The Experiences of Newly Qualified Sonographers:

A Case Study Design

Rita Phillips

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Faculty of Health and Life Sciences

University of the West of England,

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A doctorate journey is an experience and as such many people have influenced this voyage: from the initial motivation and desire to embark on this venture to the final fruition of delivering this thesis.

Firstly, this thesis is dedicated to my sister who inspired me to follow my instincts and pursue this doctorate, her philosophy was knowledge is forever eternal and when you think that you know all there is to know, the reality is that you have only uncovered a fraction of what there is to know.

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Contents

Figures

Tables

Acronyms and Abbreviations

A and E	Accident and Emergency
AfC	Agenda for Change
AQP	Any Qualified Provider
BMUS	British Medical Ultrasound Society
BSE	British Society of Echocardiography
CASE	Consortium for the Accreditation of Sonographic Education
CfWI	Centre of Workforce Intelligence
CHRE	Council for Healthcare Regulatory Excellence
CMU	Certificate of Medical Ultrasound
CoP	Communities of Practice
CoR	College of Radiographers
CPD	Continuous Professional Development
CT	Computerised Tomography
CTG	Cardiotocograph
DH	Department of Health
DMU	Diploma of Medical Ultrasound
DoL	Division of Labour
DXA (DEXA)	Dual (Energy) X-ray Absorptiometry
EPAC/EPU	Early Pregnancy Assessment Clinic/Unit
ESRC	The Economic and Social Research Council

GafRec	Governance Arrangements for Research Ethics Committees
GMC	General Medical Council
GP	General Practitioner
HCPC	Health and Care Professions Council
HEE	Health Education England
HEI	Higher Education Institution
HyCoSy	Hystero-Contrast Sonography
IPEM	Institute of Physics and Engineering in Medicine
LPP	Legitimate Peripheral Participation
MRI	Magnetic Resonance Imaging
MSc	Master of Science
MSC	Modernising Scientific Careers
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
NMC	Nursing and Midwifery Council
NSC	National Screening Committee
PCT	Primary Care Trust
PGC	Post Graduate Certificate
PGD	Post Graduate Diploma
PTP	Practitioner Training Programme
PVRS	Public Voluntary Register of Sonographers
RCM	Royal College of Midwives

RCN	Royal College of Nursing
RCOG	Royal College of Obstetricians and Gynaecologists
RCR	Royal College of Radiologists
SpR	Specialist Registrar
SCoR	Society and College of Radiographers
STP	Scientist Training Programme
SVT	Society of Vascular Technology of Great Britain and Ireland
UKAS	United Kingdom Association of Sonographers
UKCC	United Kingdom Central Council for Nursing, Midwifery and Health Visiting
UWE	University of the West of England
WRMSD	Work Related Musculo-Skeletal Disorders

Abstract:

Over the last two decades, ultrasound imaging and practice has undergone a significant transformation shaped by cultural, sociological, technological and educational influences. The continual rise in the demand for ultrasound services has had several reverberations and ramifications for the dynamics, constitution and wellbeing of the sonography workforce. Moreover, the adoption of ultrasound technology by various professionals has resulted in professional fission and fusion with both vertical and horizontal substitution within this heterogeneous workforce. It is against this backdrop that newly qualified sonographers enter the workforce. One under-researched area is an understanding of the experiences of these newest members of this multi-disciplinary workforce.

A case study methodology was utilised to explore the experiences of newly qualified sonographers in their first year of ultrasound practice. The newly qualified sonographers were participants from a small cohort of postgraduate students from a multi-disciplinary background and located at a specific higher education institution. Using a thematic framework, the data collected from interviews and work logs from eleven participants was analysed. A conceptual framework was initially developed to guide this research from three main dimensions namely individual, organisational and professional. The findings of the research were then embedded into this conceptual framework to identify issues that impact on the experiences of newly qualified sonographers. Three main overarching themes from eight subthemes were identified, including transition, role development and maintaining competency and credibility. The knowledge and understanding generated has broader benefits not only for the individual professional but also for ultrasound educational curricula, individual organisations and professional bodies.

For higher education institutions, there are areas identified that could be incorporated in the curriculum to improve the preparedness of newly qualified sonographers to practise. For organisations, the experiences of newly qualified sonographers can be improved by developing specific preceptorship programmes in the initial period of transition whilst drawing upon theories such as cognitive apprenticeship and situated learning to facilitate role development after qualification.

To support a multidisciplinary ultrasound workforce, the fostering of communities of practice should be encouraged as a social learning environment to facilitate knowledge exchange and maintaining competencies and credibility.

Professional bodies should promote strategies to support future roles and career development of sonographers to create a greater sense of professional pride, belonging and security whilst supporting both uni-professional and cross-boundary ultrasound working

Chapter 1: Introduction to the Thesis

1.1 Introduction

Ultrasound is a diagnostic imaging modality which uses non-ionising radiation. The health care professional who utilises ultrasound is commonly known as a sonographer or ultrasonographer. The term “sonographer” is derived from the Latin word for (ultra)sound —“*sonos*” — and “*grapher*”, defined as a person who writes about, records or is skilled in a subject (Collins English Dictionary, 2014). Sonographers employ sophisticated ultrasound equipment to acquire, generate, and optimise a diagnostic image. They are also required to interpret ultrasound images to formulate a diagnosis or differential diagnosis and aid effective and timely patient management (College of Radiographers (CoR), 2009). In addition, skills such as good hand-eye co-ordination, manual dexterity, spatial awareness and pattern recognition and critical thinking are also recognised as essential for competent practice (Wise, 2008; Phillips and Stocksley, 2006; Baun 2004).

Over the last two decades, in the United Kingdom (UK), there have been various changes within this imaging speciality shaped by political, cultural, sociological, technological and educational influences. Due to the easy availability and increased access to this technology, ultrasound has been hailed the new stethoscope of modern medicine (Wittenberg, 2014; Choi, 2008). However it now proves to be a victim of its own success with continual year on year rise in demand for these services. The Department of Health (DH) reports that the demand for ultrasound examinations has grown significantly in recent years (DH, 2014), without a reciprocal increase in the number of sonographers (Shortage of Occupation List, 2014). Consequently, this has had several reverberations and ramifications for the dynamics, constitution and wellbeing of the ultrasound workforce. These include stress caused by several factors, such as increased workloads, staff shortages, compassion fatigue, job dissatisfaction and work-related musculoskeletal disorders (CoR, 2009, 2009a; Walvoord, 2006). Recruitment and retention of sonographers is paramount for ultrasound departments in the National Health Service (NHS) if demands are to be met, and

for health services to be delivered efficiently. It is acknowledged that even after successfully completing extensive and rigorous programmes of study in accordance with the requirements of the associated profession, the early months of practice for new practitioners are a vulnerable time and are often associated with high levels of anxiety, mistakes, complaints and attrition (Whitehead, 2013; DH, 2010). To ensure that the future sonographic workforce is supported, nurtured and retained, it is important to understand how newly qualified sonographers negotiate their way through this multifaceted area of health care provision.

This thesis presents a case study that explores the experiences of newly qualified sonographers from multi-professional backgrounds within the context of the current NHS. In particular, it focuses on their experiences, perceptions and attitudes as well as clinical and professional aspects of their practice. This introductory chapter will give a brief overview of the key issues that have influenced this study. This section begins by presenting the rationale for this study based on my personal experiences in this field as well the current contextual setting for ultrasound education and practice in the UK. An outline of the structure of the thesis will also be presented.

1.2 Rationale for study

This study was prompted by my personal concerns regarding the challenges currently facing the newly qualified sonography workforce. These have the potential to impact on both the emotional wellbeing of individuals and their professional roles and morale. In my professional roles over the last twenty-five years, I have made several career transitions, including one from student radiographer moving from an educational environment to an NHS health care environment as a qualified radiographer. Further changes occurred in my career as I qualified as a sonographer two years later and subsequently progressed to an advanced practitioner in sonography. Over the latter fourteen years, I have also made a career change from a clinical practitioner to a newcomer in academia and gradually into an established academic. Transitional experiences stay with us all our lives, both the good ones and not so good. My own experiences in the field of ultrasound practice have fuelled and contributed to this research. Although my professional title is “radiographer”, I did not pursue any opportunities to

consolidate my radiography skills after qualification. Within two years of qualifying as a radiographer, I undertook the Diploma in Medical Ultrasound (DMU) in the subspecialty of ultrasound and embarked on a career in ultrasound imaging. The focus of my ultrasound training at that time was on technical skills and producing optimum diagnostic images that were interpreted by radiologists. I was taught to 'do' rather than to think. As the scope of practice advanced in my profession, so did my professional role: I developed cognitive and more importantly communication skills “on the job” through experiential and reflective learning. As I recall my own experience as a newly qualified sonographer, the working environment was different: sonographers were neatly placed professionally, organisationally and socio-culturally under the sole domain of the profession of radiography (Baker, 2005). Ultrasound scans were utilised as a complementary modality, and mainly limited to the field of general medicine, obstetrics and vascular medicine. Ultrasound technology was less sophisticated than nowadays, bulky and consequently only housed in dedicated radiology departments, and there were very few other health care professionals at that time using this imaging modality. “Ownership” of this technology was definitely within the domain of radiologists and radiographers, with a few self-taught obstetricians who were utilising this technology and scanned occasionally.

The landscape for the scope of practice for sonographers has evolved since then. Indeed, the role of ultrasound imaging in health care provision has transformed, and the modern ultrasound workforce is continually facing opportunities as well as challenges to maintain equilibrium. Ultrasound services are now an integral part of the patient pathway and newly qualified sonographers emerge from a variety of professional backgrounds (CoR, 2009; Aitken, 2005). They are also expected to “hit the ground running”, to work autonomously with their own workloads and perform with high levels of accountability and responsibility (Edwards, 2006).Sonographers are also required to exercise critical judgement and skills to ensure the efficient, effective and safe delivery of the ultrasound service (Baun 2004). Therefore, responsibility for the conduct, assessment, interpretation, diagnosis and production of a final report of the ultrasound examination lies squarely on their shoulders.

This thesis has provided the opportunity to have a better understanding of how newly qualified sonographers from multidisciplinary backgrounds negotiate their way after qualification in their first year of practice. Firstly, it gives the opportunity to give voice to the newest members of this multidisciplinary workforce, by focussing on what Ball *et al.* (2002) termed as the most 'vulnerable' members of any profession. Secondly, the knowledge and understanding generated has broader benefits for the profession, for example by informing the development of educational curricula and by prompting policy changes and implications for individual organisations as well as professional bodies. To date, there has been no other study in the UK directly concerned with exploring the experiences of newly qualified sonographers.

1.3 Context of the study

1.3.1 Medical ultrasound education

At present, there is no direct entry route to ultrasound education in the UK. Therefore, the only access to formal ultrasound education is via a postgraduate route. This postgraduate pathway has evolved over the years. In 1977, CoR introduced postgraduate qualifications for health care professionals which included the Diploma in Medical Ultrasound (DMU) for radiographers and a Certificate in Medical Ultrasound (CMU) for practitioners from other backgrounds. This educational programme was subsequently replaced in the early 1990s by a postgraduate higher education institution (HEI) based qualification. To ensure standardisation and the promotion of ultrasound education development across all disciplines, a Consortium for the Accreditation of Sonographic Education (CASE) was formed in 1993. This consortium consists of representatives from a number of organisations, including the British Medical Ultrasound Society (BMUS), the British Society of Echocardiography (BSE), the Society of Vascular Technology of Great Britain and Ireland (SVT), the Institute of Physics and Engineering in Medicine (IPEM) and the CoR, and thus reflects the multidisciplinary nature of ultrasound practice in the UK. CASE accredited programmes are valued worldwide. The main aim of this consortium was at that time and still remains to oversee the provision of sonography education by HEIs and to ensure that on successful completion of a period of learning, which includes theoretical and

clinical elements of the training and assessments (see Appendix 1), the exiting students are clinically competent to undertake ultrasound examinations autonomously and are prepared to be professionally responsible for their own caseload.

The minimum qualification to practise ultrasound in the UK has been specified by bodies such as the CoR, (2009), the National Screening Committee (NSC, 2008), and the CASE (2009) as a Postgraduate Certificate (PGC) in ultrasound. A PGC is awarded once the student completes a core module on ultrasound technology and one other specific professional practice module: for example obstetrics, general medicine or gynaecology. The student can then expand the breadth and depth of their ultrasound knowledge by taking on other specific professional practice modules to progress to a Postgraduate Diploma (PGD), and after a dissertation, to be awarded a Master's degree (MSc). Once the student has successfully completed the required course of study, they will be employed in an healthcare institution for example the NHS or an independent health care provider , usually by the sponsoring organisation that funded their ultrasound education; therefore, the clinical practice setting for each student will be different and will consist of both teaching and district general hospitals. In addition, depending on their primary professional health care backgrounds, the departments within the NHS organisation where the students are employed will also vary. Although there is some homogeneity in the clinical roles within the practice of ultrasound, there is no "standardisation" in their roles and responsibilities, nor in their local or professional guidelines. This implies that the contextual issues influencing each practitioner's practice are significant.

1.3.2 Developing clinical competency

Although there are no definite hours of clinical practice stipulated, the CASE Handbook (2009) recommends that students should engage in supervised clinical practice for the entire duration of the learning period, with a minimum of fourteen hours per week per module. The clinical skills are developed in the hospital environment with the support of a nominated mentor. The mentors are usually experienced ultrasound practitioners in the placements and are responsible for the delivery, integration and quality of the clinical learning episodes. They are also

required to ensure that these learning experiences complement the theoretical knowledge acquired at the university (ibid). In the continuum from a novice stage to a competent practitioner stage, the novice is required to develop ultrasound competency and build up a basic library of experience by scanning under supervision. Progression is monitored through regular meetings and action plans with a mentor, who keeps a logbook of experience. The final summative clinical assessments are undertaken using a criterion-referenced assessment documentation adapted by Phillips *et al.* (2001) employing the occupational standards originally developed by Prime *et al*. (2000;1999), where a pass is the minimum standard to show achievement of the requisite level of competency. However, a recent newsletter by CASE (2014) reported problems faced by ultrasound departments in supporting students, given the current climate of staff shortage. The main issues highlighted were that students, once released for academic study, found it difficult to obtain enough clinical practice, and many HEI ultrasound programme leaders voiced concern about the variation in the quality of mentorship and support given to students in their clinical departments. Therefore, it can be seen that the teaching and consolidation of clinical skills is dependent on the engagement of the individual organisations and the experience of the mentor, and this may result in a disparity of skills, practice and competence between different organisations and between students.

1.3.3 Scope of practice in ultrasound

Ultrasound services are multidisciplinary and multi-professional in nature and include a range of examinations which play an essential role in the screening, diagnosis and management of patients in primary, secondary and tertiary care settings (Edwards, 2010; Cantin and Richards, 2007; Aitken 2005). The scope of practice in the UK for sonographers specified by CoR (2009) as a first post competency includes image interpretation, formulating a diagnosis/differential diagnosis, clinical problem solving and report writing. This includes referral for further diagnostic tests or treatment if required based on their interpretations of the scan. Some practice settings require the sonographer to work single-handedly—for example, community-based services—and some within a multi-disciplinary team within a hospital. These include outpatient services, emergency care and

“one-stop clinics” (CoR, 2009). The NHS endorsed a career progression framework (four-tier model) to develop practice standards, promote new roles and improve recruitment and retention by widening routes of access to clinical careers in radiography (DH, 2003). The four tiers of practice include assistant practitioner, practitioner, advanced practitioner and consultant practitioner (CoR, 2005). Although there is evidence to suggest that this model has been implemented successfully in other fields of radiography (Price and Le Masurier, 2007; CoR, 2005a), the role of an assistant practitioner in ultrasound is limited and confined to examinations that only include single organ measurements, such as aortic aneurysm screening (CoR, 2012). Furthermore, the concept of a practitioner level sonographer is not apparent at the present time in the UK for various reasons, the main one being the nonexistence of direct entry into a BSc (Hons) programme. The clinical practice environment in the UK for sonographers is mostly at an advanced level (Price and Le Masurier, 2007) with a few posts at consultant practitioner level (Cantin and Richards, 2007). In the advanced practitioner role, some sonographers work with a radiologist who provides second opinions for complex or difficult examinations. Others work even more autonomously, as consultant sonographers (Cantin and Richards, 2007). The last few years have seen innovative service delivery developments that have opened up further opportunities for sonographers to develop and extend their scope of practice by learning to perform complex and technically demanding minimally invasive and interventional diagnostic and therapeutic procedures previously performed by doctors. These include Hystero-Contrast Sonography (HyCoSy), steroid joint injections, ultrasound guided biopsies, parenthesis and amniocentesis (Hart and Dixon, 2008; Price and Le Masurier, 2007; Pallan *et al.,* 2005).

Whilst this configuration of the workforce provides pathways for sonographers to take on increasingly advanced roles and has been shown to improve the cost/benefit analysis for medical imaging services in the NHS (Hunt, 2005; Pallan *et al.,* 2005), there is a distinct lack of qualitative data that explores how newly qualified sonographic workforce adapts to this challenging environment and develops skills for advanced practice.

1.3.4 Developing the ultrasound workforce

The biggest problem faced by ultrasound departments is that of recruitment and retention of sonographers. There is a UK-wide shortage of sonographers that is leading to severe difficulties for many NHS Trusts and Health Boards in meeting increasing demands and government targets (NHS workforce review team, 2009; NSC, 2008; National Institute for Health and Care Excellence (NICE, 2007). This is not a new problem and has been repeatedly highlighted over the last decade; however, it is becoming more acute as demand grows (CoR, 2014, 2011; DH, 2007; Bates *et al*., 2003). Recent statistics from the DH in 2014 have shown a year-on-year growth in diagnostic imaging activity in England, with an increase of over 15 million examinations (30 per cent) in the last two decades. (Figure1)

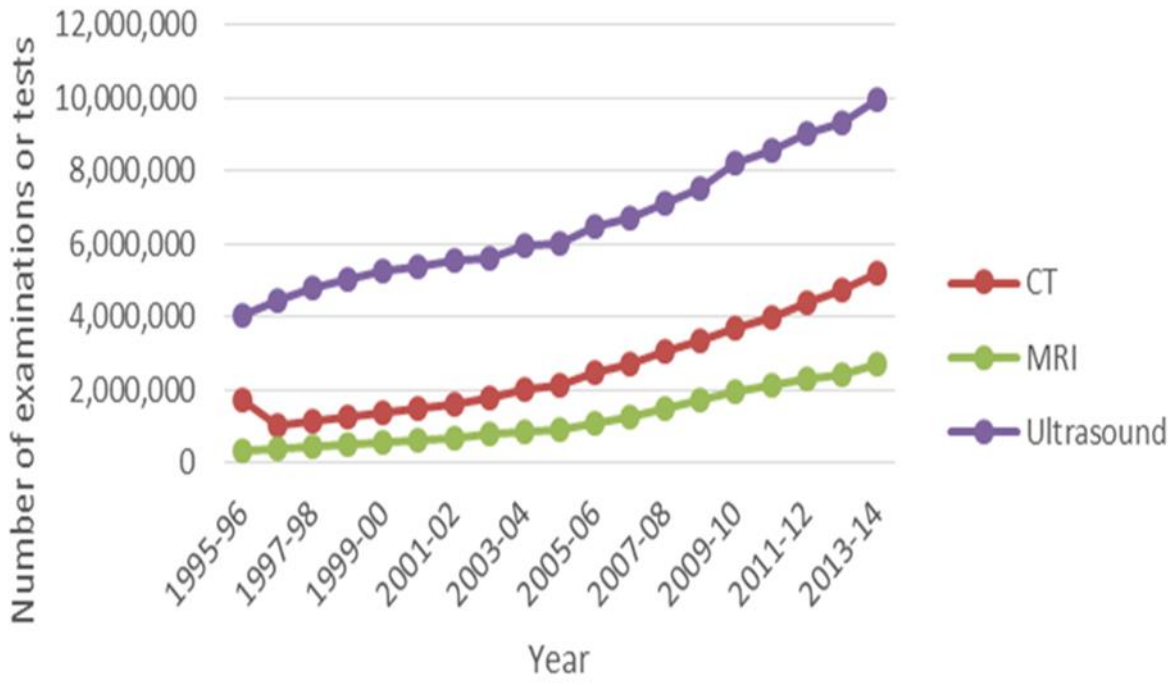

Figure 1: Growth in the number of Ultrasound, CT and MRI Imaging examinations in England 1995 to 2013-14 (DH 2014).Used under the terms of the Open Government Licence (OGL) for public sector information.

An ultrasound workforce survey conducted by CoR in 2011 to investigate the staffing levels of ultrasound departments in the UK showed that a third of departments experiencing unfilled vacancies. The findings of this survey echoed

those from an earlier study conducted by Lovegrove and Price in 2002. This project comprised of a multi-method approach utilising questionnaires, telephone interviews, workshops and an analysis of course documentation. This research explored the issue of recruitment, training and retention of clinical sonographers in England. They found that ultrasound service provision was affected adversely by staff shortages in many departments. Problems cited for successful recruitment of suitably trained professionals included lack of training funding, retention of staff, and increasing demand for ultrasound diagnostic services. Departments were employing agency staff to retain the level of service provision and there were difficulties in attracting students to train in ultrasound and/or lack of resources to offer training. Given this crisis in the sonographic workforce, the CoR concluded that a national impetus and action is required to put into effect a multi-dimensional approach to increase the ultrasound workforce. One of the strategies suggested was to widen access of ultrasound education to a larger range of Health Care Professionals by developing and accrediting short 'focused' ultrasound courses in HEIs (CoR, 2009a). Employers, Strategic Health Authorities and Commissioners were encouraged to fund accredited short 'focused' ultrasound courses. Consequently, the popularity of focused ultrasound courses is growing, and these courses are now accessed by professionals such as medical consultants, Specialist Registrars (SpRs), General Practitioners (GPs), midwives, nurses, physiotherapists, chiropractors and vascular scientists (CASE newsletter, 2012). Evidence indicates that ultrasound can be used as a diagnostic, surveillance or monitoring tool as well as a complementary tool, and ultrasound practitioners generally fall into two clusters: those who use ultrasound techniques as an additional tool in their practice and who require only relevant and selected parts of the body of knowledge (for example, midwives), and others who use ultrasound as a primary imaging modality in their daily work—in other words, as a fundamental part of their profession for example, radiographers or clinical scientists (Edwards, 2010; CoR, 2009; Aitken, 2005). Even with these initiatives to increase the workforce, a recent survey (CoR, 2014) revealed that the sonographer vacancy rate across the responding departments was 18.1per cent. This compared to a vacancy rate of 10.9 per cent in the 2011 survey. The main reason for the shortage is an inability to recruit suitable applicants. To maintain service provision, the survey showed that 30 per cent of the responding departments employed

agency or locum sonographers regularly (on more than ten days per month), with 65 per cent of sonographers working additional hours on at least one day a month. Moreover, the CoR (2014) survey found that 54 per cent of the departments were waiting for their student sonographers to qualify in order to bridge this workforce gap. Therefore, given these statistics, the burden placed on a newly qualified workforce is considerable. It is vital that newly qualified sonographers are integrated, supported and nurtured appropriately to cope with these demands.

Despite ultrasound practice being one of the mainstays of modern imaging diagnostics, there is an absence of accurate data for the current number of practising sonographers in the UK. The main reason for this is the lack of a formal regulatory register. Furthermore, there is no unique employment code that identifies a sonographer from other professions, such as radiography or midwifery, as sonographers use many different titles (Thompson and Paterson, 2014). Work is currently underway by the Health Education England (HEE) and the DH who has commissioned the Centre for Workforce Intelligence (CfWI) to provide evidence that will support HEE and NHS England in their ultrasound workforce planning. Personal communication with the Chair of CASE provided approximate numbers of students enrolled in HEI institutions in the UK undertaking ultrasound education (Figure 2). However, it is also important to note that this information does not necessarily reflect an accurate picture as not all HEIs provided data on the professional background of their students, and this data did not include students undertaking focused courses. Nevertheless, the data presented below does offer a representation of the multi-professional constitution of sonography workforce in the UK and therefore, it can be seen that ultrasound practitioners are no longer from a homogenous professional group.

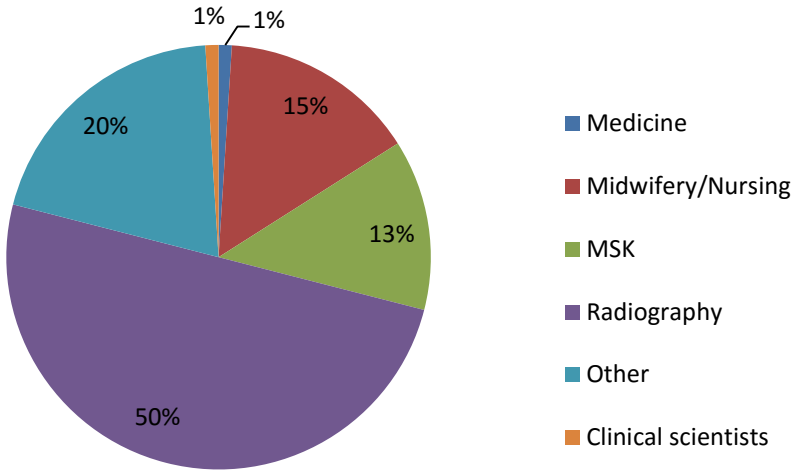

Figure 2: Background of Ultrasound students in the UK (2013-2014)

1.4 Structure of the thesis

This doctoral thesis utilised a case study methodology and was undertaken at a UK Higher Educational Institution. This introductory chapter has presented the background and context of ultrasound education, the scope of ultrasound practice, and the multidisciplinary nature of the workforce in the UK. The challenges faced by ultrasound departments in meeting the demands for ultrasound services have also been highlighted.

Chapter two explores the literature which is relevant to a number of areas that inform and underpin the main research aim and questions and is presented in two parts. The first part includes a review of the historical and sociological aspects of the evolution of medical ultrasound technology and practice; the growth of the demand for ultrasound services and the impact this has had on professional boundaries, workforce planning and dynamics. In the absence of comparable studies in this particular field, the second part of the literature review will explore literature relating to the experiences of newly qualified professionals from other professions and as such will be drawn on to inform the discussion chapter.

Chapter three focuses upon methodology and includes personal, professional and philosophical underpinnings that influenced the choice of the methodology, the selection of the case, the institutional context of the case study participants, data

collection methods and analysis. Ethical issues and the rigour and trustworthiness of the research will also be considered. The impact of my position within this research is offered in terms of reflexivity and reflections.

Chapter four begins by providing an overview of the case and relevant demographical information about the participants. The experiences of the participants will be narrated by incorporating extracts from data collected, including interviews and work logs. The findings will be described under the three main overarching themes and the subthemes that were identified and developed using a thematic analysis framework.

Chapter five presents a discussion about the relevance and significance of the findings in relation to the literature review and current theories. It will also focus on the extent to which the main research aim and questions have been answered, with recommendations where possible in relation to the ultrasound workforce.

Finally, chapter six concludes by presenting my personal reflective accounts of the research journey, including the methodological strengths and limitations, and personal challenges. The research aim and questions will be visited again to highlight contribution and the implications of this research in the wider professional context with recommendations for future research.

Chapter 2: Literature Review

2.1 Introduction to literature review

This chapter will be presented in two parts, the first part reviews the literature regarding the evolution of medical imaging technology within healthcare, the clinical and sociological aspects of the practice of ultrasound, the impact of this has had on professional boundaries, the dynamics of workforce planning and regulation. As the scope of practice in ultrasound varies between countries, only research that explored the education, practice and regulation in the UK was considered. Government reports and documents from the professional bodies were reviewed for information on relevant policies and statistical information.

The second part of the literature review explores the evidence regarding experiences of newly qualified health care professionals. In the notable paucity of a suitable body of knowledge specifically relevant to the experiences of newly qualified sonographers in the UK, literature from other professional groups that align with the practice of sonography such as nursing, midwifery and allied health professions were drawn on to inform this study. Relevant studies outside the UK are also reviewed to make connections and guide this study.

2.2 The search strategy

2.2.1 Databases

The literature was accessed via Ovid, EBSCO and PROQUEST. Table 1 shows the databases that were accessed via these publishers and the main topics explored. These databases were chosen due to the wealth of available citations which use the English language and focus on health and social care. This wide-range coverage allowed a complete systematic search of articles related to the research area. In addition, key journals relating to specific fields of practice for example allied health professions, nursing and midwifery, medicine and education were also searched electronically and manually. (See Appendix 2).

Also searched were the Cochrane Library and the National Institute for Health and Clinical Excellence (NICE).

Table 1: Databases accessed and the main topics searched.

Publisher	Databases	Topics explored across all databases
Ovid	EMBASE MEDLINE, Maternity and Infant Care, Social Policy and Practice	• History of ultrasound practice • Sociology of ultrasound practice • Defensive medicine • Scope of practice in sonography • Work related musculoskeletal disorders • Inter-professional working • Cross boundary working • Technological impact in health care • Regulation of sonographers • Experience of newly qualified health care professionals • Transition • Preceptorship
EBCSO	AMED PSYCOINFO, CINAHL, MEDLINE, RILM, SPORTDISCUS	
PROQUEST	ASSIA, British Nursing Index, Social services Abstracts, IBSS	

2.2.2 Methodology for the literature search

Key words, and Boolean operators, such as AND, NOT were used to combine keywords to narrow the search; whilst other Boolean operator such as “OR” was incorporated to expand the search using relevant synonyms, for example ‘newly qualified” or “neophyte”, or “‘new graduate” to broaden the search. Further key words were added into the search process based on the findings of the retrieved studies for example “experiences”, “orientation”, “preceptorship” and “mentorship” and “transition. Truncation was then used to ensure that all relevant literature was retrieved for example “Sono*” As the literature review evolved, phrases that were prominent in the literature were also incorporated to narrow the search for example “reality shock”, ‘support in transition’. National and international articles

that were deemed relevant were included. Snowballing strategy was also incorporated where relevant articles were found, the references cited were searched and the subject headings used to describe the subject content were identified and another search using these terms was conducted. To ensure rigour, the review was conducted systematically, the initial results from the database searches were screened using the title and abstract. Further data reduction was carried out by excluding any duplications, using inclusion and exclusion criteria and only reviewing studies published in the English language. The literature search initially focused on studies published from 2000-2015 although some seminal or influential works predating this period were also reviewed if they were deemed to be pioneering or had historical relevance to this thesis. The literature was then appraised critically. Although this process focussed mainly on primary studies and systematic reviews, where there was an absence of suitable literature, published reviews that presented a perspective on a topic or explored the relevance of a concept of practice to sonography were also included. The database search was updated before the analysis phase and the final write up phase.

2.3 Evolution of medical imaging technology

Medicine in the eighteenth century was described by Ackerknecht (1967) as “library medicine” whereby diagnosis was mainly conducted by doctors through exploring patients’ own perceptions and knowledge. By the late eighteenth century, the focus had moved from observation of symptoms to information generated by studying cadavers, effecting a reorganisation of medical knowledge (Good and Del Vecchio-Good, 1993). In 1816, a new medical technology in the shape of the stethoscope enabled doctors to “look” inside the patient. With further developments in visualisation technology, such as X-rays and blood tests, medicine was shifted into the laboratory and, as Armstrong (1995) observed, doctors no longer relied on patients’ perceptions and the concept of “hospital medicine” was born. Armstrong (ibid) argued that the patient no longer had to have symptoms or visible observations, and the defining boundaries between the expert and the generalist were blurring. Over the past twenty years, a major shift has occurred in the configuration and goals of medicine, in which technical innovations

have reshaped the contours of practice (Clarke *et al*., 2010; 2003). Manifestations of Foucault's medical gaze (1973) are most apparent in the field of medical diagnosis, with further modern technological inventions such as Ultrasound, Magnetic Resonance Imaging (MRI) and Computerised Tomography (CT) allowing for "visual" diagnostics.

2.3.1 Ultrasound as the modern stethoscope

Sonics was originally developed for detecting icebergs after the sinking of the Titanic, and expanded into naval warfare during World War I, with later applications in the manufacturing of metals (Yoxen, 1987). The application of ultrasound in medicine began in the 1950s, first in the obstetrics field and subsequently in other fields of medicine. As the hazards of x-rays became known (Caufield, 1989), a convincing body of knowledge emerged that compared ultrasound technology and diagnoses to more conventional methods and tests such as x-rays, clinical examinations and blood tests and concluded that this modality has several advantages in terms of comparable or superior diagnostic value, safety due to the absence of ionising radiation and ease of availability (Joyce, 2005; Fleisher, 2000; Nelson and Pretorius, 1997). Subsequently, over the last two decades, the popularity of medical ultrasound has increased, with further technological developments and applications (Sippel *et al*., 2011; Lysdahl *et al*., 2010). Ultrasound scans are cheaper and more readily available than other modalities such as MRI and CT; furthermore, the results are available instantly, with interpretation usually being done at the time of the examination, with the operator making the diagnoses. Therefore it is not surprising that ultrasound has been readily adopted in modern medicine, with several authors hailing it as the new stethoscope (Wittenberg, 2014; Choi, 2008).

Several other influential drivers brought this modality into the frontline diagnostic services: for example, new national protocols relating to obstetric care, gynaecological surveillance, cancer care, vascular diseases and stroke management (NICE, 2014, 2014a; 2013; 2013a; 2013b; 2012;2012a; 2011,2007),coupled with increased clinical value, patient demand, income generation for hospitals and, following the 'NHS Next Stage Review', and the

imperative to provide for services to be delivered in primary care (DH, 2008; Joyce, 2005; Bates *et al*., 2003).

Another possible reason reported by several authors is the practice rise of so-called defensive medicine (Ortashi *et al*., 2013; Studdert, 2005; Summerton, 2000, 1995). Positive defensive medicine, also referred to as assurance behaviour is described by the above authors as providing services of no medical value with the aim of reducing adverse outcomes, or persuading the legal system that the standard of care was met, for example ordering tests, referring patients, increased follow up and prescribing unnecessary drugs. The prevalence of defensive medicine is reported to be highly prevalent among physicians in the USA as evidenced by Studdert *et al.* (2005). However, this practice is also found to be prevalent in the UK (Ortashi *et al*., 2013; Summerton, 2000, 1995). A quantitative study by Ortashi *et al*. (2013) explored the prevalence of defensive medicine using a seventeen point questionnaire. They collected data from three hundred doctors from three UK hospitals and sought demographic data such as age, gender, specialty and grade as well as awareness about, and personal use of different aspects of defensive medical practice. Two hundred and four (68 per cent) out of three hundred hospital doctors responded to this survey. They found that 78 per cent of the responding doctors reported practising defensive medicine, 59 per cent of these respondents admitted to ordering unnecessary tests, and 55 per cent of these to unnecessary referrals. Whilst the authors acknowledged that the data collected was limited to only three hospitals sites and therefore cannot be generalised to the whole of the UK, they still concluded that although the NHS in the UK has been working hard for many years to create a blame free culture, their results highlighted that this far from being a reality, with 86 per cent of the doctors in this study believing they are not working in such culture. In other words, diagnostic testing, consultations and imaging studies were requested due to a fear of litigation among all doctors. These findings were echoed by two previous studies conducted in the UK by Summerton in 2000 and 1995, who investigated the prevalence of defensive medicine amongst General Practitioners (GPs).The results of the earlier study in 1995 indicated that out of three hundred GPs, two hundred and ninety four (98 per cent) claimed to have made some practice changes as a result of the possibility of a patient complaining. Of the defensive

medical practices adopted, the most common (with over half of doctors stating that they were likely or very likely to use them) were found to be diagnostic testing, referrals and follow-up. He then re-examined defensive medical practice amongst three hundred and thirty nine GPs in 2000 using the same methodology and the same questions that were initially used in his earlier survey about the likelihood of certain practice changes in response to the possibility of patients complaining and the risk of litigation. The aim of the second study was to highlight any significant changes over the five years. The results of these two surveys showed that the unnecessary referral rates had increased from 63.8 per cent to 72.7 per cent, the unnecessary follow up of patients had increased from 63.4 per cent to 68.4 per cent and unwarranted diagnostic testing had increased from 59.6 per cent to 69.5 per cent. The author therefore concluded that the prevalence of defensive medicine had increased over these five years and GPs were significantly more likely to undertake diagnostic testing, follow up and refer patients to avoid patient complaints and litigation.

This increase in the demand for ultrasound services has been reported by several studies as having an adverse impact on the workforce in terms of Work-Related Musculo-Skeletal Disorders (WRMSD) and “burnout”. WRMSD prevalence rates in excess of 80 per cent have been reported for sonographers in the literature (CoR, 2009, 2009a; Dodd-Hughes, 2008; Walvoord, 2006; Brown and Baker, 2004).Specific aspects of sonography work that are associated with WRMSD have been identified. These include inadequate ultrasound ergonomic designs resulting in awkward scanning positions adopted by sonographers, repetitive movements, prolonged pinch gripping of the ultrasound transducer; and insufficient recovery time between episodes of injury (Morton and Deft, 2008; Village and Trask, 2007).

A study conducted in the UK by Dodd-Hughes (2008) found evidence that as well as physical factors mentioned above, certain work organisational factors were also associated with musculoskeletal problems. The sonographers in her study were required to complete a self-administered questionnaire in order to analyse the ergonomic risk factors for WRMSDs. The results showed that 95 per cent of the respondents (*n*=155) experienced musculoskeletal discomfort within the past 3 months of completing the questionnaire and 75.5 per cent of this group believed that their job was the main cause of this discomfort. Work organisational

influences such as demand, control and role also featured highly as contributing factors with 35.3 per cent of the respondents reporting the inability to influence their daily workload and 49.7 per cent feeling under pressure to do the work that is expected of them. Whilst the findings of this study were based on a small sample, these observations also concurred with other earlier studies that investigated the associations between WRMSDs and psychosocial risk factors (Brown and Baker, 2004; Deveraux *et al*., 2004).Some respondents in the Dodds-Hughes study (2008) also reported a lack of senior management support, and there were positive associations found by the author, for example as the lack of senior management increased so did the inability of sonographers to influence their workloads and the pressure to do what was expected of them. This can suggest that the lack of senior management support may increase the significance of psychosocial risk factors, which can in turn contribute to the musculoskeletal discomfort for sonographers. (Deveraux *et al*., 2004).

2.3.2 Ultrasound as the modern social medium

Medical imaging generates a unique interface between high-level technology and the patient, and has been described as a human-technical science (Murphy, 2006, 2001). Similarly, Roberts (2013) acknowledges that medical science and clinical practice are social processes, and professionals, patients and others interact with and through these medical technologies. On one hand, technology and machines are used to aid diagnosis and improve patient outcomes; on the other hand, there is the social encounter with the patient and the provision of holistic care. This is clearly evident in the field of medical ultrasound. Critics have argued and continue to debate the balance between the benefits and the measurable risks of routine ultrasound in obstetrics (Goldberg, 2004; Gomez and Copel, 1993; Romero, 1993), yet this practice has become a normal and highly anticipated part of prenatal care, offering pregnant women first glimpses of their “baby” (Taylor, 2008). Research exploring this sociological impact of ultrasound, particularly in the field of Obstetrics have found that ultrasound has significantly transformed medical practice, by making possible new cultural meanings of fetuses, pregnancy, personhood, family life, and parenthood (Roberts, 2013; Taylor, 2008; Burri and Dumit, 2007; Casper and Morgan, 2004; Oakley, 1984). Several authors

(Edwards, 2012; Ji *et al*., 2005; Bencerraf, 2002) have also argued that ultrasound images have moved beyond the position of “scientific” imagery to provide confirmation of fetal wellbeing and reassurance to pregnant women. They contend that outside of medicine, ultrasound for pregnant women has an increasingly significant status in, for example, understandings of maternal-fetal “bonding”, the importance of visual confirmation and fetal sex determination. The social position of ultrasound scans has been further fuelled by media, blogging social networks such as Mumsnet and commercial companies to express women’s pleasure, pain, and other experiences during pregnancy (Roberts, 2013). Using ethnography, Roberts (2013) observed twenty five ultrasound “bonding” scans at three geographically dispersed locations within the UK: one in the North West, one in the East Midlands and one in the South East. Her observations focussed on the ways in which the sonographers, the pregnant women, and their accompanying family narrate the imagery that they see on the screen. She concluded that whilst the sonographer must adopt an expert role to confirm the health of the fetus and offer reassurance, there was also emotional and discursive work that was required to make ultrasound images meaningful for the women.

This “hybrid” nature of ultrasound imagery implies that although images are usually produced in the medical context, there is a tension between the social and medical significances of fetal ultrasound. A systematic review by Garcia *et al*. in 2002 explored pregnant women’s views on pregnancy scans. This review included 74 primary studies from 18 countries which were undertaken between 1980 and 2001. There were limitations in the studies reviewed such as lack of key information regarding time, place and type of ultrasound scan and the use of diverse data collection methods which included self-administered questionnaires, qualitative interviewing, diaries and psychometric testing. Despite these highly varied study designs, a common theme highlighted was that there is still a need for the staff, women and their partners to be fully informed of the specific purposes of the ultrasound scan and what can and cannot realistically be achieved. The authors also acknowledged the inadequacies of this systematic review for example the highly specific context of ultrasound practice, the influence of technological changes over time and the variation in ultrasound practice between countries. This finding was later supported by a prospective study of women’s expectations and

knowledge of the mid-trimester anomaly ultrasound scan undertaken by *Heazell et al.* in 2003 at a teaching hospital in the UK. All women attending for a mid-trimester ultrasound scan were asked to complete a written questionnaire prior to the investigation. All the women approached participated in the survey resulting in a total of a hundred completed questionnaires. The study found that women's knowledge of the reason for mid-trimester ultrasound varied greatly. The majority of the women (62 per cent) stated fetal growth and/or fetal development as the main purpose of the scan, however 11 per cent of patients described the main purpose of the scan as maternal reassurance whilst 10 per cent of patients thought that the sole purpose was to investigate fetal gender or to produce a souvenir photograph of the fetus. Furthermore, although all the women recognised the ultrasound scan to be an integral part of antenatal care, only 6 per cent of these acknowledged this investigation as a true medical screening test and 12 per cent of patients did not know the purpose of the scan.

More importantly, all the studies above highlighted that the strong appeal of ultrasound often meant that women were not adequately prepared for adverse findings such as fetal demise and fetal abnormalities. Lalor *et al*. (2007) recruited a purposive sample of thirty eight women who were deemed at low risk of fetal abnormality and attended a routine screening ultrasound scan and subsequently received an unexpected diagnosis of a fetal abnormality. An in-depth interview was conducted with these women within 4-6 weeks of the diagnosis of the abnormal findings. The data found that since the scan was offered routinely, women viewed it as non-threatening in nature and were positively anticipating the ultrasound examination and were looking forward to ‘‘seeing’’ their baby. However all participants described as being shocked to discover that everything was not normal. Once an anomaly was suspected, the women wanted specific information such as the description of the anomaly, timing of the referral to see the expert, written information about the abnormality and the assurance provision of a continuity of care. Furthermore, these women wanted this information at the point of diagnosis, to enable them to come to terms with the news, irrespective of the nature of the outcome. Whilst it is well documented that parents' experiences of care is highly dependent by their interactions with the professional who delivers the bad news (Vandekieft, 2005; Alkazaleh *et al.*, 2004) , there is a notable paucity

of primary studies that explore the experiences of sonographers in giving bad news. Whilst reports have highlighted the possible consequences of this stressful relationship that sonographers have with patients going through difficult situations in terms of psychological and emotional distress, compassion fatigue and in extreme cases, emotional burnout (Walvoord, 2006, Blume, 2002; Simpson and Borr, 2001), the opinions of Blume (2002) and Walvoord (2006) were based on a review of previous studies, mostly relating to other health care professionals such as doctors, nurses and midwives, however the study by Simpson and Borr (2001) gathered primary data and explored the experiences of obstetric sonographers imparting diagnostic information which may be considered 'bad news' to expectant mothers. The study was conducted using a mixed methods with an initial qualitative phase to guide the research process. Semi-structured interviews were conducted with a total of nine sonographers at two London hospitals (district general and teaching) to elicit their experiences of giving bad news. Themes which emerged from this initial stage then formed the basis for a quantitative postal survey where a hundred and eighty practising obstetric sonographers in England were invited. This sample group consisted of both radiographers and midwives. The response rate was 51 per cent (*n*=92) and the experience of the responding sonographers in obstetric ultrasound ranged from 1 year to 25 years. It was found that sonographers were predominantly concerned with lack of time and the unpredictability of the patient's reaction when giving bad news. Furthermore, staff working in settings where there was a clear protocol specifying how to proceed following disclosure of bad news experienced less stress than those working without such a protocol. The authors also found that as well as the psychological distress that the sonographers experienced and also witnessed in the patients, they were also suffering anxiety of a possible misdiagnosis which would have repercussions for the women and her fetus.

2.3.3 Interprofessional workforce dynamics

The past century has seen the growth and transformation of existing professions and the introduction of new workforces (Willis, 1989; Larkin, 1983). Factors such as skill shortages, cost containment, need for quality improvement, technological innovation, new medical interventions, new health sector programmes and health

sector reform are driving these role changes in the NHS .The emphasis is on patient-centred care, rather than on the need of the professions (DH, 2009, 2005). Dent and Whitehead (2002) suggest that the health care service is shifting away from exclusivity and autonomy of professionals towards a culture of “productivity”, thereby introducing much more flexibility in both working practices and service organisation in the NHS. Health providers have the ability to change disciplinary boundaries by identifying new areas of work or by adopting roles normally undertaken by other providers. This reference to an emerging ‘new type of worker’ is of particular significance to the research presented here, as it refers to the potential emergence of an entirely new occupational group, with a generic healthcare worker equipped with a broad spectrum of skills, able to work across established professional boundaries (DH, 2009). However, as Colyer (2004) noted, this ‘new type of worker’ may also refer to the development of new roles to plug gaps in services and/or to the broadening of current skills and roles beyond those currently considered within a profession's scope of practice. Studies in the sociology of professions have demonstrated how the “traditional” professions have developed a claim to the monopoly of certain knowledge and skills, protecting this monopoly and gaining power and wealth from restricting access to the profession (Larson, 1977), and literature also suggests that it can be difficult to break down these professional barriers in a reform environment (Freidson, 2001; Abbott, 1988).

Nevertheless, these changes in professional boundaries occur in situational circumstances such as staff shortages or in the presence of strategic initiatives to reconfigure health service provision (DH, 2009, 2007). Nancarrow and Borthwick (2005) coined the phrase “professional fusion and fission” and identified the dynamic nature of a workforce in terms of diversification, specialisation, and horizontal and vertical substitution (Figure 3). They define diversification and specialisation as expansion of professional boundaries within a single discipline—that is, intra-disciplinary change—whilst inter-disciplinary changes arise when professionals undertake roles that are normally the domain of other disciplines, resulting in horizontal and vertical substitutions. According to Nancarrow and Borthwick (2005), diversification is defined as the identification of a new task or simply a new way of performing an existing task. The result is the addition of a

task to the existing scope of practice for the profession and usually requires updating on domain-specific and contextual knowledge that may be new to the practitioner. Specialisation on the other hand is defined as the adoption of an increasing level of expertise in a specific disciplinary area and is legitimised through use of a specific title and membership of a closed-subgroup of the profession, and generally involves specific training that extends beyond the core, pre-registration training for that discipline. Post-registration specialisation in ultrasound practice has been recognised and legitimised by the introduction of the DMU and later by a PGC, PGD and MSc (CoR, 2009).

Disciplinary boundaries can also expand through professionals taking on work that is traditionally performed by other disciplines (McLaughlin, 2003; Hugman 1991). Nancarrow and Borthwick argue that the difference between vertical substitution and specialisation is subtle. Vertical substitution can occur across disciplinary boundaries, unlike specialisation, which occurs within a profession. Vertical substitution generally increases the scope of practice of a profession, but the level of formal increase in status or rewards varies; furthermore, these authors observe that given time, vertical substitution often becomes adopted as a natural extension of the role of an existing provider group. Horizontal substitution, on the other hand, is when professionals with a similar level of training and expertise, but from different disciplinary backgrounds, undertake roles that are normally the domain of another discipline (Nancarrow and Borthwick, 2005). There are a combination of reasons for promoting such multi-professional and inter-professional education and practice. These include a genuine concern for patients' wellbeing, the desire to extend the traditional team to include new specialties, technologies and occupational groups and the belief that it may be possible to save money or use resources more effectively in providing opportunities for a range of groups studying the same or similar topics at the same time (Barr *et al*., 2005). However, as several authors note, substitution can result in either a mutually-agreed transfer of tasks and/or professionally contested boundary disputes (Freidson, 2001; Larkin, 1983; Larson, 1977).

Figure 3: The influence of vertical and horizontal substitution. Adapted from Nancarrow and Borthwick (2005), excluding the bottom layer of unpaid carers. Used with the permission of Wiley and Sons

2.3.4 Professional fusion and fission in ultrasound practice.

In the UK at least, the impact of workforce deficits and advances in ultrasound technology has greatly influenced the field of ultrasound practice and can be considered with reference to Nancarrow and Borthwick's (2005) framework of professional fusion and fission.

Radiography and ultrasound

When ultrasound technology was introduced in the 1960s as a new diagnostic imaging modality, it was ungainly, unsophisticated and limited in its uses and interpretations. Ultrasound equipment was bulky and mainly housed in dedicated radiology departments. Other medical professions resisted this new technology and the use of ultrasound technology was solely under the profession and domain of Radiology (Baker, 2005). By the early 1970s, radiologists were performing the bulk of ultrasound examinations, including obstetrics. As the demand for this imaging service outstripped the provision, some of the ultrasound workload within radiology services was gradually delegated to non-medical professionals such as radiographers, with the radiologists still assuming responsibility and accountability for the delegated tasks. Radiographers embraced this delegation of work eagerly with the professional desire to increase their own competences (Larkin, 1978). However as the workload increased, effective delegation could no longer be provided; radiographers were handling large caseloads and began to find that their specialist skills in ultrasound surpassed those of the supervising radiologists (Baker, 2005). Further factors such as a shortage of radiologists and the challenge to reduce waiting times, provide timely reports and streamline patient pathways acted as a catalyst to expand the scope of this vertical substitution for radiographers (Price and Le Masurier, 2007; Leslie *et al.*, 2000)

Price and Le Masurier (2007) and Price *et al.* (2002; 2000) conducted surveys exploring extended roles in radiography using structured questionnaires. In formulating the questionnaire, extended role activities in these studies were defined as those that had traditionally been undertaken by medical practitioners but were now practised by radiographers, in other words: vertical substitution. The main aim of the 2007 survey was to map any longitudinal changes in the adoption

and diffusion of extended roles with the view to inform curriculum development. The response rate from NHS acute trusts for each survey was reported as 63 per cent for 1998 (230/276), 68 per cent for 2000 (172/253) and 69 per cent for 2004 (177/258), respectively. The authors combined data from all these three studies to demonstrate the cumulative effect of adoption and diffusion of extended roles and demonstrated the increasing scope of radiographic practice over eight years.

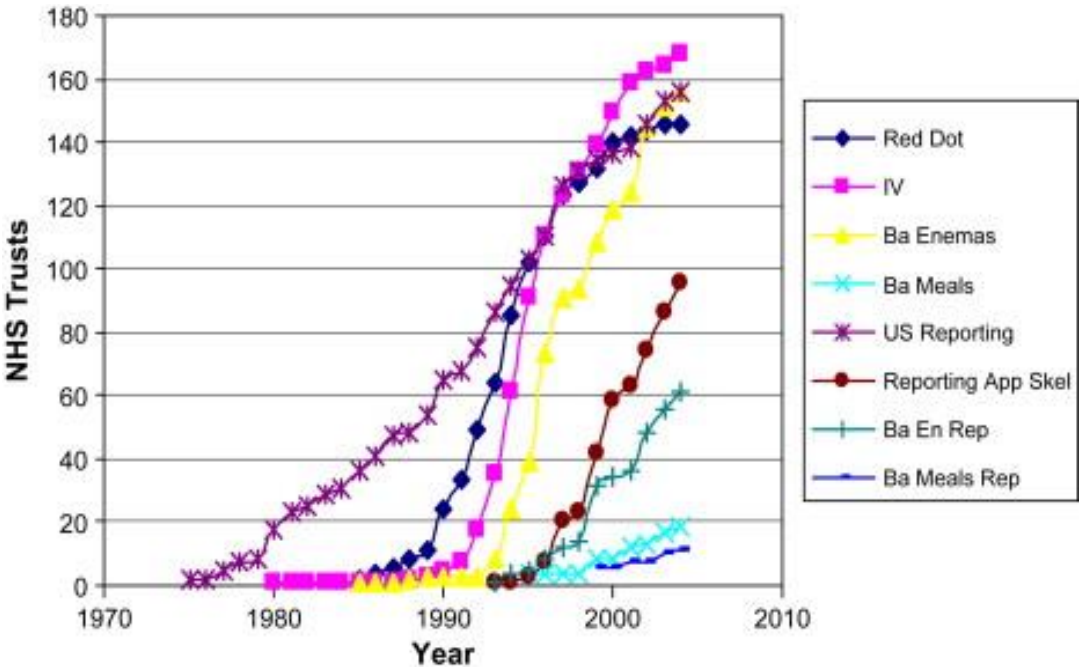

Figure 4: Adoption and diffusion of extended roles (cumulative) (Price and Le Masurier, 2007). Used with the permission of Elsevier.

The results showed a continual rise in extended roles activities for radiographers. (Figure 4). Most notably was the rise of activities such as reporting which historically was the domain of radiologists. Furthermore, the authors observed that ultrasound practice was the most frequent modality practised by advanced practitioners in radiography. The main limitation of these surveys was that only data from acute trusts was collected and given that the practice of ultrasound now incorporates other various settings such independent health care services for example any qualified provider (AQPs) and community-based services (CoR, 2013), it can be argued that the prevalence of extended roles in ultrasound could be higher than those reported.

The scope for horizontal substitution has evolved in the field of ultrasound practice as a result of the gradual application of ultrasound across fields in medicine other than obstetrics, for example general medicine, urology, orthopaedics, paediatrics, gynaecology and musculoskeletal (NSC, 2008; NICE, 2007; Baker, 2005). This expansion, coupled with contemporary advances in ultrasound technology such as automation, digital miniaturisation and the increasing ease of operating diagnostic equipment, meant that this technology became more sophisticated, portable, appealing and accessible to disciplines outside radiology (Edwards, 2006).

Midwifery and ultrasound

Ultrasound was recognised as an expanded scope of midwifery practice in 1992 by the United Kingdom Central Council for Nursing, Midwifery and Health Visiting (UKCC, superseded in 2002 by the Nursing and Midwifery Council (NMC). Other wider roles for midwives and nurses have been suggested: for example, in neonatal cranial ultrasound and infertility ultrasound (RCN, 2014; Reeve, 1999). Such practice complements the government's strategy for new ways of working across the professions in order to provide high-quality patient-focused care (DH, 2008a).The adoption of ultrasound practice by midwives is considered as a horizontal substitution in the context of this thesis. Although some midwives have been practising obstetric ultrasound for many years, there is little formal documentation of their activity and available statistics and evidence indicate that very few midwives are performing ultrasound in the UK (Edwards, 2009; Beake and Bick, 2007). As a result, there is no register to inform this thesis in terms of the exact number of practising midwife sonographers in the UK. Although no definite numbers can be found in the literature, anecdotally, it is estimated to be around 15 per cent of the total ultrasound workforce.

A service evaluation survey to explore midwifery activity in ultrasound was undertaken by Edwards in 2009: the issues explored included prevalence, scope of practice, education, incentives and barriers to ultrasound training, job satisfaction and effect on patient services. Edwards found that 58 (56 per cent) of the responding 103 midwifery units employed midwife sonographers and there were at least 197 midwife sonographers in the UK at that time. The majority of midwives in her study performed the full range of obstetric ultrasound

examinations, including first, second and third trimester scans, with a small minority performing advanced interventional procedures such as Amniocentesis and Chorionic Villus Sampling. Whilst the majority of the midwifery managers (84 per cent) in Edwards's study (2009) were generally in favour of midwives training in ultrasound, and could see the benefits for both midwives and clients in terms of holistic service provision, they all agreed that the provision of core midwifery duties must take precedence, especially in light of the on-going staff shortages in many UK midwifery units (Wise, 2014). Edwards (ibid) also identified other factors that impacted on the training of midwives in ultrasound. These included the lack of suitable clinical placements, with the majority of midwives relying on other professionals, for example radiographers, to provide clinical training in obstetric ultrasound, and attitudes of some midwives who reported anxiety about encroaching on other professions' territory, indicating that in their opinion, it was 'not their job'. Meire (1996) observed that the reason why some midwives do not find the current training courses attractive or accessible is that rewards and support once qualified in ultrasound are not adequate when compared to the increased risk of litigation. Edwards (2009) mirrored this observation and contends that additional ultrasound qualifications and skills are not always recognised and rewarded in terms of financial remuneration and further opportunities for career development. Although the Agenda for Change (AfC) was introduced in the NHS to deliver fair pay for non-medical staff based on the principle of 'equal pay for work of equal value' and to provide better links between pay and career progression using the Knowledge and Skills Framework (DH, 2004a), in practice, this system seems difficult to implement and evaluate, as there are some job profiles that do not match the actual work undertaken by health care professionals (Buchan and Evans, 2007; Hartley, 2005; O'Dowd, 2003). For example, what is regarded as advanced practice or role extension for one profession can be seen as normal practice for another. Consequently, this has had a negative effect on the recruitment and retention of ultrasound practitioners, particularly those who are traditionally outside the profession of radiography (Edwards, 2009). Despite these barriers, the number of midwives embarking on ultrasound education is rising (CASE, 2012). This may be attributed to the implementation of recent policies in routine antenatal care by NICE (2012).

Clinical scientists and ultrasound

The workforce in vascular ultrasound has evolved mainly as a result of specialisation and the advancement of Doppler technology, and to a lesser degree horizontal substitution, although there is an overlap between the work of vascular scientists and radiographers (CoR 2009). The route to ultrasound practice for vascular scientists has been formalised relatively recently in comparison to radiography and midwifery. The SVT was established in March 1992 with the main goal to promote education, training and research in the field of vascular science via national standardised professional training and an accreditation scheme. The SVT joined CASE in 1993 as one of the parent bodies.

The Department of Health's strategy (2010) for improving education and training in Healthcare Science is now being implemented nationwide. The framework of Modernising Scientific Careers (MSC) utilises an undergraduate pathway, the Practitioner Training Programme (PTP) for Healthcare Practitioners, and a postgraduate pathway, the Scientific Training Programme (STP) for Healthcare Scientists/Clinical Scientists. The main benefits cited for patient care are a faster and improved access for patients to healthcare, particularly for diagnostic services, a more efficient service for patients as the healthcare science workforce are fully engaged as part of a clinical team and a more informed patient choice with care delivered closer to home and a more informed healthcare science workforce who understand the needs of patients. Ultrasound education for echocardiography, vascular ultrasound and medical physics are taught at postgraduate level. The literature search did not identify any qualitative studies that explore the experiences of these qualified healthcare scientists into this specialist field of healthcare.

2.3.5 Impact of professional fusion and fission

Various authors agree that redefining the role of the sonographer and the scope of sonographic practice will continue to make significant improvements to NHS waiting, diagnosis and treatment times (Hunt, 2005; Pallan *et al.,* 2005); however, whilst such developments demonstrate the flexibility of the sonography workforce and its attempts to adapt to rapidly changing healthcare work environments, they

also raise other issues, particularly for individual practitioners who work across professional boundaries. In relation to health care provision, a variety of studies have made contributions to the body of knowledge on boundary work in health care teams and have explored the impact of role overlap between different health professionals: Booth and Hewison (2002) in occupational therapy and physiotherapy, Borthwick (2001) in podiatry and chiropody, Tye and Ross (2000) in emergency medicine and Price and Le Masurier (2007) in diagnostic imaging.

A case study conducted by Tye and Ross (2000) explored the extended role of the emergency nurse practitioner in the UK. Nine face-to-face semi-structured interviews were carried out with the key multidisciplinary stakeholders in the organisation. Five major themes emerged from the data analysis: blurring role boundaries; managing uncertainty; individual variation; quality versus quantity; and the organisational context. Whilst they found some professional consensus regarding the benefits of the role, such as improved waiting times and patient satisfaction, there appeared also to be a degree of uncertainty, particularly regarding role configuration, changing role boundaries and the extent to which the role should be expanded in the future. Furthermore, they caution that with growing emphasis on clinical governance, it is important to reinforce the need for on-going audit of role effectiveness in order to meet the challenges and uncertainties of increasingly blurred professional boundaries. Price and Le Masurier (2007) found in their study that radiographers who took on extended or specialist roles in modalities such as such as Computerised Tomography (CT) and Medical Resonance Imaging (MRI) and Ultrasound were concerned about role overload. The interviewees felt that there was a limit to the extent to which individuals can take on additional extended tasks which are outside their original job description. Furthermore, the authors clearly highlighted that adequate time and training were essential for practitioners to undertake and maintain extended roles. They concluded that whilst developments in role extension and specialisation were welcomed by radiographers, there was a need to achieve balance, and recommended that the expectations from different groups of staff, their development and career opportunities should be weighed up against the volume and level of work demanded from them. Furthermore, the authors questioned

whether the redistribution of workload—that is, substitution alone—will reduce the total amount of work, and argued that there will be a limit to the extent to which tasks can be “pushed up or down the line” without restructuring the workforce.

The concept of dual roles has been explored in professions such as nursing and midwifery by Drennan and Williams (2001) and later by Edwards and Kerrigan (2007). The study by Drennan and Williams utilised a comparative case study to assess the dual-role of primary care. The data was collected via interviews and individual diaries and the sample consisted of three dual-role nurses, six conventionally working district nurses and health visitors, six nurse managers and seven GPs. The GPs were further split into two groups, those who worked with dual-role nurses and those who shared community nurses with other practices, found high rates of job satisfaction in dually qualified professionals. However, there are also disadvantages. In particular, this group experienced greater occupational stress and job conflicts as a result of adopting multiple roles and multiple team membership compared to nurses working in traditional roles. The main limitation of this study was that it was conducted in a specific inner city setting and therefore the generalisability of the findings can be questioned, however these findings were later supported by Edwards and Kerrigan (2007) who explored the feasibility of developing a new dual qualified role in midwifery and health visiting. This two-phase exploratory study used both quantitative (questionnaires) and qualitative (focus groups) methods to gather data from single and dually qualified midwives and health visitors. The sample population was larger than the Drennan and Williams study and consisted of seventy six professionals who had a single qualification and twenty professionals who were dually qualified in both midwifery and health visiting. Thirty nine per cent of these professionals were employed by a Primary Care Trust (PCT) and the remaining were working at an NHS trusts. Positive aspects of working in the dual professional role were identified by the respondents as improved continuity of care and increased job satisfaction; however, particular concerns voiced by these respondents were lack of clarification of their roles, increased workload, feared loss of identity and increased stress, with the possibility of “burnout”. Practitioners with a single qualification perceived themselves as being at a disadvantage and expressed concern over the security of their jobs. The authors conclude that a

dual qualified role may help to address the requirements of government directives in the UK; however, clear role boundaries and infrastructure with sufficient support from managers and commissioners are needed to implement dual qualified roles effectively and fairly. Furthermore, both these studies identified the need for further investigations into other health care roles that might utilise more than one professional qualification. This blurring of boundaries between professions and between professional roles have also been observed by other authors to have consequences at all levels, including HEIs, the NHS, and professional and regulatory bodies in terms of regulation, scope of practice, accountability and responsibility (Newton *et al.,* 2009; Crisp and Maidment, 2009; Jones 2005). Furthermore, for some individual practitioners, there may be concerns regarding clinical responsibility, transition into practice and maintaining competencies in newly gained skills (Newton *et al*., 2009; Scholes, 2008; Thomas *et al*., 2008).

Research in other fields such as retail marketing has found that boundary spanners are particularly susceptible to two types of role stressor—role conflict and role ambiguity (Nygaard and Dahlstrom, 2002). Role conflict refers to the degree of inconsistency or incompatibility of expectations associated with the role and occurs when different members of a practitioner's work community—for example, managers, peers and clients—have conflicting demands. Role ambiguity, in contrast, refers to the lack of clarity and predictability of one's professional behaviour and results when there is a discrepancy between the information available and the knowledge needed for adequate performance. Rutter and Lovegrove (2008) looked at occupational stress and its predictors in a survey of radiographers taking on extended roles using a questionnaire. The participants (*n*=1658) were from four different specialities: mammographers (*n*=462), radiotherapy radiographers (*n*=455), diagnostic radiographers (*n*=379) and sonographers (*n*=362). They used role ambiguity, role conflict, work problems and social support from colleagues as measured predictors. Among the ultrasound group, they reported that perceived stress correlated highly significantly with predictor measures of role ambiguity and role conflict. However, what would have been useful, but was not clear in the study, was to establish how many sonographers were practising in a dual role capacity: that is, in conventional diagnostic procedures such as X-rays and ultrasound roles.

2.3.6 Technological impact on Divisions of Labour

The interplay between professions and technology also needs to be considered for ultrasound practice: for example, how different professional groups acknowledge and make sense of the same technology. Ethnological studies have noted that new technologies do not enter clinical practice as fully defined, but are constructed in situ (Larsson *et al*., 2007; Korica and Molloy, 2004). Furthermore, Burri (2008) and Timmons and Tanner (2004) argue that the acceptance of a new technology is a social process, driven by inter-professional negotiations over the role and ownership of the technology, and have noted tensions and contradictions between professional groups, regulators and managers. A study by Zetka (2001) illustrates the impact of technological innovations on medicine's occupational Division of Labour (DoL) and occupational structures. This research utilised a case study approach with intensive interviews with thirty seven physicians from a variety of specialities in gastrointestinal medicine to explore the workplace outcomes associated with the introduction of diagnostic and therapeutic laser and video technologies. The author concluded that technologies are introduced into occupational DoL through two distinctive routes. The first route occurs in the setting of anticipated applications of a specific technology. This route is typified when a dominant hierarchical sector of a DoL delegates control over the technology to new subdivisions that specialise and exclusively manage the new technology and establish its market niches. The second route, in his opinion, usually occurs as a result of unanticipated applications of a technology and results in functionally complex occupational DoL. This was illustrated in his study by the way fibre-optic endoscopy has been embraced in the field of gastrointestinal medicine. In segmented occupational DoLs, he notes that unanticipated developments are not usually system threatening and the dominant segments of the DoL safeguard their core work domains and accept whatever adjustments and consequences such technological change entails. On the other hand, in functionally complex occupational DoLs, he argues that these unanticipated developments are much more consequential, since levels of interdependence are much higher, and this can result in intra-occupational conflict.

2.4 Developments in Ultrasound Education

There is currently no qualification that leads to an undergraduate degree for ultrasound practice in the UK. There has been much debate about developing direct entry routes at first-degree level for sonographers (CoR, 2013). Direct entry to ultrasound education would offer a route for those seeking to work in this field without the necessity to undertake a first degree (or equivalent) in another healthcare discipline, and would have the potential to give rise to a more structured career progression for sonographers. This direct route of education exists in other countries such as the USA, Australia and Canada (CoR 2009), where colleges and universities offer formal training in a two-year programme that offers an Associate Degree or a four-year program that awards a Bachelor's Degree in ultrasound. The CoR issued a briefing paper in 2013 in response to the increasing demand for ultrasound examinations and a long-standing shortage of sonographers in the UK. It supports the introduction of primary (BSc) degrees in ultrasound and considers this strategy as one of the ways of increasing sonographer numbers in the future. However, it also recognises that there are a number of caveats in this proposal. These include the provision of support for undergraduate sonography students who may have no prior healthcare experience at all and will require a much greater range of support than the current postgraduate cohorts of ultrasound trainees. Another consideration is to develop and realistically map the undergraduate educational curriculum to the scope of practice of a sonographer graduand and align these with the expectations from NHS employers. Furthermore, there is currently no legal requirement for sonographers to be registered with the Health and Care Professions Council (HCPC). Sonography is not a regulated profession and the titles 'sonographer' and 'ultrasonographer' are not protected in law. Students with a primary degree in ultrasound will not be eligible to register with the HCPC nor the NMC. This is an important issue, as there are some restrictions to practise that apply to sonographers who are not statutorily registered. In particular, they cannot refer patients directly for examinations involving ionising radiation or administer drugs and contrast agents under Patient Group Directions; nor can they train to become supplementary or independent prescribers (CoR, 2013).

Another potential obstacle highlighted by the CoR (ibid) is that of student placement capacity in ultrasound departments. The intensive, one-to-one nature of teaching the clinical aspects of ultrasound and the relatively small size of most ultrasound departments (in comparison to radiography imaging departments) are likely to restrict the number of primary ultrasound degree students that can be accommodated in any one ultrasound department. Moreover, training guidelines and recommendations for minimum competencies regarding medical trainees in ultrasound from other professional organisations such as the Royal College of Obstetricians and Gynaecologists (RCOG) and the Royal College of Radiologists (RCR) will further impact on the capacity of each department to offer suitable placements. This may mean that primary ultrasound degree students will need to be placed across a large number of departments spanning a wide geographical area, especially if HEIs are to recruit viable cohorts. Funding arrangements for student sonographers will also need to be clarified, and these are likely to be country specific (England, Scotland, Northern Ireland and Wales) as well having as regional or local employer/placement specific considerations.

2.5 Regulatory and professional bodies

Core characteristics are used to distinguish occupations as professions. These include practice autonomy, altruism, a defined body of knowledge and skills, control over how these are created, normally through prolonged education and eventual certification, defined ethics and scope of practice (Freidson, 2001; Abbott, 1988). Using these characteristics as benchmarks, professions have been regulated as acting in the public's interests. Regulatory registrants are required to provide evidence of meeting the professional standards established by regulatory bodies to protect the public. The standards for each of the professions are the "necessary" or "minimum" requirements for safe and effective practice and include standards for education, training, code of practice and performance. Regulation in the UK is currently undertaken by nine regulatory bodies overseen by the Council for Healthcare Regulatory Excellence (CHRE).These include, amongst others, the HCPC, the NMC and the General Medical Council (GMC).These bodies are set up for the protection of the public using health care services by setting standards for entry onto the register and continued registration, approving education and training

programmes to meet these standards, maintaining a register of suitable qualified "fit to practise" health care practitioners and taking action if these standards are not met.

In 2008, the CoR made an application to the then Health Professions Council (HPC) for sonography to become a regulated profession and 'sonographer 'and 'ultrasonographer' to become protected titles. This application was made with the support of the United Kingdom Association of Sonographers (UKAS), which later merged with the CoR in January 2009. Statutory regulation was subsequently recommended to the Secretary of State for Health by the HPC in October 2009. However, following the publication of a Command Paper by the Coalition Government in February 2011, this recommendation is unlikely to be taken forward by the DH in the immediate future. Instead, it would encourage the development of assured (accredited) voluntary registers, and devolution of decision-making and accountability to local levels and professional bodies. In response to this requirement, the CoR opened a Public Voluntary Register for Sonographers (PVRS) with which sonographers from all backgrounds are encouraged to register. However, this lack of professional recognition has an impact on sonography professionals who want to renew their registration with regulatory bodies. Sonographers who are statutorily registered due to their initial qualifications must renew their registration periodically and must provide evidence of Continuous Professional Development (CPD). The majority of sonographers in the UK are statutorily registered with either HCPC or the NMC, as they will have a professional background as a radiographer, clinical scientist, nurse, physiotherapist or midwife that allows this, but this registration is not as a sonographer. This lack of statutory registration has led to difficulties for sonographers who do not have a "regulatory title", such as sonographers from outside the UK, when initially applying for a post or moving on, even at a time of severe sonographer shortage. NHS Employers (2013) are required to seek evidence of standards of training, competence, ethics and conduct when employing new staff, and as Thompson and Paterson (2014) found, the ability to check a central register and have confidence in the statutory and voluntary regulators for sonography practice is a requirement that is highlighted frequently by managers of ultrasound departments. Although one can argue that professional

registration is not in itself a guarantee of competence, the associated regulatory monitoring and processes help to provide protection for patients and the public. Although ultrasound technology in safe hands does not cause any significant biological effects compared to those seen with ionising radiation, the fact remains that it is still a diagnostic and screening tool for confirming normality or detecting abnormalities. There is potential to harm the public through over-diagnosis, misdiagnosis or missed diagnosis (Phillips *et al.*, 2012). The CHRE (2009) has argued robustly against the need for regulation, stating that in most instances, professional codes of conduct should provide adequate safeguards for patients. The CHRE maintains that individual practitioners are accountable for not practising outside their sphere of competence, knowledge or skills, but also points out that "where the nature of a profession's practice changes…to such a significant extent that their scope of practice is fundamentally different from that at initial registration, regulatory bodies may need to consider whether action is necessary to assure the professionals' fitness to practise in the context of a very different nature of practice where risk to the public is evident" (CHRE, 2009: p 1). In the absence of regulation and the rapid expansion and diffusion of ultrasound practice and application, it is important that professional bodies and local trusts issue guidance to safeguard not only the public interest but also the interests of their staff members to ensure a high standard of professional practice.

Personal communication with Nigel Thompson (CoR), professional officer for ultrasound in 2013, revealed that midwife sonographers have had and are still having problems renewing their registration with the NMC, especially if they practise full time in ultrasound, as this is not formally recognised as being the core scope of midwifery practice. Therefore, these practitioners require an "Intention to Practise" form completed by their local Supervisor of Midwives (RCM, 2015). According to him, at the time of the communication, there were 117 sonographers whose names were listed on the PVRS and who had no statutory regulatory home. All but a few of the 117 were in post in the UK, and many had been so for many years and were in a very senior position. Furthermore, he added that some would not make any specific registration requirements, although they might state in job specifications, etcetera, that statutory registration is "preferred". Whilst it can be

seen to be helpful, voluntary registration cannot provide the protection of a statutory register, and achieving this protection remains the goal of the CoR.

2.5.1 Professional practice documents

A literature search was carried out to explore the existence of professional and policy documents such as professional body guidelines, codes of conduct and practice and CPD in relation to ultrasound practice. Professional specific websites including regulatory bodies such as the NMC, HCPC and the GMC and professional bodies such as the RCM, the RCN, the CoR and the SVT) were searched using key words such as “codes of conduct”, “ultrasound practice”, ”sonography/er”,” specialist practice”, “extended roles”, “scopes of practice” and “skill mix” .To ensure that the documents were authentic, credible and representative, only those populating the specific websites relating to the individual professional bodies were sought. This search found generic codes of conduct that apply to registrants of the HCPC and the NMC, and some specific standards of proficiency for professions such as Radiography and Midwifery, but a distinct lack of standards of proficiency relating specifically to sonography, apart from one that relates to the CoR voluntary register. Furthermore, there was a vast difference in the amount and content of the guidelines and publications that exist for professionals who practise ultrasound, depending on their professional bodies.

The CoR has a very large number of professional practice guidelines published specifically for sonographers, including scope of practice, guidelines for ultrasound training, education and maintaining Continuing Professional Development. There are special interest groups including ultrasound to allow effective knowledge exchange through professional journals, established networks and providing career advice and support. Similarly, the SVT is the main organisation that informs vascular ultrasound practice in the UK and has a vast number of publications that support and provide guidelines for ultrasound practice via a programme of membership and accreditation of practice. However, there is a distinct paucity of guidance for members relevant to ultrasound practice from the RCN and the RCM. This is surprising, as the number of midwife sonographers in the UK is continually growing. The only specific guidance document that currently exists is written for fertility nurses who perform ultrasound scans (RCN, 2014). The RCM has web

links to the CoR website, and as such, its members will have access to the generic documents; however, not all of them will be registered with CoR. Therefore, evidence suggests that there is a lack of standardisation to inform ultrasound practice given the multidisciplinary membership of the ultrasound workforce.

2.6 Newly qualified health care professionals

There are no comparable studies that explore the experiences of newly qualified sonographers in the UK. However, other studies were reviewed that have some relevance to newly qualified sonographers. It was apparent from the review that professionals have yet to come to a consensus on a specific time frame that delineates a newly graduated professional from an established professional and what constitutes a “newly qualified practitioner”. Various researchers have chosen to define newly graduated professionals based on a time component, starting with the acceptance of a position within a health care organisation and/or beginning an orientation program within the health care department or unit. For example, newly graduated nurses are referred to as new graduates at three, six, nine, or twelve months after gaining employment or beginning an orientation program (Duchscher, 2008; Fink *et al*., 2008).Other nursing researchers have defined newly graduated nurses either as practitioners who have graduated from a college of nursing within the previous year or nurses who have practised for a time frame of one year or less (Dyess and Sherman, 2009; Delaney, 2003). Hobbs (2012) has used the term “neophytes” when referring to the status of newly qualified midwives in their first year of practice. Others suggest that professionals do not fully develop into independent and competent health care practitioners until two to three years after graduation (Scott *et al*., 2008; Halfer and Graf, 2006).

2.6.1 Transition

Literature covering the last four decades has produced various theories that enhance our understanding of the complex and challenging experience of the transitioning of health care students into clinical practice. The theory of reality shock was conceptualised by the seminal works of Kramer (1974) who focused on the initial work experience of graduates. This reality shock occurs with the transition from the educational to the service setting where there are different

priorities and pressures. While Kramer's research predates the current understandings of practice in situations of the complexity of the present health care provision, her theory has been supported and supplemented by the later influential works of Duchscher who drew on cumulative knowledge gained from a programme of research spanning several years to give an insight into the experiences of newly qualified nurses. Her research consisted of two qualitative studies conducted in 2001 and 2003 with research methodologies including phenomenology and interpretivism, a third study involving retrospective qualitative analysis of secondary data (Cowin and Hansberger-Sims, 2004) and the final work, published in 2009, which utilised grounded theory and led to the generation of her transition shock theory. She observed that there is an apparent contrast between the relationships, roles, responsibilities, knowledge and performance expectations required within the more familiar academic environment and those required in the professional practice setting. The transitional experiences of new nurses in these studies are consistent with those reported by other allied health professionals. Morley (2009) describes the challenges faced by new occupational therapists, whilst Brumfitt *et al.* (2005) focuses on new graduates in speech and language therapy. Other authors describe a similar journey, for example in physiotherapy (Tryssenaar and Perkins, 2001) and in podiatry (Mandy and Tinley, 2004). The other prevalent theory regarding transition include the rites of passage as conceptualised by Van Gennep (1960). Despite its very early anthropological roots, Van Gennep's theory (1960) still has contemporary application as a framework for understanding the ways in which transitions (of whatever nature) are both made and marked. His theory conceptualises the way people move through life's stages in distinct phases, which he called the rites of passage, namely separation, liminality, and finally incorporation. More recently, several authors have adopted ethnographic study designs to draw upon this theory and explore the influence of culture and the organisation on the transitional experiences of health care professionals (Hobbs, 2012; Bjerknes and Bjork, 2012; Draper *et al*., 2010; Barton, 2007). Although these studies provided valuable insight into the importance of organisational and professional engagement, they took place at single specific sites, thus limiting their transferability to other organisations.

The literature research on transition suggests that this experience is a socially and dynamically constructed process that moves the new practitioner through developmental and professional, intellectual and emotive, skill and role-relationship changes, and contains within it experiences, individual meanings and expectations (Duchscher, 2008). It is well documented that a positive transitional period is associated with increased reports of job satisfaction and with lower voluntary turnover rates among newly graduated nurses (Kovner *et al*., 2009; Bowles and Candela, 2005). However, as Kramer (1974) argues, new graduates come with idealistic plans and may see the transition into practice quite differently than the hospitals' bureaucratic systems, which focus on practical strategies and human resources. Newly qualified graduates are employed into health care organisations from a business perspective and as an investment, whilst new graduates view their first employment as a career opportunity (Bland-Jones and Gates, 2007).

Transition can also be seen as a process undertaken when professionals move into another speciality. Anderson (2009, p.203) defines this process as "work role transition" and argues that that the human experience associated with entering a new community of practice is dynamic. It encompasses developmental processes that are associated with emotional work, critical tasks, and diffusion through role boundaries to assume the new identity with values and knowledge base for the new role. Peel (2005) discusses these situations as career changes in which there are three main considerations: the first can be seen as a task change, which is a shift from one set of tasks to another set within the same job and same location. The second scenario involves a position change, where there is a shift in jobs, with the same employer or to a different employer or location, but with only a slight shift in job duties, and the third entails occupation change, seen as a transition from one set of duties to a different set, which might include a new work setting. All these scenarios manifest themselves in the current ultrasound workforce where professionals may use their additional ultrasound skills to complement their existing practice or make occupational changes.

Duchscher's study (2008) of newly graduated nurses' experience of transition whilst entering professional practice depicts their trajectories in the initial twelve

months of transition as a process of becoming. She argues that this journey is both a personal and a professional one, involving three stages of “doing”, “being” and “knowing” (p. 444). After the initial period of transition shock, the participants in her studies were beginning to define their roles, and reported examples of role synthesis, seeing the bigger picture and respect from peers and clients. They were acknowledging their contributions in their new roles. Their focus and energy had shifted from the immediate task of performing the scan to the wider implications of practice through processes such as questioning, searching, examining and revealing. Similarly, the Dreyfus and Dreyfus Model (1986) distinguishes between five phases of skills acquisition—novice, advanced beginner, competent, proficient and expert—and describes the respective capabilities and scope of vision of the practitioners at each stage. The progression from novice to expert is shown as a gradual process moving from a firm obedience to taught rules and procedures through to a mode of practice that is developed via instinct and awareness and is more reliant on tacit knowledge. This model has been applied to various healthcare disciplines to evaluate the development of skills, for example by Benner (1984) in nursing, by Kirkpatrick and MacKinnon (2012) (Figure 5) in anaesthesia and Field (2014) in relation to the RCOG curriculum for qualified doctors in ultrasound training. However, critics (Purkis, 1994; Rudge, 1992) have argued that whilst the Dreyfus and Dreyfus model has been seen to partially explain the ‘acquisition’ of some skills, it is debatable whether it can explain the acquisition of clinical skills. Furthermore, these authors noted that there is an apparent absence of any reference to social structures or social knowledge within this model. Similarly, Field (2014) concluded that whilst it is possible to apply this model to map skills such as pattern recognition to ultrasound trainees, it is not perfect, as it does not address the analytical problem-solving and critical thinking skills that are required for ultrasound practice. However this observation was based purely on his opinion as there was no primary data to support this.

Mackay, Anderson and Hogg (2008) undertook a mixed methods study which explored the preparedness for clinical practice of diagnostic radiographers after six months of clinical experience. They suggested that graduate diagnostic radiographers were generally well prepared for their role as diagnostic radiographers; however, some curriculum development was needed in specific

areas. These include the justification of X-ray requests (where diagnostic radiographers are required to make a decision as to whether there is a good reason for the examination to be performed), readiness for undertaking imaging procedures in theatre, and undertaking on-call duties when there are no colleagues to consult with (Decker, 2009).The analysis of radiography graduates undertaken by the CoR in 2012 found that 86 per cent of the participants felt prepared for their first job and cited the organisational environment as being an important contributory factor in how they felt. Naylor (2014) explored the lived experiences of newly qualified radiographers in the UK. Her sample consisted of participants who were all uni-professional radiographers who had graduated from a single Higher Educational Institution and were working in similar NHS organisations. The findings were based on a focus group consisting of four newly qualified radiographers and a longitudinal study involving semi-structured interviews with a further eight participants. She found although there was some anxiety initially, there was no evidence that any of the participants in her study experienced a reality shock and they all felt that they were well prepared and supported for their role as diagnostic radiographers.

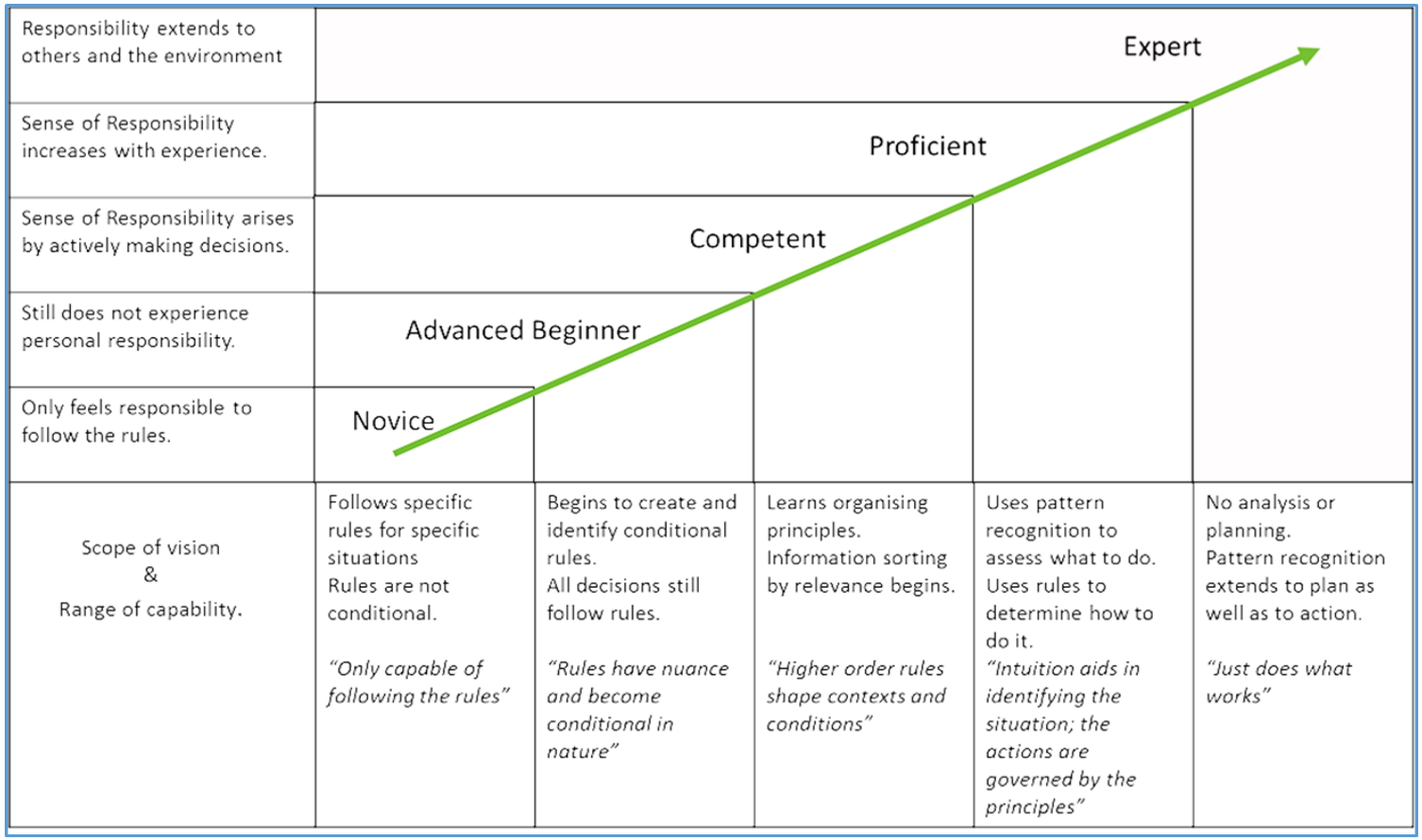

Figure 5: Dreyfus and Dreyfus (1986) model of five phases of skills acquisition, in Kirkpatrick and MacKinnon (2012)

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This influence of organisational culture in shaping the experiencing of newly qualified professionals was also highlighted more recently by the Royal College of Nursing (RCN) who hosted three focus groups in January and February 2013 to answer the question “What do newly qualified nurses think?” The sessions were attended by 100 nurses who had been qualified for between one and six months. They found that culture and conditions at work affected how nurses develop a professional sense of themselves. Additionally, their early experiences were heavily affected by their interactions with those who have an input into socialising them—predominantly other nurses but also other healthcare workers. It was felt that more could be done to ensure that both students and experienced staff have a clear understanding of what being ‘newly registered’ means in terms of previous experience, expected capability and on-going learning and support needs.

2.6.2 Preceptorship

The initial period of employment for many health care professionals incorporates an element referred to as preceptorship. This is the period of support that a newly qualified practitioner receives on entering the workforce. Several preceptorship programmes have been established and evaluated and many professions and governing bodies have their own guidelines for preceptorship. Whilst the HCPC does not formally define preceptorship, members of the Modernising Allied Health Professional Careers Steering Group agreed with the Council of Deans of Health conclusion, reached in 2009 at a national workshop on preceptorship. They recognised preceptorship as a framework that acknowledges new graduates/ registrants as safe, competent but novice practitioners who will continue to develop their competence as part of their career development/ continuing professional development. In 2010, the DH issued “A Preceptorship Framework for Newly Registered Nurses, Midwives and Allied Health Professionals” with recommendations and a framework for those in NHS organisations who have responsibility for systems for managing and developing the workforce. These included registered practitioners (preceptors), newly registered practitioners (preceptees) and their NHS employers. However, what is not clear is the definition of a “newly registered practitioner” and whether it includes already registered postgraduate professionals taking on new roles. In the briefing paper by CoR

(2013) regarding proposal of a direct entry undergraduate ultrasound programme (with competency to practise), the College proposes a preceptorship to assist employers and the existing workforce to develop confidence in this new proposed element of the sonographer workforce; disappointingly, there is no such recommendation for current postgraduate ultrasound students. CASE stipulates a period of six months for newly qualified sonographers to consolidate their skills after qualification under an element of indirect supervision; however, there are no formal guidelines to enforce this and no definition of “indirect supervision”. The DH (2010) cautions that “indirect supervision” can be open to misinterpretation and may be seen as merely an additional period in which another registrant takes responsibility and accountability for the newly registered practitioner’s responsibilities and actions without any specific elements of preceptorship.

Robinson and Griffiths (2009) reviewed preceptorship schemes in relation to four areas of nursing, namely adult, child, mental health and learning disability nursing, with the overall aim being to explore ways of improving the transitional experiences of professionals within these fields of practice. They summarised that a balance will need to be achieved between good quality preceptorship and the length of time for which resources enable it to be maintained. Furthermore, their review indicated that a formal framework for preceptorship is one that allows for it to be specialty-specific and therefore tailored to the needs of each individual newly qualified professional. This observation correlates with the observation of Whitehead *et al.* (2013) whose literature review of 24 articles relating to the preceptorship role highlighted the importance for managerial support, for both preceptors and preceptees. Several other authors have observed that without suitable management support, the process of preceptorship can often become a paper exercise where a preceptor is allocated but does not have the time and/or inclination to fulfil this role (Cleary *et al*., 2013; Robinson and Griffiths, 2009; Mooney, 2007). Both Whitehead *et al.* (2013) and Robinson and Griffiths (2009) concluded that further research in other professions apart from nursing is needed to re-evaluate the experience of post-qualification supported practice for all health care professionals.

2.7 Research Problem, Aim and Questions

The literature reviewed has revealed the complexity of issues facing the current ultrasound workforce. An obvious gap in the research is the lack of a suitable body of knowledge that explores the experiences of newly qualified sonographers. Furthermore, understanding how newly qualified sonographers from different backgrounds negotiate their way through this multifaceted area of health care provision and the factors that contribute to sonographer wellbeing is vital to ensure that the future workforce is supported and retained. Furthermore, research has shown that there are several factors that contribute to the stress levels of today's sonographers, these include increased workload (DH, 2014), staff shortages (CoR, 2014) compassion fatigue (Walvoord, 2006; Simpson and Borr, 2001) work-related musculoskeletal disorders (Dodd and Hughes, 2008) and coping with the "hybrid" nature of ultrasound practice (Roberts 2013). Research on the experiences of newly qualified professionals in other fields of practice has shown that the transitional period and first year of practice is a crucial period for these professionals and is influenced by various factors such as individual circumstances, organisational ethos and professional support. Although there are some common themes and experiences, there are also anomalies between professions and places of work. The appraisal of the literature on the nature of support and preceptorship reveals that it is complex and lacking national standardisation, with varying models of provision. Moreover, the studies reviewed have explored the experiences of newly qualified professional from a uni-professional perspective. Therefore, there is a distinct lack of knowledge regarding the experiences of newly qualified sonographers, particularly from a multi-professional perspective. Furthermore, there is a notable absence of literature that addresses the impact of boundary spanning on the multidisciplinary ultrasound workforce and the processes by which such individuals integrate into their new roles and access knowledge exchange to support horizontal and vertical health-care integration. Maintaining competency and professional registration is further complicated by the absence of regulation for sonographers. Current literature suggests that there are benefits for professionals who undertake education and training in new roles or roles that cross professional boundaries of practice. These include job satisfaction, continuity of care, and a more integrated approach to

healthcare; however, concerns are also highlighted in terms of role uncertainty and ambiguity.

Against a backdrop of these issues, the research aim of this study is to gain a deeper understanding of the experiences of newly qualified sonographers. The research questions are:

1. What is the experience of newly qualified sonographers in their first year of clinical practice?
2. What are the perceived implications for future workforce development, in terms of professional practice, education and regulation?

The significance of these areas of investigation for this professional doctorate is by gaining a deeper understanding of how professionals from different disciplinary backgrounds make a transition into new roles and their journeys to becoming sonographers, the findings will have direct relevance to the current sonographic workforce as a whole and for different professions and professional organisations that deliver, employ and support this aspect of service provision. The second significant contribution is that the findings from this research can help ultrasound educators to gain insight into specific aspects that can be incorporated into an ultrasound educational programme curriculum. The third contribution is that the findings will inform NHS organisations' and commissioners' development of continuing education activities to prepare sonographers to become competent advanced sonographers.

2.8 Chapter summary

This chapter has presented the historical, sociological and professional aspects of ultrasound practice and factors that influence sonographers from multidisciplinary backgrounds. These factors include workforce shortage, workforce dynamics comprising of vertical and horizontal substitution, cross-boundary working and the current policies of the professional and regulatory bodies. Existing literature on newly qualified professionals, their transitional experiences and preceptorship programmes has been drawn on to inform the main research aim and questions.

Chapter 3: Methodological Approach

3.1 Introduction

Numerous influences informed the methodological choice for this research. These included previous research, the researcher's position within the research process and the theoretical proposition within which the research aim and questions were developed. The literature reviewed in the previous chapter clearly highlights the issues that impact on the current sonographic workforce and the research gap that exists relating to an understanding of the experiences of newly qualified sonographers. In this chapter, the methodological approach adopted will be presented along with its underpinning rationale. The positionality of the researcher, the overall methodological stance, methods used to recruit the participants and collect and analyse the data and the rigour and trustworthiness of the research will also be discussed.

3.2 Researcher Positionality

Positionality is used in the context of the inductive approach to research to reflect on one's own placement within the many contexts, layers, power structures, identities and subjectivities of one's viewpoint (Green and Thorogood, 2004).The focus for this research emerged during the facilitation of an educational session with ultrasound students from a multi-professional cohort. The forum was deliberating professional practice and influencing factors. The students revealed challenging situations that were impacting on their individual clinical practice. It came to light during this session that although these students were enrolled on the same educational programme and were destined to leave the educational institution with a common qualification and common skills, the extent to how this interrelates with their journey into sonography as an occupation was unknown. They will embark on their ultrasound careers from different professional backgrounds with specific philosophies, attitudes, missions, knowledge, and skills. Although there is some homogeneity in the perceived clinical roles within ultrasound, their practice will be also be influenced not only by the different client groups they serve, but also by the environments in which they work. Moreover, these students were also identified as individuals with variety of specific

experiences, preconceived notions, and expectations which will shape their transitional and socialisation process. From these conversations with ultrasound students and from researching the existing literature regarding ultrasound practice, I realised that this is a complex process with many perspectives, which are all interconnected.

3.3 Ontological and epistemological influences

Social research is essentially concerned with exploring and understanding social phenomena which are involved with social, cultural and psychological processes (Bryman, 2012). Social enquiries that are influenced by different conceptions and interpretations of social reality are defined as research paradigms (Kuhn, 1970). According to Guba and Lincoln (1994), a research paradigm is an all-encompassing system of interrelated practice or assumptions in which researchers work to guide the research process. Paradigms are conceptualised by defining the research enquiry along three dimensions, *ontology* (What is the nature of reality?), *epistemology* (How is reality known?) *and methodology* (How does one go about finding out?) (Gomm, 2008; Guba and Lincoln, 1994).

There are three main paradigms that influence the philosophy of the nature of reality and the nature of knowledge construction: positivism, post-positivism and interpretivism (Rossman and Rallis, 1998).The positivist paradigm arose during the early twentieth century from the philosophy identified as logical positivism and is based on rigid rules of logic and measurement, truth, absolute principles and prediction (Lincoln and Guba, 2005). The positivist philosophy argues that there is one social reality and that it is “out there”, “objective” and “real” (Blaikie, 2008). Therefore, valid research can only be demonstrated by the degree of objective proof: in other words, it should be “value free” (Green and Thorogood, 2004). In positivistic research, a specific area of enquiry is defined and the proposed explanation for the phenomenon is tested via empirical means through rigorous quantitative measures using mathematical models, theories and hypotheses. Probably the most important shift away from positivism was towards the end of the twentieth century, into what is termed post-positivism. One of the most common forms of post-positivism is the philosophy of critical realism (Bhaskar, 1998;

Layder, 1993). A central feature of realism is its attempt to preserve a “scientific” attitude towards social analysis at the same time as recognising the importance of individuals’ meanings and in some way incorporating them in research. Furthermore, critical realists add that a key aspect of a realistic project is a concern with causality and the identification of causal mechanisms in social phenomena in a manner quite unlike the traditional positivist search for causal generalisations. From an epistemological stance concerning the nature of knowledge claims, a critical realist believes that there is a reality independent of our thinking and recognises that all observation is fallible and that all theory is revisable. In other words, the critical realist is critical of our ability to know reality with certainty and claims that no knowledge is really “value free” and that values and facts are intertwined and hard to disentangle. Interpretivism, on the other hand, supports the view that there is no one objective truth. Rather than being theory-oriented, interpretivists argue that reality is socially constructed by social actors, amidst many truths and multiple realities, including their subjective experiences of the outside world (Creswell, 2012). The discovery phase of constructivist research represents the researcher’s effort to describe “what’s going on here,” the “here” being the evaluand and its context. According to Walsham (2006), there are no correct or incorrect theories in the interpretive paradigm: he contends that knowledge and meaning are acts of interpretation and there is no objective knowledge that separates the outside world from an individual’s ideas and perceptions of that world

3.4 Research Design Influences

Historically, research within the profession of radiography has been dominated by quantitative methodology underpinned by a positivistic tradition. This focus on quantitative research may stem from the historical dominance of the medical profession in medical imaging and the aim of medical imaging to focus either on the disease process or on the deductive component of the scientific ‘confirmatory’ method (Yielder and Davis, 2009). Adam and Smith (2003) and Castle (2000) argue that radiographic practice and knowledge spans both natural sciences and the humanities and there is a need for more qualitative methodologies to “define more clearly what radiographers do and how they do it” (Adam and Smith, 2003, p.

194). All these authors conclude that there is a need for research to explore the more “human” side of the profession. Consequently, over the last decade, there has been an emergence of more interpretive and naturalistic approaches to research in diagnostic imaging with a focus on areas such as inter/intra-professional issues, clinical practice, cultural behaviours, patient and health delivery issues (Naylor, 2014; Larsson, 2007; Booth 2006; Murphy, 2006, 2001).

Sonographers, unlike radiographers, are not all members of the same profession: they are a heterogeneous workforce, and their work can be grouped either by a particular feature of practice, such as clinical practice, or by academic or specific applications of ultrasound technology, such as obstetrics, gynaecology or vascular medicine. Therefore, to understand internal issues that affect the experiences of newly qualified sonographers, it is essential that research is conducted within an interpretive paradigm to explore the meanings, perceptions and experiences of those involved in the delivery of this service. As the research aim for this thesis is to explore the experience of individuals as they embark on a journey of ultrasound clinical practice about which little was known, a constructivist epistemology was deemed to be the most appropriate. A constructivist epistemology allowed the researcher to engage in subjective exploration of data from a small sample of participants in order to probe deeply into how an individual constructs his or her own reality (Creswell, 2012). Furthermore, it provided the freedom for the researcher to explore specific aspects of the phenomenon that emerge as interviews and data analysis progress. It is important to emphasise that the focus of this research was not the technology itself, but rather the practices surrounding the use of technology and professionals who use it.

Conceptual frameworks are important aids to research design (Maxwell, 2005; Miles and Huberman, 1994) and are invaluable in gaining an understanding of how studies can be informed by and build on existing knowledge or ideas. Therefore, to understand the experiences of newly qualified sonographers and to guide the early stages of the research, a conceptual framework (Figure 6) was developed from my previous experience in ultrasound practice and education and the findings of the literature reviewed. This framework outlines three dimensions that may influence the experience of the newly qualified sonographer and facilitated the discovery

phase of this constructivist research. These dimensions are depicted as settings in which the actions and social interaction of the newly qualified sonographer will occur. The individual dimension is related to how the newly qualified sonographer is influenced by their own biographical experiences, behaviours and interaction. The dimension of institution focuses on the intermediate setting for social and professional activities and is related to the culture and dynamics of the organisation in which the individual practises ultrasound. The professional dimension relates to the wider contexts of professional policy and practice that influence and support professional activity.

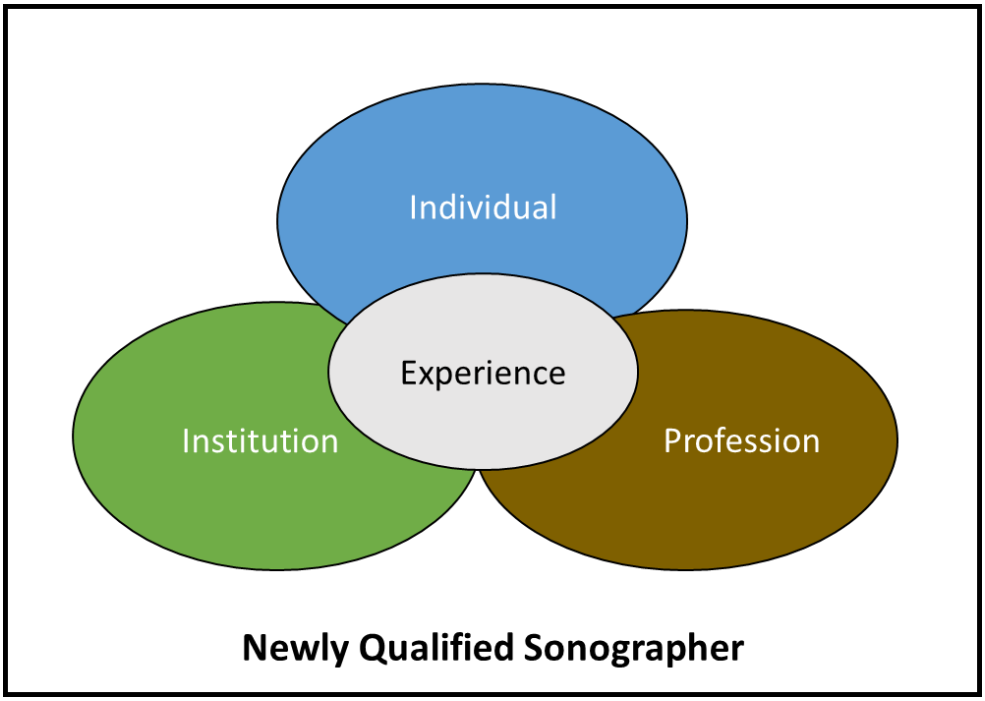

Figure 6: Conceptual framework showing the different dimensions that may influence the experiences of newly qualified sonographers

3.5 Case study methodology

A case study methodology was chosen as a means to explore relevant issues that impact on the experiences of newly qualified sonographers through the lens of this conceptual framework. Case study methodology is frequently used in social science disciplines such as political science, anthropology, psychology and economics as well as practice-oriented fields such as health care, social work,

education and business studies (Yin, 2009; Tellis, 1997).This methodology is useful to capture the complexities of a single case by exploring individuals, relationships, communities, or programs to evaluate role developments and inform public policy (Merriam, 2009; Yin, 2009; Stake, 2005; Hammersley *et al*., 2000).

The initial inquiry into case study methodology led to the discovery of differing views on what constitutes a case study methodology. Case study approaches are shaped by paradigm, study design, and selection of methods, and as a result, case studies in the published literature vary. However, a general definition by various experienced case study researchers (Merriam, 2009; Yin, 2009; Stake, 2008; Huberman and Miles, 2002) is that this approach has to fulfil three basic observations: firstly, the case has to be a complex functioning unit; secondly, it should be investigated in its natural context with multiple sources of evidence, and thirdly, it has to be a phenomenon that is contemporary, in other words one that is existing, occurring, or living at the same time. Yin (2009) advocates case study methodology as the preferred research strategy, especially when `how' or `why' questions are being posed, as it can be considered suitable for the investigation of 'real world' situations, especially for contexts where it is impossible to control potentially confounding variables. Moreover, Yin offers a more scientific meaning of case study methodology as an empirical investigation into a contemporary phenomenon that is "situated within its real life context, especially when the boundaries between phenomena and context are not clearly evident and when the researcher has little control over events" (Yin, 2009, p.18). Dooley (2002) supports the use of case study methodology when the intention is to understand a complex issue whilst adding strength to what is already known through previous research. Thomas (2011), on the other hand, argues that cases are selected because they are the focus of interest and case study methodology may be chosen when the researcher is faced with an issue that is perplexing. Furthermore, he advocates this approach when the researcher has some familiarity with the issues, but might only have a one-dimensional viewpoint based on their own individual role and perspective. Moreover, Thomas argues that case study research often starts with some specialist knowledge, noticing something interesting or unusual which sparks some curiosity. All these research approaches aligned with the motivation of this research. Therefore, by exploring different dimensions of a case, the

researcher will not only be able to provide a deeper and richer view, but may also be able to see where and how these explorations can be taken further to inform current knowledge and understanding and instigate changes. This was particularly useful for the study presented here as it allowed in the exploration of new situations where little is known about the phenomenon and in situations where current theories seem inadequate (Gillham, 2000; Easton, 2010).

3.5.1 Basic principles and characteristics of case studies

All case study researchers agree that the most important element of case study research and what sets it apart from other research strategies is the identification of the case itself. Stake (2005) stresses that the case should be “bounded”, meaning that it should have certain features that occur within the boundary of the case; furthermore, he makes a point that it is the peculiarity and complexity of the single case that allows the researcher to understand its activity within important circumstances. Merriam (2009) defines a case as “an entity”, which can be a program, event, process, institution or a social group. Thomas (2011) defines a case as a “set of circumstances in its completeness, and the case is described by those circumstances” (p.13), whilst Yin (2009) uses the term “unit of analysis”, which he implies is a case, which could be a situation, a bounded system, an event, or even an argument. Wieviorka (1992), on the other hand, characterises a case as having two distinct parts. The first part is that “for a case to exist, one must be able to identify a characteristic unit to be observed”. However, it has no meaning in itself unless the researcher acknowledges the second part, which is “the means of interpreting it or placing it in a context” (p.160).

Another particular characteristic of case study methodology is the use of multiple sources of evidence. These are mainly open-ended or semi-structured interviews and perspectives from different people; documents and archival data, for example e-mails, memos, notes, diaries, websites and media reports (Yin 2012, 2009; Thomas, 2011).This reliance on multiple sources of evidence adds breadth and depth to data collection, and promotes understanding of the phenomenon under investigation through triangulation, contributing to the reliability of the research.

A case study may be based on one case (a *single-case study*), or on several cases (a *multiple-case study*). Gerring (2007) uses the analogy of building a house to explain these two approaches:

> *There are two ways to learn how to build a house. One might study the construction of many houses – perhaps a large subdivision or even hundreds of thousands of houses. Or one might study the construction of one particular house. The first approach is a cross-case method. The second is a within-case or case study method.* (Gerring, 2007, p.1)

On this basis, a multiple case study approach was rejected for this study, as the emphasis for this research was not on comparing clearly different cases and conducting a cross-case analysis (Yin, 2009). Furthermore, Gerring (2007) argues that multiple case studies are likely to explain only a small portion of the variance with respect to a given outcome. He observes that evidence drawn from different cases often leads the researcher to make assumptions about the comparability of concepts and causal relationships across the chosen cases, whilst single-unit case studies, in his opinion, provide cases that are likely to be comparable to one another, given the fact that they are all, by definition, drawn from the same unit (Gerring, 2007). Stake (2005) concurs that one of the primary virtues of a single case study method is the depth of analysis that it offers in terms of detail, richness, completeness and wholeness. A single case study methodology was chosen and the bounded case was represented by the newly qualified sonographers who had graduated within a certain timeframe and who were practising ultrasound after qualification.

To bring richness and diversity to the case, the sonographers were recruited from a variety of professional backgrounds. The evidence was collected from the individual newly qualified sonographers and their work logs. Furthermore, the investigations involved their experiences of ultrasound practice in their “real world”, the context of their practice and their working environment, over which the researcher had no control (Yin, 2009). The data from these sources of evidence was embedded within a single case to allow extensive analysis and a deeper

understanding of the practice of ultrasound, thereby enhancing the insights into this single case.

Yin (2009) also advocates that for in-depth case studies, the researcher should be familiar with the issues being investigated as this will influence the selection of the case to be studied. The case selected for this research represents a “critical case” where there is a clear proposition as well as the circumstances where the proposition is believed to be true (Yin, 2009). The theoretical proposition maintained in this research is that the practice of newly qualified sonographers is shaped by contextual factors such as individual experiences, professional backgrounds, the working environment and their professional relationships.

3.5.2 Final methodological approach

Although case studies have been used by various authors, including Creswell (2012), Thomas (2011), and Green and Thorogood (2004), the final methodological approach for this case study was drawn from the works of the three main advocates of case study research methodology, namely Yin, Stake and Merriam. Whilst they all champion this research methodology, there are subtle differences in their approaches. The approaches advocated by Merriam (2009) and Stake (1995) are situated in a social constructivist paradigm, whereas Yin (2012) approaches case study from a post-positivist viewpoint. He emphasises a more methodological perspective with clear components to the research process, including the research questions, its theoretical propositions, its units of analysis, the logic linking the data to the propositions and the criteria for interpreting the findings. Stake’s (2008, 2005) view, on the other hand, is more grounded in an interpretive paradigm and maintains that this research strategy is more about the case selected and the researcher and their experiences and interpretations and less about the methods, thus allowing the researcher to build and illuminate a clear picture of the phenomenon through explanations and rich descriptions. Merriam’s (2009, 1998) perspective offers a more pragmatic approach, and in her opinion, case studies are an extension of qualitative research and are useful when the focus of the case study has been established, an intensive literature search has been carried out and the problem is well identified. For this study, it was

difficult to maintain and follow one particular approach throughout the research process. A methodological template was needed to ensure the rigour of the research process, whilst also having the freedom to recognise my own experiences and agencies during data collection, data analysis and interpretation. Therefore, a practical stance was maintained in this continuum, using Yin's methodology whilst also drawing on Stake's interpretive approach. Indeed, Brown (2008) reflects that qualitative case studies can be enriched when supported by the pragmatic approach of Merriam, informed by the rigour of Yin and the creative interpretation of Stake.

3.6 Research setting and case selection

To explain the context of the case selected for the research, a brief background to the format of the ultrasound educational programme at the research site and the context of clinical practice of ultrasound relating to newly qualified sonographers after qualification is presented.

The University of the West of England (UWE), Bristol has been successfully offering an MSc programme since 2001. Students can obtain three postgraduate qualifications in this programme. Appendix 3 shows a schematic diagram for the structure of the Ultrasound Programme at the time of this research. The duration of the programme at the time of the research was fourteen months for a PGC, twenty-eight months for PGD and thirty-six months for an MSc. The programme incorporates a blended learning approach which also includes undertaking clinical "hands-on" training at a health care institution which acts as a host sponsor. In practice, this is usually where the student is already employed as a health care professional and in the majority of cases will also be the employing organisation after the student has completed their ultrasound education. Funding for this postgraduate programme is mostly arranged with the individual host organisation, although there are rare cases where the students fund their own education. The newly qualified sonographers, then, depending on their funding, either carry on with their ultrasound education, specialising in other fields of ultrasound practice, or leave the postgraduate programme after fourteen months of studying one

subspecialty. As discussed earlier, the minimum ultrasound qualification required to practise ultrasound in the UK is a PGC.

At the time of undertaking the research, there were thirty new students who were enrolled on the programme. This cohort consisted of professionals from a multidisciplinary background including radiographers, midwives, nurses, clinical scientists and medical doctors. This was a convenient case located at the researcher's university and thus had the advantage of accessibility through the university database of students. Therefore, the case explored was newly qualified sonographers holding a PGC from a specific cohort of the ultrasound educational programme at the University of the West of England. The case was further bounded within a period in time, which was their first year of ultrasound practice following qualification.

Inclusion criteria included participants who:

- Had successfully completed the PGC in medical ultrasound at UWE.
- Were practising ultrasound after qualification.
- Were based within a geographical area accessible to the researcher.

3.6.1 Recruitment

Because of my academic role within the university and the ultrasound educational programme, gaining access to the educational cohort was unproblematic. The university database of students was used to identify the students who were enrolled on the medical ultrasound programme, and who had completed a PGC at the time of this research. Three students had not completed the PGC at the time of recruitment and were therefore excluded: subsequently, a total of twenty-seven students were approached. To avoid any coercion, the university research administration team disseminated the information regarding the research study via the student e-mail system. This included a participant information sheet (see Appendix 4), a questionnaire (see Appendix 5), and a participant consent form (see Appendix 6). If the participants agreed to participate in the research, they were asked to complete the questionnaire and consent form with a preferred method of contact and return this via e-mail. The questionnaire was designed to

gather general data such as primary professional background, place and nature of ultrasound practice and professional status. It was anticipated that this information would facilitate the recruitment stage to identify those individuals who fulfilled the inclusion criteria outlined above.

Recruitment, however, proved to be a challenging experience. There was a very small response rate and out of twelve responses, a total of nine participants were initially recruited. Three participants were not recruited, as they did not fulfil the inclusion criteria. This highlights the limitations and difficulties that can arise for researchers whilst using case study methodology on a small purposive cohort. As the intention for this research was to capture multiple perspectives from a multidisciplinary background, a further three participants were recruited via a snowballing technique (Bryman 2012) where participants successfully recruited suggested others known to them who were members of the same educational cohort and would be eligible. These participants had already been approached initially but had not responded within the time frame. In the end, this proved to be a more pragmatic approach, and it was possible to recruit participants across a range of multidisciplinary professionals. This allowed data collection from multiple perspectives from different professional backgrounds in order to answer the research questions. A total of twelve participants were finally recruited: these consisted of four radiographers, five midwives, two clinical scientists and one medical doctor. There was one early withdrawal. This participant was a busy medical clinician who frequently changed NHS workplaces due to work rotation and was unable to negotiate time for the interview, and subsequently decided to withdraw. Therefore, the resulting data was collected from eleven participants who were practising in seven different NHS Trusts within one region of England.

3.7 Data collection

The experience of each individual newly qualified sonographer was important for this research, as it was set within their own distinctive reality. This meant that to answer the research questions, the most appropriate way to collect data from individuals was to use interviews or focus groups to give an insight into the case. Participatory observation was rejected as a method of data collection, as the focus

of the research was not exploring the sociological culture or participant behaviour as described by case study ethnography (Creswell, 2012; Thomas, 2011). Furthermore, this data collection method would not necessarily have captured the individuals' experience and attitudes. There is also a recognised limitation that scheduled observation sessions can bias the data in terms of behaviour of the participants (Fetterman, 2010). Moreover, the work undertaken by the sonographers requires interactions with patients and their families and involves close physical examinations therefore the presence of a researcher in the scanning rooms and immediate working environment would have the potential to compromise sonographers' professional relationships with their patients and their multidisciplinary teams. A focus group was also considered but was subsequently rejected, as there was a possibility that some participants would be reluctant to discuss more sensitive issues within a group setting, and it would have been challenging to encourage participants to open up and share their experiences (Barbour, 2007). In addition, scheduling a focus group session at a convenient time and place would have been difficult, given the availability and the geographical spread of the recruited participants. Interviews and work log diaries were chosen as data collection methods after considering the information needed to answer the research questions and practicalities in obtaining this data. Interviews are commonly used in qualitative social research to explore the individual's own perceptions, interpretations, experiences and practices (Silverman, 2008). Participants were contacted using the details that were given in the consent form. The time and place of interview was negotiated via either e-mail correspondence or telephone conversation. The interviews took place at venues suggested by the participants: these included their workplaces, homes and university rooms. The interviews were semi-structured, lasted approximately an hour and were digitally recorded. The recorded interviews were personally transcribed per verbatim before the analysis stage.

3.7.1 Interview pilot and process

To maintain consistency and provide some guidance to the interview process, an interview protocol was designed (see Appendix 7). This was a set of prepared questions designed to cover the relevant topics that would allow appropriate data

to be gathered in order to answer the research questions. The protocol was piloted by conducting an interview with a work colleague. As well as ensuring validity of the interview protocol, for a naïve interviewer like myself, this process also gave the opportunity to rehearse the questions and develop skills such as probing, seeking clarification and whilst encouraging the participant to open up, to also keep a reasonable focus throughout the interview.

However, during the actual interviews probing questions or open questions were also incorporated to gather richer data and also to give opportunities for participants to discuss issues that they felt were relevant. Before each interview was conducted, the participant was given a copy of the information sheet again and consent was confirmed. The interviewing style adopted was ‘active interviewing’ (Holstein and Gubrium, 1997), in which the contribution of both parties to the production of the interview content was acknowledged. The ‘active interviewer’ asks questions, but, more importantly, helps to create a conversational atmosphere in which the interviewee feels relaxed and able to talk freely with minimal interruption. Gubrium and Holstein (2002) caution that in the naturalistic setting, “going native” and being too close to the action can result in the potential to overlook the more interesting aspects of what is going on. Ritchie and Lewis (2003) emphasise the importance of 'situating' the perspective of the researcher as this encourages a more reflexive approach to research settings and findings rather than the traditional approach in which the researcher takes an authoritative, 'neutral' stance. There were also opportunities to utilise the face-to-face nature of the interview to seek immediate clarification or extension of the participants’ thoughts and access nonverbal cues such as gestures and facial expressions (Speziale and Carpenter, 2007). Any misunderstandings were identified and clarified during the interviews.

Duchscher (2008) makes a valid point that the timing of the interviews when researching newly qualified health care practitioners is crucial. In her study of newly qualified nurses, she observed that for health care professionals, the initial four to six months of professional role transition is a process of gradual adjustment which is mediated by changing roles, responsibilities, relationships and knowledge levels. Therefore, the interviews for the study presented here were conducted after

a minimum of six months' practice following the ultrasound qualification. This allowed time for the newly qualified sonographers to establish their ultrasound practice within the context of their normal working environment. Participants were asked to talk about their experiences of being newly qualified, their professional roles and responsibilities and professional practice. The interviews also explored the context of their local working environments, their relationships with peers and the wider professional communities and their perceptions of professional bodies relevant to their professional backgrounds.

3.7.2 Work logs

In case study methodology, it is important to incorporate events within the "real life" context within the data collection plan (Yin, 2009). The purpose of the worklogs was to glean any additional data that may have been missed at the interview. Therefore, the participants were also asked to consent to completing a work log for a single day within three months after the interview. The instructions for the workload log was given verbally at the end of each interview. Participants were asked to record their normal working activities and in particular any incidents that they felt affected their normal work roles and responsibilities and any challenges they encountered as newly qualified sonographers. They were asked to email this account to the researcher. The timing and submission of the workload logs was negotiated with the participants depending on factors such as annual leave, part time work and the individual circumstances of their professional practice. The emails accounts from the work logs were "cut and pasted" onto a word document to facilitate the coding stage.

3.8 Analysis

Bryman (2012) observes that whilst theory and concepts are developed prior to undertaking a study in quantitative research and confirmed by the data acquired, qualitative research is far less driven by this approach and the analysis of qualitative data is more exploratory and inductive. The data collected from the interviews and work logs was textual in nature and the analysis process started with some initial inductive coding. The codes were then collated into subthemes and main themes that would answer the research questions. Braun and Clarke's

(2006) six phases of thematic analysis (Table 2) were followed, as this provided a flexible structure to initially code and subsequently re-visit the data.

3.8.1 Generating codes, subthemes and themes.

After familiarisation with the data during the initial reading of the whole transcript, the coding was achieved by re-reading the transcripts line by line. Where information was seen as relevant to the research questions, a code was assigned manually to the words, phrases and sentences within the transcripts that described the meaning of the text segment. The highlighted codes were then reviewed and those with similar meanings or repeated frequencies were then assigned into subthemes. At this stage, not all codes that were created were used. Bryman (2012) highlights the issue of generating too many codes in the early stages of analysis and recognises this as an inevitable consequence of inductive research. However, he also argues that coding is an iterative process which requires revisiting the data and the refinement of initially coded data into different and new subthemes. Furthermore, he cautions that this process does not necessarily equate to analysis and the researcher should focus on the significance of the coded data in relation to the context and the overall research questions and research literature.

Eight subthemes were eventually identified that revealed an emerging pattern and interconnections. The subthemes were then clustered together by connecting ideas and meanings across all data sets and three major themes were generated. These themes related to processes such as transition, role development and maintaining competencies and credibility. The themes created depicted the trajectory of the newly qualified sonographers during their first year of ultrasound practice.

Table 2: Phases of Thematic Analysis (Braun and Clarke, 2006)

	Phase	**Activity**
1	Familiarizing with the data	Transcribing, reading and re-reading the data, noting down initial ideas.
2	Generating initial codes	Coding interesting features of the data and collating relevant data into each code.
3	Searching for themes	Collating the codes into potential themes, and gathering data relevant to each theme.
4	Reviewing the themes	Checking that the themes work in relation to the coded extracts and the entire data set. Generating a thematic map of the analysis
5	Defining and naming the themes	On-going analysis to refine the specifics of each theme and the overall story the analysis tells, generating clear definitions and names for each theme
6	Producing the report	Final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

The first theme focused on participants' transitional journey from initial reaction to adjusting to the reality of practice and their new roles. The second theme was related to how they developed their roles and practice, their experiences outside the reality of transition and the organisational issues relating to role development. The third theme addresses the wider issues of maintaining their skills, establishing credibility and their relationships with their peers and the wider community. At this stage, quotes that were representative of these themes were inserted into a thematic framework for each participant. In the final report, the number of quotes signifying the same theme were reduced and only a selection were included to represent the words of the participants and the themes that were generated. A framework approach, as described by Ritchie and Lewis (2003), was then undertaken to organise the data (see Appendix 8): this is a systematic approach to

thematic analysis using “a matrix-based method for ordering and synthesising data” (p. 219). Thematic charts were then developed under each theme with relevant data extracted from the interview transcripts and the work log diaries and recorded under each of these themes. Although relevant data that was needed to answer the research questions was embedded in this initial analysis process, flexibility was also given to explore new and unconsidered issues which arose during the data collection and analysis process. Ritchie and Lewis (2003) elaborate on the issues of analysing qualitative data by arguing that although the main options to gain knowledge are either through the inductive process, which explores patterns and association derived from the data, or the deductive process, whereby propositions or hypotheses are reached theoretically, in reality, both deduction and induction processes are involved at different stages of the qualitative research process. Schutt (2006) further concurs that although researchers do not always set out to use both inductive and deductive strategies, new information can arise in the course of the inquiry, and that by allowing the flexibility to use both approaches, a more comprehensive understanding of the topic can be gained.

3.9 Ethical considerations

Research Governance dictates that research should be conducted with standards of good practice and that the four main ethical principles of research are upheld. These are autonomy, which is respecting the rights of the participants, beneficence, which means doing good, non-malfeasance, which implies not doing harm, and justice, which relates to equity and fairness (ESRC, 2010). The DH issues guidelines for ethical committees for approval of any studies that involve users or staff of the NHS, primarily to protect the participants but also to ensure that the research designs are appropriate for the research questions and conclusions (Green and Thorogood, 2004). Following the publication of the Governance Arrangements for Research Ethics Committees (GafRec) harmonised edition in May 2011, which states that research involving NHS staff by virtue of their professional role does not require NHS ethical approval review, ethical approval was gained from the UWE research ethics committee (see Appendix 9)**.**

Consent and confidentiality are the core principles that inform the responsibilities of the researcher to the participants of the study.

Participants were at liberty to decide whether or not to take part and to withdraw from the study at any stage. Informed consent for this study was obtained by providing all potential participants with an information sheet regarding the research. To promote impartiality, the research documents were emailed via the research administration office. The information sheet included the purpose, methods and intended possible uses of the research, and emphasised the right to withdraw at any time during the study process. Participation was voluntary and informed consent was accepted as given by the participant when they returned a signed consent form on which they indicated the preferred way of contact either by telephone number or personal email. The collected data was processed in accordance with the subject's rights and was kept safe from unauthorised access, accidental loss or destruction (Data Protection Act, 1998). Electronic data was stored on a university computer in a locked office and on an encrypted data storage device. All electronic data was password protected. Paper copies with the participants' names and locations were stored in the researcher's locked office. Data will be kept for six years after the completion of this study in accordance with university guidelines for the storage of confidential data.

Confidentiality has been maintained by anonymising participant details in the thesis. Several authors caution that this can also result in an ethical dilemma if bad practice is uncovered, raising the issue of whether this should be reported and whether intervention is necessary (Hobbs and May, 1993; McGarry, 2007). Fortunately, there were no serious incidents during this case study research where intervention was deemed necessary, however, some less than ideal practice was reported by the participants and in these cases, they were encouraged to report these to their managers.

Maintaining anonymity in qualitative research is more challenging than in quantitative research, which usually involves larger numbers of participants (Silverman, 2008). When researching small groups of participants within a small closed setting, it is acknowledged that the researcher and the participants will

know each other. Furthermore, there were additional considerations in this research regarding situations where the researcher revealed issues within a particular context; the information has the potential to be recognised as coming from a distinctive source within a researched group (Parry and Mauthner, 2004). This study sought to gain insights into the experiences of participants within a chosen case study, and given that this case can potentially be identified by the site where the research was undertaken within a certain time frame, it was challenging to maintain true anonymity. Moreover, the nature of the case was that it was a small group of newly qualified sonographers with individual disciplinary roles and status; therefore, there is a possibility that even a small demographic detail will have the potential to reveal a participant's identity. Therefore, where it was relevant, participants were identified with codes that relate to their professional background and their individual working roles. As there was more than one participant in each category, it can be argued that anonymity has still been preserved to a reasonable extent.

3.10 Rigour and trustworthiness

The trustworthiness of qualitative research is often questioned by positivists, perhaps because their concepts of validity and reliability cannot be addressed in the same way in naturalistic work (Guba and Lincoln, 1985). As Bryman (2012) maintains, qualitative research is neither objective nor "value free"; instead, the researcher is a central figure who influences the collection, selection, and interpretation of data. Meanings are co-constructed between the researcher and the researched within a particular social context, and research is regarded as a joint product of the participants, the researcher and their relationship. Qualitative research is about subjective reality and the complexity of individuals' experience and seeks to represent rich and in-depth meanings. The aim is to capture and reflect on the consistencies and parallels of the emerging themes and nuances (Bryman, 2012; Broom, 2005).There are, however, certain measures that are observed to maintain the trustworthiness and rigour of the research. Shenton (2004) and Guba and Lincoln (1985) propose four main criteria that should be considered by qualitative researchers in pursuit of a trustworthy study. These are credibility, which demonstrates confidence in the 'truth' of the findings,

dependability, clarifying that the findings are consistent and could be repeated, confirmability, which addresses the degree of neutrality or the extent to which the findings of a study are shaped by the participants and not by the researcher's bias, motivation or interest, and transferability, which shows that the findings have applicability in other contexts. To further promote integrity and trustworthiness, Finlay (2002) proposes the use of reflexivity as a central tenet where researchers engage in explicit, self-aware analysis of their own role within the research process. According to Finlay (2002), reflexivity can often be confused with reflection. She proposes that these concepts are perhaps best viewed on a continuum where both ends are acknowledged to be important across all stages of a project. At one end of the scale, reflection can be understood as "thinking about" and usually occurs after the event has occurred. At the other end, reflexivity taps into a more immediate, continuing, dynamic, and subjective self-awareness. These central tenets have been blended in Figure 7.

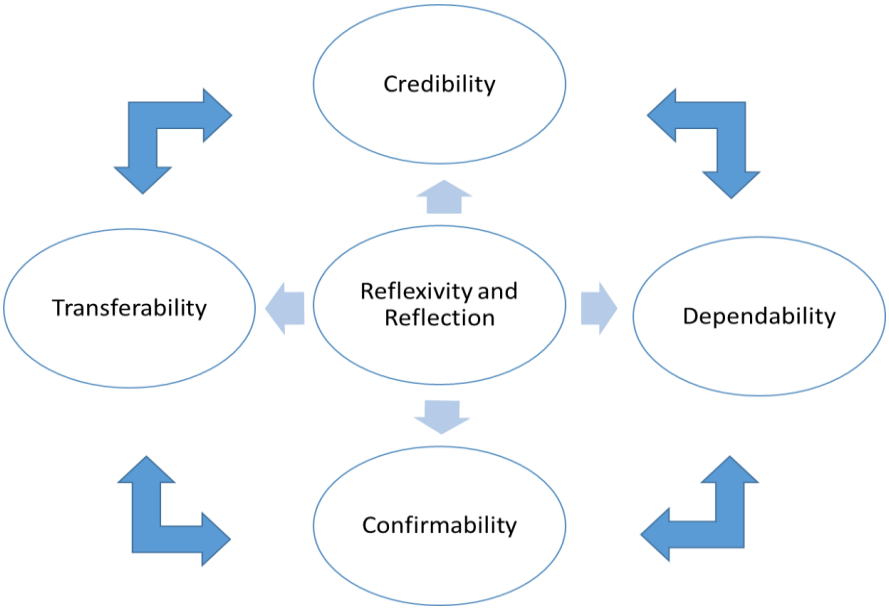

Figure 7: Criteria for trustworthiness of qualitative research (Finlay, 2002; Guba and Lincoln, 1985.)

3.10.1 Credibility

Credibility can be observed in explicit transparency which states the research methodology, the perspective and views of the researcher and the integrity of the participants in the research process. These are discussed below.

Research methodology

Hallberg (2013) argues that methodological credibility must be considered if case study research is to make a valued contribution to the field of qualitative inquiry. This study was conducted with the use of a well-recognised case study methodology, and as discussed above, is placed within a constructivist paradigm. The intention was to reconstruct the participants' understanding of the social world. Previous literature and the researcher's experience were drawn on to develop an informed theoretical proposition and a conceptual framework to guide the case study.

Further credibility was promoted by peer debriefing and discussions of the findings and conclusions with supervisors, other academic staff and researchers at forums such as supervisory meetings, research study days and professional and research conferences. Peer debriefing provided opportunities to review the emerging evidence and explore "aspects of the inquiry that might otherwise remain only implicit within the inquirer's mind" (Guba and Lincoln, 1985, p. 308).

Researcher

My personal background is important in this case study methodology, as I am the major instrument of data collection and analysis (Yin, 2009; Stake 1995). In this case study, the 'lens' through which the research was seen and interpreted was clearly stated by providing my positionality and background as the researcher as well as my professional relevance of this research. Furthermore, I kept a reflective diary to note any occurrences that might influence or change the research process. Reflexivity allowed me to constantly scrutinise my position within the research process.

Participants

The case chosen represented newly qualified sonographers from a single educational cohort. The participants in this study were recruited because they could inform the aims of the study and answer the research questions. To avoid coercion, the university research administration was approached to send out the invitation letters. In the recruitment process, I made every effort to ensure that participants made an informed decision about taking part in the research and did not feel obliged to do so. The participants were recruited voluntarily and as such made genuine decisions regarding participation and the right to withdraw. The participants who were recruited using the snowballing method (Bryman, 2012) were members of the same educational cohort and fulfilled the inclusion criteria of this case study.

Member checking

Guba and Lincoln (1985) consider member checking to be the most important factor to uphold a study's credibility. The act of capturing data may shape what is said and in turn influence how it is analysed (Miles and Huberman, 1994). Within a constructivist paradigm, rather than aiming to determine whether the research's interpretation was 'correct'—which would be difficult because the interpretation integrates multiple perspectives—member checking provides an opportunity to further explore the tensions and complexities of the proposed interpretation (Bryman 2012). Member checking in this study took place actively during and immediately after the interviews: this involved summarising the content of the interaction and seeking clarification from individuals about representing the essence and spirit of what was covered. Van Maanen (1991) cautions that when making sense of field data, one cannot simply accumulate information without considering what each bit of information represents in terms of its possible contextual meanings. Therefore the participants were asked to offer reasons for particular observations made during the interviews. Whilst it was important to ensure that the thoughts of the participants were represented, the depth and the breath of the data gathered meant that decisions had to be made around what was important to include to answer the original research questions and what could be omitted.

3.10.2 Dependability

Dependability refers to the stability or consistency of the inquiry processes used over time, particularly in collecting the data, interpreting the findings and reporting results. To ensure that the findings, interpretations and conclusions were supported by the data, the codes generated from the data were reviewed with members of the supervision team. Furthermore, Shenton (2004) recommends the use of site triangulation where appropriate: this not only reduces the effects on the study of particular local factors which may influence the results, but also provides a more stable view of reality based on a wide spectrum of observations. The sampling of a range of professionals from different organisations also provided the diversity that underpinned Dervin's above mentioned concept of "circling reality" (1992, p. 7), which proposes that when similar results emerge at different sites, the findings have greater reliability. In this case study, the evidence was sought from multiple internal sources, thereby collecting individual viewpoints and experiences that could be triangulated to provide a more consistent picture.

3.10.3 Confirmability

Establishing confirmability includes keeping an audit trail to reveal the transparency of the research process. For this study, the audit trail for the data included digitally recorded interviews, transcriptions stored as word documents, emails from the participants for the work log diaries and my reflective diary. Shenton (2004) also recommends the use of identifiers that anonymise the participants but still reveal relevant information to the reader when presenting the findings. The use of an interview schedule allowed the interview process to be consistent and focussed. Frameworks were used to code and thematically analyse and organise the data. Where possible, confirmability was strengthened by making links with existing literature and theories in the discussion chapter to corroborate and support the interpretations of the study. Furthermore, limitations of the research were acknowledged and will be discussed later in the thesis to allow integrity of the research results to be scrutinised.

3.10.4 Transferability

In qualitative research, the term transferability means "repeatability" or "consistency" and is concerned with the extent to which the findings of one study can be applied to other situations (Merriam, 2009) . Flyvbjerg (2006) observes that a frequent criticism of case study research is that the findings are not widely applicable in real life situations, and therefore cannot be statistically generalised. However, according to him, a “force of example” is equally important when generating new knowledge.

> *One can often generalize on the basis of a single case, and the case study may be central to scientific development via generalization as a supplement or alternative to other methods. But formal generalization is overvalued as a source of scientific development, whereas ‘the force of example’ is underestimated* (ibid, p. 425).

Yin (2009) also argues that for case study methodology, the emphasis is not on statistical generalisation but rather on analytical generalisation. Moreover, he contends that analytical generalisation is possible when the case study involves observations which can be generalised to some broader theory rather than to a whole population. In this case study research, with just one case, there is no assumption by myself that if the inquiry were to be repeated by different people at a different time and a different place, then the findings would be the same; however, the data generated facilitated a greater understanding of the phenomenon. Furthermore, as Stake (1995) maintains, the degree of transferability also lies in the interpretations of the reader and not only the researcher, whose obligation in this regard is to provide sufficient detail to allow readers to make their own judgements. Therefore, if practitioners believe their situations to be similar to that described in this study, they may relate the findings to their own experiences (Stake, 1995). Further reliability was upheld by providing the context and boundary of the case and a thick and thorough description in order to contextualise the data, which will also allow the reader to make inferences about contextual similarities and differences (Polit and Beck, 2010; Yin, 2009).

3.10.5 Reflexivity

This section offers my position and perspective of the research process and therefore will be written as a narrative.

Throughout this research, I was very aware of my position and my multiple agencies; this was both an advantage and a disadvantage for me. In my professional role as a practising sonographer, I have been involved in supporting newly qualified professionals, as well as undertaking collaborative work with professional bodies such as CoR and workforce development groups to inform practice. My experiences as a member of national steering groups for developing national and local professional practice guidelines have given me an insight into the issues that face the sonography workforce. I am also an academic involved with the education and training of sonographers. I was already known to the participants whom I recruited and interviewed. I had, during some stage of their ultrasound education, facilitated teaching sessions with them and had an established relationship with them as an ultrasound expert and educator. Therefore, I was very aware that this might have had implications for the research process in terms of subjectivity and bias. Finlay (2002) proposes that in these scenarios, the researcher must also be reflexive, constantly examining the impact of his/her position, perspective and presence during the research process and scrutinising personal responses and interpersonal dynamics.

My prior relationship with the participants could have influenced the recruitment process. I was mindful of the traditional asymmetrical power relationships that Seidman (2006) reports between educators and students and how this asymmetry could bias the research process and influence students' choice of whether or not to participate. Furthermore, my initial fear was that this relationship might also inhibit participants' responses during the data collection stage. In reality, this pre-existing professional relationship with participants was an advantage, as there was already a foundation to build on to further develop trust, which allowed for greater disclosure, mutuality and reciprocity between myself and the participants.

Given my background, it was impossible for me to be truly objective and adopt the stance of a complete outsider. Corbin Dwyer and Buckle (2009), in their discussion

of being an insider or outsider in qualitative research, recognise that researchers who study a group to which they belong have an advantage because they are able to use their own experience and position to gain more detailed insights into the participants' experiences and opinions; however, they also argue that outsiders are more likely to be perceived as neutral and consequently to be given more information by the participants, and therefore that they might have a greater degree of objectivity and accuracy without the danger of distortion of the data. Broom (2005), on the other hand, supports the view that the position of the researcher invariably has an impact on any research project, not only in shaping the methodological and theoretical foundations but also to some extent in the final analysis and interpretations. Mullings (1999) takes a more pragmatic stance by observing that in reality, the position of an insider/outsider is not a fixed attribute; it is seen as a boundary that is not only unstable but also interchangeable dependent on the positionalities of both the researcher and the participant in time and through space. The interpretive research approach towards the relationship between theory and practice is that I could not assume a value-neutral stance, and will always be implicated in the phenomena being studied. As Orlikowski and Baroudi (1991) observe, there is no direct access to reality unmediated by language and preconception. Rolfe and Davies (2009) propose that for research conducted to expand knowledge and inform practice via a doctorate study, the researcher practitioner will have a preconceived notion of what exactly the improvement of practice means. Therefore, my experience as a practitioner is of equal or greater importance to the experience as a researcher. This was evident throughout my research process. Very early in the data collection process, during the first two interviews, I realised that it was impossible to take an outsider role, as participants were associating with me openly and comfortably relating to me using language and terminology which perhaps a non-sonographer as an interviewer would not comprehend.

The following excerpts illustrate the "jargon" and abbreviations that only a sonographer or a medical practitioner would understand:

> *"…it's so stupid, but it was about 6 or 7 months into the course before I could work out what hyperechoic and hypoechoic meant"*

"I had just done an EPAC clinic, and again found a 9 weeker with no FH"

Corbin and Strauss (2008) discuss the nature of sensitivity in the research process, particularly when adopting the role of an insider. They argue that professional experience can enhance sensitivity, and can enable the researcher to understand the significance of the data and synthesise the concepts more quickly. However, they also emphasise that although it is important to always compare knowledge and experience against the data, the researcher must not lose sight of the data itself. It is not necessarily the researcher's perception of an event that matters but rather what the participants say or do that is important. Gubrium and Holstein (2002) also highlight that this naturalistic approach to research includes focussing on what information the participant discloses to the researcher and understanding how they see their own reality and what things mean to them. During the participant interviews, there were situations where I needed to guard against assuming that just because we shared the same medical language and the same type of job, we would also share the same understandings. This would have meant that I might have missed instances where there were differences. This became apparent during the transcription stages of the first two interviews, which I carried out myself very soon after the interviews. There were comments like:

"You know what I mean, you as an educator will realise that…"

"I don't need to tell you; being a sonographer yourself - you know how the system works…"

In my initial naivety, I did not pursue these comments further during the immediate interviews; I assumed that I knew exactly what the participants were saying. I quickly came to realise during the transcription stage that I had no real perception of what the participants were trying to express and I needed to be clear that what I understood was in reality what the participants thought I understood. This was an important reflexive moment for me, as it reinforced the fact that interview data is ultimately co-constructed and that meanings are produced through a dialogue

between two people rather than being objective accounts of particular events (Broom, 2005). Hence, for subsequent interviews, I usually followed these comments with further probing, such as:

> *"Just to clarify my understanding, can you explain what you mean?"* or *"Can you give me an example of what you mean?"*

Ritchie and Lewis (2003) emphasise the importance of 'situating' the perspective of the researcher. This encourages a more reflexive approach to research settings and findings rather than the traditional approach in which the researcher takes an authoritative, 'neutral' stance. This also supports the views of Brewer (2004) who contends that reflexivity establishes the researcher's integrity, which is part of good research practice.

3.10.6 Reflection

The use of a fieldwork diary allowed for reflections in terms of my own values and interests in the understanding and interpretations of the research process (Silverman, 2008). Personal reflections on the research process are presented below to reveal some aspects of the thought process as the research unfolded.

Reflections on the interview process

I encountered strong emotions during the interviews from five of the participants, such as crying, eyes welling up, looking visibly upset and long periods of silence. These participants went on to reveal very difficult and negative experiences during their first year of practice. It was challenging for me to detach from the situation. I had to learn to cope with silences during the interviews. I also had to keep an emotional distance and not intervene. This experience also gave me a feeling of being in a privileged position, and of appreciation for the input they had in my research experience. They had accepted my position and given me an insight into their negative experiences. They wanted an opportunity to be heard and for their experiences to be recognised.

Corbin and Morse (2003) discuss the practice of reciprocity in the interview process. They argue that an interview is an exchange whereby the participants share intimate information and the researcher gives something in return. In their opinion, participants who agree to participate in a study usually do so because they want something in return. For example, they want validation on a particular aspect of their action, to make sense out of events or to conquer fear or shame, or they need to unburden and there is no one else to whom they can turn to tell their story. One newly qualified sonographer chose to be interviewed during her lunch break. It was apparent when I arrived to start the interview that she had just completed a very challenging ultrasound scan and there was no immediate mentor support available. She was visibly very upset and sought some level of clinical verification for her actions. She asked for my opinion regarding patient management and image interpretation and whether she had made the right decisions. As an experienced sonographer and having had experiences as a mentor in my own clinical practice, it was difficult for me to keep a distance and not to offer support and advice. I had to consider my position as a researcher and not a sonographer in that setting; however, this proved difficult for me and eventually we had a debrief session before commencing with the interview.

Reflections on the analysis process

I was initially overwhelmed by the volume and depth of the data. I was too close to the participants and the data that was generated. Debriefing with my supervisors was instrumental at this stage. They advised me to continually ask myself whose view I was representing and to justify how I generated the themes and subthemes from the transcribed data and consider what was relevant to answer the research questions. I had intended to arrange the themes in relation to the contexts discussed in the conceptual framework (see Figure 6); however, as the data analysis process evolved, it was apparent that some themes were complex and multi-contextual. After discussion with my supervisors, I revisited the Braun and Clarke thematic analysis framework, particularly phase four and five, to review the subthemes by looking for similarities and interconnections between the concepts. I then redefined each new theme. This systematic approach to data analysis was invaluable for me as a novice researcher. On reflection, it seemed more logical to

present the data under the generated themes as a narrative of the participants' experiences.

Reflections on how to anonymise the participants' identity

I considered using pseudonyms so as not to distract the reader from the human aspect of this case; however, to understand the experiences of the different participants, it was important to portray the context of each participant's comments in terms of their professional background and the nature of their work, and therefore I decided to code the participants to portray their roles and work status.

3.11 Summary of Chapter

This chapter has set out the methodology and underpinning philosophical approach to the research design of this study and provided justifications for the use of a qualitative case study methodology. The methods of recruitment, data collection and analysis have been discussed. Strategies undertaken to promote the rigour and trustworthiness of the research are stated. The influences of my positionality are also presented in terms of reflexivity and reflections on the research process. In the next chapter, the case study findings will be narrated under each core theme with data extracted from the transcribed interviews and the individual work diaries.

Chapter 4: Case Findings

4.1 Introduction

In this chapter, the results of this research are conceptualised by presenting an overview of the case relevant demographics followed by the findings under each theme and its associated subthemes. The data were coded using the analysis framework set out in Appendix 8. This narrative highlights the similarities and differences in the experiences of the participants from a multidisciplinary perspective. The data include direct quotes and work diary entries to provide a rich description of the experiences of the newly qualified sonographers.

4.1.1 Overview of the case

The case included students from a single cohort who were enrolled on and had successfully completed the UWE ultrasound educational programme. Table 3 gives an overview of the participants' backgrounds, health care experience and work roles. Their experience in previous health-related careers ranged from three years to twenty-two years. For one participant, this was a first health care career move. During the interview phase, the time in ultrasound practice for participants after qualifying in ultrasound was between nine months and one year. The results showed that the participants had a mixture of contractual agreements. The participants were employed to work in various locations such as radiology departments, antenatal clinics, emergency walk-in clinics such as Early Pregnancy Assessment Clinics (EPAC), maternity and gynaecological wards and vascular ultrasound clinics. Of the eleven participants, four midwives, three of whom were also managers, were practising in a dual role, having both midwifery and ultrasound responsibilities, while one midwife was working solely in ultrasound with no midwifery commitment; of the four radiographers, three were practising in a dual role, two of whom participated in on-call weekend duties in radiography; for the two clinical scientists, ultrasound was their sole occupation. This showed that they were working in different environments with accountability to different managers during their normal working time. Of the eleven participants, six were undertaking further studies for a PGD in medical ultrasound. Three of these had

further plans to continue to a Master's Degree. Five participants had exited at the PGC award.

Table 3: Identifying codes and a summary of the professional backgrounds, health care experiences and work roles of the participants.

Identifying Code	**Description of professional background.**	**Description of the clinical setting and role**
PT1	Midwife with eight years' midwifery experience	District General Hospital Role involves both ultrasound and midwifery
PT2	Radiographer with eleven years radiography experience	District General Hospital Role involves both ultrasound and Radiography
FT3	Radiographer with seventeen years' experience, including radiography, CT and MRI	District General Hospital Role involves full time ultrasound
PT4	Radiographer with three years' radiography experience and five years' veterinary nursing experience	District General Hospital Role involves both ultrasound and radiography, limited to on-call commitments
PT5	Midwife with twelve years' midwifery and nursing experience	District General Hospital Role involves ultrasound, midwifery and management
PT6	Radiographer with nine years' radiography experience, including CT and Dual-energy X-ray absorptiometry (DXA previously DEXA.)	Teaching Hospital Role involves both ultrasound and radiography, limited to on-call commitments
FT7	Clinical Scientist with five years' experience in sports science.	District General Hospital Role involves full-time ultrasound
PT8	Midwife with twenty years' experience of nursing and midwifery	Teaching Hospital Role involves ultrasound, midwifery and management
PT9	Midwife with twenty-two years of midwifery and nursing experience	District General Hospital Role involves ultrasound, midwifery and management
FT10	Midwife with nineteen years' midwifery and nursing experience	District General Hospital Role involves full-time ultrasound
FT11	Clinical Scientist with three-year science degree.	District General Hospital Role involves full-time ultrasound

Part-time participants (PT) defined in this thesis were sonographers who practised as dual professionals having both ultrasound and other professional roles relating to their primary profession. Full-time participants (FT) were sonographers whose role involved solely ultrasound. The numbers relate to the chronological order of their interviews.

4.1.2 Themes

Three main overarching themes arose from the data analysis and were associated with processes such as transition, role development, and maintaining competency and credibility. The eight subthemes related to reality shock, role adjustment, role contribution, role (re)definition, transitional support, maintaining skills, professional relationships, emerging occupational identities and professional recognition and regulation. The themes and subthemes are outlined and described in Table 4, below.

Table 4: Themes, Subthemes and Definitions

Theme	**Description**
Transition	This theme relates to the transition journey of the participants; the subthemes are related to the different stages of the journey. These include the initial reaction to the reality of practice, role adjustment and role recognition.
Reality Shock	Negative and positive experiences, lack of experience, bridging the theory/practice gap, coping with workloads, feeling incompetent, no time to reflect, being newly qualified.
Role Adjustment	Adapting to new roles, working individually, being prepared, encountering different social structures and clientele, breaking bad news, decision making, dealing with complex challenging scans, accountability, time management
Role Contribution	Gaining confidence, seeing the bigger picture, challenging bad practice.
Role Development	This theme relates to the different facets of role development experienced by the participants during their initial journey. The subthemes relate to how the participants defined and redefined their roles and the support they experienced during their transitional period.
Role (re)definition	Role negotiation, role fragmentation, role ambiguity and conflict, different organisational structures, emotional role conflicts, lack of clarity, role expectations from others, lack of organisational infrastructure.
Support during transition	Frustration, seeking advice, lack of support, experience of formal/informal mentorship, preceptorship programmes, staff shortage, other training commitments for departments.
Maintaining Competency and Credibility	This theme relates to experiences of the participants in maintaining professional credibility and competency. The subthemes relate to maintaining skills for clinical competency, maintaining professional credibility amongst their communities and the participants' perceptions of professional bodies and their influences.
Maintaining skills	Loss of traditional skills, maintaining dual skills, job rotations, keeping up with technological/clinical advances, opportunities for CPD, self and future career development, job uncertainty.
Professional relationships and emerging occupational identities	Multidisciplinary working, knowledge exchange, professional tensions, establishing own identity and credibility amongst peers/managers, Them and Us.
Professional Recognition and Registration	Recognition of role from peers, recognition from professional body, influence of professional bodies on ultrasound-specific professional practice, support/guidelines/policies.

4.2 Transition

The transition period is a formative period where the knowledge, skills and attitudes acquired during a programme of education are applied in practice (Duchsher 2009). During this critical period, newly qualified practitioners not only consolidate their skills but also develop full competency in their new roles. Therefore, entering into new practice in any profession can be a major challenge to newly qualified practitioners. The experience of transition from the status of a postgraduate student to being newly qualified was explored under this theme. The subthemes relate to how newly qualified sonographers coped with the reality of practice and adjusted to their new roles amid different social and professional structures, including developing decision-making skills, dealing with challenging situations and working individually.

4.2.1 Reality shock

It was clear from the case that the majority of the participants found the initial period during which they were coping with the reality of practice and trying to adjust to their new roles intense and overwhelming. When they were asked to describe their experiences immediately after qualification, the participants reported negative experiences, with words like "*terrified "*or *"scared"* appearing frequently in the interviews. Other manifestations expressed included "*a roller coaster going up and down",* "*adrenaline pumping and high state of anxiety"* and *"I have lost so much weight since doing ultrasound"*.

These revelations expressed above were related to a number of factors, the main ones being a lack of experience and bridging the gap between theory and practice. There were feelings of self-doubt or incompetence when initially faced with working without supervision.

> *The main thing I've been struggling with is knowing whether it is my incompetence to get something or whether it really is difficult – you automatically assume 'I'm new so it must be my fault'.* Midwife PT1

When you are a trainee, and working with another qualified sonographer in the room, it is completely different – they say it is fine, so I think, 'ok it's fine' – but when you're sitting down and writing your own reports, you're thinking about it, you go home, you fall asleep, you wake up thinking about it, you come back, you think about it a bit more and so you know my colleagues tell me that sleepless nights come with the job. Radiographer PT6

[I] think it was really difficult and then you're put into a situation where you're just scanning, scanning and scanning, and you're thinking 'My goodness, am I doing this right, is this correct?' Radiographer PT4

When asked to comment on their activities and workloads in their new roles, the majority of the participants were not only consumed by the initial allocated workload, but also struggled to keep up with the demands of the new role. Working on their own and coping with their own work lists was challenging for participants in terms of time management and autonomous working

I was very conscious that I was slow, I would fall behind on my list to begin with. I would be like half an hour behind everyone else, which was difficult - just wanted to keep up with everyone, so that was my main problem: it's a busy department and I don't want to let the rest of the team down. Midwife FT10

Ultrasound is very individual so you are assigned a room and assigned a list so basically that's your list to get on with - sometimes you run over lunch time and stuff like that, and it's not feasible to keep asking somebody you know, can you take this scan or can't do this scan. Radiographer FT3

I think as a radiographer, you work as a real team and there are always lots of different people around that you can go and see, talk to, discuss different things and you're not really left on your own, whereas I think as a sonographer, you're left suddenly in a room, I think it is very, very

difficult to go from a situation like that into a room on your own. Radiographer PT4

During the transition period, participants needed more time to reflect on their actions, assimilate information and consider the consequences of their actions within the whole patient care process and outcome. The following example is typical of the thought process when a complex case was encountered during the early period of practice. This participant reflected on her actions after a complication of a fetal anomaly was suspected during a scan.

I think I over-think things sometimes and you are thinking "Have I made the right decision? Have I triggered off the right process? Or have I got them (patients) brought them back unnecessarily and caused undue distress?" Radiographer PT2 (work diary)

Lack of belief in their own abilities and feelings of inadequacy took on a further dimension when participants experienced insecurities that arose from being "newly qualified and less experienced" amongst experienced expert practitioners in ultrasound and the overall service offered to patients:

I think one of the major things for me is…I am newly qualified and there are people out there who have been qualified for twenty years and I sometimes look at my patients and I just think "Are you getting second rate service?" I can only do my best but that does go through my head. Radiographer PT2

For some participants, making mid-career transitions after having been established in their traditional roles created tensions when adjusting to the role of newly qualified sonographer.

It was always a very difficult role because I am a very senior midwife—so twenty-odd years down the line, it was actually going back to this again, to think "yes, I am gonna gain experience but I am new". Midwife PT8

I am a mature person and they (patients) look at you and think I must know and must have been doing this for years and I am thinking "Oh my God", you know, I haven't and I am a newly qualified sonographer and I haven't got a clue (deep sigh). Radiographer PT4

4.2.2 Role adjustment

The role of sonographers involves working as part of a multidisciplinary team as well as working autonomously. Patients referred for scans present in varying circumstances and with an array of illnesses. These include asymptomatic patients referred for screening as well as patients with clinical symptoms. Being familiar with the healthcare environment was seen as a positive attribute by some participants. They recognised this as being an important factor in preparing them for their new ultrasound role. Positive transferable skills were identified as multidisciplinary working experience and dealing with patients.

I am glad I had my radiography degree beforehand to prepare me because nothing can prepare you for ultrasound - I think that's why it's a post-graduate course, is because there is an increased responsibility with it…and I know it is a long time training but I think I feel so much better having had my pre-ultrasound experience in dealing with patients and dealing with relatives and dealing with other medical staff, doctors, nurses. Radiographer PT2

Despite this feeling of preparedness, the majority of the participants relayed examples where they had encountered situations with which they were unfamiliar. The complexity of their work included different clinical scenarios and changing social structures. They were not only working within different professional environment but also with a different patient clientele. Participants were also grappling with different technical terminology than they would normally have encountered within their background professions.

I am much more confident about obstetrics – but for gynae, on the other hand, I was more scared of older women and having those sorts of problems; post-menopausal bleeding scared the life out of me. Midwife PT1

I think when you come in as a midwife in sonography, I think it's so much harder than it is if you're a radiographer because it's all in a completely new language to you. Although you understand the babies, the physics and technology is more challenging for midwives Midwife PT9

For the participants who had had no previous health care experience, encountering and managing patients with ill health was seen as challenging. This finding was mainly relevant to the clinical scientists, as illustrated by this participant:

Ultimately you're working with overweight patients, a lot of ulcers, and a lot of very unwell patients as well and it's quite challenging. Clinical scientist FT7

Diagnostic imaging modalities such as Radiography, CT, MRI and Nuclear Medicine usually involve limited periods of patient contact and image interpretations by radiographers or radiologists are carried out after the patient has left the examination room. Furthermore, there is an element of physical separation between the radiographer and the patient due to ionising radiation or sophisticated and sizable equipment. In contrast, ultrasound examinations are usually first line examinations, involving continual physical contact and face-to-face interaction with the patients throughout the scan. The diagnosis or decision-making process is dynamic and usually unfolds gradually over the duration of the scan. The environment is such that it allows an immediate and visual image which can be seen by both the sonographer and the patient. Consequently, patients seek immediate or on-going feedback and reassurance.

Participants, particularly radiographers and clinical scientists, voiced the complexities in dealing with patient emotions and anxieties whilst carrying out the “medical” work such as screening, diagnosing and relating abnormal findings to the patients. This challenge for sonographers was highlighted frequently, especially when there were certain other factors such as limited time to develop a rapport with the patients and their families, the limitations of the technology and uncertainty about the significance of the findings. This was particularly evident with participants who were working in the field of obstetric scanning, where the sonographer is usually the first person to deal with an unsuspected abnormality and the subsequent emotional fallout.

> *When I was newly qualified, I used to find that difficult - working in an early pregnancy clinic, because everyone is very anxious, women are on the ceiling, often crying before you have even put the probe on…the hardest thing was talking to the people, especially in situations when you are there and you’re having to break bad news - steep learning curve.* Radiographer PT4

> *The most challenging thing I find from a radiographer to a sonographer is certainly obstetric scanning and breaking bad news, and has a lot to do with communication…ultrasound is real time so there is no time to prepare - we have 20 minutes with the couple to break bad news to them.* Radiographer PT6

In contrast, the midwife participants were able to adapt to this aspect very early on, coming from a profession which is traditionally more oriented to patients rather than to technology. They had already developed an established role in relation to pregnant women and were familiar with humanistic aspects of this role.

> *I feel my role is good because a lot of the ladies will ask me questions and I use all my midwifery skills there, which is nice, so it enhances it. They do get a bit more I think from a midwife sonographer, because I am a bit more interested - babies and pregnancies are my thing and*

that's my background so I kind of know what they want to talk about. Midwife PT1

However, although midwives generally are used to caring for pregnant women in their professional role, the findings also highlighted the difference in the behaviour of the clientele towards these participants when they adopted a different role. One midwife had experienced and noted the contrasting needs of the pregnant women whilst she took on the two separate roles of midwife and sonographer. The following quote emphasises how obstetric ultrasound scans have now entered into a public consumer market.

*I've really noticed that pregnant women are totally different in a scan room than they are in antenatal clinic. On maternity they need you, they want you because they are either in pain or they have a baby and don't know what to do with it. Here (ultrasound) they come here because they want to see their baby - they want something from me but it's not like they need you, so they have this different attitude. Sometimes they are quite rude to you, if you don't behave in exactly the same way that they want you t*o. Midwife PT1

Ultrasound imaging is a dynamic process which depends on the skills of the operator to acquire suitable images and interpret these images and formulate a clinical report or make decisions regarding diagnosis. All participants, regardless of professional backgrounds, highlighted this specialist skill as being a difficult aspect of the new role.

It's like the report writing, I think it's one of the things that is really difficult to adjust to because you're so used to radiography going "Oh, go and talk to your Doctor", you know, whereas suddenly you're in a situation where you have got the probe on and you're thinking, "Oh my God, they're expecting results". Radiographer PT2

I think the biggest change was working on your own and making your own decisions. Clinical scientist FT11

The participants' realisation of the new levels of responsibility and accountability that come with working autonomously in ultrasound practice was also apparent in the above quotes. Participants reflected on the medico-legal implications of their decisions whilst comparing their other more traditional roles to those after qualifying in ultrasound.

I don't think I realised how much pressure there was in sort of doing the scan, doing the report, making sure that you are correct. I think it is quite a lot of pressure, whereas in MRI you do the scan and that's it. Ultimately, you know, the buck doesn't stop with you, whereas in ultrasound it does, you know? If you miss something or whatever, it will come back and it will be "Who's missed it?" Radiographer FT3

With midwifery, you are kind of working as part of a team in as much as if I miss something, which could happen, the next appointment or the next time she is seen, somebody would pick it up, whereas in ultrasound no one else is necessarily going to look at that baby until that baby delivers, so that is very much down to me. Midwife PT9

When asked to give examples of challenging situations, the newly qualified sonographers cited scenarios where they felt exposed to unrealistic expectations due to workload pressures and lack of an appropriate skill mix within departments. The work diary examples below highlight the importance of appropriate and progressive exposure of a newly qualified sonographer to more complex clinical cases.

I had to do a renal transplant today (complex scan) and it's sort of like doing it for the first time and if you haven't done it before, it's difficult - sort of like, a steep learning curve and you don't always get it right. Radiographer FT3 (work diary)

It is just very difficult , I am sort of thrown in and they keep sending me down to the termination clinic…and that's sort of like a 10 minute walk away from everyone else and my first three patients were suspected ectopic - it was awful because I were there, absolutely there on my own. Radiographer PT4 (work diary)

4.2.3 Role contribution

After the initial period of adjustment, the participants were beginning to see the bigger picture, gaining confidence to achieve an understanding of how their individual role fits in and supports organisational objectives and the wider public needs. It was evident that participants who had progressed beyond this first stage of transition had begun to think of their new role as an integral part of the patient experience and care, rather than a one-off imaging examination. Benefits cited by participants included role extension, expansion of their skills and knowledge base, a more patient-centred approach, increased responsibility and autonomy. Comments such as the ones below demonstrated that the participants were beginning to not only analyse their actions in context and longer-term goals, but also to reflect on the impact of their new roles in terms of service delivery and the overall patient pathway.

I mean the thing about the role, as opposed to just being a midwife and the additional role of a sonographer, is the fact that I do kind of see the bigger picture and at the end of the day it's about delivering the service and it's about the patients coming first. Midwife PT5

There were examples of the participants evolving in their new roles, taking ownership and responsibility and having the confidence to challenge bad practice.

Now I am confident to talk to a Doctor, and stand up to a Doctor as you quite often have to, like I had a recent experience where they sent down a query ectopic and they hadn't even done a pregnancy test - when I

was newly qualified I wouldn't have said a word, whereas this time I questioned them. Radiographer PT2

Another example was given by a participant who had to intervene after a scenario where a registrar without any prior ultrasound training scanned a patient and misdiagnosed a miscarriage.

From the doctor's point of view, it worries me - they don't even know if they have the probe upside down or not. I'm finding that people in other departments, especially with early pregnancy and dating, and A&E, are picking up probes and, and they need to know what they're doing. So I actually went to one of the other consultants who also scans and I said "you have to deal with this" and it was dealt with. Midwife PT8

This concern about the misuse of ultrasound technology was also expressed by four other participants and highlights the fact that with technology which is easily accessible and not regulated, such as ultrasound, there is a potential for misuse or inappropriate use.

4.3 Role development

This theme relates to the different facets of role development experienced by the participants during their initial journey. The subthemes relate to how the participants defined and redefined their roles and the support they experienced during their initial period of ultrasound practice.

4.3.1 Role (re)definition

This subtheme relates to the experiences of newly qualified sonographers in defining and redefining their clinical roles during the first year of practice. Differences were noted depending on whether the participants had a sole ultrasound role or were working in dual roles.

Participants who worked in dedicated ultrasound departments and whose roles involved solely or mainly ultrasound practice had better experience in

managing their new roles. These included a midwife who worked in dedicated antenatal midwifery-led ultrasound departments, both of the clinical scientists and three radiographers, one of whom was a full-time sonographer whilst the other two had limited on-call radiography commitments and worked solely in their Radiology departments.

> *I think mine is better because it's just all vascular: I don't have to worry about these other rotations and things*. Clinical scientist FT11

> *I am full-time ultrasound: my usual day is really straightforward. I have a meeting morning, or lunch time. I scan and I scan again*. Radiographer FT6 (work diary)

However, for some participants, negotiating roles after qualification was not possible with their individual trusts. There were situations where participants who desired to work full time or solely in ultrasound could not do so due to the financial and staffing situation of the individual's trust.

> *I have asked them if I can give up radiography and just do ultrasound and they have said no, I have to keep doing nights and I have to keep doing late shifts - they are short everywhere.* Radiographer PT2

On the other hand, this full-time midwife who worked solely in ultrasound wanted to split her role to maintain her midwifery skills as well as sonography, but felt that there was no current opportunity to do so.

> *I would like to work in antenatal clinic but there has not been an opportunity to do it, so I am hoping maybe in the future I might be able to do a few shifts in antenatal clinic and continue sonography so I can keep both going.* Midwife FT10

Of the seven participants who were practising in a dual role capacity, five reported conflicts at some stage of their everyday practice. This included four midwives and one radiographer. The participants used phrases like *"double-*

edged sword", "*you have to learn to put two hats on and wear them all the time",* "*So I am sort of sat between a rock and a hard place"* and *"Limbo land"* when describing their dual roles. These participants commented on the lack of continuity on a daily basis and the fragmentation of their new roles. The main reasons identified for these role conflicts were competing workloads, lack of time and conflicting priorities.

> *I'm scanning at least one day a week. Some weeks I'm scanning four days, some days I'm doing dating, one week all our sonographers and the doctors were off: I ended up doing EPU all week.* Midwife PT8

> *It is time because we have fifteen-minute slots over here and usually it's rammed full so there isn't much leeway and you don't want your lady that you are scanning to feel like you're rushing and not giving her the time that she deserves because you're trying to deal with someone else who wants you to do something else because they need your expertise, different expertise, to manage another problem. So it can be a bit of a juggling act.* Midwife PT5

Other contributing factors reported included a lack of structure and direction in the expected new role, which resulted in uncertainty for both the participant and colleagues.

> *My midwifery staff say to me "you're in the scan room, the next minute you're at a meeting, the next minute you're with us clinically". It draws me out of things, you know, so that's the hardest part.* Midwife PT9

Where participants worked in the same clinical and geographical environment and had the same clientele, both advantages and disadvantages were cited. For example, although they appreciated that adapting dual roles created more holistic patient care and continuity for the practitioner and the client, some participants encountered awkward situations where it was difficult to physically, professionally and emotionally detach the

two roles. This feeling was mainly represented by midwives who practised in a dual role.

> *It is difficult on a daily basis - I work with obstetricians as a clinic midwife but then they know I am a sonographer as well and they will try and push me to do a growth scan that's not warranted…So people do try to manipulate the fact that you have the dual role.* Midwife PT8

One participant even contemplated changing her outward appearance to symbolically define her dual roles whilst working in the same location so that she and others around her would be able to define and separate her dual professional roles to prevent any interruptions to her work due to competing priorities:

> *I have even wanted to change my uniform so that I only wear my antenatal clinic manager's uniform on my three days and my sonography uniform (sigh) on the other days but I am not allowed. The Trust insists that I am clinic manager five days a week for the duration of the week, so that's it. It would be so much easier if I was in a different building.* Midwife PT9

This feeling of the geographical location of work being an important factor in role conflicts was also mirrored by another midwife when reporting her opinion of the experience of a peer midwife sonographer and the use of the word *"struggle".*

> *Because other than me and (name) there isn't anybody else who does anything else other than sonography - I would say actually her struggles between the two are probably worse because they are geographically in the same place.* Midwife PT5

As well as professional role conflicts, there was also evidence of "emotional role conflict" when traditional professional instinct conflicted with the new ultrasound designated role. The following example illustrates this observation

during a situation encountered by a newly qualified sonographer, which led to a feeling of being bound by a moral duty when making decisions about prioritising work. She had two separate contracts that defined her midwifery role working in a maternity ward and a sonography role working in a radiology department with a caseload of ultrasound scans.

> *Recently I was in the middle of a scanning list, I had just done an EPAC clinic, and found a 9-weeker with no FH (fetal heart pulse) and sent her back to be seen by EPAC staff, then just as I was literally taking someone else into the room to scan, the partner said she is miscarrying in the toilet and you know most sonographers would not know what to do and say right, we have to get somebody, but then the midwife in me says "Oh ok" so I ended up making my list late (looking upset) and being in the toilet with this lady miscarrying down the toilet and that's horrible because most people can walk away from that, but I can't and I find that really, really difficult.* Midwife PT1

There were frequent references to the lack of clarity and the expectations of roles. One participant was asked to scan a women as an emergency on a maternity ward, where she was working as a midwife, with very limited access to the patient's previous obstetric imaging history and therefore with no opportunity to gather relevant information before making clinical decisions.

> *There was a lady that had the most horrendous hydrops (fetal abnormality) and this baby was 23/24 weeks and our consultant said to me "Will you scan her (the patient)?" and I said "What am I going to be looking for?" and he said "Tell me if it's worse", but basically what he was wanting me to do was to check it was still alive. They store their images to Viewpoint (an electronic archiving database) and when I went on, there were not many images…I didn't feel particularly comfortable because actually I felt "What am I supposed to be doing?"* Midwife PT8

Similarly, the participant quoted below was put in a difficult ethical and moral dilemma when asked to scan patients on the ward in an emergency out-of-

hours situation with a suboptimal ultrasound machine. This also illustrates the lack of understanding of individual roles among peers.

> *People asking me all the time upstairs (midwifery ward) to do things that I really shouldn't do, so that's been difficult. Somebody asked me to look at a pelvic mass on a gynae patient on a portable machine that really isn't good (quality) and I had no way of reporting it either. You know it's not how it should be done: if it is an emergency, it should be done by a radiologist out of hours or it should be done in the department (ultrasound) and on a proper machine and sometimes they don't get that… [upset] I'm sorry [silence]. When you then say "Oh no, I'm not allowed", you then feel like they are losing respect in you.* Midwife PT1

Another participant recalled a situation where diagnosing an intrauterine death, there were no ultrasound experienced staff available to support her decision.

> *And I have also been in situations where because I can scan, people have come in with no or reduced fetal movement and I can't find a fetal heart with a CTG or Doppler and I know I can scan that woman but I have got to be really careful that I have a second backup person (who is a sonographer) that can come and confirm what I am finding and that has happened to me before, that I have scanned someone and found no FH (fetal heart beat) and then there is no-one there to come and back me up.* Midwife PT5

This participant relayed a scenario when she was working in a hospital with no obstetrics services or staff, and was expected to scan emergency obstetric patients and make decisions without the provision for a second opinion.

> *I suppose the one which I have just done, where you have got a head injury, seventeen-year-old, twenty weeks pregnant, and they want us to*

do an anomaly scan here and I can understand they don't want to transfer the patient to [nearby hospital] but I am not signed off to do (fetal) anomaly scans. We haven't got Viewpoint here either because we are not an obstetric hospital, and we have a number of patients coming through from A and E that are pregnant , I don't know if it's because they know now that I am here and I do obstetrics and early pregnancy. A and E would normally transfer query ectopic to [nearby trust] because that is where they deal with them, but now they're sending them across to me and I am terrified that I will miss an ectopic and because there is nobody here to double check with either 'cos nobody else does obstetrics. Radiographer PT2

4.3.2 Support during transition

Preceptorship in this case study is defined as a period of training for future professionals, during which a more experienced professional (or preceptor) provides support, training and supervision time for the less experienced trainee (DH, 2010). Having expert support and learning from best practice in dedicated time gives a foundation for lifelong learning and allows practitioners to provide effective patient-centred care confidently. For a newly qualified practitioner, preceptorship not only provides opportunities to apply and develop the knowledge, skills and values that are already learnt, but also time to reflect on practice and receive constructive feedback. Preceptors identified by participants in this case study were experienced sonographers and obstetric and radiology consultants.

One of the strongest pieces of evidence to emerge from the case findings, which would also support and explain the findings relating to the transition experiences of the participants, was related to the support given to the newly qualified sonographers in the initial period of practice. When participants shared their experiences of the preceptorship period, it emerged that there were considerable differences. Preceptorships encountered ranged from having formal structured support to informal arrangements where an

experienced member of staff was available but not necessarily designated, while some participants had no designated support at all.

Significantly, only a minority of the participants had a formal preceptorship experience. Participants who had no preceptorship period used phrases such as *"thrown in at the deep end", "sink or swim"* and *"given the scanner and room and a patient and - let loose!"* when talking of their experiences. One participant talked about feeling *"absolutely dumped in the middle of a situation"* during her early experiences of ultrasound practice. She had to *"pester"* for some support: "*I would email my boss and say please can I just have an hour with my mentor, just to go through some images, check I am ok?"* Similarly, this participant reflected on lack of support after qualification*: "They said 'off you go'. There are no study sessions, there is no, you know, 'how are you getting on?' or anything. You are just there to scan".*

One of the participants recalled a frustrating experience when actively seeking advice from a radiologist following a scan and trying to keep up with the workload at the same time. This also highlighted the importance of having realistic workload allocations to allow newly qualified sonographers to expand their knowledge base through supported learning whilst working.

> *The problem that we are having is with the radiologists: because I am newly qualified, I will go and see them about something and they will just say "go and look that up and report it". I haven't got time because by the time I have waited for them, I have another five patients waiting to be scanned, you know? We are grabbing coffee and just taking it into the room to slurp in between the patients. I haven't got time to go and look through five different books to then try and formulate a report – I want them to teach me and that is very frustrating.* Radiographer PT2

In situations where support was given informally, timely access to a suitable mentor was difficult for the participants: there was also a perception of being a nuisance when seeking advice from consultants.

I think sometimes, you know, when you find the consultant, surely you're hassling them a little bit. Sometimes they are a little bit grumpy but really rather bear the old grumpiness than put in a report that you are unsure of. Radiographer PT6

One participant reported consequential experiences of being reprimanded when decisions were made in the absence of a mentor.

You can hang about to see a radiologist but most of the time they are busy or they are not in, so I have taken the images that I can, sent the patient away and then I have been pulled up because I haven't done this and I haven't done that but trying to explain that I came to ask advice but there was nobody to help me is just making excuses and they don't want excuses, they want actions. Radiographer PT4

Although some organisations had formal policies for preceptorship, these were not always implemented for various reasons. The main ones given were a general shortage of experienced staff to facilitate this process and the pressures on the department to support the training of other professional groups in ultrasound.

So I wasn't thrown into it initially like that but it wasn't long after that I was thrown into it - I probably had three or four weeks where I was still working alongside somebody, - then I was thrown into it because of the problems that they had with sickness and things. Radiographer PT4

They are training doctors as well, so they are training lots of different professionals. Radiographer PT2

There was also a situation cited where lack of communication resulted in the newly qualified sonographer not being aware of the preceptorship process.

Well apparently there is supposed to be: you're supposed to do fifty double reporting scans, which didn't happen. Nobody had mentioned to

me and nobody's obviously followed it up, so I have never had that. Radiographer FT3

Other factors that hindered the preceptorship process for the participants were related to spatial barriers such as the location of their workplaces.

I think the problem in our trust, as well, is the rooms are quite scattered: you don't always have somebody on standby, you can't sort of say 'can you quickly look at or review my images?' Radiographer FT3

In contrast, the four participants who experienced some level of "formal" preceptorship arrangement identified aspects which provided them with a positive experience for on-going professional support and development, building confidence and moving towards autonomous practice. Interestingly, two of these were clinical scientists who were supernumerary during their training period and reported dedicated scheduled time with supervisors.

I would always have a supervisor with me and so if I was learning to do something new, my sessions would be longer and I would have a longer time to spend with the patient and just talk it through afterwards. Clinical scientist FT7

Other elements of good practice identified included double reporting, delegated support, regular and easy access to a mentor or experienced colleague and formal reviews after a period of audited practice.

We have a really good preceptorship programme here--I know that other people that I have spoken to didn't have quite as much support. After I had passed all my exams, I had to do one hundred scans fully supervised, and after that I had to do another hundred with my pictures looked at before the woman went home, and then I had another hundred scans where they were audited, you know - just looked through, and then signed off completely to work on my own. Midwife PT1

The sonographers here were brilliant and if I was struggling with something, they would put their head in and have a look…I would formulate the report, and then I would forward it on to a delegated person who would then check my images, check my report and say yes if they were happy to send that out. So, it was like double reporting but I only had a month, really: it happened very, very quickly. Radiographer PT6

4.4 Maintaining competency and credibility

Advances in ultrasound technology and techniques have meant that sonographers have to continually expand their clinical and technical knowledge as well as develop their practice through the existing evidence base. This theme explored the experience of the participants in consolidating their skills and further developing their new ultrasound roles as well as continuous professional development and future career development. The subthemes relate to maintaining skill levels, professional relationships, emerging identities and professional recognition, regulation and registration.

4.4.1 Maintaining skills

In scenarios where participants were working solely in established ultrasound environments, the majority had good support systems and opportunities to allow for CPD and maintaining professional skills. However, all participants who practised in a dual role situation reported experiencing a loss of traditional skills and difficulties in consolidating and maintaining new skills.

I mean as a midwife because I am not there that much really, and I still work my hours as a night shift—for example one week, I'll do one night a week and the next week, I'll do two nights, that's how it works—so because I am not there as much, it makes me a bit sad, as I feel I am not quite as on the ball as I used to be. Midwife PT1

The worst thing for me is that my radiography friends sort of moved on and left me in ultrasound but I wasn't quite in ultrasound…it was really difficult and then I'm going back to sonography the next day and it was just awful: I couldn't scan because I hadn't been in there for two weeks, and then I would be coming back out to radiography. I hated it, it was awful: it's like having to be good at two totally different things. Radiographer PT4

Whilst some trusts were not able to offer opportunities for sonographers to practise or maintain the full range of ultrasound skills, others were not able to support the maintenance of traditional skills due to staff shortage and lack of suitable job rotations.

I actually want to go and do obstetrics—you don't get a chance to rotate through—well, if I don't do obstetrics then I won't be maintaining my competencies in it. It would be a shame, so I mean I would have to sort of think long term, what I want to do, but then I mean there are lots of other people who are not getting the chance to do any ultrasound who are trained. Radiographer FT3

…all the others, CT, MRI radiographers, they do on-call, they are allocated a number and they still do night shifts with x-ray as well as the specialised modalities, but ultrasound is completely out of the picture. They are short-staffed, they want you there full time so the only time you have is outside of your usual job. So if you wanted to do any of the x-ray, it would be the odd weekends in x-ray. Radiographer PT6

Two midwives gave a managerial perspective on the issue of allocating enough workload to their midwife sonographers to maintain ultrasound skills whilst having to keep up with normal midwifery workloads. This highlighted the difficulty that managers face in making decisions that optimise service delivery whilst maintaining skill mix and competencies within their small ultrasound workforce.

I have seen more junior midwives do the sonography training and then almost end up not confident in either place because of not having enough time, which I think can be very difficult. Midwife PT9

There are only five of us that do nuchal scanning still, because none of us get enough time: I cannot release people and say "right, you've got a month just to practise nuchals every single day". I could not provide that…I felt that actually to have more people scanning, I wouldn't be able to offer them the opportunity to keep up the skills, so it was about keeping people with enough scanning to maintain competences. Midwife PT8

Keeping abreast of technological advances concerning their professions was also a major anxiety for two participants who were practising dual roles.

They (managers) refused to train me on the new (x-ray) equipment because of my ultrasound commitments, and well that was just silly. I just don't feel like I am going to be able to move forward because I am just gonna be stuck in a bit of a time warp. Radiographer PT2

I don't feel I have cracked it (ultrasound) and I am not sure that I ever will because everything keeps changing and they keep bringing new stuff in—better machines—and so that side of things presents more of a challenge. Midwife PT5

Lack of opportunities to update skills or share knowledge around current and updated clinical guidelines or local protocols was also highlighted

Even our protocols at the moment still haven't been updated and this is three years down the line having started, they are still in the process of being re-written, because at one stage we would be doing dating scans over in EPC, but there is no way they would sort of fulfil the criteria for proper dating scans, so there is none of this sort of continual education, which I think is a shame. Radiographer FT3

Because there is no obstetric department here, you know, it's not somewhere you can just pop down and say "Right, what's going on?" so you feel as if the onus is for you to keep that connection with (name of neighbouring hospital), meaning other hospitals who provide the same service. Radiographer PT2

The importance of attending formal CPD activities and knowledge exchange forums was also highlighted by the majority of the participants. Factors such as funding and staff to backfill the workload were reported as being the main obstacles.

I will have to pay for myself and actually if I have to travel, I have to pay for that myself and actually will I be able to cover? But actually I couldn't go - I couldn't get anybody to cover. So, you know, but the whole idea was to go and have the opportunities to look at the newest machines and to meet people basically that scan. Midwife PT5

The clinical scientists, on the other hand, reported a more structured approach to CPD in their departments via the Society of Vascular Technologists of Great Britain and Ireland (SVT).

The SVT does organise a lot of study days which I think is really good and obviously all of our CPD is done through the SVT, which I personally feel is a really important role of your job. Clinical scientist FT11

When asked about their future career development, all participants with the exception of the midwives reported that they were taking on further studies in ultrasound: for example, a PGD or an MSc. Three of the midwife participants who practised in a dual role expressed uncertainty about their future roles and the possible direction that they would pursue.

If I wanted to go any further in my midwifery career, it would be a matron's post and that would be full time, so I would have to sacrifice the ultrasound. And I am always conscious of the fact that you don't even know what is

round the corner: I might actually not be able to carry on this job in five years' time, ten years' time, whatever it is, whereas I may be able to carry on with the ultrasound. Midwife PT8

Yes, I do feel as time goes on that eventually, whether the Trust drives it with cut backs and there will no longer be a clinic manager, but I have to say, I think I will end up as part-time sonographer with nothing else, rather than definitely another midwife. Midwife PT9

In contrast, the radiographers expressed concerns over job security in light of current changes in the provision of NHS services such as Any Qualified Providers (AQPs) and the dilution of ultrasound roles.

I find it quite almost unsettling because we know we are going through the same situation here across all the NHS Trusts: funding is always an issue, you don't know if you will be re-banded when 'any qualified provider' comes in when the NHS lose contracts or be competitive enough to keep up with the other providers – what will happen to your job? Radiographer PT6

You feel that in your role, all the nice bits have been pinched away. I think people are cherry picking off, the physios are going to get all the musculoskeletal and we are gonna be left with ward patients and you know, looking at gallstones, because the midwives are gonna clip off the obstetrics and vascular has gone to vascular lab, I think are we gonna be left with the bare bones and with not much else to do. Radiographer PT4

4.4.2 Professional relationships and emerging occupational identities.

This subtheme was related to the newly qualified sonographers' participation in different professional communities and their relationships with peers and other professionals.

Ultrasound service has changed over the years and now incorporates a variety of professionals and service strategies with cross-boundary working: this is

particularly evident in the field of obstetrics, where there is the most overlap between professionals. Where newly qualified sonographers worked within established ultrasound departments or environments with an ethos of multidisciplinary working, there was evidence of mutual support, respect, continual learning and networking.

> *They (radiographers) are amazing at knowing different anatomy, you know – my anatomy is rubbish! But they recognise that and realise that I need more help with that, but then when it comes to obstetrics, I bring in something there, and it is a bit of, you know, taking something from each other and just respecting what each others are good at and here they are great – it is really nice to be working with people who understand ultrasound.* Midwife PT1

For participants who were negotiating dual roles, there was a sense of isolation and lack of understanding of role and responsibilities when working outside local communities of ultrasound practice. This was particularly evident for the participant quoted below, who was working as a midwife sonographer in her trust and was managed by a midwife.

> *I'm not managed by a sonographer: I'm managed by a midwife, who is a fab manager, she is absolutely great, but actually, and she is very good at listening, but I don't think they quite understand the implications of my role – I feel I'm isolated 'cos I'm the only one. I feel like a bloody dodo sometimes – I'm not extinct.* Midwife PT8

In some circumstances, professional relationships and multidisciplinary working were hindered by internal politics and historical relationships between different professions and directorates. This had the potential to hinder multidisciplinary working and knowledge transfer. It was also apparent that for a minority of the participants, there was a lack of integration within the directorate itself. This highlights the need for improved working relationships and communication networks.

I am not sure if there is a good enough rapport because early pregnancy comes under radiology and antenatal is under women and children's health. Radiographer FT3

I don't know why it is and I don't know if it's the same elsewhere, but here, you know, all the other modalities (CT, MRI) seem quite a lot better integrated with x-ray (radiology department) than the ultrasound department. Radiographer FT6

There was also encouraging evidence that despite these professional tensions, participants working across separate directorates and departments were able to improve relationships and promote mutual understanding of professional roles.

I know that everyone upstairs (midwifery ward) were like "Oh, you are going to ultrasound (radiology) – they are horrible down there. Why would you want to do that?" Completely misunderstanding – there was a very much a "them and us", and I hope that I have made that better. I gave a presentation to the midwives about ultrasound and I think that helped quite a lot. I also feel it is important to respect what different people bring to a job. Midwife PT1

Again I am encouraged to be a sort of link between several places. I go out to the community midwives with a presentation and say to them "When you send in a woman for a growth scan, this is what it means; this is what we (sonographers) are looking for". So that they have a much better handle because they have been out in the community for donkeys' years and they really don't understand the sonographer role that happens here. Midwife PT9

Two of the participants reported professional and personal concerns over lack of opportunities to extend their professional roles and develop further ultrasound skills. There was a perception of role extension being obstructed by other professional groups or as a result of occupational shift, with other professionals

encroaching on their work. This could suggest intra-professional conflicts and an element of tribalism over the ownership of ultrasound technology.

> *Some sonographers are interested in doing musculoskeletal: we have got four orthopaedic radiologists – two have said yes, two have said no. So there is that divide even amongst the professions themselves as to what people can and can't do.* Radiographer FT3

> *I would love to do breast ultrasound, I think because I had such a big interest in mammography and helping out with the biopsies and all of that, but I'm not sure if there is scope for it, and the Radiologists are very protective.* Radiographer PT2

The evidence above suggests that inter- and intra-professional relationships can be strained and participants highlighted the lack of understanding of their new roles within their own professional communities. Consequently, the participants seemed to construct their own new practices as "different" from their peers and created "sub-identities" and a sense of "them and us" not only when they referred to other sonographers from different backgrounds but also within their own professions.

> *I mean we are quite stuck out on our own – we have a different pathway and it's much more specialised. When the physics trainees come to see what our jobs are all about, they are always quite shocked.* Clinical scientist FT7

> *I think they are very different roles. I think as a sonographer you work and you go back into x-ray and you're like, "Oh my goodness, they are so closeted and protected and we have none of that". I talk to my radiography colleagues now and say "Oh God, I have had the most dreadful morning, you know, I have had a dead twin", and they're like "Oh my God, do you have to tell them?" and all that, and I'm like "Well of course you do".* Radiographer PT4

Whilst there was a perception that whilst their new ultrasound skills were appreciated by their wider community *("I think people are quite admiring of the fact that you can do the two things"* – Midwife PT9), the midwife participants also reported lack of understanding and resentment from some longer standing colleagues. The following examples were relayed by participants who were already established within their health care role. Interestingly, these two participants referred to members of their own professional community as ***"they"***, suggesting an emergence of a new identity and the concept of "othering".

> ***They*** *don't get it upstairs (midwives who don't scan),* ***they*** *don't get how hard it is and how frustrating it is and you know you get women who complain that the sonographer has not spoken throughout the scan but actually I can understand that now because - you literally cannot verbalise everything that you are doing because you are concentrating so much. It infuriates me and midwives do not understand that and* ***they*** *are very quick to complain about sonographers.* Midwife PT1

> *There is resentment towards the (midwife) sonographers, I feel, from the midwives that work here:* ***they*** *don't see them as proper midwives,* ***they*** *don't recognise the importance of what the sonographers are doing and* ***they*** *see them in antenatal clinic, on cushy hours, nine to five, Monday to Friday and not working Bank Holidays –* ***they*** *don't understand the significance of that role because* ***they*** *don't scan.* Midwife PT9

These participants gave the impression that being a sonographer was seen by members of their own professional communities as exhibiting "elitism".

> *Recently I was introduced to a radiographer from (name) and when they said that I was one of the new sonographers, she said, "Oh you are one of them?" (making a gesture, sticking her nose up) and I thought I don't know what that meant, and I'm sure they did not mention that I was a midwife, so it was more because I was a sonographer…I don't know:*

although I am not a radiographer, I have observed it that even in radiography, there is a ***them and us*** *attitude*. Midwife PT1

I think ***they*** *are perceived as quite elitist by everybody else, but that's not generated by the sonographers necessarily – that's actually generated by everybody else*. Midwife PT9

4.4.3 Professional recognition, registration and regulation.

The importance of *"being recognised as a sonographer*" by their local institutions, other professionals and professional bodies was raised by a majority of the participants. This was also closely aligned to the previous findings about sonographers constructing an occupational identity.

…feel a lot more respected now, which is one thing that I wanted from being a sonographer – I wanted that sort of professional identity in that people sort of listened to what I said. Radiographer PT4

…ultrasound is part of my role as a midwife, as I am always classed as a midwife sonographer. A lot of the obstetricians especially have been quite supportive with me and recognising of the extra skill, which is really good, and everybody has been great upstairs. Midwife PT1

We are clinical scientists, well, clinical vascular scientists is what we are called. Clinical Scientist FT7

Only a few of the participants who already had existing contracts with their organisations reported having a formal sonography contract and/or a job description. As the participant below highlights, for her, a professional title of "midwife sonographer" was important to define her dual role.

They (the organisation) gave me a new job description which said sonographer and I wrote back to them and said "Oh it needs to be Midwife/Sonographer" but they never got back to me. Midwife FT10

For some participants, this question was thought-provoking and they had not really considered it before.

> *I don't think I ever had a sonography job description. I have definitely got a sonography contract but I don't know whether they ever enclosed a job description with it.* Midwife PT8

As well as role recognition from their local institution, participants, regardless of professional backgrounds, also expressed the perception of the lack of recognition from regulatory bodies:

> *I got really excited when I qualified because when you looked up my registration and where it says extra qualifications and it says none – I mean you are qualified but they don't put it down on your list and I think they should (this is the NMC). For example, if you are a prescriber, after you do the course where you prescribe certain drugs, you get it, and I felt really gutted – I would like a bit more recognition for midwife sonographers because I think it is an important role.* Midwife PT1

> *Under the HCPC I am a radiographer. What really bugs me is when you go on and you have to put in your occupation, you never see sonographer – it comes up as unrecognised, and nobody knows what we actually do and they just think we are all to do with babies. There is no promotion of sonography within the community – it's not out there in the public domain and we are not looked after. We are part of the radiographers; we are not part of our own group.* Radiographer PT2

> *I think sometimes for larger groups, numbers do mean a bit more and the fact that we are smaller numbers I think maybe that has an impact on our recognition. Again, it's a very small organisation: I mean, the SVT accreditation actually is only recognised within Great Britain.* Clinical scientist FT7

When the participants were asked their views on the influence of their professional bodies in relation to their ultrasound practice and registration, each of the professional groups had their own views, and, with the exception of the clinical scientists, generally highlighted the gap or the perceived gap in support provided for sonographers within their own professions.

For midwifery, the participants interpreted the "*scope of practice*" as encompassing ultrasound practice, although all of them highlighted that their professional body had not produced any ultrasound-specific documents to guide them.

> *We do fall through gaps, so to speak, which I find difficult. My Royal College of Midwifery professional body are my support but they don't have the knowledge around ultrasound or have the specific ultrasound support people in place. They will tell you that they will support you in practice etcetera but they won't actually have the same degree of knowledge as other pure radiographers. Everything is about midwifery, which is fine, but the difficulty is that I have to remain a registered member of the Royal College of Midwives to be able to practise as a clinic midwife but it does leave you unsupported really with your ultrasound role.* Midwife PT9

For radiographer participants, there were mixed reactions as to how they understood and interpreted the role of the Society and College of Radiographers (SCoR) as a professional body.

> *I have got the Society membership, um, that's only with the radiography side. I understand the ultrasound is a voluntary registration at the moment and I gather there has always been some debate about trying to make it more official.* Radiographer PT6

> *I think definitely it's radiography geared and not ultrasound geared…I don't think that we are a strong professional body, whereas I think if we*

were registered sonographers, there is nobody else who can actually do your job, I think you would have probably a bit more clout. Radiographer FT3

I don't know what they actually do. I think the Society is for insurance, just in case I get sued. Radiographer PT2

In contrast, both the clinical scientists were very aware of the requirements for maintaining ultrasound practice and registration via the SVT

For your SVT accreditation and registration you are expected to have completed so many scans in different modalities. They also give guidelines where you have to have done so many scans per year, you have to submit your CPD, and they also give guidelines on the number of scans they feel should be, you know, checked and monitored with colleagues, so if people don't scan for a few years they will lose their accreditation because they haven't been keeping up with their professional development. Clinical scientist FT7

4.5 Key findings

The findings of this study revealed factors that disadvantaged a smooth transition for newly qualified sonographers thereby giving an additional insight. In Figure 8, the main findings of this case study are conceptualised from these narratives to give an insight to the challenges that face newly qualified sonographers.

The data suggested that the experiences of the newly qualified practitioners were socially constructed, and varied with their professional backgrounds, the working environment and their professional relationships. There were similarities and differences within the case which related to the transition process. All participants experienced a reality shock which exposed a disparity between idealistic practice and the reality of practice. Although previous health care experience was perceived to be advantageous, particular challenging aspects of the new role were identified as having to make individual decisions in a short space of time, the fear of missing or making a wrong diagnosis and concerns over quality of patient care and time management issues, and in particular, taking on accountability, including reporting and breaking bad news. Lack of formal preceptorship and unrealistic workloads in some departments meant that at times, the majority of the newly qualified sonographers, with the exception of vascular scientists, were left unsupported. Despite this, it was encouraging to find that after the initial months of transition, newly qualified sonographers were developing professionally, moving from competency to proficiency. They were beginning to gain confidence, taking ownership of their practice and linking it to the wider picture of patient care and pathways. Their new occupational identity as sonographers was beginning to emerge very early on in their ultrasound careers.

Based on these findings, a number of central influences were identified that impacted on the experiences of the newly qualified sonographers: three main overarching themes arose from the findings and were associated with processes such transition, role development and maintaining competency and credibility. The subthemes were related to reality shock, role adjustment, role (re)definition, role contribution, support during transition, maintaining skills and credibility, professional relationships, emerging occupational identities and professional recognition and regulation.

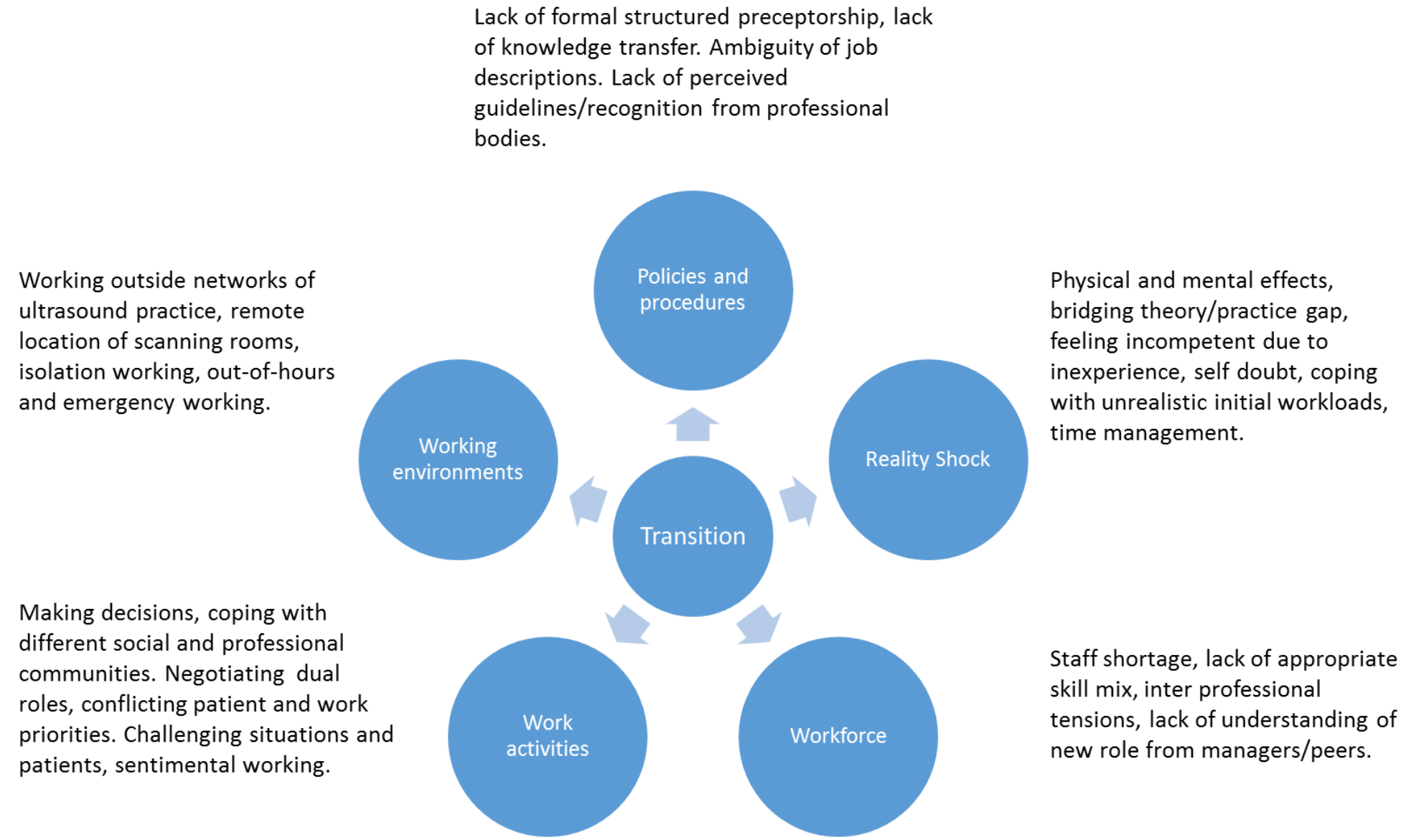

Figure 8: Challenges facing newly qualified sonographers-"Transition into ultrasound practice" (Phillips, 2014)

4.6 Summary of chapter

In this chapter, the findings were presented to provide an insight into the experiences of newly qualified sonographers. The constitution of the case participants was presented relating to their particular professional backgrounds, their work roles, activities and work locations. By drawing on excerpts from individual interviews and work diaries of the eleven participants, an account of the experiences of newly qualified sonographer in their first year of practice was portrayed. The findings were presented as a narrative under the main themes identified by using a thematic analysis framework. Based on these findings, a number of central influences were identified that impacted on the experiences of the newly qualified sonographers: three main overarching themes arose from the findings and were associated with processes such transition, role development and maintaining competency and credibility. The subthemes were related to reality shock, role adjustment, role (re)definition, role contribution, support during transition, maintaining skills and credibility, professional relationships, emerging occupational identities and professional recognition and regulation. Where appropriate, the similarities and differences between the newly qualified sonographers as well as between the professional groups were highlighted.

In the next chapter, existing literature and conceptual framework will be drawn on to discuss the findings in relation to the research questions and implications for clinical practice and the future development of the ultrasound workforce.

Chapter 5: Discussion

5.1 Introduction

In this chapter, the findings presented in the previous chapter are discussed in relation to the overall research aim of this professional doctorate research study, which was to gain an insight into the experiences of newly qualified sonographers in their first year of practice.

The discussion will examine the findings in relation to the research questions:

1. What is the experience of newly qualified sonographers in clinical practice?

2. What are the perceived implications for future workforce development in terms of professional practice, education and regulation?

This professional doctorate has made a unique contribution to the body of knowledge by providing valuable and unique insights into the experiences of newly qualified sonographers from a multidisciplinary perspective. Firstly, there is no research published to date that is evident to the researcher which has explored the experiences of newly qualified sonographers in the UK. This is surprising given the transformation of ultrasound service provision over the few decades in terms of technological advances, workforce dynamics and the sociological impact of the technology itself. Secondly, the methodological approach of utilising a case study provided the opportunity to explore this phenomenon within its own context. Therefore, the findings have direct relevance to the current sonographic workforce in terms of implications for the workforce as a whole and for different professions and professional organisations that support this diverse workforce. The originality of this research also means that there are no comparable studies to inform or align with in the field of ultrasound; however, there are studies that explore the experiences of newly qualified professionals in other areas of health care provision and these will be drawn on to make links where possible to the existing body of knowledge and theories.

The themes and subthemes were augmented with the conceptual framework in chapter 3 to inform this discussion chapter. These themes were seen to be related

to all the dimensions that were portrayed in the conceptual framework (see Figure 6). Figure 9 portrays the interaction between concepts and themes/subthemes. The subthemes identified have implications for ultrasound practice from the individual, institutional and professional perspective. Additionally, the themes presented centrally in Figure 9 are areas which are particularly relevant to the practice of newly qualified sonographers from a multi-disciplinary perspective.

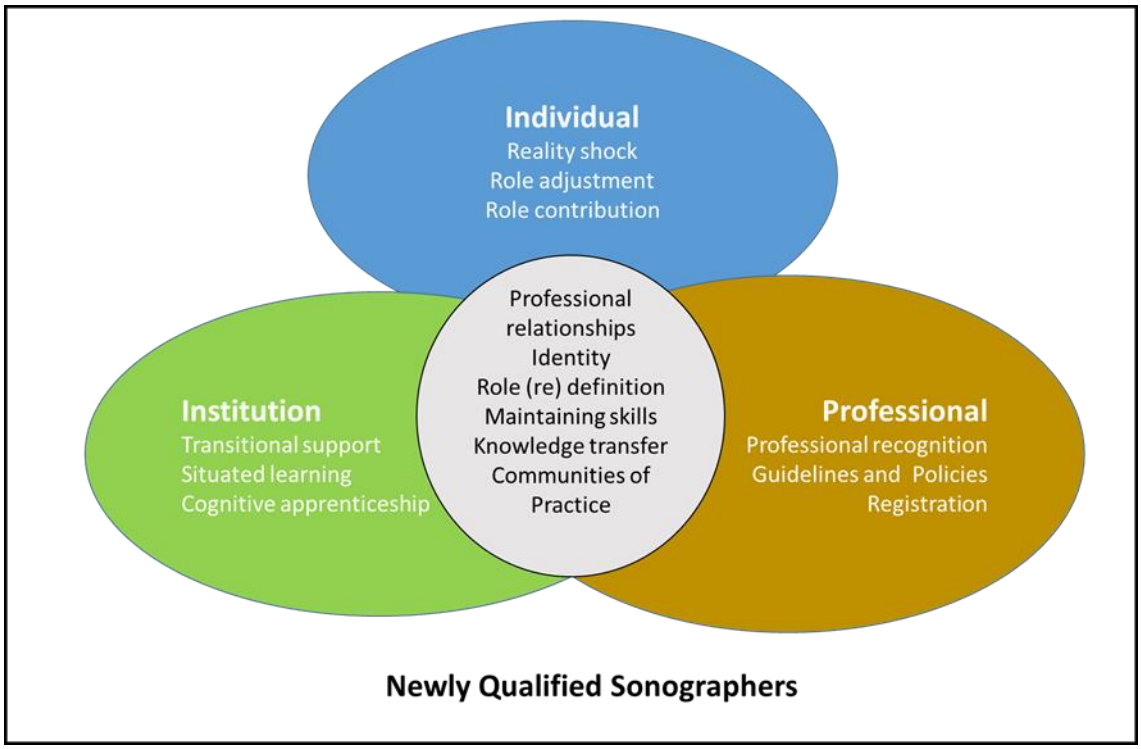

Figure 9: Relationship between Concept and Themes/Subthemes

The themes and subthemes that align with current literature have been considered in the context of ultrasound practice and their potential impact not only for the newly qualified sonographers themselves, but also for health care institutions that employ them and the professional bodies and organisations that guide, support and regulate professional practice. These findings illustrate that newly qualified sonographers need better support in the initial stages of their careers. Whilst these findings concur with existing studies that explore the experiences of newly qualified graduates (Duchscher, 2009, 2008), they also introduce additional perspectives that also need to be addressed. These include the support for

already established health care professionals entering into new roles and a better understanding of the challenges that sonographers who work across professional boundaries face to deliver ultrasound services. The theory of cognitive apprenticeship (Brown *et al*., 1989), situated workplace learning and Communities of Practice (CoPs) developed by Lave and Wenger (1991) has not previously been applied to ultrasound practice and is proposed in this thesis as a further contribution to this field as a concept that can be developed to support the newly qualified sonographer's journey. The topics identified within this discussion can also inform HEIs in terms of curriculum development, and commissioners who are responsible for ensuring that the right workforce is developed for the future provision of ultrasound services in the current NHS. Furthermore, there are implications for NHS employers who have the responsibility for these practitioners within their own environments.

5.1.1 Transition

One of the key issues highlighted in this study is the need for better understanding and support during the transition period of these newly qualified sonographers. The main themes identified can be seen to align with a rite of passage into practice as observed by other authors (Hobbs, 2012; Draper *et al*., 2010; Barton, 2007). The first phase of separation in this study involved detachment from secure constructed structures such as educational institutions, the status of a student or traditionally experienced professional positions: for example, radiographer or midwife. The second phase of liminality, referred to by one participant as "*limbo land*", was a period where participants were negotiating their new roles and experiencing conflicts, role fragmentation and role adjustment. They were also finding their way through uncertainty, ambiguity and conflict over social and professional roles. The third phase of incorporation was when the newly qualified sonographers entered fully into a professional role, building relationships and connections within communities, and were returned to a new socially constructed identity within their own and other professional groups. However, as Bridges (2003) argues, these phases are not necessarily distinct, and depending on individual circumstances, each of these processes can start before the preceding one is totally finished. This latter theory supports the initial theoretical proposition

for this study that the practice of newly qualified sonographers is shaped by contextual factors such as individual experiences, professional backgrounds, the working environment and their professional relationships. Furthermore, given the varied demographics of the participants, it was evident that they were negotiating multiple and simultaneous transitions and therefore were likely to be in more than one of these phases at the same time, with one phase dominating the other two, rather than experiencing an absolute shift from one to another. This aligns more closely with the theory proposed by Bridges (ibid).

The findings in this study present thematic conclusions that resonate with prior works by Duchscher (2009). It was evident from the findings that during the first months of practice, the majority of participants experienced a misalignment of what they thought they were prepared for and the reality of practice. Kramer (1974) termed this reaction “reality shock”. Kramer claims that “reality shock” is a product of high levels of stress, resulting from role uncertainty and value conflict, which consequently manifests through frustration, hostility, and burnout and in some circumstances resignation. Several other authors have adopted Kramer's term to describe the experiences of qualified practitioners in new roles (Hughes and Fraser, 2011; Morrow, 2005). There is evidence to suggest that newly qualified sonographers experience similar stages in their first year of practice, as the factors identified by these authors were also recognised within this case study, particularly in the subthemes for reality shock and role adjustment. Although there is no evidence of burnout or resignation in this case study, there is evidence of stress, role uncertainty, value conflict and emotion.

The transitional trajectories of the newly qualified sonographers mirrored the three stages depicted by Duchscher (2008, p. 444) of “doing”, “being” and “knowing” as they moved from a competent stage to a more proficient stage of practice. In the “doing” stage, the participants initially focussed on themselves and on mastering their clinical and technical skills whilst trying to cope with the realities of ultrasound practice during the first few months of the transition period. Experiences of stress and self-doubt were evidenced by having to make individual decisions in a short space of time, the fear of missing or making a wrong diagnosis and by concerns over quality of patient care and time management issues. As the participants

became more established in their new roles, they also gained more confidence and took ownership of ultrasound technology and of their new roles and responsibilities. They recognised inconsistencies and inadequacies within their own health care environments and in some cases took proactive steps to challenge and report them. Examples cited include inappropriate ultrasound requests, ultrasound scans being carried out by professionals who were not adequately trained, the use of suboptimal ultrasound equipment and lack of clinical governance, guidelines and organisational infrastructures for ultrasound reporting and interpretation in areas outside the main ultrasound departments. Duchscher (2008) called this period one of “being” (p. 446). These findings depict a movement from competency to proficiency in their practice which involves a gradual and progressive improvement in the skills attainment, critical thinking and level of knowledge that are required in “being” a sonographer. The theme of maintaining competency and credibility identified issues that impact on newly qualified sonographers being able to maintain and develop their new and existing skills and gaining professional credibility within their working environments and communities. The subthemes were related to maintaining skills, professional relationships and identity and professional recognition, registration and regulation. These findings resonate with the final stage that Duchscher (2008) depicted in her trajectory, which is the process of “knowing”. At this stage, newly qualified sonographers enter a phase of separating, recovering, exploring and critiquing (ibid).

What was interesting to note is that Duchscher’s research was mainly concerned with new graduates from a uni-professional setting who were making a transition into health care for the first time. By contrast, the majority of the participants in this study comprised of experienced and established health care professionals, however, they recounted similar experiences during their transitional journey. As Duchscher (2009) observes, for graduates to experience a successful transitional journey, they require consistency, predictability, stability and familiarity during their initial clinical practice. It emerged from the accounts of some of the participants in this case study that this was not their experience. The subthemes of role adjustment and role redefinition clearly highlighted the factors that impacted on consistency, predictability and stability in their new roles, particularly for those who

were established professionals. Interestingly, whilst Duchscher highlights the difficulty faced by graduates in her study in adjusting to working in teams, the findings in this study suggest the contrary. The newly qualified sonographers reported anxieties when they were required to integrate into an environment that emphasised individually and autonomously based care provision as opposed to the teamwork environment that they were traditionally used to. Furthermore, there was also an element of working outside their comfort zone when encountering a different clientele than traditionally met, while the unpredictability of the nature of ultrasound practice also exposed them to challenging situations and having to give results to patients in unforeseen and unprepared for circumstances. One participant expressed this adjustment period as a "*steep learning curve*"

This case study also identified a potential gap in the preparation of newly qualified sonographers which has implications for both the HEIs and the NHS organisations. Whilst adjusting to ultrasound practice, participants found two main areas particularly challenging and felt unprepared for them in their first year of practice. The first area that was highlighted involved communication skills needed for "breaking bad news" and "sentimental working" (Strauss *et al*., 1982, p. 254). Breaking bad news is a complex communication task that requires expert verbal and non-verbal skills (Fallowfield and Jenkins, 2004) and "sentimental working" in ultrasound examinations requires higher levels of technological as well as communication skills. In adjusting to these specific aspects of the new role, there were similarities and differences in this case study between the individuals and between professional groups.

The midwife sonographers generally reported that they were comfortable with work involving close contact and compassion. In many ways, this is not surprising, as it is widely acknowledged that pregnancy and birth represent emotionally intense experiences for women and their families: therefore, working in such an environment is one of the core skills required in the day-to-day work of midwives (Masterson, 2010). However, they reported initial difficulties in adjusting to new technological jargon .The more scientifically oriented practitioners such as radiographers and vascular scientists reported contrasting experiences when adjusting to the humanistic aspects of ultrasound practice. This is particularly

evident in technological procedures and scientific examinations, as reported by Murphy (2001). The seminal works of Strauss *et al*. (1982) focused on the work that professionals do with patients, on and around medical equipment, which they describe as sentimental work. In their opinion, sentimental work is a dichotomy of work that involves maintaining staff members' and patients' composure, keeping up of spirits or courage, rectifying interactional frictions or errors, getting and giving biographical information and making decisions based on this information whilst managing the 'real' medical work which needs to be carried out at the same time. They found that inexperienced health care professionals are often preoccupied with and will focus on purely the medical work, which can make the patient feel like an object rather than a human being.

Booth (2008) looked at different styles of communication used by radiographers who carry out radiographic duties and found that in her study, the radiographers generally resorted to using parental styles of communicating with patients. She explains that a possible reason for this is that radiographers are used to working in fast-paced/short-staffed settings that involve an ever-increasing emphasis on processing as many patients in as short a time as possible and having to deal with patients in what they perceive to be the most efficient manner. However, in contrast to the study presented here, Booth's study only focused on radiographers who were using imaging techniques that did not involve close and prolonged contact with the patients. Additionally, the participants in her study did not have the responsibility of communicating results to the patients, unlike the sonographers in this case study. Alderson and Hogg (2003) contend that advanced practitioners in medical imaging modalities such as ultrasound are required to conduct invasive complex-imaging procedures whilst managing sensitive and highly emotional patient issues and therefore need more developed levels of communication skills. Moreover, the "hybrid" nature of ultrasound imagery, as highlighted by Roberts (2013), creates a tension between the social expectations of the patients and the medical significances of ultrasound. This tension was observed by one of the participants in this study, who narrated the contrasting behaviour of women when they attended for an ultrasound examination and when they attended an antenatal check-up visit or on the maternity ward.

This study highlighted that participants—particularly radiographers from conventional radiographic roles—found the aspect of ultrasound practice that involved breaking bad news extremely stressful. Prior studies have shown that the bearer of bad news can experience strong emotions such as anxiety, a burden of responsibility for the news, guilt and fear of a negative response (Walvoord, 2006; Orlander *et al*., 2002; Simpson and Borr 2001). It is only recently that focus has fallen upon this emotional experience and the sentimental work involved from the perspective of sonographers, particularly in the field of obstetrics ultrasound, given that 25 per cent of early pregnancies end in miscarriage and 5 per cent of second trimester pregnancies demonstrate a structural abnormality (NICE, 2012; RCOG, 2010). Furthermore, the RCOG (2010, p. 22) stipulates that:

> *"If the scan reveals either a suspected or confirmed abnormality, the woman should be informed by the sonographer at the time of the scan. It is essential that all practitioners performing fetal anomaly ultrasound screening should be trained to communicate abnormal findings to women, as such information is likely to have significant emotional impact*".

Chervenak *et al.* (2010) and Simpson and Fernando (2008) summarised the challenges faced by sonographers in situations where unexpected findings are detected in a screening setting. There is likely to be no time to prepare, the sonographer is unlikely to have met the patient before, the sonographer may have limited information, and the ultrasound finding may be of questionable significance. Furthermore, Chervenak *et al.* (2010) elaborate that the patient may be accompanied by family, including children, and the sonographers have to cope with their reactions as well, and despite the information that patients are given about the purposes of the scan, no one expects bad news in a screening setting. On the other hand, managing symptomatic patients also requires advanced communication skills. These patients have already had some questionable symptoms or findings relayed to them, and as a result, are likely to be feeling frightened, vulnerable and concerned about the potentially negative outcomes of their imaging experience (Shuldham *et al*., 1995). Ultrasound investigations involve both "screening" scans, mostly involving asymptomatic patients, and

“diagnostic” scans, servicing mostly symptomatic patients. Although these two types of scan may have similar procedures, equipment and staff, the needs of the patients will be quite different and will require different professional skills. Therefore, it is safe to assume that any newly qualified sonographer will inevitably be faced with both of these situations in their early careers and it is not surprising that the participants in this study reported being overwhelmed by this aspect of ultrasound practice.

Inadequate training in communication skills is a major factor contributing to high rates of burnout and psychological morbidity in health care professionals (Fallowfield and Jenkins, 2004). As several authors have noted, professionals need to develop an awareness of the risks and teaching behaviour and communication skills is very different to teaching knowledge skills (Chervanak *et al.,* 2010; Gough *et al*. 2009; Alkasaleh *et al.*, 2004) They consider alternatives to the traditional approach of 'learning by doing' in a clinical context by focusing on the technology of simulation and virtual reality, which highlight elements of good and bad practice. Gough *et al*. (2009) evaluated a study in which experiential learning with ‘simulated parents’ was the core learning activity. The main aim was to develop junior doctors’ skills in giving bad news to parents. The simulated parents were a small group of professional actors who also had teaching qualifications and experience so that they could give feedback to and support the trainees’ reflections and learning. Following this simulation, the trainees met individually with a more experienced member of staff for further reflection and feedback by watching the recording of their simulation session. The authors found that this method of communication skills development in breaking bad news was evaluated positively by participants and medical educators. The main benefit cited was that this method helped to focus attention on the different types of communication skills that are required and the provision of context-specific, repeated, safe and credible learning experiences. It is recognised that no amount of simulated training can adequately prepare the practitioners for the varied scenarios they will encounter in their professional lives. However, as Vandekieft (2005, p. 1131) argues, “Students will learn this skill gradually and become efficient in breaking the bad news. If they are not trained properly, the thought of

breaking the bad news itself is “bad news” for them when they become professionals.

The findings of the present study indicate that there is a need for both HEIs and NHS institutions to work in collaboration and use similar strategies in preparing sonographers for breaking bad news. Ultrasound educationalists can embed the development of these skills into the curriculum whilst organisations can also develop and nurture these skills through preceptorship, in-house support and continuous professional development policies. Furthermore, learning whilst working can be refined with reflection and observation of role models in practice, as most scenarios tend to repeat themselves. Future collaborative research is required to explore the different educational levels needed for the preparation of these new practitioners during their training period and the initial years of practice. The second aspect of role adjustment that participants reported as being challenging was adapting to practise with increased accountability. This included making diagnoses, writing clinical reports and the perceived threat of litigation. All participants in the study reported anxiety and fear of making a mistake by missing or making a wrong diagnosis. This finding aligns with the work of Ismail (2012), who also observed this anxiety, although her research involved already established sonographers making the transition to advanced practice in the USA. Advanced practice in this sense is seen as a vertical substitution of the workforce and as such involves taking on roles that were historically within the medical profession. This brings additional demands in terms of accountability and legal liability (Dimond, 2002). Litigation related to diagnostic imaging has become progressively more frequent as equipment and applications have become more widespread (ibid). Additionally, there is greater public awareness of the legal system and increased willingness to believe that a sub-optimal outcome is the fault of another and/or a perception that a large financial settlement could be awarded (Alderson and Hogg, 2003). In particular, obstetric ultrasound has always attracted more litigation than other aspects of diagnostic ultrasound. This may be due to the increasing public expectations of the ability of diagnostic ultrasound to detect all fetal abnormalities (Chervenak *et al.*, 2010; Marteau and Dormandy, 2001; Meire, 1996). Sanders (2003) carried out a survey using data over nineteen years to study changes in the patterns of litigation for sonographers and found that 75 per

cent of cases reported were related to obstetric ultrasound. Similarly, in a fifteen-year retrospective UK-based study by Harrison and Mitcalf (2003), who sought data from managers regarding litigious claims, obstetrics and gynaecology had a much higher prevalence (85 per cent) of litigation than other areas of ultrasound. The other 15 per cent of litigation was reported to be in the field of vascular ultrasound. Experienced sonographers in their study identified the time allocation for the scan, feeling rushed and competing priorities as main factors that were perceived to increase the risk of litigation. It is interesting that although this study was conducted twelve years ago and the participants were established, experienced sonographers, the factors highlighted by Harrison and Mitcalf were also mirrored in the study presented here by the newly qualified sonographers. Whilst the findings of the research presented here aligned with aspects of skills acquisition as seen in the Dreyfus and Dreyfus model (2004,1986), there were other rich and complicated interactions between the technical and cognitive domains of knowledge that involved not just routine scans but also very complex ones. This finding was also observed by Field (2014), who notes that progression from a competent sonographer to an accomplished sonographer who can scan both intuitively and rationally, recognising and taking clinical history and interpreting the images accordingly, happens when the sonographer builds a “library of experience”. This can only be gained through continuous and gradual experiential exposure to complex scans, facilitated by knowledge transfer forums such as team meetings focussing on interesting cases and professional development. This gradual and experiential exposure to complex scans did not occur for some participants in this study and the research findings indicate that the working environments of these practitioners did not always support nurturing of these skills.

This case study also provides a unique insight into the differences in how participants experienced role development depending on the context of their backgrounds, working environment and nature of their work. For the newly qualified vascular sonographers, there were no conflicts in defining and developing their ultrasound practice. Introduced in 2008, the paper “Modernising Scientific Careers” (MSC) identified the challenges and opportunities of future care delivery and addressed some of the historic difficulties that faced the workforce in terms of

education and training, skill mix and workforce planning. In 2010, “Modernising Scientific Careers: The UK Way Forward” detailed the strategy for improving the education and training of this specific workforce. Following these recommendations, the training status for clinical scientists was agreed as supernumerary members of staff. This supernumerary status was seen as an advantage for the vascular scientists in this study who worked alongside more experienced staff, learning and receiving feedback from them, during which time they gained confidence. Several authors have also reported that supernumerary status for newly qualified practitioners is a positive factor in transitions (Gerrish, 2000; O’Kane, 2012; Van der Putten, 2008). Furthermore, as seen here, the clinical scientists reported a smoother transitional experience, as they were developing skills and practice from a new and previously un-encountered perspective, and as such had no other healthcare-related experiences and professional status to compare. However, for established professionals such as radiographers and midwives, although they reported positive experiences and coping strategies during this initial period, which were facilitated by previous health care experiences and familiarity with the health care environment, additional factors were identified in this study. These included experiencing exposure to a clientele that was different from their usual practice and the duality of making transitions from an experienced professional back to the status of a newly qualified one. This posed a threat to their established “ontological security” based on their previous healthcare experiences (Giddens, 1991), as ontological security depends upon the individual’s perception of the “natural state of things” and “common sense”– both socially constructed by everyday routines.

5.1.2 Role development

The diffusion of technology in imaging is a complex process influenced by both the technology itself and by the social and cultural environment in which it has been adopted (Larsson *et al*., 2007; Korica and Molloy, 2004).The concept of boundary working in current health care organisations is becoming more explicit due to increasing vertical and horizontal substitution, as well as specialisation and diversification of health care professionals (Nancarrow and Borthwick, 2005). It was evident in this study that for practitioners working across boundaries, there

were important issues that impacted on their professional roles and their experiences of those roles. These included two radiographers who were working across two hospital sites and across two separate clinical directorates, one midwife who was working across two separate clinical directorates within the same hospital and three midwives who were working for the same clinical directorate but with different roles. Inflexible organisational structures meant that some of these practitioners could not negotiate what they perceived to be a realistic working balance between their dual roles. Their initial expectation of delivering holistic care was shattered by the reality of working in dual roles. Examples cited in the subtheme of role (re)definition were fragmentation of their dual roles, lack of clear job descriptions and lack of guidance and understanding from peers and managers. Consequently, these professionals were searching for ways to connect and position themselves across social and professional practices (Nancarrow and Borthwick, 2005; Goodwin, 1994).

Participants who reported a lack of role definition from organisations also recounted examples of being subjected to unrealistic expectations from their own communities as well as from other health care professionals. These unrealistic expectations from managers and employers have important implications for clinical governance and the safety of patients. Examples cited by midwives were having to "juggle" their dual roles, having to cope with their ultrasound workload whilst being interrupted for other midwifery roles and being expected to carry out scans because they happen to be present at a particular time and place. This was mainly attributed to a lack of understanding of roles from managers, peers and the wider multidisciplinary team and this finding reflects the observations of Nancarrow and Borthwick (2005), who argue that clear role boundaries and infrastructure with sufficient support from managers and commissioners are vital to support and implement vertical and horizontal workforce substitution effectively and fairly. Whilst accepting the role and responsibilities of a sonographer, some participants also cited incidents where they were placed in clinical situations that were beyond their comfort and knowledge levels. These included performing complex examinations for the first time and performing ultrasound examinations in isolated, unsupported and inappropriate environments. Although they recognised this practice to be less than ideal, participants felt pressurised to do so as a way to

establish credibility amongst their own communities and the fear of failing their patients, colleagues or themselves. These situations encountered by newly qualified sonographers highlight an important observation that medical technologies cannot be utilised in isolation without a formal infrastructure in place, such as fit-for-purpose equipment, appropriate quality assurance, provision for accurate record keeping, provision for second opinions and appropriate follow-up.

A joint publication in 2012 between the RCR and CoR highlights the principle of the “right test at the right time and place”. This document was developed to inform all providers with staff who carry out ultrasound scans and those responsible for the commissioning of such services. Both these professional bodies stress that although there is recognition that the details of protocols and service needs will vary with locality, it is essential that these protocols are clear, understood and agreed by all members of the team delivering clinical imaging. Furthermore, they caution that working in isolation is a potential risk for both staff and patients, and employers and commissioners are advised against engaging services without a team providing appropriate support and governance.

One of the most important tests of any culture is what it considers acceptable and unacceptable. The Francis report (2013), following the public inquiry into failings at Mid Staffordshire NHS Foundation Trust, highlighted a number of areas where a more robust approach to accountability was critical. This was later reinforced by the study of Culture and Behaviour in the English NHS by Dixon-Woods *et al.* (2013), who concluded that there needs to be a close relationship between the wellbeing of staff and outcomes for patients and that service provision is also about ensuring that the right support, engagement and values are in place.

It was evident from the findings of this study that some participants perceived the support to consolidate, develop, and nurture their new skills during the first year of practice as inadequate and dependent on their local organisational ethos. Provision of support at work, discussed here as preceptorship, ranged from some participants having formal meetings with mentors for case reviews and auditing of reports to others having an informal arrangement where an experienced member of staff was available but not necessarily designated to act as a mentor, and more

disturbingly, there were situations where participants had no designated support at all. When other experienced staff, such as radiologists, were approached for advice, the new sonographers were left without suitable guidance, suffered irritability or were reprimanded. The findings from this study were not unique to sonographers as several researchers have previously reported newly qualified practitioners experiencing difficult relationships with numerous individuals, including peers, doctors, managers, and preceptors throughout the transition period (Kovner *et al*., 2007; Bowles and Candela, 2005). This lack of formal support for newly qualified sonographers has profound implications for NHS employers, given that the CoR survey (2014) identified that due to unsuccessful recruitment of experienced sonographers, 54 per cent of the responding departments anticipating filling this deficit by waiting for one or more trainee sonographers to qualify. More worryingly, 45 per cent of these trusts already counted these students as current qualified staff rather than giving them supernumerary status. Consequently, there is an expectation that these newly qualified sonographers will immediately fill the gap in the workforce within these departments. The findings in this case study have already identified the pressure that these new qualified sonographers experience in their early careers, such as reality shock, coping with the same workloads as their more experienced counterparts, making quick decisions, report writing and the previously discussed specific aspects of ultrasound practice. What is clearly apparent here and has not been highlighted before is that there are no formal preceptorship programmes for newly qualified sonographers. Chambers (2007) argues placing such high expectations on a newly qualified workforce without any adequate support and preceptorship will invariably be detrimental to their own wellbeing, the overall service provision and patient safety. Although the CoR has proposed a preceptorship period to assist employers and the existing workforce to develop confidence in the new proposed direct entry undergraduate sonographer workforce (CoR, 2013), as identified by this case study, there is no such recommendation for newly qualified sonographers from current postgraduate ultrasound programmes. To nurture the gradual development of a sonographer, a preceptor needs to offer more than *ad hoc* meetings and the provision of second opinions. The findings of this case study support the observations of Robinson and Griffiths (2009), who found three main reasons why preceptorship programmes

were unsuccessful. These were a misunderstanding of this role by potential preceptors, the absence of formal training for preceptors and the inconsistency of organisational support for this role. Preceptorship needs an element of “emotional buy-in”, which involves active engagement and commitment from the individual, the preceptor and the employer (Carraccio *et al*., 2008). Research on the theory of cognitive apprenticeship explores the situated knowledge gained through structured, mentored activity in the workplace (Brown *et al*., 1989). This method is aimed primarily at teaching the problem-solving processes that experts use to handle complex tasks. Cognitive apprenticeships are intended to enable newcomers to learn strategies and skills in the context of their application to realistic problems, within a culture focused on and defined by expert practice. In this way, the student first gains an understanding of the abstract generalisable principles, which are then transferred to an authentic situation to allow enhanced learning to take place (Brannagan, 2012, Brown *et al.,* 1989,). The application of cognitive apprenticeship provides an opportunity to facilitate higher-level thinking, by using six progressive strategies as depicted by Brannagan (2012).These are illustrated in Figure 10.

Figure 10: Cognitive apprenticeship (Brannagan, 2012). Reproduced with permission from MERLOT - the Multimedia Resource for Learning Online and Teaching.

These are:

- Mentoring a newcomer in his or her learning by modelling and coaching the desired roles.
- The provision of scaffolding to the learners; as learners become more independent, mentors reduce or fade out their support.
- Encouragement of reflection on differences between novice and expert performance.
- Encouragement of the development of self-monitoring and correction skills required for the problem solver to alternate among different cognitive activities.
- Sequencing of tasks to reflect the changing demands of learning: increasing complexity, increasing diversity, and global before local skills.
- Promoting a progressive culture of expert practice within which newcomers can explore and learn how to apply their skills in varied contexts with intrinsic motivation.

The accounts of the participants in this study did not resonate with the ideas of modelling, scaffolding and fading as described by these authors. In a climate of ever-increasing service demands and shortage of staff, it is understandable that this crucial element of the transition and professional development support for newly qualified sonographers can be compromised, misinterpreted or even overlooked, as evidenced in this case study. Allan *et al*. (2011) contend that the NHS is not a learning-focused organisation and the demands and constraints of the practice setting are often cited amongst factors accounting for why practitioners struggle to implement theory into their practice (Robinson and Griffiths, 2009).This is clearly an area that can be improved in clinical practice with constructive recommendations so that in the long run, this new ultrasound workforce is supported and has an opportunity to flourish, which will in return benefit patients, the organisation and the individual profession. Successful preceptorship programmes have been shown to have several other benefits, such as nurturing reflective practice, increasing confidence levels, reducing medical errors and increasing job satisfaction (Morley, 2009; Robinson and Griffiths, 2009).The development of a specific framework to support the preceptorship of

newly qualified sonographers based on cognitive apprenticeship is highlighted in this study as an important area that needs to be considered through collaborative work with the stakeholders, commissioners and HEIs.

5.1.3 Maintaining competency and credibility

Learning and maintaining skills whilst working after the initial qualification period was also a concern expressed by some participants. CPD is an important part of maintaining skills and registration with regulatory bodies, and all registrants are required to provide evidence of continual development of their knowledge and skills while they are registered. The HCPC recommends that CPD should include a mixture of learning activities, including work-based learning, professional activity, engaging in formal educational programmes and self-directed studies. However, there are no specific guidelines that stipulate the amount of CPD, as it is argued that the time spent on an activity does not necessarily reflect the learning gained from it. The NMC, on the other hand, stipulates specific hours of clinical practice to maintain registered practice as a nurse or midwife, but does not offer any parallel guidelines for midwife sonographers to maintain ultrasound skills. In contrast, the SVT has definite guidelines for its clinical scientist members. These include a specific number of CPD points which are to be accrued and submitted by each member annually to remain accredited.

CPD and activities for learning whilst working were reported by participants in this case study as attendance at conferences and study days; however, barriers were identified. Despite the well-intentioned recommendations from regulatory and professional bodies, with employers initiating and funding attendance at courses, the specific requirement to demonstrate continuing competence within practice thereafter is often not in-built (Afful and Henwood, 2000; Eraut, 1994). CPD provision has always been challenging for health care institutions amid staff shortages and lack of resources (French and Dowds, 2008; Afful and Henwood, 2000). In response to the modernisation agenda, Gibbs (2011) proposed that healthcare providers and HEIs will need to be more innovative in the design and delivery of CPD to the clinical workforce. Furthermore, Friedman *et al*. (2000) stress that employers should not take the view that CPD is a luxury that cannot be

afforded when funding is in short supply. CPD in professional fields such as ultrasound is vital to facilitate the necessary maintenance and development of technical, clinical and cognitive skills as well as theoretical knowledge if this workforce is to continue to make a significant contribution to diagnostic imaging and health screening. This is a major issue for ultrasound practice and will impact on the skill mix within the ultrasound workforce, given that the CoR survey (2014) found that 33 per cent of the current workforce is due to retire in the next ten years. Inevitably, this will result in a loss of valuable expertise and experience and should be addressed by providing sufficient opportunities to the current and future ultrasound workforce if this deficit is to be addressed in a timely fashion. Furthermore, given the scope of ultrasound in vertical and horizontal substitutions and the concept of boundary working, maintaining skills across both spheres of practice is vital. This is not always possible, as shown by the participants in this case study working across disciplines. Reasons cited by participants were the lack and length of time to maintain both roles, lack of opportunities for job rotations, and staff shortage. Participants who also happened to be sonography managers cited difficulties in allocating enough workload to their newly qualified sonographers to maintain ultrasound skills whilst still having sufficient resources to deliver their routine midwifery services. This emphasises the fact that in an already depleted workforce, demands are conflicting and provision of opportunities for the staff to maintain dual skills is problematic. This was highlighted by a midwife who reported that she was not as *"on the ball"* as she used to be and the radiographers who could not negotiate time to update their knowledge in the advancing radiographic equipment. Participants in this study who were working across directorates also reported a lag in updating local clinical protocols and timely dissemination of these working protocols. These observations reflect those reported by Nancarrow and Borthwick (2005), who argue that horizontal substitution in a workforce can be fraught with obstacles such as limited access to relevant technology, protocols and workload whilst maintaining competences. These findings are significant and have serious connotations both for the individual practitioners and for the NHS organisation. Furthermore, the consequences of not meeting professional expectations can result in practitioners facing scrutiny and criticism within professional domains. This was highlighted in an incident that was investigated by the Public Services Ombudsman in 2013.

This inquiry investigated a situation where a woman was given a misdiagnosis of miscarriage when she attended for her early scan. She attended another hospital for a uterine evacuation and a subsequent scan in that hospital revealed a healthy nine-week pregnancy. The woman went on to have a normal baby and lodged a complaint. The enquiry revealed several shortcomings. These included out-of-date protocols, the training and level of competence of the sonographers involved. Moreover, the enquiry found that a change in national guidelines had not been incorporated into local protocols and disseminated to the ultrasound midwifery staff in a timely fashion. Furthermore, inadequacies were identified in an on-going professional developmental programme for all midwife sonographers in the Trust. This lack of opportunity to update knowledge was also evidenced in the present case study, in which some newly qualified sonographers recognised the fact that they were losing traditional skills whilst not being able to develop fully their new skills and keep up with national guidelines that inform aspects of their practice. Field (2014) cautions that the lack of opportunities to maintain and develop skills could result in regression, with the high possibility that someone working at a competent level can move back to the novice stage if they do not have regular exposure to their relevant practice. Given that HEIs are increasingly training ultrasound students from diverse professional backgrounds (CASE, 2012), it is important that NHS employers and professional bodies should consider developing guidelines to support them and to ensure that there are strategies and recommendations for every professional delivering ultrasound service in terms of skill development and skill maintenance to maintain this important aspect of professional practice.

Whilst professional codes of conduct may refer to an obligation to engage in CPD, it is also acknowledged that CPD training courses alone cannot be assumed to result in practitioners being able to integrate (theoretical) concepts into their practice (Roberts, 2002; Roberts and Barber 2001). Furthermore, there is little evidence that front-loading theory within an education process is efficient in integrating such knowledge into the context of lifelong professional learning (Eraut 1994). Learning is a complex, contextualised process where knowledge and skills are developed, adapted, transformed and shared within the dynamic setting of the

workplace. This interaction of learning by doing, belonging, experiencing and becoming is portrayed by Wenger (1998) as an integral aspect of a situated social theory of learning (see Figure 11). It is notable that the findings of this case study lacked any strong references from the participants to any activities that were tied to the concept of “situational learning”.

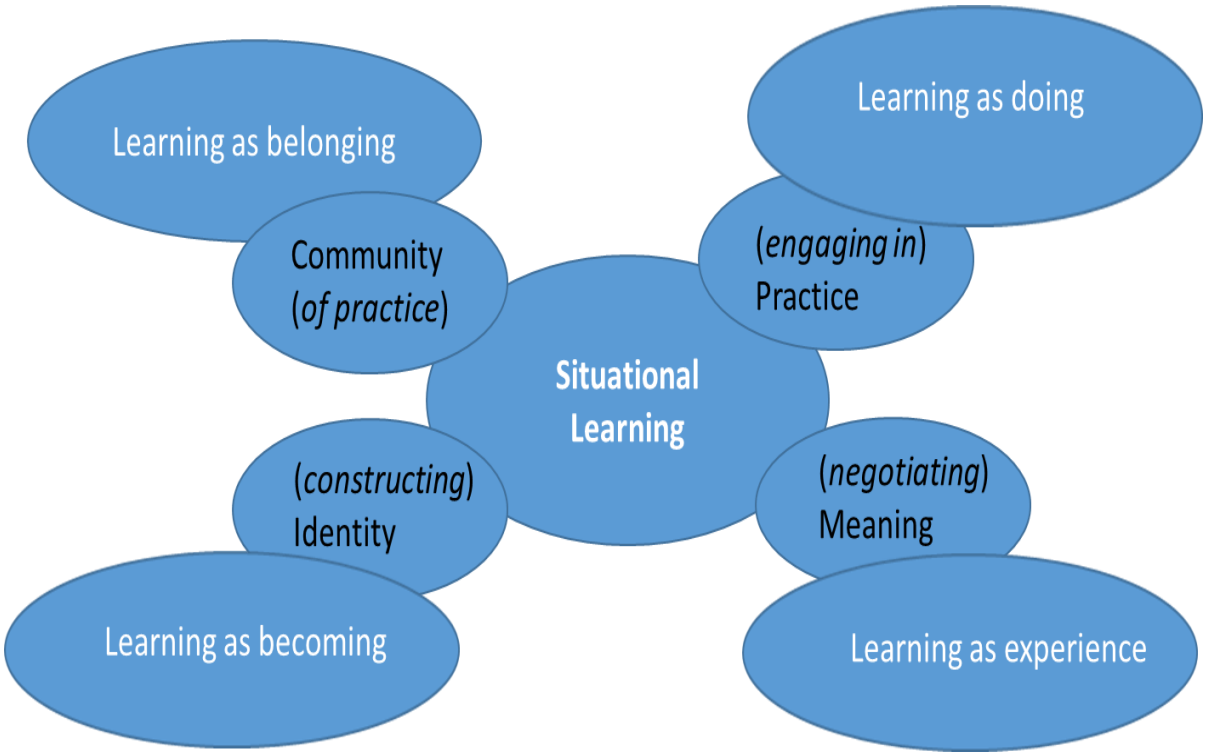

Figure 11: Components of Wenger's social theory of learning (1998)

Lave and Wenger (1991) propose that learning is fundamentally a social process that can be seen as a situated activity with a central defining feature, which they call Legitimate Peripheral Participation (LPP). Legitimate peripheral participation describes the process whereby learners enter into a community of practitioners as newcomers, and, via interactions with established members, gradually move towards full participation in the sociocultural practices of that community as they assume more responsibility and move more centrally. The accounts of the participants in this study did not quite fit with the concept of movement from

peripheral to full participation, as their accounts reported performing the same tasks as their more experienced counterparts from the outset rather than moving from more routine (peripheral) work to more complex (central) work. In addition, in Lave and Wenger's (1991) conceptualization of apprenticeship learning, mentors were the central experts who steered the learning of newcomers. In this study, although mentors did exist, it was the participants who sought them out if and when they saw a need, and took it upon themselves to define whom they would approach and what they would seek to learn.

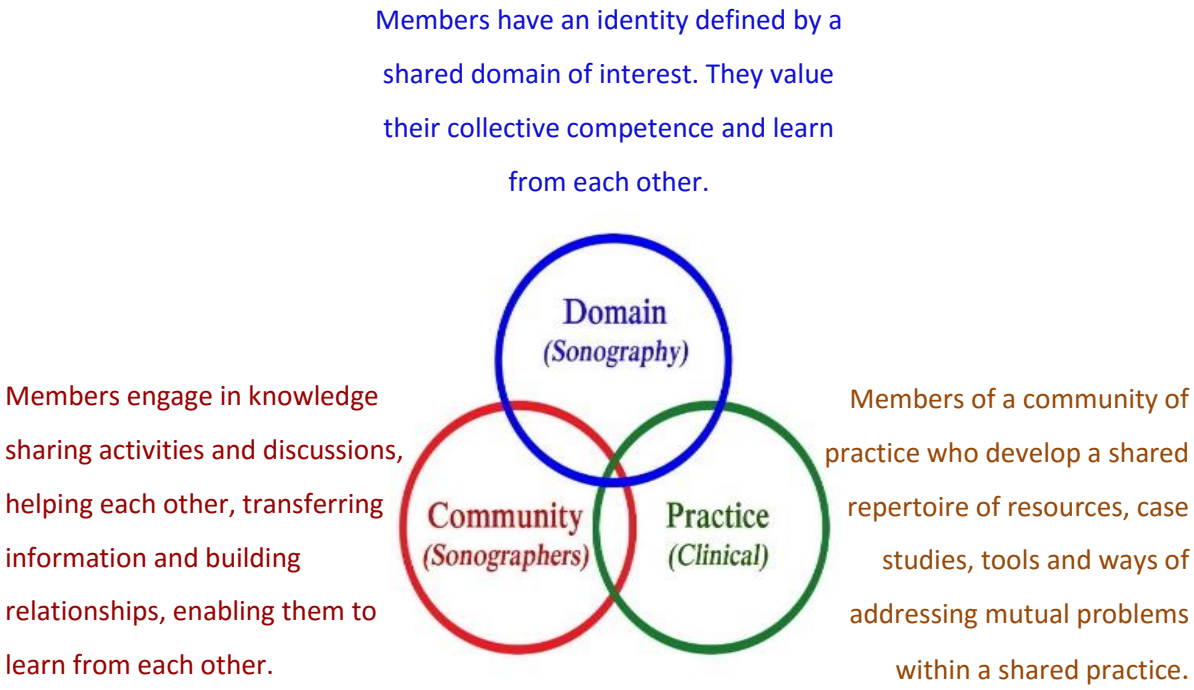

Figure 12: Ultrasound Community of Practice based on Lave and Wenger (1991)

Professional relations are important for newly qualified practitioners for several reasons, including developing and learning professionally, the socialisation process, giving a sense of belonging and developing mutual respect (Brown *et al*., 2012). It was evident in the findings that participants who were uni-professional and were working solely in dedicated ultrasound departments with other "like-minded" sonographers reported a more positive experience in terms of the socialisation process and developing professionally. However, this case study also

revealed important information that has a significant bearing on the modern ultrasound workforce. Participants who were working across boundaries (mainly midwives and radiographers who were working in dual roles or between different directorates within the same NHS setting) reported experiences of feeling isolated and lack of understanding from peers, inter- and intra-professional tensions as well as tensions between the different directorates. The participants cited environments where they perceived themselves to be working in *"isolation",* and there was no ethos of cross-boundary networking or opportunities to participate in any knowledge transfer forums. The implications of these findings are that if professionals working in large organisations do not work together or lack understanding of the roles of others, then the organisation will not operate effectively. Professionals need to have an understanding of how their work can affect others. A lack of communication between staff and departments was evident at Mid Staffordshire with serious consequences, as identified by the Francis report (2013).The NHS Institute for Innovation and Improvement (2010) recognise that:

> *"The NHS workforce is one of the most precious resources that we have and that these are the people who have the potential, passion, skills and expertise to deliver high quality care which provides a great experience for patients and families. During any change there will not only be changes to the process of care but there will also be changes that impact on staff: for example, working hours, new skills, new relationships and even a new work base. Identifying these changes and engaging with staff early to look at the design of their roles will help to develop a shared understanding and ownership of the change". (p. 10)*

The literature on knowledge management suggests two types of boundaries that present significant barriers to knowledge transfer. These include organisational and professional boundaries, described as "endemic tribalism" within the medical profession (Bate 2000).

The concept of CoP as proposed by Lave and Wenger (1991) has been highlighted in health care by several authors in uni–professional, multi-organisational and multi-professional settings (Goodwin *et al*., 2005; Lathlean and

Le May, 2002; Curran *et al*., 2009).This study adds a new contribution by proposing the potential of the model of CoP by Lave and Wenger (1991) in ultrasound practice (see Figure 12) as a suitable driver to develop uni-professional as well as multi-professional learning and knowledge generation across a variety of different working environments. Furthermore, CoP can achieve a diverse range of outcomes, including breaking down professional, geographical and organisational barriers, sharing information, reducing professional isolation and facilitating the implementation of new processes and technology. Communities of Practice have both newcomers and expert members and provide a forum for successful knowledge exchange. Moreover, CoP are much more than the accumulation of the technical knowledge or skills associated with undertaking some task, but also a vehicle to shape the process of developing professional expertise, spreading adoption of new technologies and clinical leadership at all levels (Wenger, 1998; Freidson, 1986). More importantly, the community, and the people and artefacts within it, are all resources for learning and CPD. However, whilst the above authors observe that deliberately constructed CoP have been shown to enhance professional education, the adoption of innovation and knowledge transfer, the impact of pre-existing professional and organisational boundaries on the cultivation of new CoP seems somewhat underestimated (Kislov *et al*., 2011; Currie and Suhomlinova, 2006). Therefore, the success of facilitating CoP to improve the performance of healthcare organisations can only be achieved through behaviour change among individuals, managers and employers within the organisation.

This case study also hints at the process by which the newly qualified sonographers were beginning to redefine and align themselves in light of ultrasound technology, their newly gained knowledge and skills and new practice. In particular, ultrasound technology provides an occasion for such dynamics, and these in turn greatly influence the on-going negotiation of professional identity by professionals in everyday practice. Building on Wenger's perspective (1998), whilst the participants in this case study who were working across boundaries appeared to be building a new identity trajectory as 'sonographer', some were also working hard to maintain their existing trajectory as radiographers or midwives.

The midwives felt pressure to symbolise their new role as sonographers and considered concrete steps in this direction—for example, changing uniforms—but they found it difficult to prioritise this area of activity within their everyday practice and workload. This significance of the uniform in different settings was also observed by Draper *et al.* (2010) as a key part in defining the identity of the person during the transition process and was seen as an external symbol marking an internal change felt by participants. Furthermore, these participants saw themselves as being excluded by some longer-standing staff members from their own professional communities, but also needed acceptance within the new communities of practice. Wenger (1998) contends that boundaries can create divisions and be a source of separation, fragmentation, disconnection and misunderstanding. Whilst much of the identity literature tends to emphasise self-comparisons in terms of similarities (Jenkins, 2004), the accounts of the participants in this study suggest that the construction of professional identity is characterised by differences more than similarity, thus aligning with the work of authors such as Freidson (1984). Korica and Molloy (2010) observe that more junior professionals relate to, engage, promote, and identify with new technologies as a way to establish credentials and become 'insiders', even if this means challenging the existing 'establishment'. This was observed in this case study via the practice of "othering" (Bogenrieder and van Baalen, 2007) when the participants defined their sonography practice in light of another, delineating how it differs from the other practice, or when they discussed the attitudes and actions of "others" even though the "others" sometimes were members of their own professional communities. In other words, the 'we' and 'them' were dynamically constructed identities that did not always obey the neat boundaries of individual occupations or professional sub-groups. This research complements the work of Norris (2001), who studied professionals working across boundaries in the treatment of musculoskeletal problems. The case study findings align with Norris's concepts of limitation and holism. Limitation (the others are limited because they do not do something that we do) was a consistent theme cited by all participants in this study. Holism ("we are holistic in our approach whilst others aren't") was cited by midwives who cared for pregnant women. However, from a positive aspect, boundary working can also provide areas of unusual learning, places where

perspectives meet and new possibilities arise: for example, a new practice in its own right (Wenger, 1998).

One encouraging finding in this case study was that it also revealed good examples of cross-boundary working, when some participants who were working across boundaries actively sought to bridge gaps between professions to promote interdisciplinary relationships. Wenger (1998) refers to these as “brokers” and maintains that the role of skilled “brokers”, who straddle different professional communities and facilitate the exchange process is crucial to the success of cross-boundary working. He also argues that on one hand these “brokers” have a very rich and valuable position, since they are the ones who can introduce elements of one practice into the other. On the other hand, they face a difficult position because they can be easily seen and remain as being “peripheral participants” with the risk of never fully belonging to or being acknowledged as central participants in any one practice. Therefore it is important to develop, nurture and support these broker roles given the diverse constitution of the sonographic workforce. Figure 13 gives examples of participation activities that Wenger (2000) identified that can be applied to ultrasound practice and promote effective boundary working for sonographers from multidisciplinary backgrounds.

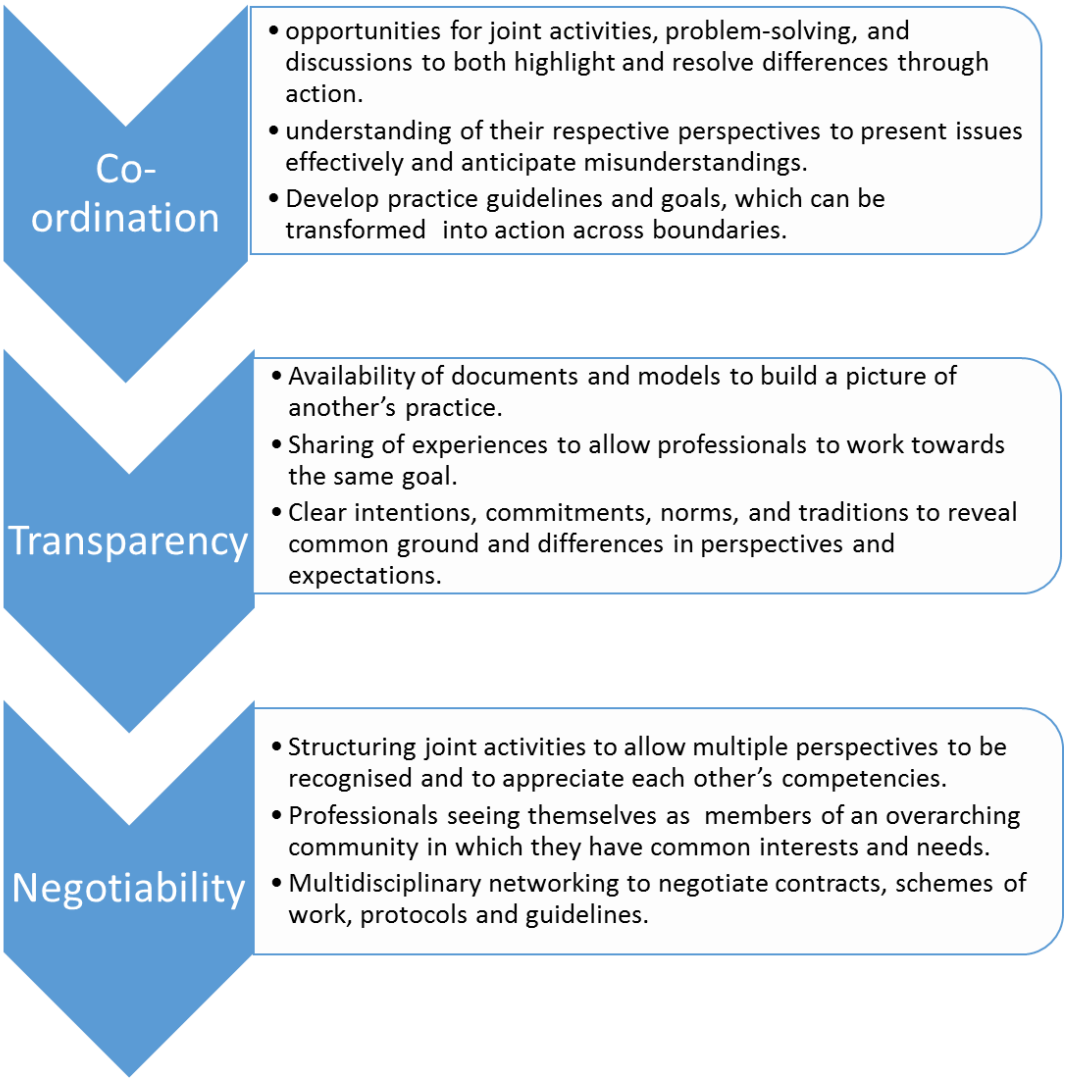

Figure 13: Participation activities to promote effective boundary working. Based on Boundary Dimensions (Wenger, 2000)

Phelan and Kinsella (2009) argue that individuals construct occupational identities when they define themselves in terms of the work they do and the distinctiveness of skills they possess that typify the line of work. This concept also aligns with the findings of "limitation" and holism" (Norris, 2001) discussed earlier in this chapter. Furthermore, occupations have personal and social meanings and occupational identities are socially constructed by the values attached to the individual self and how one is perceived by peers, managers, other workers, trainees and clients (Lingard *et al*., 2002; Oliver, 2010; Laliberte-Rudman, 2002). In the researcher's anecdotal experience, students training in ultrasound start off as radiographers, midwives or nurses; however, as evidenced in the interview accounts of this case

study, participants also used occupational titles such as “sonographers”, “midwife sonographers” or “vascular scientists” rather than using their given professional titles. This emphasises the active role that the participants portrayed in the construction of their own occupational identity of what being a sonographer means in practice. This complements the work of McLaughlin (2003), who argues that in particular contexts, certain kinds of values are consciously articulated as personal and are incorporated into the defence of professional legitimacy, and that by bringing personal claims inside professional boundaries, there is an interplay between personal and professional values and notions of the self. In this sense, identity construction is not always stable and can change depending on organisational settings as individuals move or transition into new roles; it has a strong social element in which individuals learn, work and interact with others and there is recognition of the existence of general and particular 'communities of practice' associated with particular occupations and organisations (Wenger 1998; Pratt *et al*., 2006). According to Brown (1997), there are key elements that influence identity construction. These are considered in relation to newly qualified sonographers and are shown in Figure 14.

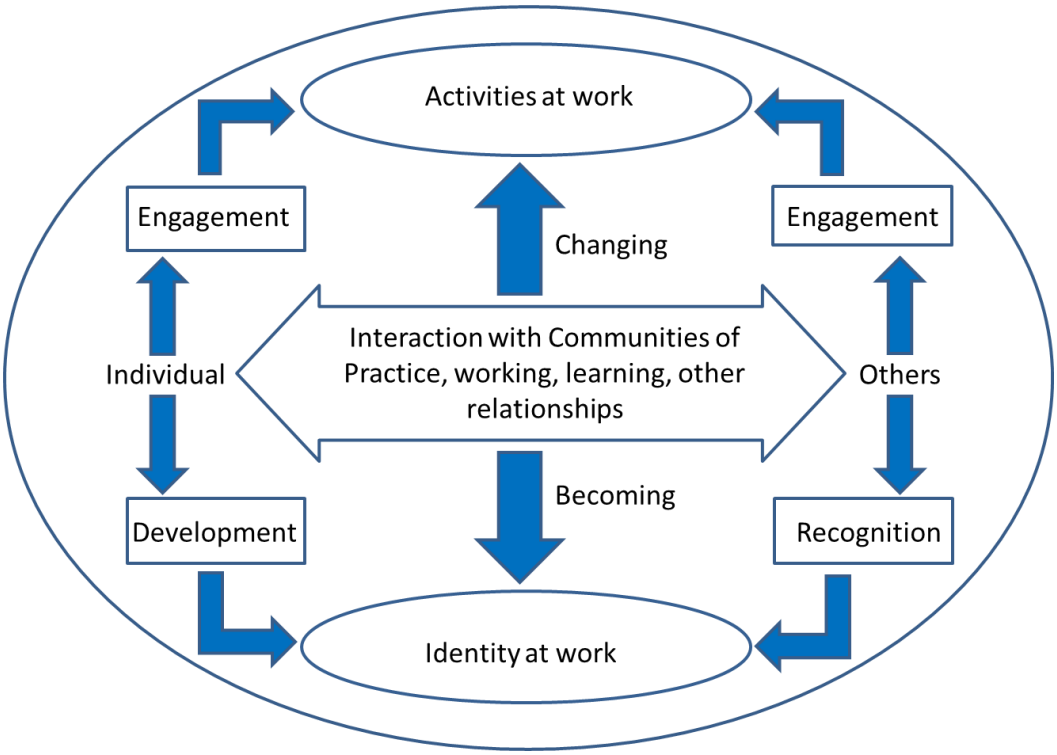

Figure 14: Elements that influence occupational identity construction. Adapted from Brown (1997). Used with permission of Brown, A.

This case study also depicts the multifaceted views on recognition and regulation held by participants following ultrasound qualification and the utilisation of ultrasound technology. Additional to the need for recognition from peers, other professionals and organisations, the participants also identified the perceived lack of recognition of sonographers by professional bodies and the appreciation of their ultrasound qualifications within professional registers. More specifically, if membership of a professional register is seen as a means by which professional identity can be established and maintained, it can be argued that the lack of rules in this case is seen as problematic because it makes the barriers to membership unclear, with potential negative consequences in terms of who is seen as an insider and on what basis. As discussed by Thompson and Paterson, (2014) formal recognition as a profession and associated regulation for sonographers is a complex area, and as such is outside the remit of this professional doctorate. The perceived lack of support from CoR from some of the radiographer participants was disappointing, as the CoR has a considerable amount of comprehensive and specific documents informing ultrasound practice and this study highlights the need to promote these. The SVT being solely dedicated to ultrasound practice in vascular studies, has populated its website with specific guidelines and recommendations and these were recognised and were adhered to by the clinical scientists in this study.

However, the midwife sonographers in this case study reported “falling through gaps” with their profession. The lack of formal recognition and support for ultrasound practice was also identified during the literature review and this concurs with Meire’s findings in 1996 and his comment that some midwives feel that the rewards and support once qualified in ultrasound are not adequate when compared to the increased risk of litigation. It is disappointing to see that although the number of midwife sonographers in the UK is growing, eighteen years later, there is still this apparent lack of recognition and support. Furthermore, if short “focused courses” are offered to professionals such as midwives, and given that in the absence of suitable regulation, the devolvement of decision-making and accountability is placed in the domain of a professional body by the DH, the implications go beyond education and a set of competence standards. In the absence of adequate support, recognition and infrastructure, it is likely that this

emerging group of practitioners will be discouraged from considering a career in ultrasound. Therefore, collaboration between professional bodies is vital to facilitate and support the diverse constituents of the modern ultrasound workforce.

The changing environment and dynamics of ultrasound practice have also caused some anxieties in terms of future job prospects and professional and career developments. This concurs with the findings of Nancarrow and Borthwick (2005).The radiographers reported concerns about potential role erosion and dilution by horizontal substitution by other professional groups such as midwives, physiotherapists and vascular sonographers and the scope for vertical substitution as being limited and controlled by the more powerful medical disciplines such as radiologists This also aligns with the observations of Burri (2008), McLaughlin (2003) and Hugman (1991), who discuss “lateral closure” as a variant of occupational closure in which conflict arises between occupations of similar status and power, which might compete with each other for control over similar areas of expertise or ownership of specific technologies. Similarly, Bolderston (2005) reported that radiographers in advanced and consultant roles may “upset” the traditional medical hierarchy of power: therefore, this concern expressed by the radiography participants may be valid. Although the demand for ultrasound examinations is not only expanding by volume but also extending into primary and community care to meet the access and choice agenda of the DH (2012) and sonographer role development within the professional umbrella of radiography in terms of extended roles, advanced and consultant practice is evident (CoR, 2009; Hart and Dixon, 2008), there is limited evidence to suggest that this vertical substitution in terms of professional status is widespread. Although consultant radiographer numbers are reported to be growing, the progress is slow given the overall size of the profession. As of May 2013, there were 74 consultant radiographers within a population of approximately 21,000 (CoR, 2014), equating to less than 0.4 per cent of the professional mass. As Cantin and Richards (2007) observe in the context of ultrasound practice, the introduction of consultant level sonographer posts remains slow compared with consultant practitioners in other imaging modalities. Possible explanations are that sonographic practice already carries a high degree of autonomy and role extension, and as such fulfils the

requirements of vertical substitution, and further opportunities to progress careers into consultant roles are consequently considered less urgent.
On the other hand, the midwives reported personal experience of role expansion and positive career progression in the direction of ultrasound practice but also communicated organisational and professional obstacles. There was a distinct lack of formal professional guidance pertaining to career progression for this professional group after qualification in ultrasound and these findings further support the observations of Meire (1996) and Edwards (2009).

The DH paper “Liberating the NHS: development of the healthcare force–from design to delivery” (2012) recognised the limitations of a top-down management approach led by the DH, as it does not allow sufficient flexibility for decisions affecting workforce supply and demands at a local level. The paper proposed that employers should exercise greater autonomy and accountability for planning and developing the workforce, alongside greater professional ownership of the quality of education and training. Healthcare employers and their staff should agree plans and funding for workforce development and training; their decisions should determine education commissioning plans. Commissioners should work with the employers to ensure that a multi-disciplinary approach is taken to meet their local needs. Furthermore, although professional bodies are collaborating in deciding the structure and content of training and quality standards (CASE 2009), they should also provide suitable trajectories for all ultrasound practitioners in terms of career developments. This will ensure that the correct workforce is developed at the right time, without having restrictions as a result of so-called “turf wars” and conflict about ownership of the technology.

5.2 Summary

This chapter has presented a discussion linking the case findings to current literature and theories in order to answer the overall research aim. Whilst the limitations of this case study have been acknowledged, it has also addressed a number of issues that were not previously highlighted and provided a unique insight into the experiences of newly qualified sonographers. Whilst the findings

suggest that the experiences of the newly qualified sonographers mirror those reported by previous research in terms of transitions into new practice, there are additional considerations for established health care professionals embarking on new roles in ultrasound practice. There is a need for a better understanding and support during the transition period of these newly qualified sonographers. The two main deficits in the preparation of newly qualified sonographers in this case study were highlighted as being communication skills to “break bad news” and adapting to practise with increased accountability. This included making diagnoses and writing clinical reports. These need to be addressed in terms of preparing the workforce from an educational perspective and the provision of support from employing institutions. The lack of formal preceptorship is clearly seen as an area that needs to be addressed and formalised. The concept of cross-boundary working in ultrasound raises a number of issues, including role negotiations, maintaining skills and knowledge transfer, and professional socialisation. Lack of formal role definitions and understanding has resulted in unsafe environments for newly qualified sonographers working across boundaries and as such has implications for clinical governance for organisations and professional bodies. The concept of CoP in ultrasound is considered as a strategy for breaking down professional, geographical and organisational barriers, sharing information and reducing professional isolation whilst ensuring the delivery of a quality service. The implications for HEIs, commissioners, NHS employers and professional bodies are also discussed as potential areas to be addressed and improved.

Similarities and differences in the experiences of different professionals are discussed. The clinical scientists in this case study seemed to experience a much smoother process in terms of role adjustment, role developments and maintaining competency and credibility. The experience of the radiographers was varied and was dependent on the local institution, support and working environment, however the midwives and radiographers in this case study who were practising in dual roles were the professional groups that appeared to experience the greatest challenges in terms of role development and maintaining skills and credibility.

In the next chapter, this thesis will conclude with personal reflections around the methodology, methods and the research journey, a summary of the implications

for the profession arising from the findings will also be presented with a discussion of the areas identified for future research.

Chapter 6: Conclusions

6.1 Introduction

In any research journey, initial plans do not always materialise, and as such a more pragmatic approach is needed. In this concluding chapter I will present personal reflections on the choice of methodology and research methods identifying the strengths and limitations of this study. I will also offer final reflections on the overall research journey. In concluding this thesis, the main aim of this research will be revisited and the contribution of this doctorate study will be reported with recommendations for future research.

6.2 Reflections

My doctorate study explored the experiences of newly qualified sonographers in their first year of practice. This topic was important for me to understand from three different perspectives. Firstly, as a practising sonographer, I wanted to discover what it is to be a newly qualified sonographer in the current NHS setting and identify the factors that influence the experiences of this newly qualified workforce. Secondly, as an educator, I wanted to inform current educational commissioning and curriculum and identify areas of improvement, and thirdly, as a professional doctorate researcher, I wanted to be in a position to inform NHS institutional and professional policies to influence professional practice. I also wanted to develop my research skills and gain a better standing in research forums, especially in the field of qualitative research, which was unfamiliar to me. Looking back on the whole journey, there were challenges for me, resulting in both positive and negative experiences.

6.2.1 Reflections on methodological choice

The first dilemma encountered was deciding on the overarching research approach, especially as my background was previously rooted in scientific research. I was also aware that very little qualitative research exists in my specific field of inquiry. At the time of starting this doctorate, there were no comparable studies: consequently, a gap in understanding existed. Furthermore, my enquiry was inductive in nature, as this topic has not attracted any previous scholarly

inquiry. After reviewing the existing literature and drawing on the expertise of my supervisors, I decided that a case study methodology was the most suitable. I chose this methodology as it aligned with my personal agencies, the aims and objectives within this research enquiry and had not previously been utilised in the context of ultrasound practice. The structure provided by Yin (2009) gave initial guidance and a degree of focus, which was useful for me as a naïve case study researcher. This methodology also provided a framework and a practice-based lens through which to explore the experiences of newly qualified sonographers within the context of ultrasound practice. It is through this “real life” setting that this case study adds value in terms of richness and depth. Furthermore, this choice of methodology provided a flexible approach that focused on a particular case where there were multiple variables that I could not control (Yin, 2009).The boundaries of the case facilitated data collection from the “right” person at the “right” time, thereby offering a holistic understanding of the case by providing rich and significant insights into events and experiences of newly qualified sonographers. It has also contributed uniquely to knowledge of individual, organisational, social, and professional phenomena affecting ultrasound practice.

6.2.2 Reflections on the research methods

Specific issues were encountered during the research process which needed more flexible and pragmatic approaches. Whilst Yin (2009) acknowledges that a case can also be an individual, and the case study may be the experiences of that person, the intention of this case study was to explore multiple perspectives and consequently, there were initial anxieties experienced during the recruitment stage, these included the possibility of not having an appropriate sample size and representation from different professional backgrounds to answer the research questions. The final recruitment strategy was practical after a poor initial response, and a sampling strategy of snowballing had to be incorporated. There was a last-minute withdrawal from a medical practitioner who might have provided further insight into the case from another professional perspective; however, in this particular case, there were no other suitable potential participants. This highlights the difficulty of purposive sampling for case study researchers when recruiting from a small sample pool.

Despite these setbacks, a pragmatic approach ensured that the final sample composition was from a multidisciplinary background and from different institutions, and therefore it was possible to gather data from multiple perspectives. The natural interview settings, whilst providing a forum to probe and discover information that I would not otherwise have been able to access, did bring additional challenges, such as distractions and disruptions that were beyond my control. One interview with a participant had to be rescheduled several times due to other competing priorities for both parties. Additionally, collecting evidence from multiple sources also meant that I accumulated a wealth of data that was challenging to interpret and to make sense of, given this complex phenomenon.

From my perspective, having previously relied on statistical probability or *p* values to reveal whether the findings were statistically significant, I found the analysis process of this qualitative case study challenging. Yin (2009) contends that the analysis of a case study is the least developed aspect of case study methodology and there is no fixed formula to guide a novice case study researcher. Adopting Stake's (2005) creative interpretive approach to analysis was liberating. This approach allowed me to acknowledge my own positionality and subjectivity as part of the research process in the sense that I had opportunities to ensure that the appropriate voices were heard in terms of what was important and relevant to the participants and to this research. The decision to undertake an adaptive and flexible stance to continually inform the overall process of this case study research was instrumental as the research evolved. Another problem encountered was the lack of access to other sources of evidence, such as professional documents (including job descriptions), which form a central element of case study methodology (Yin, 2009). Despite concerted efforts, it was not possible to locate these documents, and their absence impacted on the ability to further strengthen the rigour and data triangulation for this case study. This in itself highlights the fact that support and guidance for newly qualified sonographers by individual NHS institutions as well as by different professional bodies is problematic and needs to be addressed.

6.2.3 Reflections on the doctorate journey

Although advocates of case study methodology such as Yin (2009) and Stake (2005) regard the experience and knowledge of the researcher as paramount in case study methodology, in hindsight, my multiple agencies brought their own influences and conflicts as the research process unfolded. Being objective in a field that is very close to me was challenging, especially in the setting of the fieldwork and data analysis. I found the fieldwork of interviewing both demanding and rewarding. These encounters gave me an opportunity to engage with the participants on a level ground, as a sonographer, and discourses outside the educational environment gave them an opportunity to reveal aspects of their professional experiences without facing the judgement of an educator. However, taking on an insider role during the interviews was also a soul-searching process. Some of the case findings portrayed a less than ideal picture of transitional experiences for newly qualified sonographers—and as such, for my own profession—but these findings also identified areas for improvement.

Being an academic, a clinical practitioner and a researcher, all in part-time roles, was difficult to manage at times. Townsend and Burgess (2009) observe that in the real world, research does not always unfold as anticipated and perseverance and flexibility are paramount for the successful completion of research. During this doctorate journey, there were diversions, interruptions and adjustments which tested my personal skills of negotiation, resilience and confidence. Whilst these occasions unsettled my continuity and thinking pattern in terms of my doctorate, they also provided opportunities to reflect on the realities of my own personal goals, expectations and demands. During this journey, my supervision team changed in light of the retirement of two of my supervisors. Fortunately, I had the stability of my Director of Studies who had overseen my progress throughout my doctorate experience, and having two new supervisors who provided additional and fresh outlooks gave me the opportunity to address other challenges and different viewpoints that transformed my thinking. This changed the direction of my doctorate study, for which I am truly grateful.

This professional doctorate has answered the main research aim and questions, and it has also provided personal learning in terms of my own practice. As a sonographer, I realised how fortunate I had been in the way I was supported initially in my ultrasound career, and whilst my generation of sonographers were the pioneers of role extension in ultrasound, we did this gradually, at our own pace, and continued to develop as our confidence grew. The participants in this study did not have this luxury: they were faced with increasing work demands and staff shortages and were expected to manage their workload autonomously in an NHS environment that is rapidly changing. This journey has enriched my understanding of their experiences and this in turn has enhanced my own professional practice as well as putting me in a position to inform my peers in terms of supporting these newly qualified practitioners. As an educator, I have realised that these students need to be better prepared for this environment, not only in cognitive and technical competencies but also in terms of the other skills, such as communication, emotional resilience and self-preservation. As a researcher, I now appreciate the importance of developing and maintaining a reflexive stance in social research whilst negotiating the so called “messiness” of qualitative research (Bryman, 2012, p.15).

6.2.4 Limitations

Whilst this methodology provided data to answer the overall research aim, there were some limitations.

This research utilised a single case study methodology and explored a case that was located within a specific geographical area and with a small selected sample from one university faculty: therefore, there are no claims that the findings of this case study can be generalised. Secondly, the small number of participants can have the potential to lead to accounts that only portray the experiences of a part of the population of newly qualified sonographers. Therefore the findings highlighted in this case study in terms of the experiences of newly qualified sonographers in their first year of practice may or may not be suggestive of encounters or deficits elsewhere in other HEIs and NHS institutions.

However, it could also be argued that the findings can be generalised by audiences through “naturalistic generalisation”, as it is the reader, not the

researcher, who determines what is applicable to his or her circumstances (Stake, 2005). Furthermore, Yin (2003, pp. 31-33) describes these as "analytic generalisations". Analytic generalisations are not transferable to some defined population that has been sampled, but to existing theory of the phenomenon being studied, a theory that may have much wider applicability than the particular case studied. In this sense, the findings of this case study are seen to align with existing literature and theories and can prepare the way for more extensive research which could then be transferrable to a wider population of newly qualified sonographers.

The case study is also limited in the sense that it does not address the longer-term career trajectory of these newly qualified sonographers. It was conducted over a limited time and the findings were based on data acquired through what Thomas (2011, p. 146) calls a “snapshot”. In studying complex phenomena, Merriam (2009) argues that researchers are unlikely to observe the same set of events—the same configuration of people, groups and social relationships unfolding in exactly the same way. For example, at the time of writing this thesis, all the radiographers and vascular scientists in this case study who were continuing with their ultrasound education had successfully completed their intentional awards. However, there were still ongoing issues for the midwives. Three of the five midwives were continuing to experience issues and conflicts in terms of their ultrasound and midwifery careers.

6.3 Research Summary and Contributions

It is important to understand the experience of newly qualified sonographers against the backdrop of a rapidly changing health care environment. The literature review highlighted the issues that impact on this multidisciplinary workforce. A case study methodology was utilised with evidence from a multidisciplinary perspective using data collected within a natural setting and within the context of ultrasound practice. The unique contributions of this research are summarised below in relation to the research questions.

6.3.1 What is the experience of newly qualified sonographers in their first year of clinical practice?

The data showed that the experiences of the newly qualified practitioners were socially constructed, and varied with their professional backgrounds, the working environment and their professional relationships. There were similarities and differences within the case which related to the processes of transition, role development and maintaining competency and credibility. From an individual's perspective, all participants in this case study experienced a reality shock which exposed a disparity between idealistic practice and the reality of practice. This included make individual decisions in a short space of time, the fear of missing or making a wrong diagnosis and concerns over quality of patient care and time management issues.

Although previous health care experience was perceived to be advantageous, challenging aspects of the new role were identified as the accompanying need to practise at an advanced practitioner level and in particular taking on accountability, including reporting and "breaking bad news". This situation needs to be addressed by HEIs and NHS institutions to prepare the students in these areas of practice. There were some good examples of support which can be built on to develop a preceptorship framework for newly qualified sonographers. However, there was discrepancy in the provision of formal preceptorship and unrealistic workloads in some departments meant that at times, the newly qualified sonographers were left unsupported. Having supernumerary status in the initial period of practice and approaching ultrasound practice from a newly encountered perspective was seen as an advantage to support students in the preceptorship period. However, this can only be successful in limited, specific fields of practice with an environment that supports clear role definitions and uni-professional practice.

Participants' new occupational identity as sonographers was beginning to emerge very early on in their ultrasound careers. The need for recognition of their skills from peers, managers and professional organisations was closely aligned to this emerging occupational identity. It was encouraging to find that after the initial months of transition, newly qualified sonographers were developing professionally, moving from competent practice to proficiency. They were beginning to gain

confidence, taking ownership of their practice and linking it to the wider picture of patient care and pathways.

6.3.2 What are the perceived implications for future workforce development, in terms of professional practice, education and regulation?

Implications for education and training

This study drew attention to the disparity in the support provided to newly qualified sonographers after qualification. There was a distinct lack of formal preceptorship for some of these professionals. Where elements of preceptorship was offered, it did not fit the perfect model of true preceptorship. Developing and formalising preceptorship programmes which incorporate elements of cognitive apprenticeship and situated learning is an important area for improvement for both NHS organisations and HEIs. This requirement is relevant for postgraduate students who are already in health care roles and might not necessarily expect complications at this early stage of their sonography careers. Equally, these findings will be more significant if and when direct entry education as proposed by CoR (2013) is commissioned, as the potential students recruited will not necessarily have any previous health care experience or any familiarity with a health care environment. Therefore, consideration will need to be given as to how to support and nurture any outstanding skill development needs after the conclusion of the period of education, and preceptorship can be built into the sonographers' on-going personal development plan.

In this case study, there were gaps in the education of newly qualified sonographers in terms of developing and nurturing skills such as breaking bad news, sentimental working and specific aspects of autonomous working such as confidence in reporting skills. This also raises the question of how best to prepare newly qualified sonographers to work in specialties which require very specific skills. This is an area that can be improved by both HEIs and NHS institutions by making the students aware of these complexities and developing strategies to foster these skills, perhaps by including in-house training in specific skills as part of a wider preceptorship programme.

Implications for professional practice

Professional socialisation was important to these newly qualified sonographers: this included being recognised and accepted as a sonographer with a sense of belonging, identity and professional security. Therefore, it is critical that the workplace culture provide an environment that supports socialisation and lifelong learning. Whilst the findings of the present study revealed opportunities for role development for some professionals, there were also inter- and intra-professional tensions The notion of a community of practice has been provided as an additional proposition for ultrasound practice where the importance of exchange of knowledge and the building of a sustainable community of competent practitioners are viewed as all-important conditions for learning to take place and subsequent change in practice(s) to occur (Wenger, 2002; 2000; 1998).For organisations with a multidisciplinary ultrasound workforce, the fostering of communities of practice should be encouraged as a social learning environment. This strategy will promote the future role and development of the sonographer, create a greater sense of professional pride and belonging and encourage both uni-professional and cross-boundary working. However, it also needs the commitment from newly qualified sonographers to utilise these networks and actively seek and engage with ultrasound communities of practice centrally or peripherally to develop professionally and socially by sharing ideas and building a “library of experience” (Field, 2014).

The concept of “brokering” could promote mutual respect and understanding across different professional communities and discourage the concept of “othering”. For a community of practice to thrive, it requires a balance between core and boundary processes and the commitments of all its members. However, it is also recognised that the nature of professional boundaries can be hierarchical (Abbott, 1988) and these boundaries can inhibit the development of successful communities of practice, especially when a community of practice is weak or exhibits relationships that inhibit entry or participation.

Implications for healthcare organisations and professional bodies

In addition to readiness to practise and skills development, the findings of this research also highlighted specific issues associated with newly qualified

sonographers that have previously not been considered. These included unrealistic expectations from managers and the potential to subject them to unsafe practice. Clear role boundaries and infrastructure with sufficient support from managers and commissioners are needed to implement and manage cross-boundary ultrasound roles effectively and fairly. Furthermore, collaboration between the different professional bodies is paramount to ensure parity of health care provision from different professionals in ultrasound practice. There must be agreement between professional bodies in deciding upon the structure and content of training, quality standards and registration for practice. Additionally, they should provide, where necessary, suitable trajectories for new ultrasound sonographers to include role adjustment, role development, maintaining competencies and credibility which support their career developments. This will ensure that the correct workforce is developed at the right time, without the restrictions of so-called “turf wars” and disputes over ownership of the technology.

6.4 Recommendations for future research

There are a number of main areas to consider for future research.
Whilst this research provided a snapshot of the experiences of newly qualified sonographers, a longitudinal study spanning two or three years and focusing on the main findings of this study would provide a longer-term trajectory of newly qualified sonographers. This would complement the findings of this case study and provide a deeper understanding of how these newly qualified sonographers progress and develop professionally over time. An initial interview before the participants embark on their new careers would be useful to gather information around initial expectations and anxieties. Interviews at three, six, nine and twelve months would provide a more realistic picture of the different phases of transition and explore further the dimensions of negotiations, resilience and confidence with minimal risk of recall bias.

Developing strategies to improve the transitional experiences of newly qualified sonographers is paramount to ensure that suitable support is available and is implemented. This is the area of the research which is important for me as a practising sonographer and an academic. A focus group approach with

stakeholders and managers is planned for the next academic year. The enablers and disablers identified in this research will be built upon to brainstorm possible solutions and to identify good practice. This will inform the development of specific preceptorship programmes whilst drawing upon theories such as cognitive apprenticeship and situated learning to improve the experiences of the current and future ultrasound workforce.

This case study chose to explore experiences from a multi-disciplinary perspective simultaneously. The model of professionals working across boundaries in ultrasound services is not new. However, as demand for this service increases, there will be more professionals embarking on a career in ultrasound (CASE, 2014). Profession-specific case studies from a homogenous group of practitioners may provide further in-depth understanding of issues that affect each individual professional group

Current literature has mainly focused on uni-professional CoP. As a result, the development, functioning, and effects of multi-professional and multi-agency CoP, whether they are naturally occurring or deliberately constructed, is an area for further investigation, especially in the field of ultrasound practice. Further research is required to identify contextual factors that can facilitate their formation and to analyse how the members construct their existing professional and organisational identities within a new 'collaborative' identity and cultivate a culture for enhancing knowledge exchange, learning and innovation. It would thus be worthwhile to explore the influence of power and professional conflict within ultrasound communities and multidisciplinary working in order to identify barriers and solutions. In particular, it would be useful to conduct evaluative research on team working processes, such as participation, communication, decision-making and leadership, and how these contribute to the effectiveness of teams in the quality of health care provision and the development of innovative practice.

6.5 Concluding remarks

This final chapter has provided personal reflections on specific aspects of the research journey. The methodological choice and methods utilised in this study, including the strengths and limitations, were embedded within the discussion. A summary of the study and the significance of the research contributions were presented, along with implications for the current and future development of the ultrasound workforce. Areas recommended for future research to build on the findings of this case study were also identified.

This case study has made a unique contribution in the sense that it has in highlighted issues that could face the current and future sonographic workforce, however more wider research is needed to expand this body of knowledge if it is to be generalised to all newly qualified sonographers. This could yield further valuable information and improve the experiences of newly qualified sonographers, enabling them to make successful transitions in safe environments. In the long term, this will serve to ensure that the future ultrasound workforce is supported, retained and developed to deliver more effective services.

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Figure 1*: Growth in the number of Ultrasound, CT and MRI Imaging examinations in England 1995 to 2013-14 (DH 2014)* used under the terms of the Open Government Licence (OGL) for public sector information.

Figure 2: *Background of Ultrasound students in the UK (2013-2014).* Illustration using data obtained from and used with the permission of the Chair of the Consortium for the Accreditation of Sonographic Education (CASE).

Figure 3: *The influence of vertical and horizontal substitution* in Nancarrow and Borthwick (2005) Dynamic professional boundaries in the healthcare workforce Sociology of Health and Illness. 27: pp 897-919 Used with the permission of Wiley and Sons.

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Appendices

Appendix 1: CASE Handbook (2009) © CASE Minor Revisions June 2014 (pp 30-32)

6.2 Programme, Course and Module Learning Outcomes

An Institution seeking CASE accreditation must satisfy it that the learning outcomes for the programme, course or modules can be satisfactorily achieved through its delivery of the learning material and associated assessments. Programme and course organisers are strongly recommended to access current information on learning outcomes. CASE recognises that M-level learning outcomes have equal standing across the three stages of a postgraduate programme. However, where an advanced practice route has been identified in the documentation, the learning outcomes should reflect this additional depth and breadth of student learning identified below are *examples* of learning outcomes that might be evidenced in the programme or course documentation.

6.2.1 Science and Technology

On completion of this component, the student should be able to: -

- demonstrate and apply a thorough knowledge of the physical and technological principles and processes of diagnostic ultrasound describing their relevance to the ultrasound image and the equipment utilised
- demonstrate proficiency in recording ultrasound images and Doppler outputs
- critically evaluate and debate the safety issues related to diagnostic ultrasound to enable optimal use of the equipment within the current, internationally recognised recommendations for safe practice actively reducing any hazard to patient and staff
- critically appraise current ultrasound equipment, latest technology and associated quality assurance procedures for pertinent use in order to identify and select new machines for replacement
- utilise graphical and numerical data commensurate with ultrasound practice

6.2.2 Professional Issues

On completion of this component, the student should be able to: -

- evaluate the emotional impact of the ultrasound examination on the client, patient, carers and relevant healthcare professionals
- critically analyse international, national and local legal, ethical, professional and organisational principles that underpin diagnostic ultrasound practice
- critically discuss the changing national and local health care needs of clients ,patients, carers and organisations
- Integrate and synthesise diverse knowledge, evidence and concepts to promote understanding in the ultrasound profession.
- identify qualitatively and quantitatively the limitations and compromises associated with ultrasound imaging
- evaluate the need for life-long learning in medical ultrasound practice.

6.2.3 Clinical Topic

On completion of this component, the student should be able to: -

- apply and synthesise scientific, ergonomic and safety principles in order to identify, select and manipulate equipment
- critically appraise and utilise all information from various sources to determine the most appropriate ultrasound examination
- analyse the needs of the patient in order to perform all aspects of the ultrasound examination safely and competently
- competently carry out ultrasound examinations according to the evidence base
- critically evaluate the ultrasound findings and where necessary arrange, advise or undertake further investigations appropriate to local policies and practices
- actively demonstrate proficiency in reporting ultrasound examinations to reflect the clinical question raised communicate clearly and effectively with clients, patients, carers and other healthcare professionals appropriately

- demonstrate a comprehensive knowledge of the principles of problem solving within the ultrasound profession in order to resolve issues in practice and service delivery
- contribute to case management and service delivery by discussion and debate at all levels in patient diagnosis and prognosis
- critically reflect on personal and professional practice in order to challenge, develop, maintain and enhance local and national professional standards in clinical ultrasound.

6.2.4 Negotiated Learning / Focused Practice / Specialist Skills Module

On completion of this component, the student should be able to: -

- formulate a learning contract in order to acquire skills for personal, clinical and professional development
- develop negotiation and time management skills in order to achieve the module learning outcomes
- critically evaluate the normal ultrasound appearances, variations and pathological appearances of the areas of practice as specified in the learning contract.
- competently, safely and accurately undertake clinical ultrasound examinations in the areas specified in the learning contract
- critically reflect on and recognise responsibility for own learning and develop independent study skills.

6.2.5 Advanced Practice Topic

On completion of this component, the student should be able to: -

- demonstrate continuing competent undertaking of medical ultrasound examinations in an identified area of advanced practice
- actively contribute to case management and service delivery by discussion and debate in patient diagnosis and prognosis in an area of advanced medical ultrasound practice

- synthesise, appraise and critically evaluate theory and research relevant to advanced ultrasound practice in order to improve patient care and inform future practice and the profession
- demonstrate skills in critical reflection and evaluation of theoretical concepts in order to inform and enhance personal learning and professional medical ultrasound practice
- plan, negotiate and manage own learning whilst demonstrating a team approach in support of self-directed learning.

6.2.6 Clinical Education Component

On completion of this component, the student should be able to: -

- carry out medical ultrasound examinations and other appropriate actions safely, competently and independently critically relate theory to practise in the clinical setting in order to contribute to patient diagnosis, management and service delivery
- identify sources with whom to consult in order to influence patient management and change practice
- critically reflect on self in order to demonstrate continuing professional development within clinical practice
- function independently and as part of a team.

6.3 Theoretical and Clinical Assessments

An Institution seeking CASE accreditation must satisfy CASE that the assessment strategies applied both to the academic and clinical components are sufficiently rigorous to enable successful students and trainees to demonstrate such skills as appropriate to a 1st-post competent practitioner. These strategies must be appropriately matched to and measure the learning outcomes for each module or course element. CASE advises that the assessment methods used for the academic component of each module reflect relevant aspects of the clinical or professional role of the competent practitioner and wherever possible are linked to practice.

The fundamental aim of CASE is to ensure that on completion of a period of learning, the exiting students or trainees are clinically competent to undertake ultrasound examinations and are professionally responsible for their own case load. In order to demonstrate competency, clinical assessment must be undertaken in all programmes and courses.

CASE strongly advises that clinical assessments should carry a Pass or Fail criterion, where Pass is a minimum standard that is equivalent to safe practice or competence as defined by the criterion-referenced assessment documentation. The methods used must be clearly identified and the rationale appropriately justified by the programme team or course faculty. Compensation for a failed clinical assessment is not recommended.

Examples of typical theoretical methods of assessment may include objective, structured tests (OST or OSCE), multiple choice questions, case studies, presentations, posters, portfolios, unseen examinations, open book examinations and on-line discussions. Peer or group assessment may be used where appropriate. Electronic assessment will be considered but it must demonstrate an academic rigour for Masters programmes.

Appendix 2 Topic Specific Journals Searched

Subject	Key Journals
Allied Health Professions	Clinical Radiology Journal of Occupational Science Physiotherapy Radiography
Nursing and Midwifery	British Journal of Midwifery British Journal of Nursing Journal Clinical Nursing Evidence Based Midwifery Journal of Nursing Education Journal of Advanced Nursing Midwifery Nursing Economics Nursing in Critical Care
Ultrasound	Current Opinion in Obstetrics and Gynecology Journal of Diagnostic Medical Sonography Journal of Ultrasound in Medicine Ultrasound Ultrasound in Obstetrics and Gynecology
Education	Academic Medicine Educational Researcher Journal of Advanced Nursing Journal for New Scholars in Education Nurse Education Today The Journal of Continuing Education in Nursing Medical Education
Sociology	American Sociological Review Annual Review of Sociology Sociology Social Forces Sociology of Health and Illness Social Studies of Science The Sociological Review
Medicine	British Medical Journal International Journal of Emergency Medicine Journal of General Internal Medicine Journal of the American Medical Association Lancet

Appendix 3: Structure of MSc Medical Ultrasound Programme

Post-graduate Certificate (Year 1):

Core Module	Optional modules (select one 40 credit or two 20 credit modules)
Ultrasound Technology 20 credits	Obstetric Ultrasound 40 credits
	General Medical Ultrasound 40 credits
	Negotiated Specialist Ultrasound (3 & 4) 20 credits
	Negotiated Specialist Ultrasound (1 & 2) 40 credits

Post-graduate Diploma (Year 2):

Core Module	Optional modules (select one 40 credit or two 20 credit modules)
Health and Social Care Research: Methods and Methodology 20 credits	Obstetric Ultrasound 40 credits
	General Medical Ultrasound 40 credits
	Negotiated Specialist Ultrasound (3 & 4) 20 credits
	Negotiated Specialist Ultrasound (1 & 2)40 credits

MSc (Year 3):

Dissertation 60 credits	
Dissertation 40 credits	Health and Social Care Research: Methods and Methodology 20 credits

Appendix 4: Research Information Sheet for Participants

18th January 2012

PARTICIPANT INFORMATION SHEET

I would like to invite you to take part in a research study. This research is organised and funded by the University of the West of England as a fulfilment towards a Doctorate in Health and Social care.

Before you decide you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully. Talk to others about the study if you wish. Take time to decide whether or not you wish to take part.

What is the purpose of the study?
The aim of this study is to explore how Health Care Professionals from an educational cohort based at the University of the West of England, Bristol, practise following completion of the Post Graduate Certificate in Medical Ultrasound practice. The study also aims to investigate

- How do these professionals integrate the qualification of a Post Graduate Certificate in their current practice?
- What are the challenges (if any) for these professionals in practising as dually qualified professionals?
- What are the implications for future workforce development, in terms of professional practice, education and regulation?

Why have I been invited?
You have been invited as you have completed the Post Graduate Certificate in Medical Imaging at the University of the West of England. All students who have completed this educational programme will be invited.

Do I have to take part?
It is up to you to decide. You will be asked to sign a consent form to show you have agreed to take part. You are free to withdraw at any time, without giving a reason. This would not affect your further education at The University of the West of England.

What will I have to do if I take part?
You will be given options on the accompanying consent form which will include

- Your consent to not to take part at all
- Your consent to just to participate in completing the questionnaire.

- Your consent to complete the questionnaire and agree to take part in the interview and worklog data collection process.

Initially you will be asked to complete a questionnaire for information regarding

- Your professional background.
- Your educational qualifications
- Your place of work after ultrasound qualification.
- Your nature of ultrasound practice within the context of your job.
- Your current and future professional development.

If you decide to participate further in the study, you will be asked to provide contact details on the consent form for the researcher to contact you. A face to face interview with be arranged with the researcher at a time and venue of your preference. It is anticipated that the interviews will be conducted between February 2012 and April 2012, however there will be some flexibility depending on your availability. The interview will address themes such as your clinical responsibilities in the context of your different professional roles, the nature of your ultrasound work within your clinical setting, and also the role of your professional and regulatory body. This interview will last for approximately an hour. The interview will be recorded digitally. You can be assured that this research only concerns your professional practice and will not address any personal issues. You can request for a chaperone to be present if you prefer.

After your interview you will be asked to keep a work log diary for 6 individual days over a period of six months. The work log will consist of details of your work activities during the day, the date will be again mutually agreed with you taking your annual leave and any part time commitments into consideration. You will be asked to fill out a proforma via e-mail communication

Expenses and payments
Any cost that is incurred as a part of this study will be reimbursed for example travelling.

What are the possible benefits of taking part?
I cannot promise the study will help you personally but the information we get from this study will help local and national workforce initiatives, such as curriculum and education frameworks, scope of practice development, professional body and individual health care institutions policies and contribute to future collaboration with strategic ultrasound workforce commissioning. To obtain different perspectives, It is very important that this research collects data from a multidisciplinary professional group.

What if there is a problem?
If you have a concern about any aspect of this study, you should ask to speak to the researcher or the research supervisor who will do their best to answer your questions Contact details are included at the end of this information sheet. The researcher will be empathic towards any details that you may wish to reveal regarding your practice and the practice within your organisation. If you are worried about any professional practice issues, a support plan will be mutually agreed with you and your line manager or Head of the department if appropriate.

What will happen if I don't want to carry on with the study?
You can withdraw from the study at any stage of the research process, however all anonymised data collected up to the withdrawal will be used in the final report.

Will my taking part in this study be kept confidential?
Caldicott principles and the Data Protection Act 1998 will be adhered to in the handling, processing, storage and destruction of your data.

All information which is collected about you during the course of the research will be kept strictly confidential, your identity and details will be anonymised using individually assigned numbers and will not be included in any publications and reports resulting from this study. All personal data and research data will be kept stored safe from unauthorised access, accidental loss or destruction. All electronic data will be password protected. The data will be destroyed appropriately after the end of the study.

Identifiable data will only be accessed by the researcher and the supervisory team.

Who is organising and funding the research?
This research is organised and funded by the University of the West of England as a fulfilment towards a Doctorate in Health and Social care.

Ethical approval
Before any research goes ahead it has to be checked by a Research Ethics Committee. They make sure that the research is fair. This project has been approved by the University Research Ethics committee.

Contact details

Rita Phillips (Researcher)
Room 2K17
Glenside Campus
University of The West of England
Blackberry Hill
Stapleton
Bristol
BS16 1DD
Tel: 0117 32 88789
Rita.Phillips@uwe,ac,uk

Dr Pamela Moule (Director of Studies and supervisor)
Room 2C14
Glenside Campus
University of The West of England
Blackberry Hill
Stapleton
Bristol
BS16 1DD
Tel: 0117 32 88422
Pam.Moule@uwe.ac.uk

Thank you for reading this – please ask any questions if you need to.

Accompanying documents

1. Consent form
2. Questionnaire

Please return the completed forms by the 5th February 2012 either by post to

The Research Administration office,
Room 1K22
University of the West of England
Glenside Campus
Blackberry Hill
Bristol BS16 1DD

Or e-mail as attachments to hls.researchdegrees@uwe.ac.uk

Appendix 5: Research Questionnaire

Centre : Number

Participant Number

Please indicate the date that you successfully completed the Post Graduate Certificate in Medical Ultrasound at the University of the West of England (UWE)

What Professional Practice Module(s) did you undertake at UWE? If you undertook the negotiated specialist module, please indicate which speciality

General Medical	**Gynaecology**	**Negotiated specialist**
Obstetrics	**Vascular**	**Specify-**

Primary professional background eg Radiographer, Midwife, Nurse e.t.c.

Place of work-Hospital or Trust name

Please state your work commitments in terms of your contract with all Health Care Institutions

For example full time or part time (please indicate how many days per week)

Professional body registration (tick all that are applicable)		**Regulatory body registration** (if applicable)	
College of Radiographers (SCoR)		Health Professional Council (HPC)	
Royal College of Midwives (RCM)		General Medical Council (GMC)	
Society of Vascular Technology of Great Britain and Ireland (SVT)		Royal College of Nursing (RCN)	
Other (please specify)		Other (please specify)	

After qualifying do you still practise ultrasound? Yes/No
If No please give details.

If you are or have at any stage practised ultrasound after qualification, can you please indicate your scope (s) of practice after obtaining a Post Graduate Certificate in ultrasound (tick all that are applicable). Please give details of your areas of practice after you have qualified in ultrasound in conjunction with your primary role- for example Radiography and Ultrasound, Midwifery and Ultrasound.

Radiography and ultrasound		Vascular and ultrasound	
Midwifery and ultrasound		Medicine and ultrasound	
Nursing and ultrasound		Ultrasound only	
Other (please specify)			

Approximately how many ultrasound sessions are you undertaking per month in your area of ultrasound qualification?

Approximately how many sessions do you undertake per month in areas which are not ultrasound related and relate to your primary professional role?

Are you planning or are undertaking further health care education?

If Yes please give details.

Thank you for taking the time to complete this questionnaire

Rita Phillips (Researcher)

Please return this completed form before **5th February 2012** to The Research Office, Room 1K22, Glenside Campus, Blackberry Hill Bristol BS16 1DD or

Or email as attachment to hls.researchdegrees@uwe.ac.uk

Appendix 6: Research Consent Form

Faculty of Health and Life Sciences
School of Allied Health Professions
Glenside campus
Blackberry Hill
Stapleton
Bristol
BS16 1DD

CONSENT FORM

Centre Number:

Participant Number:

Title of Project: The Practice of Health Care Professionals following successful completion of a Post Graduate Certificate in Ultrasound

Name of Researcher: Rita Phillips

	Please initial box
I confirm that I have read and understood the information sheet dated 18th January 2012 for the above study and have had the opportunity to ask questions.	
I confirm that I have read and understood the information sheet and do not wish to take part in the study.	
I have completed the initial questionnaire but do not wish to participate further in interviews and a work log submission for this study.	
I have completed the initial practice questionnaire and agree to participate further in interviews and a work log submission for this study. My contact details are stated below	
I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my healthcare or legal rights being affected.	
I understand that direct quotes may be used when the project is written up, although they will be anonymised and my personal and health care institution details will not be included.	
I agree to my interview being audio-taped.	
I understand that any issues arising will be dealt with in a confidential manner and action plan agreed with me.	

Name of Participant Date Signature

Contact details

Tel:

Please return this completed form by **5th February 2012** to The Research Office, Room 1K22, Glenside Campus, Blackberry Hill Bristol BS16 1DD or email to hls.researchdegrees@uwe.ac.uk

1 copy for participant; 1 copy for researcher

Appendix 7: Interview Schedule

- Tell me a bit about yourself, your background and why you decided to undertake ultrasound training?
- Tell me about your experiences of working as a sonographer after you qualified?
- What support or preceptorship have you had in your new role?
- How has your role and responsibilities changed since gaining your ultrasound qualification?
- How have you managed your new roles and responsibilities
- What are the most positive aspects of your new role/experiences after your qualification?
- What are the most negative aspects of your role/experiences after your qualification?
- Can you give me any examples of any challenging situations that you experienced?
- What do your peers/professional colleagues feel about your new role?
- How do you maintain and enhance your ultrasound skills and competencies in your new role/roles?
- What are your future career plans?
- What support do you get/ would like to get from your professional bodies for your new role?
- Are there any other issues that I have not mentioned that you would like to discuss?

Appendix 8: Example of Thematic Analysis

Excerpt from transcription from participant MPT1 (p. 8 and 9)	Code	Subtheme	Theme
R: so can you talk a bit more about your present role within midwifery and ultrasound and how you find that? A: I mean um as a midwife um, *because [1]I am not there that much I really, and I still work my hours as a night shift,* for example one week, I'll do one night a week and the next week, I'll do 2 nights, that's how it works, *so because I am not there as much, it makes me a bit sad as [2] I feel I am not quite as on the ball as I used to be*, so [3] *I found that very difficult, sometimes I wish I had never done ultrasound , because I (pause) miss midwifery, but I just love ultrasound and I don't want to stop doing it*. And if I had never done it I wouldn't have known how much I would have liked it so sometimes I do wish	[1] reduction in midwifery hours [2] feeling a loss of traditional skills [3] Emotional role conflict/adapting new roles	Maintaining skills Maintaining skills Role redefinition	Maintaining competency and credibility Role development

that I had never done it, because of that reason ,[4] *because I do enjoy it very much and I don't want to give it up.* [5] *That's been difficult upstairs (pointing to the upper floors of the hospital meaning the midwifery wards). The other thing that has been difficult is that people asking me all the time upstairs* [6] *to do things that I really shouldn't do so that's been difficult.* R: Like what? Can you give examples? A: [6] *Ooh loads! It's quite often,* [7] *but they just don't seem to understand that ultrasound is only as good as you know the situation and the machine that you are using,* I mean our portable scanners are for scans like, um I'm trying to think of an example now. [8] *Somebody asked me to look at a um pelvic mass on a gynae patient on a portable machine that really isn't good and* [9] *I had no way of reporting (clinical) it either or a growth scan on a portable machine up there* and *I can't report it,* [8] *you know it's not how it should be* done *and you know a pelvis*	[4] Role satisfaction [5] Role expectations from others [6] unrealistic expectations from peers /managers [6] Frequency of occurrence [7] Lack of understanding of role [8] recognising bad practice [9]Lack of guidelines and policies	Role contribution Role redefinition Role redefinition Role redefinition Role contribution Professional recognition,	Role development Role development Role development Role development Transition Maintaining competency and credibility

scan, if it is an emergency, it should be done by a radiologist out of hours or it should be done in the department (ultrasound) and on a proper machine and [7] ***sometimes they don't get that***. The um (pause) I'm sorry (silence). It is difficult cus when you then say [10] "***oh no I'm not allowed", then they, you then feel like they are losing respect in you as a sonographer because you have turned them away*** [11]***and that I am not as qualified as I say I am which is rubbish*** *R: so listening to your example, I gather that one of the challenges is that you are pulled when you are doing midwifery---: ---to do ultrasound duties* *R:---and does this happen the other way around?* *A: yes it does,*[12]*it happened here (ultrasound) as well –*	[8] recognising bad/good practice [7] Lack of understanding from peers [10]feeling of losing credibility [11]having to prove qualification/competency [12] Role conflict and ambiguity in both roles	registration and regulation Role contribution Role redefinition Professional relationships and emerging occupational identities Role redefinition	Transition Role development Maintaining competency and credibility Maintaining competency and credibility Role development

Appendix 9: UWE Research Ethics Committee approval

University of the West of England
BRISTOL

Faculty of Health & Life Sciences
Glenside Campus
Blackberry Hill
Stapleton
Bristol BS16 1DD

Tel: 0117 328 1170

Our ref: JK/lt

15/11/2011

Rita Phillips
UWE
Glenside Campus
2K17

Dear Rita

Application number: HLS/11/11/121

Application title: The practice of health care professionals following successful completion of a Postgraduate Certificate in Ultrasound? A case study approach.

Your ethics application was considered by the Faculty Research Ethics Sub-Committee and based on the information provided was given ethical approval to proceed.

You must notify the committee in advance if you wish to make any significant amendments to the original application.

Please note that all information sheets and consent forms should be on UWE headed paper.

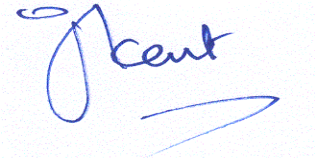
If you have to terminate your research earlier than planned, please inform the Faculty Research Ethics Sub-Committee within 14 days, indicating the reasons.

Please notify the Faculty Research Ethics Sub-Committee if there are any serious events or developments in the research that have an ethical dimension.

Please be advised that as principal investigator you are responsible for the secure storage and destruction of data at the end of the specified period. A copy of the 'Guidance on Managing Research Records' is enclosed for your information.

We wish you well with your research.

Yours sincerely



Prof Julie Kent
Chair
Faculty Research Ethics Sub-Committee

c.c. Pam Moule