3.5 Individual as a driver for change

The final table highlighted one key finding from this study, namely that ECRs were more likely to seek collaborations or move to different methods in the soft knowledge areas.

6.4 Research Question 4: What are the Implications of this Research for the Future of the Disciplines?

In answer to question two in my discussion chapter, I explored changes to ways of working in the disciplines. Here I presented two meta-themes, namely the mixing of different types of knowledge and the pressures on academic identity. In my answer to question three, I explored the production of disciplinary knowledge and this produced one key discussion theme: the interplay between disciplinary knowledge and society. In this section, I present the results of my examination of these themes under two headings: 'Changes to the organisation of knowledge production', and 'Knowledge restrictions in a risk averse era - how different knowledge forms respond'. In answering this question, I suggest the implications for the future of the disciplines based on the findings of this study. The granularity of this answer is different to that of earlier questions, in that it is drawing on those answers to summarise and conclude. It includes, to some extent, a form of future gazing, but, my interpretations are grounded in the literature and the data I have collected for this research that I have presented in the thesis.

6.4.1 Changes to the organisation of knowledge production

In this thesis, I defined a discipline as:

A discipline is two things. It is an intellectual system that contains a dynamic body of knowledge that includes a developed theoretical base. It is also a social structure that enables this knowledge to be generated and shared through the generations, allowing the body of knowledge to develop. New members to a disciplinary community are enculturated into specific ways of working, language use and ontological and epistemological views.

From the data, I identified how researchers' working practices and knowledge had changed and the underlying factors they reported for these changes. The implications for the disciplines are twofold. Firstly, the disciplines are its members: a living breathing system; but are also objects, bodies of knowledge. When the type of knowledge produced in the system changes, so does the object. This may lead to additional fields developing based on technological changes, such as the field of tele-medicine for example.

Researchers' professional identity is the second thing that affects the disciplines through the changes in type of knowledge and methods. This is inherently linked to researchers' particular discipline and field. Within the singular disciplines Bernstein (2000) refers to the sacred core, that is surrounded by the profane outer concerned with interaction with the world. In the current context, my findings indicated that less sacred knowledge is needed so that some researchers change their research orientation, and this lessens the researchers' links with the sacred part of their discipline. The boundary between the sacred and the profane are therefore broken down. The boundary, the classification of the sacred, is weakened, introducing different knowledge forms into singular discourses. This moves pure disciplines towards becoming more region like where "the world" and "the word" are held in "mutual beneficial tension with each other" (Beck & Young, 2005). Further to this point, newer researchers also spoke about being flexible and developing as many skills as was necessary, in order to keep their job and continue to gain funding. Their testimony suggested less resistance to pursuing work that was novel to their field or discipline as it involved different types of knowledge and methods. They were able to accept cases where this did not work out and move onto the next opportunity. Newer researchers also had less autonomy as they were without an established body of work to protect them and give them more latitude in their choice of project.

This data resonates with Bernstein's (2000) idea of genericism; whilst he was referring to the inclusion of generic skills in university curricula, the idea can also be applied to the workforce. A genericist worker would possess a variety of skills that can be applied in any context. While this hypothetical role is limited in how far it would work in practice, the data suggest the development of a new generation of empirical researchers who are able to apply numerous methods (for example qualitative and quantitative skills) across various topics. Regional researchers' modus operandi is field or even discipline agnostic with workers identifying more as methodological, rather than topic experts. Beck & Young (2005) state that the regionalisation notion is not fully realised in Bernstein's work. I would suggest that the HA group and other similar groupings in British HE research departments are examples of what he presciently proposed as "new regions" (Bernstein, 2000, p.54). I would suggest that the organisation of knowledge units in HE has gone beyond singulars and classic regions such as engineering or nursing to permanent multi-disciplinary teams and departments which draw upon singular and classic regional knowledge forms represented by researchers from these disciplines. Entrants to these areas may come from industry/practice rather than through a traditional PhD route. In line with Bernstein's genericist role, some researchers in these configurations operate in a mainly functional role with expertise in a particular method/ology which they apply in different research questions, sensitising themselves to each topic in turn in order to effectively tailor their contribution to each project.

Given the existence of these configurations and the change in how ECRs spoke of changing fields, and changing and gathering methodological skills, I would tentatively predict that British HE institutions will increase the split between singular / regional knowledge. This could be in entirely new, separate groupings, such as

that of the HA group, not a regional discourse but a collection of singular/regional/genericist researchers who create regional knowledge. This may be what Bernstein envisaged as "new regions" but, as Beck & Young (2005) suggest, this development was not fully explained by Bernstein.

In discussing the emergence of new regions and using this term, it is important to make a distinction between the group producing the knowledge and the body of knowledge itself. The term could be applied in either instance. New regional groups are essentially established, long-term, pre-disciplinary formations. In time these new regions could move to become further integrated to produce ID knowledge and become a classic regional discourse, these are disciplines, with a foundation of developed conceptual knowledge. One threat to this future envisioning is that this type of group could fragment as large configurations of researchers from varied professional/industry and traditional routes come together. As there is less connection between researchers' epistemological roots to begin with, and people have very different ideas as to what counts as knowledge, this could be stretched too far and lose coherence.

Another way in which an increased split between singular and regional discourses could manifest itself would be that smaller groups of researchers in singulars or classic regions would undertake MD research but would not be housed in permanent separate teams. Evidence from this study suggests that this is increasing, as newer researchers in singular regions are attracted to MD / ID projects in order to gain funding and remain in employment. The researchers I spoke to accepted a change in research methods or orientation in order to keep an academic career. Current PhD students will receive the message from ECRs to show impact, be flexible, work outside their discipline. There will be fewer 'sacred' PhD opportunities

available. This means the enculturation into the discipline will reflect these new practices, thereby reducing the ratio of pure to applied knowledge. However, extrapolating further, the pure nucleus of the singular discourses will not disappear; instead, these 'sacred' knowledge experts would form smaller groups. This is more of a threat in new classical regions (such as arts therapies) as their conceptual base is in an early stage of development. Singulars are mature disciplines and would therefore be more able to withstand a slowdown in research capacity but may become static without further theoretical work, such as reassessing established theories in the light of new ideas.

Based on the literature and the findings of this study, the future of disciplines could be of smaller singulars with larger new regional, classic regional, or even super-regional (conjoined regional) groupings. An example of such a super-regional grouping is the allied health professions where similar preoccupations and concerns are found at the higher levels of abstraction. If one explored deeper into each region's knowledge and practice, the more context would become important and mark the different concerns of the member regional discourses. However, my ideas are stimulated by the way the disciplines are responding to the current demands of government and society; this could shift back, the balance could change, because the disciplines respond to both external forces *and* have their own core nucleus of knowledge and ways of working.

6.4.2 Knowledge restrictions in a risk averse era - how different knowledge forms respond

So far, in this chapter, I have presented possible future configurations of the disciplines and HE knowledge production teams based on the findings of this study and interactions with the literature. I have especially drawn on Bernstein's (2000) ideas of regionalisation and

genericism. In the second part of this section, I present my final observations on changes to the disciplines. Having reflected on the changes that I have reported in this study, the enduring impression that I draw from this evidence is the overwhelming conservatism that currently imbues research in British HE.

Based on the evidence from researchers' testimony, the literature and my own experience as an HE professional, I believe that, as a community, we are experiencing a risk averse, restrictive period. The hallmarks of this period are that pure knowledge is restricted and applied knowledge incompletely evaluated due to research governance requirements. This situation is also associated with the type of funding available and a change in the site of some market-orientated research. In applied areas, commissioners want relevance and rigour, but my data suggests that research which takes place in an engaged environment threatens the disciplinary processes that enable rigorous research to be produced. With so much interaction with commissioners and the public and other stakeholders happening throughout the research process, researchers conduct their work in a challenging environment under much more scrutiny than their pure discipline colleagues.

As Oancea (2013) suggests, applied research may be unfairly viewed as of lesser quality than other forms of research by its association with the world of practice, even to the point of believing that work such as evaluation reports are not peer reviewed. Micro-management from commissioners and excessive scrutiny on processes place an inordinate and unbalanced focus on the *use* of this type of research and arguably lend support for this unenlightened perspective. My data on impingements on academic freedom also indicate the stifling of curiosity-driven research, which limits spin-offs and new ideas. I suggest that the restriction to a particular viewpoint or certain argument within a discipline (as reported in the SP area) could also lessen a researcher's affiliation with their discipline.

Given that regional knowledge which links 'the word' and 'the world' is in demand, my assertion of a conservative culture would seem contradictory, as this type of knowledge is seen as greatly beneficial to address society's problems. Prioritising the production of this type of knowledge is seen as a progressive role for universities to occupy in contemporary society (Campbell et al, 2016; Strike, 2018). That is, to produce knowledge that has utility and can help address current problems we face, reform and make changes to society. However, following Emile Durkheim's argument on the evaluation of knowledge (cited in Young, 2008, p.207), if we only judge knowledge by its usefulness, this is neglecting other markers of quality, such as trustworthiness, credibility, generalisability, cogent argumentation. This can be seen in the erroneous perception of applied knowledge as of lesser quality than other forms of research as it is so concerned with real world problems.

Social constructivism is also concerned with utility since it evaluates knowledge only by how it affects the knower and, in this way, has partially co-opted neo-liberal values to further its cause. It is, as Young & Muller (2010b) argue "a utilitarianism thinly veiled beneath a moral correctness" (p.121) as being concerned only with moral correctness is not an effective way to evaluate knowledge as its other properties are ignored. This leads to an equivalence lens of knowledge types. In this way, social constructivist views of knowledge align with neo-liberal demands for relevance to limit production and access to certain types of research and existing knowledge, meaning that counter-intuitively what appears as an inclusive and progressive approach to knowledge ultimately contributes to a short-termist outlook. This, in turn, lessens opportunities to create and debate new ideas, beyond those that are immediately and manifestly 'relevant'. Moreover, as I posited in the last chapter, focussing on the knower only, rather than the knower and the knowledge, engenders certain topics settled, beyond debate

and therefore creates an atmosphere un-receptive to new research (Williams, 2016; Hoepner, 2017).

Another problem with measuring the worth of research knowledge only on its utility is that, as Weiss (1982) suggests, research knowledge is hardly ever linked causally to a change in policy or practice. Rather it joins many other pieces of diffuse knowledge that enlighten policy makers in complex decision-making processes. Watermeyer & Chubb (2018) make a similar point in their research on the evaluation of the REF Impact Case Studies. Their study of the process reveals a messy business, with decisions sometimes being made as a matter of taste or emotion as impact claims are sometimes nebulous and the evidence provided to support the claims non-specific. It is therefore rarely possible to prove that a piece of work changed someone's life or was the key source of a policy change. This does not mean that these claims were erroneous, rather that it is not possible to prove the claims, given the nature of the knowledge form or diffusion of the knowledge in practice. It may also be that the full impact of the research is not yet known.

6.4.3 Summary

In answer to the final research question, I have drawn together the discussion themes from the previous chapter on knowledge production, researchers' ways of working, peer review and research evaluation activities. I have suggested that combined factors have led to an increasingly conservative approach to knowledge production in contemporary UK higher education. I have also suggested that there will be a change in how research teams are organised, based on the data I have collected and analysed and my application of ideas on singular and regional discourses proposed in the work of Bernstein (2000). To summarise, the implications of my study for the disciplines are that additional fields may develop due to the influence of technology and new types of knowledge required. There will be a

rise of the genericist researcher. There will be a split between singular / regional knowledge in the short / medium term. The singular discourses will remain, as sacred knowledge is needed to inform regional operations. Finally, there is an over-emphasis on the utility of research knowledge in the UK higher education system, which has detrimental effects to all research production, applied and pure.

6.5 Recommendations for Research, Policy and Practice

As a result of the findings presented in this thesis, I will now give recommendations directed towards research policy makers, HE researchers and institutional managers in HE. My first two recommendations are for policymakers in HE

❖ Firstly, I recommend that the current agreed level of impact in the REF, (twenty-five percent) is not increased in order to protect the development of disciplinary research. The evidence for this recommendation is that the level of innovation was reported as restricted in HP research at a time when innovation is needed. Limiting academic freedom to create knowledge that will have spin-off instrumental impact seems contradictory. Researchers in pure knowledge areas felt that their research was undervalued; participants reported an effect on morale and a barrier to potential collaborations.

❖ Secondly, in line with the findings of the Stern review (2016), I recommend the implementation of responsible metrics and the monitoring of the effects of this change on disciplinary knowledge and the development of the disciplines. The reason for this is to protect the development of disciplinary research, especially the humanities. The evidence for this is that all knowledge areas reported a narrowing of topics and this was especially acute in the

SP knowledge area, where there was also an introduction of empirical work into their portfolio. This broadening of knowledge types will disrupt the development of this knowledge area. Responsible metrics address this problem by advocating diversity of metrics to reflect a plurality of research types. This will lessen the need for people to conduct empirical and other instrumental research and will protect the development of disciplines in this knowledge area that is vital for human development.

❖ My third recommendation is for institutional managers who are responsible for preparations and training for the REF. Generic training programmes to incentivise collaborative working and impactful research should be avoided because, according to my participants, they do not stimulate the behaviour required to attain these outcomes. The reasons for this vary in different disciplinary areas, but all participants stressed the importance of liking the people you work with and collaborations rising from a shared interest, rather than a shared interest in collaboration. HA researchers suggested that training should be bespoke to a disciplinary area or field.

❖ My fourth recommendation is for educational researchers in the field of higher education research. I suggest future research on the development of singular and regional knowledge forms to investigate further the following prediction based on this research. Interpreting the evidence from this study in the light of the work of Basil Bernstein (1999; 2000) I suggest that there will be three possible developments for Bernstein's 'new regions'. I interpret a new region to be a collection of singular/regional/genericist researchers who create regional knowledge such as the HA group in my study. I suggest these established pre-disciplinary formations will become disciplines, remain as permanent pre-disciplinary regional groupings drawing on singular knowledge or

become a 'super-regional' and join with other regional groupings. In alignment with this prediction, singular knowledge forms would contract and more disciplines will be housed together to facilitate cross-disciplinary research such as the SA group described in this study.

6.6 My Contribution to the Field of Higher Education Research

This study offers a cross-disciplinary perspective on knowledge production and ways of working in British HE at a time of great change in the sector. It offers insight into ways of working and knowledge production in hard, soft, pure and applied knowledge areas from researchers at different career stages. My aim was to 'To explore researchers' experiences and identify if, why and how working practices and knowledge types have changed in the disciplines.' I have set out the implications for the disciplines and my recommendations for policy and practice. I believe this study has illuminated differences in how disciplines currently operate and how they are evolving in response to the requirements of research governance and technological changes. It also highlights what is important to researchers such as academic freedom, autonomy, curiosity driven research, peer review and research that makes a difference to people's lives. I believe there are three key ways that this study has demonstrated originality in its contribution to the field. I have highlighted them below with links to the detailed accounts elsewhere in my work.

Firstly, I have used an existing typology of disciplinary knowledge (Becher & Trowler, 2001) in a new context (3.6), to reassert a disciplinary perspective to current debates about research production at a time when descriptions of research as pure and applied are seen as "old-fashioned" (Jones, 2018). However, with the balance in

allocation of research funding currently a focus point of debate (Jones & Wilsden, 2018; Clark & Gyimah, 2018), this study reasserts the worth of a disciplinary perspective on knowledge production as it highlights the differences, limitations and strengths that different types of knowledge provide (2.2, 4.3, 5.4).

Secondly, I have illuminated existing theory (2.2) by linking empirical data to Bernstein's theories on the organisation and development of disciplinary knowledge (5.3, 5.4). I argue that it is important to use theory on disciplinary knowledge production in order to inform current thinking and debates on what kind of knowledge should be produced in our universities. Through a social realist lens, particularly using the work of Bernstein (1999; 2000) this case study has highlighted the limitations, uses and benefits of a variety of knowledge types including different types of research and expert and everyday knowledge.

Finally, the originality of this study can also be found in its implications for future research on the development of the disciplines and in fostering an understanding of how researchers feel about their research and respond to attempts to encourage particular ways of working. It also argues for protection for singular disciplines in the form of responsible metrics, adding a new voice in support of the adoption of responsible metrics advocated by the (2016) Stern review.

6.7 Truth Claims, Study Limitations and Strengths

As a qualitative case study, using a small, purposive sample of participants, this research was not designed to be generalisable to all researchers or all HE providers. Rather, it seeks to bring a disciplinary perspective to current debates on knowledge production in British HE. If I had taken a different path, chosen one disciplinary area, and conducted a number of focus groups / interviews within it, I would

have realised a study that explored complexities in one area, but which denied the overview I sought. The strength of the project is that within the limited constraints of a short thesis, with research conducted by one part-time researcher, the study design allowed an insight into different knowledge forms and researchers' practice across a number of disciplinary areas. Case study research is not generalisable and is bounded by its context, but it can be relatable and transferable to similar contexts and help inform others' practice or research. Additionally, whilst I have made recommendations for various stakeholders based on this research, what the reader draws from this study is, of course, at their discretion. I have aimed to enable the trustworthiness of this study and its usefulness to others in the sector by describing my methodology, methods and the study context as clearly and fully as I am able.

6.8 Dissemination Channels

At this stage in the examination process, I have plans to present my work to peers in the School of Education. Following successful completion of my award, I will submit my abstract to register my research with the British Journal of Sociology of Education. I will also translate the material into a journal article to submit to a peer-reviewed journal.

6.9 Closing Remarks

No study is ever finished; it is always provisional, and this work is no exception. My aim was to contribute to debates on knowledge production in higher education by re-focussing attention on knowledge forms, and how knowledge production has changed in recent years from a disciplinary perspective. I believe that whilst research impact outside the academic world is desirable, it is equally important and necessary to invest in and protect research that has

impact within a discipline. Research has limitations, it is only one knowledge form and applied research does not make decisions for us. I have demonstrated through the ideas and evidence detailed in this study that instrumentalism, both in the form of 'voice' discourses and economic and social impact, is damaging the development of pure knowledge and restricting academics' freedom to share research findings in applied research. A current area of focus in the UK higher education sector is the need to ensure that the correct balance of research knowledge is produced in universities.

To this end, then, it is important that earlier generations' debates on rigour and relevance in research are considered because utility is merely one criterion in a range of ways to appraise research. Furthermore, to appraise different types of knowledge, that possess different characteristics, a plurality of measures is essential. I argue that a social realist theoretical perspective, such as the work of scholars cited in this study, provide an alternative and helpful model to assist in understanding the complexities of knowledge production currently experienced in British higher education.

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Appendix A

Recruitment email

Subject: What do academic freedom, inter-disciplinary working and impact really mean in [discipline] research?

Dear Colleagues,

Is good research all about "engagement", "impact" and "co-production"? Would you like to discuss these questions and how they relate to your own and colleagues' research? If so, I am looking for researchers at all levels from your subject area to join me in a group discussion this winter.

I'm asking for one hour of your time, on Thursday 15th December 1 - 2 pm at x, (lunch will be provided**). Your views about research methods and knowledge production in *your* discipline will be enormously valuable. They'll add to those of colleagues from other focus groups in applied and pure research areas. I am approaching the discussions as an "interested, but uninitiated enquirer" following the approach of Tony Becher in "Academic Tribes and Territories".**

I'm anticipating that our discussion will focus around three areas:

- **Research methods and whether and how they have changed**

- **Academic freedom, inter-disciplinary working and impact**

- **Whether we should produce research *only* in the context of application.**

I'd like to hear a variety of views and opinions on the topic. I think the discussions will be interesting to everyone taking part, and be a rare opportunity for researchers to get together and talk about their work outside of the usual day-to-day perspective.

If you would like to take part please register using the link below.

…………………………

Further Information

I am an information scientist, working at ScHARR in the Faculty of Medicine at The University of Sheffield. This discussion will inform a mixed-methods study for my Doctorate in Education which is investigating how knowledge is produced in UK Higher Education Institutions; specifically if, and how, modes of knowledge production and research methods are changing.

This study has ethical approval from The University of Sheffield Ethics Committee (School of Education) and the usual conventions of confidentiality and anonymity will apply. An information sheet is attached which provides more details about participating in the study. The study is supervised by Kathryn Ecclestone, Professor of Education.

Reference: Becher, T., & Trowler, P. R. (2001). Academic Tribes and Territories. Buckingham: SRHE and the Open University Press.

Appendix B

Interview schedule

Good afternoon, and thank you for coming to this group discussion. My name is Helen Woods and I will be leading the group today. I'm an information scientist, I work at ScHARR …. I'm also a doctor of education student, researching how knowledge is produced in higher education. I want to know how research is done and how methods are developed in your discipline. I've got a number of questions to put to you. Before we start a couple of important housekeeping points -

Please fill out a consent form to say you are happy to be involved in the project and please take a participant information sheet if you would like one.

I'll be recording us today as I don't want to miss any of your comments. All the data will be stored on a secure drive and no names or other obvious identifying words will be used in my thesis.

I'll be asking questions and listening rather than offering my views, but please feel free to talk to each other. We will finish just before 2pm.

Opening - Could you tell me your name and what your area of research is? (1.10 pm)

Introductory - What's the most exciting piece of research that you've been a part of?

2-3 minute pause (also give them the question before hand to think about)

*Now I am going to ask you some questions about **research methods and your discipline.***

- Do you think that research methods in x have changed over the last 20 years?

    - Do you think that certain types of research methods are less used now in x discipline?

    - What do you think causes methodological change?

- **Think back** to when you began your career as a researcher. Have you used similar research methods or have you changed your way of working?

- **To what extent** are researchers autonomous, or responding to demands from commissioners/government etcetera

Cues: researcher led (disciplinary development) or due to external factors (such as responding to the REF and requirements of funders).

*I now have some questions about **the kind of knowledge we produce in Higher Education** (1.25 pm)*

- **In universities there are workshops and schemes to encourage inter-disciplinary research and other research practices which relate to applied or "impactful" research.**
- I'd like to know what you feel about the presence of these kind of initiatives?

What's your impression of this: give specific examples after discussion has started.

- **There have been a number of stories in the HE press about academic freedom, such as academics being banned from speaking at certain institutions as their views and research are seen to be too controversial. From a research perspective, what do you think of this?**

- Follow up - Do you think this disrupts the way knowledge is produced in your discipline

- Has it ever affected the kind of research you do?

- Does it change your behaviour?

*I am know going to ask you some questions about about **Modes of knowledge production** (1.40 pm) Introduction and document.*

Scholars have been classifying knowledge and processes of knowledge production for millennia. There are numerous models and typologies of knowledge. I'm interested in research knowledge.

More recently, there have been articles and publications that have claimed that we have moved or are moving into a new mode of knowledge production.

Characteristics "created in the context of application" - no "knowledge transfer", transdisciplinary, heterogeneous practice, reflexive - incorporates many views and sensitive to impact - ex ante, also it is judged not just by peers to see if it is good research - but economic, social, political, cultural criteria.

These have been named: mode 2.0, post-finalisation science, post-academic science.

Have a look at this document - Mode 1/2 characteristics

- Something different going on - or business as usual?

- Do you think there is any kind of research we could do now that hasn't already been done?

Extra questions

1. Have a look at this statement, what's your response?
We need disciplinary research, without it all other research is impossible.

2. Do you agree with this statement?
Research can be produced in the context of application in the long term without the disciplinary structure supporting it.

Ending (1.50 pm)

- **All things considered - Do you feel that your discipline is healthy and strong?**

- I will give a short summary of what we've discussed

We have talked about research methods, the nature of knowledge and modes of working.

Is this a reasonable summary?

Have we missed anything?

Thank you.

Appendix C

Transcript accuracy email

Dear …,

I was very pleased to meet you all before Easter. You remember our discussion over lunch on research methods, impact, and knowledge production?

I have attached the transcript from our meeting. Please have a read through it and let me know if there is anything inaccurate in the transcription.

Also, if you feel that there is anything missing from your answers that you would like to add, please email me any additional responses.

If I don't hear back from you by the close of play on Tuesday 2nd May, I'll assume that you have no comments.

I assigned the following to indicate who was speaking:

P1G5 …
P2G5…

It was great to hear your views and experiences and really interesting to hear about ways of working in your different research fields.

Thank you again for participating in the study.

With best wishes
Helen

Appendix D

Stage 2 open code book

EdD Thesis

Nodes\\Phase 2 Generating initial codes (open coding)

Name	Description
Academic Freedom	References to academic freedom to investigate, write or disseminate research and ideas
At the Vanguard	References to comments which refer to research which is at the cutting edge of new knowledge.
Career building	references to activities motivated by self-interest i.e. job security, promotion etc
Career Rank	Specific references to a person's academic position.
Collaboration	References to collaborative research with another person e.g. writing an article together.
Discipline Development conceptual	References to how disciplines develop conceptually as opposed to in practical terms.
Discipline Housing	References to how disciplines interact with other disciplines or where they are housed in University structure.
Diverse practices across discipline	
Enjoying research process	References to participants enjoying research process
Enthusiasm for topic	Refers to instances of researchers showing interest in their research topic.
External Factors	References to external factors influencing research
Identity politics	References to knowledge practices which are subjective. so if you criticise a person's viewpoint, you could be perceived as attacking them. There is no gap.
Importance of setting	References to research carried out or big links with setting outside of the University.
Interaction with	Describes researcher interaction with various types of participant

Name	Description
participants	groups in their research
Internal Attack	Different ways of viewing knowledge in a discipline
Linear Impact	Refers to instances of researcher referring to the impact of their research where it is linear in nature.
MD or ID Research	References to multi-disciplinary or interdisciplinary research practices
Narratives	Refers to different stories researchers have to tell about their research to different audiences.
Navigation	References to experiences of conducting research
NMKP	References to concept of new mode of knowledge production
Personal factors	Effect of academic lifestyle on researchers particularly ECRs, short term contracts etc
Policy	Refers to instances of researchers expressing pleasure that their research would influence policy agenda.
Political	Refers to instances of researchers expressing enthusiasm about their research being sympathetic to their political perspective.
Research Methods Changed	Statements describing how research methods have changed in a particular disciplinary area
Research Methods stay same	References to continuity of particular methods in discipline in question.
Technology	References to the use of technology and how they have changed the research process.
Types of knowledge	References to different types of knowledge
University Impact Schemes	References to initiatives to encourage research impact on society, economy, culture etcetera (not academic impact).

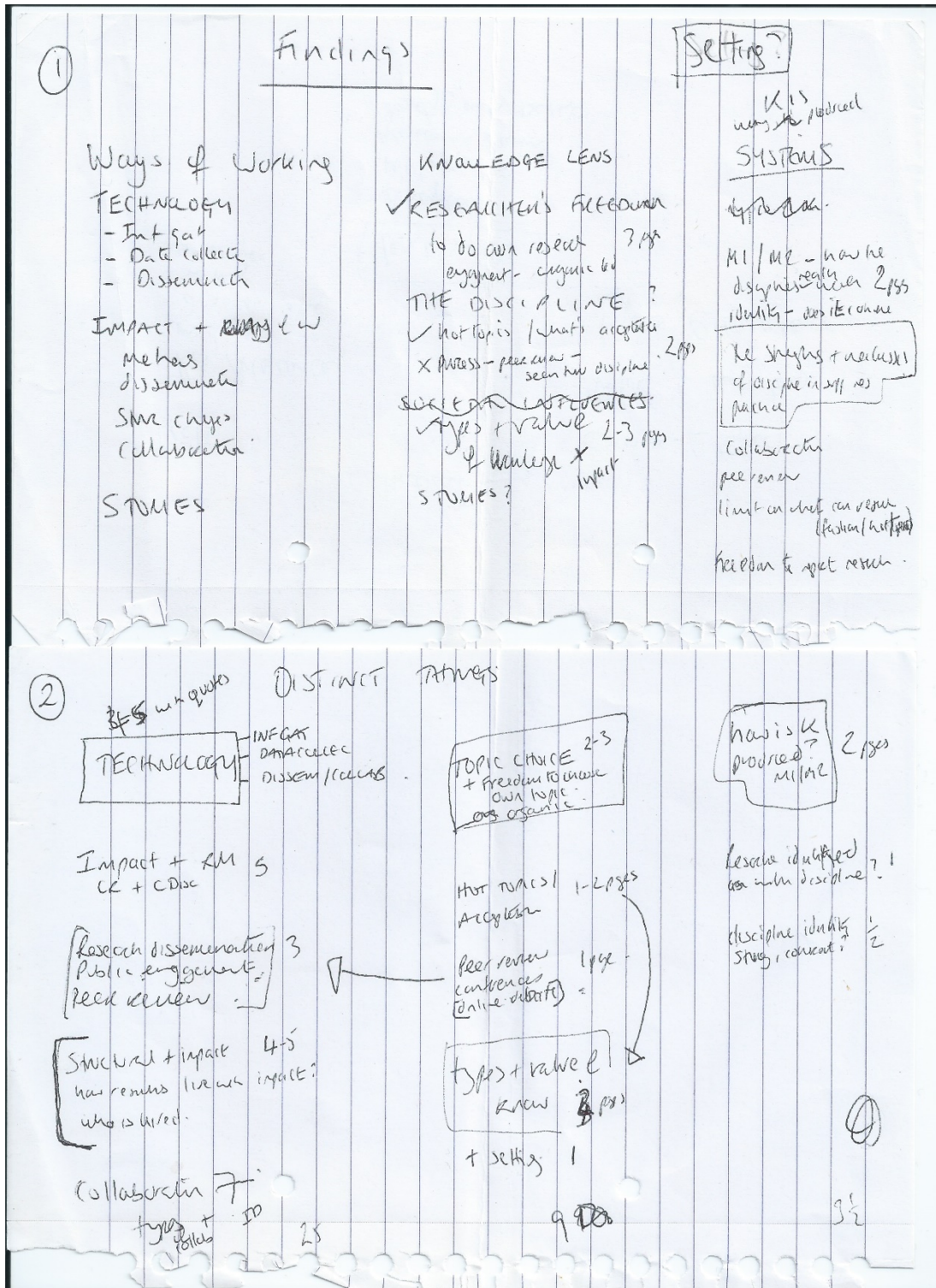*Screenshot stage 3 codes*

	Phase 3 Searching for themes (developing categories)						
	Name	Sources	References	Created On	Created By	Modified On	Modified By
	Discipline as theory	5	82	03/04/2017 18:24	HBW	01/05/2017 15:24	HBW
	Personal Perspectives	5	79	03/04/2017 18:28	HBW	03/04/2017 18:51	HBW
	Academic Freedom	6	33	03/04/2017 18:22	HBW	01/05/2017 15:24	HBW
	Collaboration	4	27	03/04/2017 18:33	HBW	05/04/2017 12:24	HBW
	Technology	3	24	24/03/2017 16:33	HBW	05/04/2017 12:46	HBW
	Research Impact	4	22	03/04/2017 18:37	HBW	05/04/2017 12:37	HBW

Appendix E

Phase 5 themes mind maps

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CHANGES IN RM
Bes Practice   Relationship

- Impact + [RM]
- rubbishing of MI/M2
- INF GATH + DATA COLL
- CROSS RANK + CROSS DISC
- COLLABORATIVE writing
- ☺ Always been collabs
- STRUCTURAL

TYPES AND VALUE OF KNOWLEDGE
+ SETTING
+ HOT TOPICS / ACCEPTABLE
+ MARKET SCHEMES
+ TOPIC CHOICE
+ ③

Changes in K
not completely explant
by impact
also fashion -
culture -
technology -

Everyones got an opinion or.
TRAD + NEW FORMS OF RESEARCH EVALUATION.

Research dissemination
Pub engagement
Peer review
+
Peer review
⊕ 2
Conferences
tech dissemination

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Appendix F

Participant Consent Form

Title of Research Project: Knowledge production in Higher Education: are disciplinary knowledge practices in rude health?

Name of Researcher: Helen Buckley Woods

Participant Identification Number for this project: **Please initial box**

1. I confirm that I have read and understand the information sheet
   dated *[insert date]* explaining the above research project
   and I have had the opportunity to ask questions about the project.

2. I understand that my participation is voluntary and that I am free to withdraw
   at any time without giving any reason and without there being any negative
   consequences. In addition, should I not wish to answer any particular
   question or questions, I am free to decline.

3. I understand that my responses will be kept strictly confidential.
   I give permission for members of the research team to have access to my
   anonymised responses. I understand that my name will not be linked with
   the research materials, and I will not be identified or identifiable in the
   report or reports that result from the research.

5. I agree to take part in the above research project.

_____   _____   _____

Name of Participant   Date   Signature
(*or legal representative*)

_____   _____   _____

 Lead Researcher   Date   Signature
To be signed and dated in presence of the participant

Copies:

Once this has been signed by all parties the participant should receive a copy of the signed and dated participant consent form, the letter/pre-written script/information sheet and any other written information provided to the participants. A copy of the signed and dated consent form should be placed in the project's main record (e.g. a site file), which must be kept in a secure location.

Participant Information Sheet

1. Research Project Title:
Knowledge production in Higher Education: are disciplinary knowledge practices in rude health?

2. Introduction
You are being invited to take part in a research project. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. Thank you for reading this.

3. What is the project's purpose?
This research project is being undertaken as part of a Doctorate of Education qualification for the University of Sheffield. The researcher is investigating how knowledge is produced in Higher Education Institutions, with specific interest in modes of knowledge production and changes in disciplinary knowledge practices (research methods). The project is empirical comprising secondary data analysis and a qualitative data analysis. The results of both phases will be reported, compared and discussed in a thesis which will be submitted to The School of Education. The project will conclude in 2017.

4. Why have I been chosen?
As an active researcher you are the ideal person for me to talk to in order to find out about how research is conducted in your discipline. For example, how you have seen research methodologies and methods develop in your field. There will be four focus groups conducted across the University to reflect a variety of disciplinary practices. The aim is to recruit 10-12 participants for each demographically diverse group e.g. a mix of career length, gender, types of research undertaken.

5. Do I have to take part?
It is your choice to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep (and be asked to sign a consent form) and you can still withdraw at any time without it affecting any benefits that you are entitled to in any way and there will be no penalty for this action. Also, you do not have to give a reason for withdrawing from the project.

6. What will happen to me if I take part?
If you decide to take part you will be invited to attend a focus group which will take place in your department (or as near as possible). A focus group is a group discussion which focuses on a specific set of issues. The group will be for one hour and there will only be one meeting of the group. The Principal Investigator will chair the group, and after each group member introduces themselves, the group will consider a number of questions or statements in order to share their experiences, anecdotes and views. The Chair will facilitate the discussion and the group will be encouraged to talk to each other and respond to each other's contributions.

7. What do I have to do?

Present at the allocated time for the group and participate in the discussion. You will also have to sign a consent form before participating in the group.

8. What are the possible disadvantages and risks of taking part?
There are no disadvantages or major risks foreseen in participating in this research. A participant could feel uncomfortable in talking to the researcher as they are part of the same institution. However all resulting data will be anonymised and kept securely in order to protect the rights of individual participants.

9. What are the possible benefits of taking part?
Whilst there are no immediate benefits for those people participating in the project, it is hoped that they will enjoy the opportunity to discuss the topic with colleagues. It is also hoped that this work will stimulate wider debate on the value of disciplinary knowledge and knowledge practices in Higher Education research.

10. What happens if the research study stops earlier than expected?
In this situation the reason(s) for the research project being abandoned will be explained to the participant.

11. What if something goes wrong?
If you have any complaints about how you have been treated as a participant in this project or want to report any subsequent adverse events which are related to your participation in this project the options are as follows. In the first instance contact the Principal Investigator Helen Buckley Woods (h.b.woods@sheffield.ac.uk) or her supervisor Professor Kathryn Ecclestone (k.ecclestone@sheffield.ac.uk). Should you feel that your complaint has not been handled to your satisfaction please contact Professor Elizabeth Ann Wood (e.a.wood@sheffield.ac.uk) Head of The School of Education who will be able to escalate the complaint through the appropriate channels.

12. Will my taking part in this project be kept confidential?
All the information that I collect about you during the course of the research will be kept strictly confidential. You will not be able to be identified in any reports or publications.

13. What type of information will be sought from me and why is the collection of this information relevant for achieving the research project's objectives?

Your views on how research is conducted and how knowledge is developed in your discipline will be sought. This information is important to meet the project's objectives as it is only through conversations with researchers that I can find out about current research practice and how this has developed in your experience. The disciplines are made up of people and only by talking to them can I learn about their experiences and lived reality of producing research in their field.

14. Will I be recorded, and how will the recorded media be used?
The focus group discussions will be recorded using an encrypted recording device, which will be transferred to a University password protected computer and then deleted from the recording device. The recordings of your activities made during this research will be used only for analysis and for illustration in conference presentations and publications. No other use will be made of them without your written permission, and no one outside the project will be allowed access to the

original recordings. If you withdraw from the project before the data has been analysed then your data will be destroyed, if you withdraw after the analysis (when the data has been anonymised) then it won't be possible to destroy it until after the project has concluded.

15. What will happen to the results of the research project?
The results of the research will be published in a doctoral thesis and made available on the web at the White Rose e-thesis online (WREO) database; this is in addition to the requirement for a hard copy to be submitted to the University Library. It is also anticipated that a peer-reviewed journal article and/or presentation will be produced from the study. Participants or their institution will not be identified in the final thesis or any report or publication.

16. Who is organising and funding the research?
This research is part of a Doctorate of Education Award and the candidate is sponsored by the University of Sheffield.

17. Who has ethically reviewed the project?
This project has been ethically approved via The School of Education's ethics review procedure which administers and applies the University's research ethics policy.

18. Contact for further information
If you wish to obtain further information about the project please contact the Principal Investigator Helen Buckley Woods: h.b.woods@sheffield.ac.uk. School of Health and Related Research (ScHARR), Regent Court, 30 Regent Street, Sheffield S1 4DA, 0114 2222994.
Alternatively please contact the candidate's supervisor: Professor Kathryn Ecclestone (k.ecclestone@sheffield.ac.uk).

All participants will be given a copy of the information sheet and consent form to keep.

Thank you for your interest and participation in this project.