Conceptualising radiography knowledge and the role of radiography educators : Perspectives and experiences of a radiography education community

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Abstract

The diagnostic radiography curriculum and the process of its enactment are under researched in the United Kingdom. To date, there have been no published studies which have investigated the curriculum and the role of radiography educators from the multiple perspectives of radiography students, university radiography educators and clinical radiography educators, that is, *a radiography education community*. Accordingly, this study describes the perceptions and experiences of a radiography education community in relation to three research questions:

1. How does a radiography education community conceptualise the radiography knowledge and skills required of a diagnostic radiographer ?
2. How does a radiography education community conceptualise the role played by university based and clinically based radiography educators in helping the radiography student acquire radiography knowledge and skills ?
3. How does the community in this study compare with Lave and Wenger's theoretical constructs of a situated learning, legitimate peripheral participation and Communities of Practice (CoP)?

The epistemological foundation of the study is constructivism and the overarching methodology is a case study conducted within a single higher education institution and three of its associated clinical practice partner settings. The primary data collecting method comprised semi-structured interviews, supplemented by a critical review of germane literatures, government policy and the curriculum guidance provided by the relevant professional and statutory bodies. The theoretical framework in which the study is situated is based upon Lave and Wenger's theories of situated learning, legitimate peripheral participation and communities of practice.

The findings of the study reveal a radiography education community which is lacking any unifying pedagogic discourse. In particular, there is an absence of opportunities for cross-community working, especially in collaborative curriculum development and the process of its enactment. This is further compounded by the community's narrow interpretation of what a curriculum should comprise. Currently there is a

clear focus on knowledge content and curriculum as a product which fails to take into account praxis and the social context in which learning takes place. These findings have been summarised by a representation of the enacted curriculum as compared with the 'ideological' function of a radiography curriculum. Specific developments required of the curriculum include: (i) placing a greater emphasise on the vocational relevance of radiography knowledge; (ii) gaining a better understanding of tacit radiography knowledge; (iii) ensuring greater familiarity with the curriculum and (iv) enhancing the standard of clinical supervision.

The radiography education community in this study evidences both convergence and divergence with Lave and Wenger's theoretical constructs of situated learning, legitimate peripheral participation and community of practice. Within the context of radiography education the study also highlights the consequence of power relationships, the complexity of learning in and across multiple communities of practice and the importance of individual learner biographies, all of which are underdeveloped in Lave and Wenger's theoretical discourse. These findings have been summarised in a proposed theoretical model for a radiography education community of practice.

Three specific pedagogic and managerial inferences may be drawn from this study which will require staff development and consideration of how the diagnostic radiography programme is managed across the community. Firstly, context, process and praxis need to be carefully considered in the collaborative development, design and implementation of the curriculum. Secondly, the university and clinical educators need to reflect on their own learning and teaching skills by engaging more fully with pedagogy. Thirdly, communication across the radiography education community of practice must be improved.

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Glossary

Angiography – an X-ray examination of the arteries and veins

Computed radiography (CR) – a process that uses an electro sensitive imaging plate to produce an X-ray image

Computed tomography (CT) – a process that uses X-rays to generate cross-sectional, two-dimensional images of the body. Images are acquired by a rapid 360° rotation of the x-ray tube and sensitive detectors around the patient.

Diploma of the College of Radiographers (DCR) - the radiographic qualification recognised by the regulatory body before the introduction of degrees.

Fluoroscopy – continuous X-rays producing a dynamic image.

kVp – the voltage applied across the anode and cathode of an X-ray tube. A parameter set by the radiographer

Magnetic resonance imaging (MRI) – an imaging process that uses the magnetic properties of H+ and radio waves to generate an image.

mAs – the current applied to the cathode of the x-ray tube. A parameter set by the radiographer

Mobile – an X-ray examination on a hospital ward.

Projection Radiography - a two dimensional image commonly referred to as a plain X-ray.

Radionuclide imaging (RNI) - diagnostic examinations of anatomy and function where radiation emission is detected following the administration of a radioactive isotope to the body.

Ultrasound – a method of imaging using ultra high mechanical sound waves. Sound waves enter the patient and the reflections are used to build up an image.

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Introduction, Purpose and Rationale

The fundamental aim of radiography education is to provide the student with the knowledge and skills that are required to practise effectively both upon qualification and in the future. The framework used to achieve this aim is a radiography curriculum, the content of which is determined by a complex interplay of political, social and historical influences.

The hierarchy of external influences on the curriculum begins with government health care policy and health care education policy. Subsequently, such policies impact on the curriculum guidance proffered by the Professional, Statutory and Regulatory bodies (PSRB) associated with the development, validation and delivery of a programme of radiography education. These bodies currently include the Society and College of Radiographers (SCoR) and the Health and Care Professions Council (HCPC). The curriculum is further informed by the Quality Assurance Agency (QAA) and Radiography Benchmark Statements (Pratt and Adams, 2003; QAA, 2001). As of March 2013 the radiography curriculum must also be aligned with the five domains set out in the Education Outcomes Framework (Great Britain. Department of Health, 2013). The EOF aims to "[e]nsure the health workforce has the right skills, behaviours and training, available in the right numbers, to support the delivery of excellent healthcare and health improvement" (*ibid.*, P.4)

In order to validate a radiography curriculum a higher education institution must evidence alignment with the guidance provided by the SCoR, HCPC and QAA.

Once validated the programme is both delivered and developed by a higher education institution in collaboration with its clinical practice partners located mainly within

National Health Service (NHS) Trusts. In the context of this study I refer to the actors involved in radiography education, that is, students, clinical educators (radiographers) and university educators (lecturers) as a '*radiography education community*'.

Rationale

My reasons for undertaking this research endeavour, as a radiography educator and in line with the philosophy of an education doctorate include:

(i) the desire to examine an area of my practice in the hope that I might improve this and ultimately the students' experience of radiography education;

(ii) the paucity of research in conceptualising radiography knowledge and practice from multiple perspectives within the context of radiography education in the UK setting;

(iii) the absence of published research examining radiography education through the theoretical lens of Lave and Wenger (1991) and Wenger's (1998) constructs of situated learning, legitimate peripheral participation and Communities of Practice (CoP);

(iv) the need to better understand the radiography curriculum from the perspective of a radiography education community charged with improving *service delivery* for patients and clients who make use of a medical imaging service.

Findings from this study have already been used in a national guidance document on supporting radiography students at all levels in clinical practice - "*Roles and Responsibilities in Clinical Education*" (CoR, 2011). This document (Appendix One)

was co-authored by me and officers from the SCoR at their request. In addition, I also hope that the conclusions of this study will inform curriculum development at a local and national level.

Overarching research questions

Given the rationale described above the following research questions are proffered.

1. How does a radiography education community conceptualise the radiography knowledge and skills required of a diagnostic radiographer ?
2. How does a radiography education community conceptualise the role played by university based and clinically based radiography educators in helping the radiography student acquire radiography knowledge and skills ?
3. How does the community in this study compare with Lave and Wenger (1991) and Wenger's (1998) theoretical constructs of a situated learning, legitimate peripheral participation and Communities of Practice (CoP)?

In asking these research questions my intention is also to establish whether there is alignment or misalignment with government policy and the PSRB curriculum guidance. In addressing the first two questions I will be able to determine whether a radiography education community of practice exists and how this community functions.

Overview of chapters

Chapter One – *Background and Context*

Here I introduce myself, the radiography education community and the setting for this research.

Chapter Two – *Conceptual and theoretical framework*

This chapter outlines the conceptual framework for the study and establishes the ontological foundations of its design. It is from the conceptual framework that the key assumption that radiography education takes place in a radiography education community is justified. This in turn facilitates the development of the theoretical framework in which this study is situated – Lave and Wenger (1991) and Wenger's (1998) theoretical constructs of situated learning, legitimate peripheral participation and Communities of Practice (CoP).

Chapter Three – *The Influence of Professional, Statutory, Regulatory Bodies and Government Policy on The Radiography Curriculum*

This chapter examines the external influences on the diagnostic radiography curriculum. Its primary purpose is to compare PSRB and government policy expectations with the perceptions and experiencies of a radiography education community.

Chapters Two and Three constitute the literature review of this study.

Chapter Four – *Research design*

This chapter describes and justifies the overarching research design for this study. The key areas considered are: the inquiry paradigm, the methodology, data collection methods, sampling and sample size, data analysis and finally, ethical considerations.

Chapter Five – *Data analysis and Discussion*

This chapter examines and critically discusses the findings of this study by describing the categories and themes which have emerged from an inductive analysis

(Charmaz, 2006) of the semi-structured interviews conducted with a radiography education community.

The chapter is presented in two main sections aligning with the two main research questions. Section One describes the perceived knowledge and skills required of a diagnostic radiography practitioner. Section Two describes the role of the radiography educators from the perspective and experiences of the study's participants. Covergence and divergence with Lave and Wenger (1991) and Wenger's (1998) theorising is discussed across the piece.

Chapter Six – *Conclusions, recommendations and limitations*

The concluding chapter brings the threads of this study together by: (i) providing a synopsis of a radiography education community's views on curriculum content, the role played by the radiography educator and then a representation of how the 'real' as opposed to the 'ideological' curriculum functions (ii) proposing a theoretical model for a radiography education community. This chapter also includes recommendations for curriculum development based on the research findings. It discusses the limitations of the study and finally outlines the impact of the study on my own praxis.

Chapter One

Background and Context

In this chapter I introduce myself as the practitioner researcher via a brief biography of my experience as a radiography student, as a practising radiographer and as a university radiography educator. This is followed by an introduction to a radiography education community, that is, the participants. Finally, I provide an introduction to the research setting.

1.1 On becoming a practitioner researcher

I have been a university based radiography educator for the past fifteen years but have had an interest in radiography education since becoming a diagnostic radiographer twenty seven years ago. During this time I have held a variety of clinical and managerial positions within radiography before moving into higher education.

As the researcher I bring a sense of self to the study, that is, my own social world and thinking which has been grounded in my experiences during the transition from radiography student to university lecturer (Sword, 1999).

The internalisation of socially developed knowledge from such experience will undoubtedly have influenced my perspectives and beliefs about radiography knowledge and practice, in addition to my views on radiography education (Denzin, 1989). Further, it is likely that my 'life world', that is, what is self-evident to me, may differ from that of the participants (Habermas, 1987). Such differences have implications within the study and its findings. Therefore I hope to convey specific instantiations of my experiences to make these explicit for the reader.

The initial professional programme of study which I completed in 1986, the *Diploma of the College of Radiographers* (DCR), was very different to the graduate and post graduate programmes on which I teach today. Radiography education was then regarded as 'training' (Slumming, 1996; CoR, 1990). Schools of Radiography were hospital based and education often comprised equal periods of time spent in the classroom and the host hospital's x-ray department.

The geographical proximity of the social spaces in which the theoretical elements of radiography knowledge were taught and the application of that knowledge in clinical practice engendered a close relationship between the teaching staff and the radiography practitioners. Radiography practitioners would often deliver both theoretical and practical sessions to students (Bentley, 2004). The School of Radiography which I attended was relatively small in terms of cohort size, with an average yearly intake of 10 students compared with cohort sizes of 60 on the undergraduate programmes I now teach. There was a perceived sense of community between the School and host hospital, helped in part by their close proximity whereby the majority of the clinical experience was gained in the host hospital. Today radiography students spend time in various clinical departments.

The 1990s saw radiography education moving from Schools of Radiography to Higher Education Institutions (HEI). The *Diploma of the College of Radiographers* was replaced by a graduate qualification, a Bachelor of Science degree. The incentive to change the qualification of radiography practitioners from diploma to a degree was driven by the College of Radiographers (CoR). The CoR policy document

Radiography Education and Training: a New Policy (1990) stated that the Diploma of the College of Radiographers:

> [I]mposed a didactic, authoritarian and inflexible model and an assessment and evaluation procedure which is theoretical and knowledge based and remote from clinical practice ...the model is out-of-step with informed educational and vocational training practice (Slumming, 1996, p.489).

At the time of studying for the DCR(R) I regarded the highly structured curriculum (CoR, 1986) as familiar, since it reflected the type of curricula I had been used to during my Ordinary and Advanced Level courses at school. The didactic nature of curriculum delivery was also similar to my experience of 'being taught'. This view remained during my time as a clinical radiographer and only changed after moving to the higher education setting, completing a postgraduate teaching qualification and embarking on an education doctoral programme. I would now regard this model of learning and teaching as 'banking education', that is, "instead of communicating, the teacher issues communiqués and makes deposits which the students patiently recieve, memorise and repeat" (Friere, 1996, pp. 53-54). Cleary my view of what education 'is' has changed over time as a result of engaging with pedagogic discourse (Peterson, 2003).

Undoubtedly, the DCR curriculum was more authoritarian than the PSRB guidance of today. For example the *Learning and Development Framework for Clinical Imaging and Oncology* states "the framework maximises flexibility and facilitates innovation in curriculum design and delivery" (CoR, 2007, p.8). In other words, the educational provider can decide how to structure the curriculum content and its delivery. The DCR curriculum in contrast was highly directive with detailed

descriptions of the subject matter to be covered (CoR, 1989). The prescribed practical work associated with domains of knowledge, such as physics, in the DCR curriculum appears to connect theory and practice (*ibid*). However, on closer inspection it evidences a physical theory but not necessarily how that theory connects with radiography practice. Such observations would suggest that my interpretation of a curriculum and its purpose have also changed.

The move from diplomat to graduate proved controversial amongst some members of the radiography profession. According to Brown (2004), the radiography profession felt threatened by graduate radiography students, who seemed to be more knowledgeable and, perhaps of more significance to the aim of this study, dared to question the norms of radiography custom and practice. During my transition from radiography student to qualified practitioner I had come to better understand the custom, practice and socially generated organisational culture prevalent in imaging departments. Associated with this culture was a clearly defined hierarchy – something I had learned to accept without question. During that time I witnessed what I then regarded as inappropriate behaviour by radiography students who questioned the norms of such a culture. Accordingly, as a practising radiographer and supervisor of radiography students on a graduate programme I aligned in part with Brown's (2004) proposition. However, as a university lecturer I came to understand that it is only by *questioning* that a profession can develop and began actively encouraging students to engage with critical thought (Sim, Zadnick and Radloff, 2003). Completing a doctorate in education has allowed me to step outside the

clinical culture in order to view its associated customs and norms through a more critical lens.

As a student and later as a practising radiographer, I had no particular views about radiography knowledge and practice in terms of their ontology (i.e. the artifacts of practice, their relationships with discipline knowledge and the values generated by the act of practising) or epistemology (i.e. what constitutes valid knowledge). Radiography knowledge was the theory required to 'do the job'. Having acquired the knowledge by formal (classroom) and informal (practice) means the pieces somehow fell into place through repetition and routine. In other words, much of the radiography knowledge I had and was able to apply became tacit over time (Eraut, 2000; Wenger, McDermott and Snyder, 2002).

My transition from practitioner to lecturer entailed moving from an accustomed world to one which had a new vocabulary and a new model of working – specifically I had more autonomy. However, for a long period of time I was unclear of the expectations or boundaries of my role (Diekelmann, 2004). In a sense it was like moving from expert to novice (McArthur-Rouse, 2008). Over time, I became more immersed in the world of higher education and to a degree this 'know how' has also become tacit.

Undertaking this doctoral study has facilitated a reflexive examination of my tacit radiography practice and education practice knowledge, for example through discursive readings of the literature and maintaining a reflexive diary throughout the journey (Neese, 2003).

In conjunction with educational developments, medical imaging technology experienced a period of rapid change and development in the 20th Century. The remit of the diagnostic radiographer was increased in line with these technological advances. In the early 1980s for example, the diagnostic imaging techniques performed by the radiographer included projection radiographs, contrast examinations, fluoroscopy and mobile x-ray examinations (Mackay, 2009). Nearly 30 years on, the role of the diagnostic radiographer has changed markedly. Diagnostic radiography practitioners are now expected to posesss the knowledge and skills necessary to operate a vast array of imaging equipment, including Computed Radiography, Computed Tomography, Magnetic Resonance Imaging, Radionuclide Imaging, Angiography and Ultrasound (White and Mackay, 2002). New specialisms have emerged in response to technological advances, along with developments in the role and the blurring of professional boundaries, specifically between the role of the radiographer and that of the radiologist (CoR, 2003; Price, 2007). The diagnostic radiography curriculum has had to reflect these changes (Ferris, 2009). For example, the physical principles of advanced imaging modalities, along with patient preparation and aftercare associated with these modalities, had to be included in an already content heavy curriculum. The rate of technological change is likely to continue and this has implications for the pedagogic grounding required of the contemporary radiography practitioner (Price, 2001).

As both participant in and observer of these changes, my personal history and experience will provide insight and an appropriate starting point from which to investigate the perceived professional knowledge requirements of a diagnostic

radiography practitioner and the way in which it is constructed by the diagnostic radiography student. The benefits of such a position are an understanding of the radiography landscape in terms of the contexual, historical and political antecedents, as well as the lexicon used within radiography education and practice (Perselli, 2012, p.420).

1.2 Introducing a radiography education community

The actors involved in radiography education are the students themselves, the radiography educators in the university setting, whom I refer to as 'university educators' and the radiography educators in the clinical practice setting, whom I refer to as 'clinical educators' in this study. Collectively, I regard these actors as a 'radiography education community'. What connects the actors within this community is the common purpose of helping the student radiographer to locate themselves within radiography knowledge and to enact this in practice, in other words, learning is central to the community's existence. This assumption chimes with Lave and Wenger (1991) and Wenger's (1998) theoretical framework of a Community of Practice (CoP) which describes learning as a collaborative and social enterprise (Andrew, Tolson and Ferguson, 2008).

Wenger's (1998) framework integrates four major components of which *community* is one constituent; the others are *meaning*, *practice* and *identity*. According to Wenger, these components are 'deeply connected' and 'mutually defining' and represent a type of social learning theory (Wenger, 1998, pp.4-5). Figure 1. (p.23) below represents my understanding of a community of practice whose purpose is radiography education. Whilst the focus here is an overarching radiography

education CoP which brings the various actors together, it is my view that each of the actors within this community is also a member of their own respective CoP's and that a dynamic connection exists amongst them. I base this assumption on my own experiences as a student radiographer, a radiography practitioner, and most recently, a radiography educator. This key assumption of the existence of a radiography education community is further explored and rationalised in the conceptual framework for this study in Chapter Two.

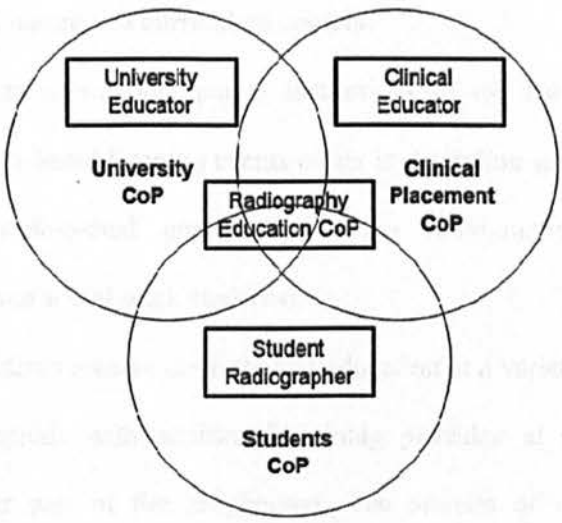


Figure 1. The proposed radiography education community (Jackson, 2011)

1.3 The research setting

The setting for this research is a School of Radiography at a London University and three Clinical Imaging Departments in the London area. The School of Radiography forms part of a Faculty of Health and Social Care Science. The Faculty is located jointly at two parent higher education institutions.

The School of Radiography offers a three year undergraduate Bachelor of Science Degree in both Diagnostic and Therapeutic Radiography. Radiography has two branches, Diagnostic and Therapeutic. Diagnostic radiographers are responsible for producing and in some cases assessing medical images in a variety of formats. Therapeutic radiographers are responsible for the delivery of treatment(s) for patients who have been diagnosed with cancer. Whilst the two branches have an almost symbiotic relationship, the diagnostic radiographer helps in the diagnoses of cancer and the therapeutic radiographer then treats the patient, their programmes of study are quite different in nature and curriculum content.

Radiography students attend both parent institutions of the Faculty for lectures, seminars and problem based learning events either in discipline specific groups or as part of a multi-professional group (comprising radiography, physiotherapy, midwifery, nursing and social work students).

The radiography students receive their clinical education at a variety of teaching and district general hospitals with additional training provided at specialist clinical centres in the latter part of the programme. The amount of time spent at the university and in clinical setting during the programme is approximately 50:50. It is widely acknowledged that radiography is a practice based profession and that clinical education is fundamental in the overall educational process (CoR, 2004). This underscores the importance of seeking the perceptions and experiences of all members of the radiography education community.

Chapter Two

Conceptual and Theoretical Framework

This chapter develops the conceptual framework for this study and in so doing establishes the ontological foundations of its design. It provides a scaffold from which to build a critique of the concept of radiography knowledge, radiography practice and a reflection on how radiography students might currently understand these concepts. After establishing the conceptual framework I will outline the formal theory in which this study is situated and thus the theoretical lens through which the project may be constructed.

2.1 Introduction

Together with Eisenhart (1991) and Lester (2005) I make a distinction between the conceptual and theoretical framework of my study. Eisenhart's explanation of a theoretical framework is:

> .....a structure that guides research by relying on a formal theory; that is, the framework is constructed by using an established, coherent explanation of certain phenomena and relationships (Eisenhart, 1991, p.205)

Accordingly, I call upon formal theory for decisions made in both constructing the research design, and for contextualisation of the study in an established body of theory.

Eisenhart's (1991) account of a conceptual framework facilitates an expression of my own views and beliefs, which in turn justifies the concepts that have served to guide the development of the problematic, the research questions, subsequent data

collection and analysis. Eisenhart (1991) captures this view in her definition of a conceptual framework:

> .....a conceptual framework is an argument that the ***concepts chosen*** for investigation or interpretation, and any ***anticipated relationships*** amongst them, will be appropriate and useful, given the research problem under investigation (*ibid.*, p.209, my emphasis)

2.2 Articulating my owns views on radiography knowledge and practice

My conceptual framework thus begins with the belief that radiography education is a social and shared experience amongst the members of a radiography education community. The purpose of radiography education is multi-dimensional, at its most tangible level it encompasses the acquisition and application of radiography knowledge, prior to the practice of radiography as a profession.

Thus radiography knowledge is the knowledge required to carry out the role of a radiographer. Radiography practice embodies the application of radiography knowledge which may to some degree be visible by observation. At a more abstract level, radiography practice also invokes the tacit notion of a profession which is often played out as behaviours and norms at large in a radiography setting (Eraut, 2000).

Professional knowledge encompasses theory, skills and attitudes and as such it is both complex and difficult to separate from the act of practice. However, in an attempt to describe professional knowledge some authors have made a clear distinction between 'technical' knowledge and 'practical' knowledge (Oakeshott, 1962), 'knowing that' and 'knowing how' (Ryle, 1949). On this view theoretical knowledge and skills may be taught and understood by the radiography student in the

university setting, and subsequently, theory and skills are applied in clinical practice. Alternatively, Eraut (1994) provides a more nuanced framework in which to site professional knowledge by using the descriptors of '*propositional*, *personal* and *process*' knowledge. Rather than being distinct and separate entities Eraut (*ibid*) suggests that his three categories of professional knowledge are both inextricably connected and embedded in the act of practice.

My own value position is that attempting to separate theory and practice represents a false dualism in that theory cannot be separated from action, nor can practice be disaggregated from the social context in which that practice takes place. I believe that practice is a dynamic construct which is produced and reproduced by a radiography education community, that it is influenced by the context of practice (e.g. institutional structures and cultures) and also by the history and experience which a radiography educator or learner brings to that community (Chaikin and Lave, 1993; Cole and Engeström, 1994). This view is supported by Baird (1996) who examined the idea of a reflective practicum for radiography education in the Australian context:

> Contrary to popular belief neither education nor professional practice are benign and value-free activities. Rather, both are practical and socially constructed activities in which deeply held beliefs and attitudes towards the nature of knowledge and the nature of people ultimately shapes their implementation (Baird, 1996, p.120)

The development of this conceptual framework has enabled me to identify an area of my practice to be researched, the concepts to be investigated and the presumed relationships at large in radiography education (Eisenhart, 1991).

Much of this conceptual framework has been derived from my experience as both a clinical radiographer and a radiography educator. It has been further refined by a critical review of the radiography literature and wider literatures which challenge reductionist views of professional practice. This has occured in combination with personal reflection and a critical dialogue in an effort to position myself in the process of radiography education.

This positoning of self will be implicit throughout this thesis in an attempt to render visible on the page my thinking and decision making both in the research design and the synthesis of data collected. The intention here is to clearly signal my own ontological and epistemological position as an educator interogating my own practice (Schön, 1991).

2.3 The central role of reflexivity in my study

The notion of reflexivity has become a central feature of contemporary discourses on research design and 'rigour' in qualitative analysis (Koch, 1993, 1998; Murphy and Yielder, 2009; Rolfe, 2006). Its purpose and purported value will vary according to the social theory in which it has become embedded. As Lynch (2000) reminds us in his critical review of reflexivity "meaning and epistemic virtues ascribed to reflexivity are relative to particular conceptions of human nature and social reality" (ibid., p.26). Therefore, for the purposes of this study I am defining reflexivity as the recursive 'turning back' as the story of this study is told (Bourdieu and Wacquant, 1992). In doing so, I am not suggesting an uncontested truth but problematising my own value postion as the practitioner researcher.

To capture my thoughts during the conduct of the study I maintained a reflexive diary which I term my 'thought wall'. During the interviews with the participants of the study I also made reflexive field notes. Both accounts of my reflexive thoughts are implicitly interwoven thoughout the study.

Having established the conceptual framework for this study I will now outline my understanding of the constructs of radiography knowledge and radiography practice, and the reciprocal relationship which exist between them, derived from a critical review of the literature.

2.4 Conceptualising radiography knowledge

I use the term radiography knowledge here to describe two interconnected broad based elements. Firstly, the underpinning theoretical knowledge and secondly, the skills and attributes required to apply this theoretical knowledge in practice (Ahonen, 2009). In the following paragraphs I position radiography knowledge within the wider concept of medical imaging. I review the literature on previous studies that have attempted to conceptualise radiography knowledge within and beyond the UK, and finally indicate the wider implications of the knowledge requirements for a diagnostic radiography curriculum.

Diagnostic radiography is a central component of the health care domain of medical imaging (Great Britain. Department of Health, 2003). Medical imaging is an overarching term which describes the use of a variety of electromagnetic radiations (energy waves) and mechanical sound waves to create images. Collectively, these are refered to as imaging modalities (Graham and Cloke, 2003). Each imaging modality

has a specific function in terms of respresenting a patient's anatomy and identifying any associated pathologies. Radiography students engaged in a programme of study at my practice setting are expected to have an understanding of how an image is generated and the clinical application of these imaging modalities upon graduation.

Medical images are used to aid diagnosis and as a means of monitoring a patient's progress. Medical imaging is an essential resource for the National Health Service (NHS) and fundamental to its mission of providing an efficient and high quality diagnostic service. (Great Britain. Department of Health, 2003). With approximately 30 million medical imaging examinations performed each year, it is essential that the actors involved in producing and evaluating these examinations, not only possess, but are also able to apply appropriate specialist knowledge in accordance with their role.

The actors involved in the medical imaging process include radiologists, medical doctors who specialise in medical imaging and diagnostic radiographers. The term *Diagnostic Radiographer*, a protected title that may only be used by practitioners who are registered with the Health and Care Professions Council[1], it describes a group of health care practitioners responsible for the acquisition, and increasingly, the interpretation of medical images (Price, 2007).

The acquisition of medical images must be performed in an effective and safe way, that is, with due consideration to patient management, including an appropriate level of care. The proper use of ionising radiation, also forms an integral part of the radiographer's role. In order to perform these roles, the diagnostic radiographer must

[1] Practitioners are eligible to be registered with the HCPC only after completing an approved programme of study.

call upon a range of knowledge domains which may be refered to as professional knowledge or more specifically radiography knowledge (CoR, 2007).

Radiography knowledge has been developed by scientific experimentation evaluating the effects of electromagnetic radiations on the human body in both producing an image and in the treatment of disease. It has also been developed by encompassing the knowledge domains from a diverse range of scientific and social science academic disciplines such as human biology and physiology, physics, mathematics, pyschology and sociology. Collectively these scientific and academic domains of knowledge when applied, faciltate the practice of radiography (Castle, 2000; Graham and Cloke, 2003) .

As the term 'conceptualising' is central to this study it is important that I define what I mean by this term in the context of this study. Therefore, I will be adopting Ahonen's (2008) definition of a 'concept'. In her study Ahonen (2008) aimed to conceptualise radiography in a holistic sense and proffered the following definition of a conceptualisation:

> The term concept usually means a mental impression of a certain object or phenomenon. First the object is observed, then mentally formulated in the human mind into a mental impression, and finally expressed in linguistic form (words or expressions).....concepts have prime characteristics which may be designated[...] as attributes...depending on the concepts abstraction level, [the concept] may be considered [theoretical or operational].....concepts are considered dynamic and transient in nature, tending to change according to context and over time. (Ahonen, 2008, p.289)

This definition highlights the potential complexity of articulating the nature and scope of radiography knowledge. It also suggests that any conceptualisation involves consideration of the multiplicity of objects, abstract principles, perceptions and

experiences embedded in radiography practice. Moreover, the notion of implicit and explicit conceptualisations infers that this research endeavor will be neither linear nor straightforward. These implicit and explicit conceptualisations are embedded in radiography practice, radiography culture and the political and historical antecedents of radiography education (Niemi and Paasivaara, 2006).

Conceptualising how radiography knowledge is utilised by radiographers in their daily practice has recently become of great interest to the profession (Ahonen, 2008; Larson, Lunberg and Hillergård, 2008; Yielder, 2000, 2006; Sim and Radloff, 2008). However, much of this empirical research has been conducted in Scandinavia, Australia and New Zealand and as such offers a different context to both radiography practice and radiography education in the United Kingdom.

Larson, Lunberg and Hillergård's (2008) study aimed to identify and describe how radiographers use knowledge in the production of medical images by observing how radiographers use their knowledge in practice. They signal the fact that advances in technology and the ever increasing demand for imaging services have changed the role and expectations of the radiography practitioner. Further, they highlight the complexity of radiography knowledge, citing Davenport and Prusak's (1998) definition of knowledge which they describe as

> a mixture of several elements; as a mix of framed experience, values, contextual information and expert insight that provides a framework for evaluating and incorporating new experiences and new information [....], [t]he image itself is proof of the radiographer's explicit knowledge and the actual act of conducting the examination is an example of the radiographer's tacit knowledge. (Larson, Lunberg and Hillergård, 2008, p.2)

Research conducted in this area within the UK context includes the work of Castle (2000) who classified radiography knowledge using a three dimensional model which compared knowledge as 'hard versus soft', 'pure versus applied' and 'life system versus non-life' system'. Castle's study *(ibid)* reported that radiography knowledge spanned both the natural and social sciences.

Decker and Iphofen (2005) used an oral (life) history approach as a tool to frame knowledge about radiography practice from the practitioner's perspective. Their study also highlighted the substantial technological and sociological changes in both radiography education and practice over the past few decades aligning with Larson, Lunberg and Hillergård's (2008) study - a trend which is likely to continue (Price, 2001). Decker and Iphofen (2005), acknowledge that a conceptualisation of what radiography knowledge 'is' requires consideration of various interelated characteristics. Firstly, radiography knowledge is dynamic in nature and as such is constantly evolving. Secondly, radiography knowledge is situated and embedded in social experience, that is, radiography practice.

Decker and Iphofen's (2005) conclusions align with Schön (1991) and Eraut's (1992) argument against conceptualising professional knowledge using only a model of technical rationality; that is, systematic problem solving by applying scientific theory and technique. Schön draws our attention to the role of artistry and intuition in developing professional knowledge (Schön, 1987, pp.22-26). Further, Schön's conceptualisation of professional knowledge goes beyond that which is based purely on the content of work to include social interactions when performing such work. (Schön, 1991).

As Schön suggests:

> we should be turning the puzzle of professional knowledge on its head, not only seeking to build up a science applicable to practice but also to reflect on reflection-in-action already embedded in competent practice (Schön,1991, p.61)

The implications for the knowledge content in the diagnostic radiography curriculum are that the scope and role of the radiographer in medical imaging is changing as suggested earlier. Viewing this in parallel with technological advances, suggests that curriculum development should be regarded as a dynamic process which not only attempts to incorporate theoretical concepts but also acknowledges the importance of social interactions in the aquisition and application of knowledge (Ahonen, 2008). Furthermore, radiography knowledge should be evidence informed and authentically representative of contemporary practice (CoR, 2007). To achieve these aims requires a collaborative approach which takes into account the mutiple perspectives of a radiography education community.

2.5 Conceptualising radiography as a practice

A number of studies have been conducted which focus on radiography learning in the clinical practice setting (Brown, 2004; Rosie and Murray, 1998; Yielder, 2005; Baird, 1996 & 2007; Mackay, Anderson and Hogg, 2007). However, few studies exist which explore and define what radiography 'is' as a practice. Niemi and Passivaara (2006) in their study of a radiographer's professional identity discuss the role of 'communality', 'the social–historical context,' and 'material and symbolic spaces', in the formation of that identity. Larson, Lundberg and Hillergård (2008) make reference to the work of Orlikowski (2002) when they define tacit knowledge

as "a form of knowing and thus inseparable from action because it is constituted through such action" (*ibid.*, p.2). Pakarinen and Jussila (2006) propose a discourse on the more explicit knowledge domains at large in radiography practice, essentially the 'science' of radiography practice.

What is apparent from the radiography literature is that there is an interplay between explicit and tacit knowledge which takes place in the practice setting (Larson, Lundberg and Hillergård, 2008). Explicit knowledge, that is, scientific and technical knowledge, is perhaps more accessible and certainly easier to articulate. The tacit knowledge embedded in radiography practice is less accesible because of its connections with personal experiences, ways of knowing, personal beliefs and values (Polanyi, 1974). There is also a discourse emerging in the radiography literature that recognises radiography practice as a phenomenon which does not separate theory and action (Curtise, White and Mckay, 2007), a notion which is supported in the wider literature on practice (Wenger, 1998; Eraut, 2000).

This holistic notion of practice invites us to position radiography as a practice in some of the more established theoretical discourses, specifically, the theoretical perspective that does not seperate theory and action. I argued earlier that radiography knowledge goes beyond that which is based purely on the content of work which Morell (2006) describes as *naive functionality*, to include social interactions when performing such work. This view also aligns with Schön (1991) and Eraut's (1992) opinions on professional knowledge and is an axiomatic assumption in this study. Thus, given my intention is to garner the perceptions and experiences of a radiography education community through the research process, it would seem

appropriate to examine radiography practice within Lave and Wenger (1991) and Wenger's (1998) seminal work on developing practice within a community.

Wenger's (1998) theory of practice – '*Communities of Practice*', is a form of situated learning which supports Schön's and Eraut's views in also challenging the notion of practice which seperates theory and action (Schön, 1991; Eraut, 1992). Wenger (1998) refutes the idea of a dichotomy between the theoretical and the practical in everday practice by emphasising that practice:

> involves the whole person both acting and knowing at once. In practice, so called manual activity is not thoughtless, and mental activity is not disembodied (*ibid.*, p.48).

Wenger (1998) also acknowledges that the historical and social context of practice gives meaning and structure to the act of performing that practice and in doing so emphasises that practice is embedded in social activity, whilst social learning theories call attention to the view that learning involves the modeling of the behaviours and attitudes of others (e.g. Bandura, 1977; Lave and Wenger, 1991).

The radiography literature on the nature and impact of the modeling behaviours and attitudes within the context of learning in practice and in the academic setting is somewhat limited. Studies conducted to date use the term 'role model' to describe this phenomenon, a simplistic term that could be contested from the postmodernist perspective of the plurality of values and truths, but for the purpose of this review it serves as a useful descriptor (Wilson, 1997).

In addition to commenting on the paucity of research in this area Lewis and Robinson (2003), established that the generic characteristics of the ideal 'role model' in terms of personal attributes were: approachable, sound knowledge base, good

communicator, high standards of patient care, a positive work ethic, and finally, a willingness to share their experience.

Conway, Lewis and Robinson (2008) recognised that role models have a significant impact in "shaping the students future as a diagnostic radiographer" (*ibid.*, p.214). The attributes associated with an ideal 'role model' were once again identified as radiographers who were prepared to share their clinical experience and were good communicators. Although the evidence base is limited, the findings from previous research will provide a means of comparison with the views of the radiography education community in this study on the existence and purported function of the 'role model' in radiography education within my own practice setting.

Lewis and Robinson (2003) also comment on the ethical conduct of radiography practitioners which brings to the fore another important facet of radiography practice which requires careful consideration. Their study highlighted "a mismatch between the ideal characteristic composition of a role model and the self-perception of the participants as professional role models on the subject of ethical conduct" (*ibid.*, p.13). In other words, whilst ethical conduct was highly rated and perceived to be a key characteristic of an ideal role model by the participants of the study, few of the participants identified good ethical conduct as a feature of their own behaviour (*ibid.*, p.20). Both the HCPC (2008) and SCoR (2008) have produced guidance on the ethical conduct and behaviours expected of radiography practioners and student radiographers (HCPC, 2012). However, Lewis and Robinson's study (2003) suggests that radiography practitioners do not help students to understand the complexity and dynamic nature of sound ethical conduct in the practice setting.

The ethical dimensions of radiography and the implications for the curriculum and practice have also been explored in the UK radiography literature. Pettigrew (2000) advocates that health care practitioners should become sensitive to ethical issues and learn to make professional judgements on such issues in their daily practice. However, she also proposes that the ethical codes produced by the SCoR (2008) and HCPC (2008), do not in themselves, represent a panacea for dealing with ethical dilemmas, but merely provide a guidance framework as a point of reference. In daily radiography practice ethical considerations are often complex and expedient decisions need to be made as the scenario unravels. In circumstances such as this, generic ethical codes may be of little use. Interestingly, Pettrigrew (2000) also remarks that length of practice experience does not nessarily equate with more judicious decision making in the face of an ethical dilemma. Furthermore, she suggests that more experienced practioners are likely to require some form of regular update on their bioethical knowledge. Pettigrew ends her discourse with some guidance on how bioethics and ethical decision making might be best delivered in a undergraduate radiodiography curriculum:

> In addition to providing core information on the ethical principles that direct their moral development , it will also be important to include problem solving tasks which use analytical tools to explore critical incidents. This will allow them the opportunity to explore their own particular ethical dilemmas directly related to to their specific learning context (*ibid.*, p.296).

Students need not only to become aware of the ethical codes of conduct and behaviour that they are professionally obliged to follow, but also that they should be taught critical thinking skills, not least to apply such skills in daily practice. In

addition, I therefore feel that critical debate should become an integral element of the delivery of bioethical knowledge in the curriculum.

The ethical dimensions of radiography practice may also be located in the wider theoretical construct of practice by reference to the work of Alasdair MacIntyre. In what is considered to be a seminal text *After Virtue,* MacIntyre provides a sense of congruence to the situatedness and dynamic complexities of practice. He highlights the role of a community in defining and developing a practice that is morally sound. MacIntyre describes practice as:

> [A]ny coherent and complex form of socially established cooperative human activity through which goods internal to that form of activity are realised in the form of trying to achieve those standards of excellence which are appropriate to, and partially definitive of , that form of activity [...] (MacIntyre, 1981, p.187).

Here MacIntyre (1981) is suggesting that the ethical dimension of practice is embedded in the delivery of that practice and therefore ethical norms and behaviours develop within the context of that practice. 'Internal goods' or moral goods are defined in respect of a community engaged in a practice; they relate to the practitioner's performance and the products of their labour rather than focusing upon an individual practitioner's own sense of moral obligation. In other words this construct is opposed to the notion that practice and its embodied ethical domain are solipsistic[2] in nature. Smith (2003, p.314) regards such a characterisation of practice as "opaque and dubious". Whilst it is true that MacIntyre's use of games as an analogy to differentiate between 'what is' and 'what is not' a practice can detract from his account of a practice, the advantage of MacIntyre's discourse is that it does

[2] The belief in self as the only reality

invite us to consider the "complexity.....the self involvement of practitioners [and] the self-transformative cooperative engagement " that occurs in a radiography education community (McLaughlin, 2003, p.314).

In summary, radiography practice engages the whole person and requires social interaction within its own community. Further, practice involves the application of both explicit, tacit and bioethical knowledge. This chimes with my intention in this research which is to conceptualise radiography knowledge more holistically. The term 'holistic' is used in this context to encompass not only the technical rational constructs of professional knowledge, but also professional knowledge constructed by the individual, together with the relationships that exist in the social domains of radiography practice (Schön, 1991). To take this holistic agenda forward necessitates a research endeavour which seeks to describe what radiography knowledge 'is' from the perspectives of those who practice, those who teach and those who are in the process of learning to become a radiography practitioner - in other words a radiography education community. Such research could at best only hope to describe and critique the status quo at a given point in time – not least because of the substantial and rapid technological and sociological changes in radiography practice evident over the past few decades (Castle, 2000; Decker and Iphofen, 2005; Bentley, 2005). This contemporary era characterised by constant and often rapid change has its own implications for conceptualising radiography knowledge within the context of practice. Schön draws attention to this line of reasoning in the following statement:

> Even if professional knowledge were to catch up with the new demands of professional practice, the improvement in professional performance would be transitory. The situations of practice are inherently unstable (Schön, 1983, p.15).

2.6 An emerging theoretical framework

The assumptions made in developing the conceptual framework and the emerging ontology for both radiography knowledge and practice derived from the radiography literatures would indicate that learning in radiography education is a social enterprise. Specifically, learning occurs, is developed and attains a degree of meaning within a radiography education community. Based on these conclusions radiography education may be situated in Lave and Wenger (1991) and Wenger's (1998) theoretical concept of a '*Community of Practice*' in which members are unified by *learning* about, and *participating* in activities that constitute radiography practice. In viewing radiography education as a social enterprise it is not my intention to overshadow any individual actor in that community, but to put forward a theoretical perspective with which to view the multifarious processes and experiences of radiography education. As Lave and Wenger (1991) suggest:

> ....participation in social practice – subjective as well as objective – suggests a very explicit focus on the person, but as a person-in-the-world, as a member of a sociocultural community. This focus in turn promotes a view of a knowing as activity by specific people in specific circumstances (Lave and Wenger,1991, p.52).

Similarly, in the conceptual framework there is an inference that the less experienced actor of such a community learns from those who are more experienced suggesting that a degree of alignment may also be made with Lave and Wenger's (1991)

analytical view point on social learning – *legitimate peripheral participation*. On this view the radiography student and the less experienced radiography practitioner participate in a community of practice intially at its peripherary but gradually increase their engagement and by doing so better understand the complexity of practice.

2.7 Situated learning, Legitimate Peripheral Participation and Communities of Practice – a review of the literature

Although the focus of this critique is the work of Lave and Wenger (1991) and Wenger (1998) and the critical discourses that this has provoked, it should be noted that the undergirding rationale for their theoretical perspective is by no means a recent concern (e.g. Dewey,1997 [1938]). Like many other commentators who have been critical of educational practices that regarded learning as a solipistic construct Lave and Wenger (1991) view learning as a participatory and socially encultured act.

Lave and Wenger's (1991) theoretical perspective posits three central concepts which Hughes (2007) summarises as:

> ***Situated learning*** as the umbrella concept of learning, ***legitimate peripheral participation*** as the form that situated learning takes, and ***communities of practice*** as the locus or site of learning. (Hughes, 2007, p.31 my emphasis)

Hughes' (2007) summary provides a useful framework within which to present a review of these three interconnected concepts. Accordingly, I begin with Lave and Wenger's (1991) views on situated learning.

In articulating their understanding of 'situatedness', Lave and Wenger (1991) are keen to address what they regard as its over simplified depiction of this construct by some authors.

> ....[S]ituated activity is anything but a simple construct; it is a general theoretical perspective that generates interconnected theories of perception, cognition, language, learning, the social world and their interrelations. (Lave, 1991, p.66)

Situatedness is more than an empirical attribute expressive of the context of an activity, because in their view learning can never be disassociated from the context in which it is applied (Lave and Wenger, 1991, p.33). Expressed another way, all learning could be regarded as situated.

The genesis of this understanding may be found in Lave's (1991) account of three theoretical variants within this learning genre. The *cognition plus* view posits that individuals will process, represent and remember in relation to each other whilst located in a social world. Social factors become conditions that effect an individual's cognition. Cognition is therefore a result of social processes but it is not itself the subject of reconceptualisation in social terms. In other words, meaning is fixed and the social space is more influential than an individual's cognition (Lave, 1991, p.67).

The *interpretive view* of situatedness is not constrained by a physicial space. Here the individual constantly negotiates meaning through language whilst engaged in a social activity. On this view there is no world independent of the individual's construction of it (Rommetveit, 1987).

The third view, which shares various tenets of the *interpretive view* is derived from anthropological research, focuses on learning within 'communities of practice' and questions more fully what is meant by 'situated' and what precisely is consituted by social interactions. Lave and Wenger's (1991) theoretical construct, which adopts this wider anthropological definition of situated learning refers to *situated social practice* which emphasises "the relational interdependency of the agent and world, activity, meaning, cognition, learning and knowing" which are further located within the historical development of ongoing activity (Lave, 1991, p.67). On this view learning, thinking and knowing are relational to people engaged in activity " in, with, and arising from, the socially and culturally structured world" (*ibid.*, p.67). That is, the world is socially generated by dialectical exchange with persons in activity, resulting in the production and reproduction of both the known social world and persons in activity. In this way agents continuously recreate their shared identity by engaging in practices within their own community (White, 2010).

Lave and Wenger (1991) suggest that a desire to become a more central participant within a community of practice acts as a strong incentive to learn from peers and more experienced practitioners. The fundamental question here is whether there is a desire or indeed agency on the part of the learner to actively participate. What makes agency a fundamental prerequiste to situated learning in clinical practice is the accepted belief that 'expert' radiography practitioners do not necessarily operate from codes or rules derived from theoretical models but use tacit situational understanding (Dreyfus and Dreyfus, 1986; Eraut, 2000; Yielder, 2005, 2006). White (2010, p.3) cites two conditions that will faciltate acquistion of these tacit skills.

Firstly, the learning space must be an authentic practice context and secondly, the learner must be allowed access to such practice contexts, that is, legitimate participation in practice. However, it could be argued that novice practitioners have only partially developed some of the complex practice skills to make a full contribution to practice and as such engage in actvity that is more peripheral to practice – this is described as "legitimate peripheral participation" (Lave and Wenger,1991). Stalmeijer, Dolmans and Wolfhagen (2009) proffer a potential strategy by which the expert practitioner can help focus the attention of the novice learner toward the salient features of their tacit situational understanding of an activity in practice and in doing so, make them more visible. This strategy, a form of cognitive apprentiship, includes: modeling; coaching; scaffolding; fading; articulation; reflection and exploration.

From the above account legitmate peripheral participation describes three conditions: legitimate access to authentic practice contexts, a forward trajectory of practice in which the novice practitioner progressively engages in more complex activities and at the same time develops their professional identity. However, many authors have commented that access to peripheral particpation may not be possible nor encouraged in certain practice situations (Handley *et al.*, 2006), further, reflecting on my own concern, the assumption that peripheral participation is linear, consistent or unidirectional in its trajectory toward full participation is also problematic (Yakhlef, 2010).

Lave and Wenger (1991) themselves recognise that communities of practice rather than promoting learning can at best create barriers to learning and at worst enculture potentially negative learning outcomes.

> Conditions that place newcomers in deeply adversarial relations with masters, bosses or managers; in exhausting over-involvement in work; or involuntary servitude rather than partcipation distort, partially or completely the prospects for learning in practice. (Lave and Wenger, 1991, p.64)

However, this quote also highlights the unequal power relationships that can exist within a community of practice. This factor would inhibit the novice practitioner moving toward a position of mastery; a point that Fuller (2007) maintains is under-developed in Lave and Wenger's (1991) intial accounts of their theoretical construct. If there is an assertion that communities of practice can have less than a benign effect on learning and identity formation, what follows is the question; what makes a community of practice sucessful or otherwise in its aim of developing expert practioners ? In order to respond to this question the concept of a community of practice as a locus of learning must be explored.

To problematise further - 'Communities of Practice' is a ubiquitous term within the discourse of Human Resource Management (Jørgensen and Keller, 2010) and Knowledge Management (Ardichvili, Page and Wentling, 2003) as well as being an enlightening metaphor to explain how learning takes place in the context of practice. Consequently, multiple definitions from different disciplinary contexts may be found in the literature. Andrew *et al.,* (2008) from a nursing perspective, define a community of practice as "a model of situated learning based on collaboration

amongst peers, where individuals work to a common purpose, defined by knowledge rather than task" (*ibid.*, p.246). Andreatos (2009, p.74) defines communities of practice from a Knowledge Management viewpoint as: " a group of professionals informally bound to one another through exposure to a common class of problems, common pursuit of solutions, and thereby themselves embodying a store of knowledge". Another much quoted, and perhaps a more encompassing definition, may be found in Lave and Wenger's (1991) seminal text which defines a community of practice as "a system of relationships between people, activities, the world; developing with time, and in relation to other tangential and overlapping communities of practice" (*ibid.*, p.98).

The above definitions suggest the core characteristics of a community of practice are a social and collaborative enterprise amongst people with a common purpose or goal which binds them together, "in, with, and arising from the socially and culturally structured world" (*ibid.*, p.67). This would imply that communities of practice represent a locus and intrinsic condition of the existence of knowledge specific to the purpose of that community. This knowledge of practice, its meaning and its associated professional identify forming function is negotiated through participation and *reification* (Wenger, 1998), that is, treating an abstraction as if it were something concrete – a real event or a physical entity. The concept of reification from Wenger's (1998) standpoint is the process of giving form to a practitioner's experience by the mental construction of 'objects'.

> Any community of practice produces abstractions, tools, symbols, stories, terms and concepts that reify something of that practice in a congealed form. (Wenger, 1998, p.59)

The negotiation of learning, meaning and professional identity according to Wenger (1998) occurs as a result of three conditions which produce this 'congealed form'. These conditions include *mutual engagement*, *joint enterprise* and a *shared repertoire* and to all intents and purposes represent the means by which a community of practice maintains both its coherence and functionality. Mutual engagement describes the interactions that result in relationships being formed. It is through such relationships that the values and norms of a community are established. The common purpose or joint enterprise is a feature that binds the community and the shared repertoire is developed by the community sharing its communal resources e.g. artifacts, language and stories (Roberts, 2006).

As part of their substantive literature review Amin and Roberts (2006, p.7) propose a typology for communities of practice based on the type of knowledge embodied in their practice. In a craft/task CoP knowledge is described as aesthetic / kinaesthetic. Co-location is a prerequiste for knowledge transfer and is achieved through shared task performance. Becoming a member of this type of community occurs via long lived apprenticeships.

A professional CoP also involves aesthetic and kinaesthetic knowledge but is described as specialised expert knowledge. Knowledge transfer in and membership of this type of community is attained through prolonged periods of education and training. Based on arguments made throughout this chapter it would be reasonable to suggest that radiography practice spans both types of CoP.

Earlier in this chapter I outlined my understanding of the ontology of radiography knowledge and practice. During this discourse a degree of alignment with Lave and

Wenger's (1991) definition of a community of practice became apparent to me. Specfically, the conceptualisation of radiography knowledge and practice described in a tangible way, the embedded nature of objects, perceptions and experiences together with the reification of abstract principles. Furthermore, evidence began to emerge which supported professional identity formation within a community of practice. For example, Niemi and Passivaara's (2006) study of a radiographer's professional identity discusses the role of 'communality', 'the social–historical context,' and 'material and symbolic spaces' in the formation of that identity.

A further consideration is how well radiography students and radiography practitioners cross boundaries between communities of practice in the wider health care context, given that government policy talks of the imperative of interprofessional working. Wenger (1998) suggests that boundary crossing is achieved by establishing 'bridges' across communities of practice. The difficulty here is that, at the boundaries, the true nature of a community is less well defined.

2.8 Critical perspectives on Lave and Wenger's theorising

I have already tentatively raised general weaknesses and limitations of Lave and Wenger (1991) and Wenger's (1998) theorising. Here I explore these in more detail being mindful of the radiography education context. It is not my intention to explore every nuance of the critical discourse that their theories (*ibid*) have instigated, but to focus on those that are of particular relevance to my own practice.

2.8.1 Power and hierarchy: the impact on learning in a radiography education community

Lave and Wenger (1991) recognise that power relationships within a community of practice can be unequal and impact on the learning function of that community:

> The social structure of [practice], its power relations, and its conditions for legitimacy define possibilities for learning. (Lave and Wenger, 1991, p.98)

They also acknowledge that it is an area that is largely undeveloped in their theory:

> [U]equal relations of power must be included more systematically in our analysis [...] It would be useful to understand better how these relations generate characteristically interstitial communities of practice and truncate possibilities for identities of mastery. (Lave and Wenger, 1991, p.42)

In other words, power relations within communities of practice may inhibit learning. Inherently related to power relations is the notion of a hierarchy within a community of practice which may also influence the possibilities of learning (Sulkowski, 2009). In the text *Cultivating Communities of Practice*, Wenger, McDermott and Snyder (2002) acknowledge the potential for a hierarchical structure to prevail by describing the development of *'cliques'* within communities of practice which result in '*stratification*'(*ibid.*, p.146).

Power and hierarchy in radiography practice has been explored by Yielder and Davis (2009) in the context of radiographer practitioner relationships within the wider medical imaging community. Their findings suggest that the historical dominance of the medical profession in medical imaging has resulted in apathetic radiographers lacking any sense of agency to question and challenge. Lewis *et al., 's* (2008) study identified medical dominance as a key influence which shaped the attitudes of

radiographers resulting in what the authors describe as *'just the radiographer'* syndrome. Such attitudes of subordination and compliance are at odds with PSRB philosophy of radiography education which aims to encourage critical thinking skills in order to *question and challeng*e radiography practice. Nonetheless, Levett-Jones and Lathlean (2009) similarly propose that nursing students are socialised into a culture of compliance and obedience, which according to Yielder and Davis (2009), is equally true of radiography students. There is a scarcity of research to date which has examined power relations and hierarchy between radiographers (clinical educators) and radiography students. However, given the impact of power and hierarchy on radiography practitioners (clinical educators), it seems reasonable to assume that a similar phenomenon will exist between radiographers and radiography students. As stated earlier in this chapter when discussing the less than benign effects of a community of practice:

> [I]nvoluntary servitude rather than partcipation distort, partially or completely the prospects for learning in practice. (Lave and Wenger, 1991, p.64)

If such conditions are present in the practice setting, the radiography student is in effect being denied access to authentic participation in their practice (White, 2010; p.3). Lave (1993) suggests that there can be no separation between participation in authentic practice and learning. Therefore, the logical conclusion is that a radiography student's development and progress will be effected where power relationships result in a perceived sense of servitude.

Although written within the specific context of workplace learning, Billett's (2001) notion of affordances in the workplace offers a theory that may be used to predict the

potential consequences of a hierarchy in the radiography clinical practice setting. The *affordances* relate to status within a workplace (practice) setting. In essence, a lower status within a hierarchy equates to a reduced access to learning opportunities (Hodkinson and Hodkinson, 2004). To date no research has been undertaken to investigate the impact of a hirerachy amongst radiography students and radiography practitioners (clinical educators). However, Chandler (1991) found that nursing students regarded themselves as occupying the lowest tier of a rigid nursing hierarchy and frequently adopted an attitude of compliance because of the strong fear of exclusion by ward staff. Accordingly, if a similar rigid hierarchy exists in radiography, learning may be affected by the radiographers' (clinical educators') perception of the students' position and the radiography students' perception of their own position. Viewing this in terms of peripheral and full participation in a radiography education community (Lave and Wenger, 1991), with clinical educators being regarded as full participants, clinical educators are therefore likely to excercise greater influence in the negotiation of the meaning of radiography knowledge in practice. The danger here is that the meaning of radiography knowledge will simply reflect the dominant source of power. This presents two problems: firstly, a clinical educator may dismiss a radiography student's understanding of an element of radiography knowledge that does not align with their own; secondly, it could ultimately stifle the growth of professional knowledge (Roberts, 2006, p.628).

What is missing from this critical discourse so far is the power and hierarchy that may also exist in the university setting between the student radiographers and the university educators. It is beyond the scope of this critique to include the body of

literature which examines the asymmetry of power between the student and the teacher (Freire,1996 [1970]; Dewey, 2007). However, it is acknowledged that power relations and perceptions of hierarchy may also impact on learning in the university setting in similar ways to those described earlier in this chapter in the context of the clinical setting.

2.8.2 Problems with the metaphor of participation to capture how learning occurs in a radiography education community

Lave and Wenger (1991) and Wenger (1998) are clear that it is the metaphor of *participation* which captures how learning occurs in a radiography education community. It is through participation in a social practice that the iterative negotiations of meaning and identify formation occur. Hager (2005) suggests that these broad based declarations fail to take into account the effect on a community member whose learning and sense of self are being continuously constituted and reconstituted as they engage in social activity (practice). Expressed another way, *participation* is a process which results in the products of learning and will ultimately be transformative (Meyer and Land, 2003). However, this does not align with Lave and Wenger's (1991) original descriptions of the route from legitimate to full participation which suggest minimal changes to practice or social relations and therefore self (Fuller, 2007, p.22). Further, there is an assumption that the negotiation of meaning will be an inert and consenual process, when it could equally be fraught with misunderstanding and disagreements (Marshall and Rollinson, 2004). Finally, various commentators agree that *participation* cannot in itself provide a explanatory model of learning that has universal applicability (Sfard, 1998; Hodkinson and

Hodkinson, 2004; Hager, 2005). In summary, taking a wider view, *participation* in a radiography education community will result in the constitution and reconsitution of meaning associated with radiography knowledge, which may result in transformation in social relations and professional identity. However, it is not necessarily an inert or consenual process and it cannot be seen as a 'catch all' concept to describe how learning occurs.

2.8.3 Failing to take the individual learner into account in a radiography education community

Lave and Wenger's (1991) theory of learning as participation within a community of practice focuses on how the collective learns with and from each other rather than the individual (Fuller, 2007, p.19). Therefore in the context of this study an unquestioning alignment with Lave and Wenger's (1991) theoretical constructs will fail to take into account the individual biographies of students and radiography educators. Such biographies could include prior learning, variable motivation to engage with learning (Fuller, 2007) and personal epistemologies (Billett, 2009). Cornford and Carrington's (2006) study captured the perceptions and experiences of doctors training to become general practitioners (GP). The results of their study emphasised the importance of an individual's prior learning identity and the impact that different practice cultures had on the type of learning experienced within a GP training community of practice (*ibid.*, p.279). Consequently, there are associated challenges using 'the collective' rather than 'the individual' as a unit of analysis.

2.8.4 Learning within multiples communities: crossing boundaries, conflicts and tensions

The conceptual framework developed earlier in this chapter described a radiography education community bounded by a radiography student, university educator and clinical educator communities of practice or, as described by Brown and Duguid (1991) *communities of communities of practice*. Wenger's notion of 'constellations' of practice would suggest that the radiography education community has permeable boundaries with student and radiography educator communities (Wenger, 1998, p.129; Nah, 2012). However, as Wenger also implies, members of multiple but connected communities often behave differently within each of them and consequently may establish contradictory or reinforcing constructs of themselves and the practice in which they are engaged. This has particular significance here because radiography knowledge, radiography practice and ultimately professional identity may be integrated and represented in these adjoining communities in very different ways (Roberts, 2006, p.631) creating the potential for tensions and conflicts to arise. Handley et al., (2006, p.647) concludes that Wenger is portraying a picture of "compartmentalisation of practices within each community setting". A notion that Handley et al., (2006, p.648) citing Mutch (2003) rejects by suggesting that members of multiple communities maintain a sense of agency via both adoption and adaptation of participation in different communities of practice.

2.9 Situating the findings of this study within Lave and Wenger (1991) and Wenger's (1998) theoretical construct

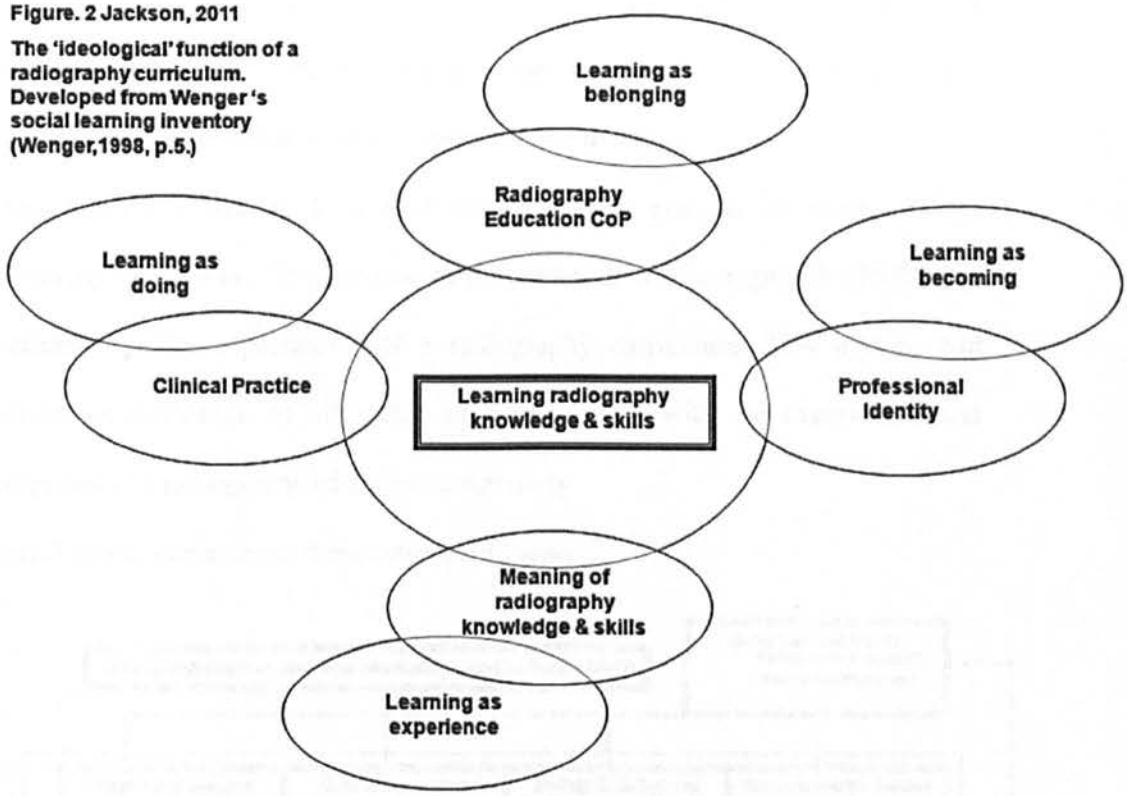
Communities of practice as defined by Wenger (1998) cannot be formed but evolve, and may not be necessarily evident to its participants. In order to establish whether or not this is case I will compare the perceptions and experiences of the participants of this study with the key characteristics of Lave and Wenger's (1991) and Wenger's (1998) theoretical perspective derived from this critical review using the summary table and model below (pp.57-58).

Key characteristics of Lave and Wenger's theoretical perspectives	Questions to ask of the findings of this study
Situated social practice is a result of the relational interdependency of the agent [practitioner] and their world, activity they are engaged with and meaning they derive from such activity. That is, the world is socially generated by dialectical exchange with persons in activity, resulting in the production and reproduction of both the known social world and persons in activity.	Do the participants recognise / describe meaning as product of relationships and negotiation within their community? Do the participants recognise/ describe a dialectical exchange about practice that results in a more fully developed understanding of practice?
A desire to become a more central participant within a community of practice acts as a strong incentive to learn from peers and more experienced practitioners.	Do the participants recognise / describe a trajectory from peripheral to full participation within their community ?
Legitimate participation within an authentic learning context.	Do the participants recognise / describe either the university setting or practice settings as an authentic learning context? Is there a sense that access to such learning spaces is present?
A community of practice evolves when the conditions of mutual engagement, joint enterprise and a shared repertoire are present.	Do the participants recognise / describe interactions within their community which results in relationships being formed? Is there a sense of a common purpose? Is there a sense of a community sharing its communal resources e.g. artifacts, language and stories? Do the participants recognise / describe the power relationships within their community?
A community of practice results in mutually defined professional identities.	Do the participants recognise / describe professional identity and its formation and development within their community?
A community of practice rather than promoting learning can create barriers to learning at best and at worst enculture potentially negative learning outcomes.	Do the participants recognise/ describe a community which creates barriers to learning? Is the culture within the community described as positive or negative?
Boundary crossing between communities of practice is achieved by creating mental 'bridges'.	Do the participants recognise /describe strategies that facilitate engagement with different communities of practice?

Adapting the components of Wenger's (1998) social learning framework within the context of radiography education allows us to capture the *ideological* function of a radiography curriculum Figure 2:

Figure. 2 Jackson, 2011

The 'ideological' function of a radiography curriculum. Developed from Wenger 's social learning inventory (Wenger,1998, p.5.)



Comparing the findings of this study with this adapted model will facilitate the development of a representation of the *enacted* radiography curriculum.

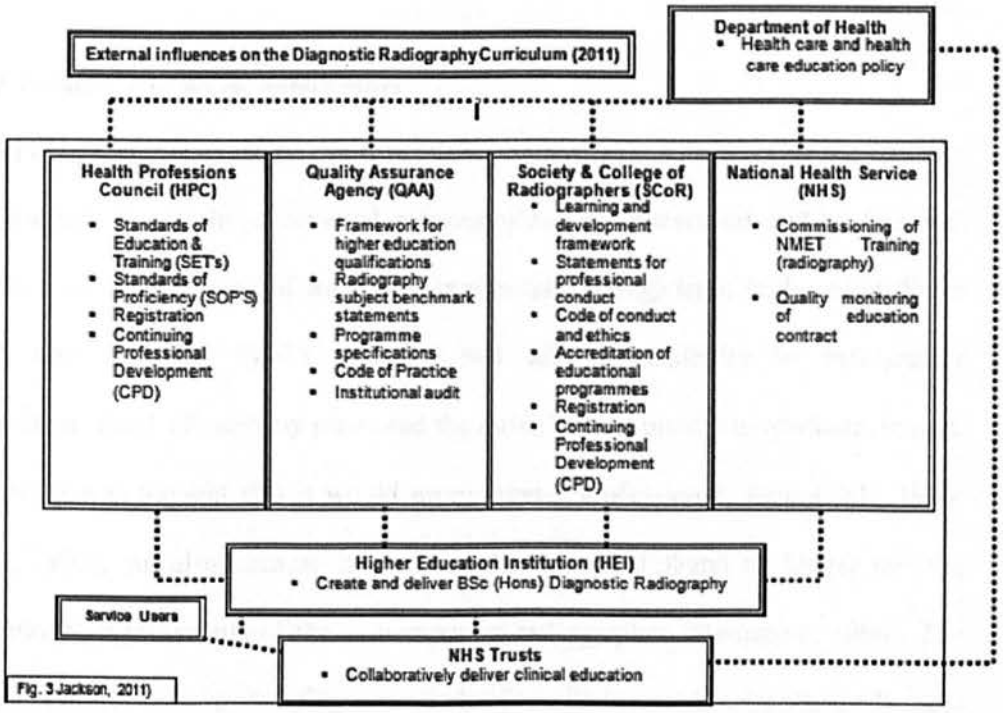
Chapter Three

The Influence of Professional, Statutory, Regulatory Bodies and Government Policy on The Radiography Curriculum

In Chapter Two I outlined my understanding of the constructs of radiography knowledge and radiography practice and the reciprocal relationship that exist between them, derived from a critical review of the theory.

In this chapter I offer a descriptive review of the external influences on the radiography curriculum. The purpose of the review is to interrogate the PSRB and government policy expectations of a radiography curriculum. This in turn will facilitate an evaluation of alignment or misalignment with the experiences and perceptions of a radiography education community.

Figure.3 below summarises these external influences.



3.1 The Society and College of Radiographers (SCoR)

The Society and later the College of Radiographers (SCoR), collectively the professional body for radiography, has produced guidance on the educational requirements of radiography practitioners since its inception in 1920. Pittillo, Morgan and Fergy (2000) defines a professional body as:

> A membership organisation acting as the learned society and representative body promoting and developing the profession. This is done by approving courses and qualifications for membership purposes. (*ibid.*,p.216)

Accordingly, the curriculum guidance proffered by the SCoR aims to prepare the radiography student for contemporary clinical practice at the same time as having an eye toward the future in terms of personal and professional development (CoR, 2007). In order to unpack this aim it is necessary to explore the historical and social developments that have shaped the SCoR curriculum guidance.

3.1.1 Political and social antecedents

In 1977 the College of Radiographers (CoR), a charitable subsidiary of the Society, was formed. The College assumed responsibility for educational and professional issues, whilst the Society of Radiographers became a registered trade union. From 1977 until the early 1990's the CoR had sole responsibility for radiography curriculum. The CoR actively promoted the move from diplomat to graduate, in part, because it was thought that it would bring greater professional status (CoR ,1989; Eraut, 1992), but also because it was thought that the diploma no longer met the educational requirements of the contemporary radiographer (Slumming, 1996). The educational needs were changing as a result of a shift in healthcare policy, advances

in technology and patient expectations (Pratt and Adams, 2003). Possibly the most salient guidance from radiography's professional body was *A Strategy for the Education and Professional Development of Radiographers* which acknowledged external political and societal influences on what a radiographer 'should know' and what type of role they might perform (CoR, 2002). This document set out the underlying principles for radiography education which would support the development of radiography practitioners who were capable of producing a *patient centred*, high quality service. The underlying educational philosophy of this strategy aligned with the then Labour Government's ambitious healthcare reforms set out in the *NHS Plan* (Great Britain. Department of Health, 2000) which in the words of Rudolph Klein (2006) represented a paradigm shift in the model of healthcare delivery: "the monolithic, paternalistic 1948 model [which had fashioned healthcare provision and delivery up until the new millennium] was to be transformed into a pluralistic, consumer-led model" (Klein,2006, p.V).

The major aims of the *NHS Plan: a Plan for Investment, a Plan for Reform* (Great Britain. Department of Health, 2000) were to create a health service that was more patient centred and one which was fit for the 21st century. The NHS plan was critical of the organisation of the NHS claiming:

- a lack of national standards;
- old-fashioned demarcations between staff and barriers between services;
- a lack of clear incentives and levers to improve performance;
- over centralisation and disempowered patients. (*ibid.*, p.2)

The publication and subsequent implementation of the healthcare strategy outlined in the NHS Plan presented multiple challenges for the profession of radiography and

radiography education. There was a perceived need to question the value of professional boundaries and, for all intents and purposes, the flexibility of the workforce, in an effort to ensure that the patient's journey was seamless.

In medical imaging this had intra-professional ramifications. The boundary between the radiographer and the radiologist, a medical doctor who specialises in medical imaging, continued to blur (Price, 2000). A combination of rapid advances in medical imaging technology and its associated changes to service requirements and a shortage of radiologists presented an opportunity for extending the role of the radiographer (Price, Miller and Mellor, 2002). Patient expectations were also changing, in part because of better access to information about medical imaging (e.g. via the internet) and also because in a sense this new healthcare policy advocated greater patient expectations. Patient choice was also becoming an important factor in healthcare resource allocation and medical imaging service provision (Salter, 2001).

This is acknowledged in *A Strategy for the Education and Professional Development of Radiographers* (CoR, 2002) – this strategy for radiography education proposed a more coherent structure at the same time as promoting 'widening access' to the profession and the development of 'flexible career pathways' (*ibid.*, p.1). The strategy included a model which mapped potential career pathways within radiography – 'the ladder of education and professional development '(*ibid* p.4)

This 'ladder' describes a variety of educational pathways for career development from Assistant Practitioner to Consultant Radiographer. It claims to closely match "professional career and lifelong development to service needs in conjunction with personal aspirations [whilst capitalising] on opportunities within the changing

context of health care" (*ibid.*, p.4). The 'ladder' is a result of various government policies associated with the NHS modernisation agenda; specifically it can be linked to policy on widening access to higher education and the notion of lifelong learning, contained within the *Dearing Report* (National Committee of Inquiry into Higher Education, 1997).

3.1.2 Current CoR curriculum guidance

In May 2003 the CoR published the *Curriculum Framework* as an implementation guide for the College's *Strategy for the Education and Professional Development of Radiographers* (CoR, 2002; CoR, 2003b). This has subsequently been superceded by the *Learning and Development Framework for Clinical Imaging and Oncology* (CoR, 2007). This latest document provides a framework which it claims "maximises flexibility and facilitates innovation in curriculum design and delivery" (CoR 2007, p9). At the same time it acknowledges the importance of the clinical placement as a learning environment, aligning with the educational philosophy of the Department of Health (Great Britain. Department of Health, 2004).

The framework goes beyond the skills and knowledge required for practitioner level by providing guidance on what appears to be a seamless continuum of professional development. In doing so it links with the *Four-tier model, NHS Knowledge and Skills Framework* and *Agenda for Change* (AfC) (Great Britain. Department of Health, 2004) and presents a means by which 'the ladder of education and professional development' might be actualised. In other words, the undergraduate curriculum content aims to lay the foundation of knowledge and skills required for continuing professional and personal development.

Whilst this document declares that the framework is not overly prescriptive it does provide an overarching structure in which connections may be made with the other external influences on the radiography curriculum namely the HCPC *Standards of Profiency* (HCPC, 2009) and the QAA *Radiography Subject Benchmarks* (QAA, 2001).

3.1.3 A curriculum open to interpretation

The *Learning and Development Framework for Clinical Imaging and Oncology* (CoR, 2007) presents the curriculum guidance as a series of generic themes e.g. 'care for patients, clients, users and carers' and discipline specific themes such as 'biological sciences'. Each of the themes uses the descriptor 'illustrative content' for the domains of knowledge and skills required of a radiography practitioner. Taking communication as an explicatory example from this document:

> [the radiography practitioner should posses] methods of effective communication relevant to [the] scope of [their] practice [which are both] clear and concise [in] oral and written [forms] (*ibid.*, p.22).

Whilst this statement is relatively clear in its aim, its interpretation by a radiography educator may vary, not least because such a generic descriptor refers to threshold concepts (Meyer and Land, 2003), that is, the scope of practice of a radiography practitioner will vary according to their roles and responsibilities. The interpretation of clear and concise communication either in a written or an oral form may also differ. This would suggest that the consistency of interpretation of the curriculum themes will vary.

3.1.4 A lack of student and service user input into the CoR curriculum guidance

The *Curriculum Framework* (CoR, 2003b) and *Learning and Development Framework for Clinical Imaging and Oncology* (CoR, 2007) were developed by a consultation process with 'high level' representives from both radiography education and clinical practice e.g. radiography education programme directors, consultant radiographers and superintendent radiographers. This group certainly represented 'experts' in the field of radiography practice and radiography education if Dreyfus's notion of the 'expert' is applied (Dreyfus and Dreyfus, 1988); that is, authorative understanding of the knowledge base, including a tacit understanding of practice required of a radiography practitioner. However, the most notable omission to the consultation process was service user involvement and the learner voice – a point highlighted in the professional accreditation literature by Dill (1998). To date there there has been no research to evaluate how the radiography student views their preparedness for practice in Level 5 or Level 6 of a radiography programme in the UK. This ommision further supports the aim of this study which is to capture the multiple voices of a radiography education community in terms of what *their* curriculum should look like.

3.1.5 The CoR curriculum guidance remains relatively unchallenged

There would also appear to be a gap in the radiography literature in the UK context which either questions the value of the CoR curriculum guidance and its undergirding government policy rhetoric or its potential impact on the autonomy of radiography educators – specifically, their academic freedom. Academic freedom is

somewhat limited in any case by the curriculum requirements of the Professional and Statutory bodies which lead to state registration (Snelling and Lipscomb, 2004).

Much of the radiography literature that does exist seemingly champions the government policy exhortations to inculcate the skills of lifelong learning (Gibbs, 2011) or the panacea of reflection (Hamilton and Druva, 2010). However, there are a few notable exceptions. Price (2006), in part of his PhD thesis, conducted a document analysis of the curricula of 24 UK institutions offering an undergraduate programme in diagnostic radiography. The purpose of Price's study (ibid) was to evaluate the alignment of the undergraduate curriculum with contemporary practice, with a particular focus on the impact of technology on the role of the radiographer. Price (ibid) found only 60% of his sample made explicit reference to skills required for extended roles in radiography. Pettigrew (2000) conducted a document analysis of the *College of Radiographers Code of Conduct* (CoR, 1994) exploring the ethical issues embedded in radiography practice and the implications for the undergraduate curriculum. She suggested that bioethical knowledge should be explored by the use of critical debate. In their mixed method study Mackay, Anderson and Hogg (2007) evaluated (by postal survey and semi-structured interview) how well the CoR curriculum prepared radiography practitioners for clinical practice. The overall findings indicated that employers of radiography practioners who had completed a SCoR accredited programme of study at the University of Salford were happy with their knowledge and skills. Interestingly, the newly qualified radiography practitioners rated themselves lower than ratings given by their clinical supervisors (*ibid.*, p.230).

Paterson (2011), Director of Professional Policy at the SCoR recently challenged the fitness for purpose of the current model for radiography education by questioning its 'task and performance focus' (*ibid.*, p.3) and whether or not it prepares *all* students for practice. She suggested that whilst "learning outcomes, standards, and knowledge and skills are important" the social context of their application is of equal, if not of greater importance to "professional development and individual accountability" (*ibid.*, p.3).

The fluid nature of radiography practice does present a challenge for the developers of a radiography curriculum. Price's (2006) study suggested that the radiography curriculum will always lag behind radiography practice, a notion supported by Schön (1983) amongst other authors who have commented on the unstable nature of practice. Nevertheless, it could be argued that whilst the content of the current radiography curriculum aligns with contemporary practice (Mackay, Anderson and Hogg, 2007), the current modular programme model used by the majority of radiography education providers, does not. The philosophy of health care and health care education policy has at its very core the notion of an integrated and holistic approach which is said to result in patient /client care that is seamless. However, as Paterson (2011) suggests, clinical learning and, it could be equally argued, university based learning, does not adopt an integrated approach. This has resulted in learning which may be perceived as decontexualised and "generally isolated from the [wider] social construct" (Paterson, 2012, p.2) in which patient/client care is delivered.

3.2 The Health and Care Professions Council (HCPC)

The Health and Care Professions Council (HCPC)[3] is a regulatory body established as a result of government statute (*The Health Professions Order 2001*) with a remit to 'protect the public' (HCPC, 2009, p.3). The HCPC currently regulates sixteen professions including 'Diagnostic Radiographers', a protected title which may only be used by HCPC registrants. Eligibility for registration with the HCPC is achieved by ensuring that a HEI who provides education and training for diagnostic radiographers meets the prescribed HCPC 'Standards of Proficiency' (SOP). Attainment of the SOP, and adherence to the HCPC Standards of Conduct, Performance and Ethics, will result in a diagnostic radiographer practitioner who is deemed by the HCPC to be 'fit for purpose'. Registration by the HCPC is normally a requirement for any diagnostic radiographer who wishes to gain employment in an NHS insitution in the UK.

3.2.1 HCPC expectations of a radiography curriculum

In order for a HEI programme of study to be approved by the HCPC the HEI must meet six Standards of Education and Training (SET). These include: (1) level of qualification for entry to the register; (2) programme admissions procedures; (3) programme management and resources; (4) curriculum; (5) practice placements; (6) assessment.

Of most relevance to the context of this study are those SETs which offer guidance on the curiculum of a programme and the management of practice placements.

[3] Health Professions Council was renamed the Health and Care Professions Council in August 2012

Described 'as one of the most crucial standards' (HCPC, 2009; p31), the curriculum SET describes a broadbased set of principles and values from which providers of radiography education can design their own curriculum.

The curriculum SET (SET.4) stresses the importance of 'relevance' of the curiculum to contemporary practice, that is, the curriculum should accurately reflect practice. The HCPC suggest that this is in part assured by regular input from clinical partners and services users. There is a dearth of research evaluating clinical practitioner teaching on undergraduate radiography programmes. In addition, there appears to be no current research which evaluates the impact of service user involvement in curriculum development in terms of the intended outcome of better *patient-centred* care in radiography or indeed in any other health care profession (Repper and Breeze, 2007).

The HCPC also recommends that members of a university based teaching team should be regularly up-dated on radiography practice by, for example, attending practice placements and keeping abreast of developments within radiography research. The underlying purpose here is to maintain an evidence informed curriculum. However, the emphasis is clearly on discipline specific knowledge rather than pedagogic knowledge. It could be argued that whilst a radiography educator may have a high degree of evidenced informed content knowledge their ability to convey this knowledge could be limited by a lack of understanding of what Schulman (1987) labels pedagogic content knowledge, that is, the ability to help the students understand content knowledge in and across different contexts of practice.

A connection can be made here with the point raised earlier by Patterson (2011) about decontexualised learning.

The second SET of relevance to the context of this study is 'Practice Placements' (SET.5). The overarching guidance from the HCPC is that a HEI delivering a programme of study for diagnostic radiography must take overall responsibility for placement learning. Specifically, this SET outlines the need for a HEI to effectively manage placements to ensure assessments are conducted appropriately and placement staff and students are provided with appropriate information and support in order to perform the respective roles in the educational process.

Whilst the SET clearly states that there is no specfic guidance for the length, structure, organisation or timing of placements, the SET does suggest that practice placements must be integral to the programme of study and that the number, duration and range of practice placements must be appropriate to support the delivery of the programme and achievement of its stated learning outcomes. The 'Practice Placement' SET goes on to suggest that all placement environments must be safe and supportive, be subject to effective monitoring and approval, have equality and diversity policies in place, have appropriate levels of staff who possess relevant knowledge, skills and experience (including familarity with the scheme of assessment for the programme of study) and an established strategy for communication between the placement provider and a HEI.

However, recent publications from the SCoR would suggest that there is variation in the level of support given to students in the clinical placement setting. The most damming account of the student radiographers' experience on clinical placement was

published by the SCoR in 2010. This report detailed episodes of 'aggressive behaviour', 'exclusion' and 'humiliation' (CoR, 2010).

3.2.2 A lack of student input in HCPC guidance

The HCPC standards (SOP and SET) like the SCoR curiculum guidance have been neogitated through consultation with 'experts' from the radiography community. However, there appears to be a lack of learner input in developing the standards, a point noted when reviewing the SCoR curriculum guidance. Another similarity that can be made between the HCPC and SCoR in terms of the indicative content of the radiography curriculum is a lack of detail or context. Although, in the case of the HCPC guidance, this is much more pronounced.

3.3 The Quality Assurance Agency

UK universities are independent and self governing and as such they have the principal responsibility for academic standards and the quality of learning and teaching. It is currently the role of the QAA to audit the quality and consistency of these standards. In doing so, the QAA also ensures that students who complete a programme of study are 'fit for award', that is, they have met specific standards, attributes and capabilities appropriate to the level of award. In the case of radiography and other healthcare programmes these standards are articulated in the form of *benchmark statements.*

The Department of Health contracted the QAA to produce subject benchmark statements for eleven health care related subject areas in an exercise referred to as 'Phase 1'. The results of this consultation excercise were published in 2001. The

Phase 1 exercise coincided with health care policy changes in the form of the *NHS Plan: a Plan for Investment, a Plan for Reform* (Great Britain. Department of Health, 2000) and the establishment of two statutory regulatory bodies, the Health and Care Professions Council (HCPC) and the Nursing and Midwifery Council (NMC).

In 2003 the Department of Health once again contracted the QAA to prioritise six more health care professions for which subject benchmark statements were to be developed. In addition the QAA were given a slightly wider remit which included the further development of the emerging *Health Professions Framework* which began to take shape in the Phase 1 excercise. The *Health Professions Framework* aimed to identify 'common ground' across health care professions. However, because of concerns over the superficiality of such a document, the framework was replaced by *statements of common purpose* whose aim was to identify meaningful situations in which interprofessional education might take place across health and social care professsions (Pittilo, 2006). In doing so the *statements of common purpose* furthered the philosophy of a seamless patient care stream outlined in the NHS Plan (Great Britain. Department of Health, 2000).

The QAA claims that these statements underpin trends towards increasingly integrated service delivery as well as inter-professional education and training at the same time as maximising the distinct contribution that each professional group brings to patient / client care (QAA, 2006). The rhetoric which surrounds these statements emphasises this philosophy by using terms such as 'effective team';'inter-professional' and 'inter-agency'.

The *statements of common purpose* are set out under three main themes:

- Values in health and social care practice
- The practice of health and social care
- Knowledge and understanding for health and social care practice

The sub categories described within these themes are threshold notions such as 'respect for clients' and patients' rights' and 'co-operation and collaboration with colleagues' (QAA, 2006). These descriptors align with those outlined in the HCPC codes of practice and Standards of Proficiency e.g. "understand the need to respect, and so far as possible uphold, the rights, dignity, values and autonomy of every service user"(HCPC, 2007, p.5) and also the generic skills outlined in the SCoR *Learning and Development Framework for Clinical Imaging and Oncology* e.g. p.22 (CoR, 2007) under the skill of care for patients, clients , users and carers : "patient dignity and respect". Although perhaps a little less tangible, these statements also reflect the SCoR Code of Conduct and Ethics (CoR, 2008).

The *statements of common purpose* are followed by subject specific benchmark statements. These subject specific statements cover the range of skills, attributes and behaviours necessary to carry out an ever inceasing array of medical imaging examinations in a safe and efficient way. These examinations span the human life cycle from "fetal life and anti-natal care to old age" in addition to health screening and forensic investigations.

The subject specific statements are described under three broad themes:

- Expectations held by the profession, employers and the public
- Principles and concepts held by the profession of diagnostic

radiography

- Knowledge, understanding and skills that underpin the education and training of diagnostic radiographers

Once again there are clear similarities here with the HCPC Standards of Proficiency and the SCoR *Learning and Development Framework for Clinical Imaging and Oncology* (CoR, 2007; HCPC, 2007). The subject specific statements like the *statements of common purpose* could also be categorised as threshold notions (Meyer and Land, 2003).

The subject benchmark statements may be used as an external reference source when developing new programmes by providing guidance in artculating learning outcomes associated with the programme. However, the QAA literature does make it clear that the statements are not meant to be used as detailed specifications of a curriculum but that they provide an overall conceptual framework which facilitates flexibility and innovation in curriculum practices (QAA, 2001).

Radiography benchmark statements were produced in consultation with 'experts' in the field of radiography and 11 other healthcare professions. These experts included representatives from higher education, service providers (practitioners), professional and statutory regulatory bodies. However, as with the HCPC and SCoR the 'experts' included in the consultation and development process of the benchmark statements had no learner input.

In summary, the QAA provides guidance for developing a radiography curriculum which will result in diagnostic radiographers who are 'fit for award'. This guidance

also embraces the Standards of Profiency (HCPC) and the curriculum framework outlined by the SCoR.

Similar observations can be made about the benchmark statements and the curiculum guidance offered by the HCPC and SCoR with regard to their potential for variable interpretation by radiography educators.

3.4 Government policy and radiography education

Various government health care policies have influenced the content of the undergraduate radiography curriculum. These include:

- The Four-Tier system of Service Delivery;
- Widening Participation;
- Lifelong Learning skills.

All of these policies are a legacy of the previous Labour Government but would appear to be supported by the Coalition Government elected in 2010.

3.4.1. *The Four-Tier System of Service Delivery model: background and context*

The *Four-Tier System of Service Delivery model,* which was consequence of the *NHS Plan* (Great Britain, Department of Health, 2000), formed a strategic element of the NHS *Cancer Plan* (Great Britain. Department of Health, 2002), and was articulated in the document *Radiography Skills Mix - A report on the four-tier service delivery model* (Great Britain. Department of Health, 2003) which purported to offer the following benefits:

> The model should offer radiographers greater potential for an extended clinical career, developing roles and responsibilities beyond those conventionally associated with radiography. [Further], the model should offer new or

> existing staff opportunities to develop clinical skills which are equitable and transferable, with the potential for further career development. (*ibid.*, p.7)

The Four -Tier Service Delivery Model's underpinning philosophy was the notion of skill mix. Skill mix may be defined as:

> [a] mix of skills or competencies possessed by an individual; ratio of senior to junior grade staff within a single discipline; or mix of different types of staff within a multidisciplinary team (Sibald, Shen and McBride, 2004).

The origin of skill mix in health care services may be traced back to the Government's White Paper *Working for Patients* (Great Britain. Department of Health, 1989) which encouraged the implementation of self-governing NHS *Trusts* and the introduction of *internal markets.* Adopting a more cynical perspective, this resulted in a series of reviews into *service delivery* driven by the aim of reducing labour costs (Klein, 2006). However, according to government policy rhetoric the aim was to improve the *'patient journey'* and make better use of limited resources.

Skill mix came to the fore once again with the National Skill Mix Project. This resulted in the publication of *Four-Tier System of Service Delivery Model* (Great Britain. Department of Health, 2003), which the SCoR openly embraced, stating that the four-tier model provided development opportunities for radiography practitioners – specifically role development (CoR, 2003c). The four-tier model could now perhaps be better described as the "career progression framework" (Woodford, 2005, p.325) as it was regarded in the radiography literature as the catalyst that encouraged and accelerated role development within the profession (Woodford, 2005; Price 2001, Price and Masurier 2007). Moreover, Price (2002) considered the "career progression framework" as a means of attaining the government's policy of

eliminating needless role demarcation and the promotion of flexible working practices. However, not all of the profession regarded this policy as a positive development. Bull (2003), whilst recognising the potential benefits of the Four–Tier model in the sense of an established career progression framework, used the metaphor of the pyramid to imply wider access at the bottom of the model than at the top. In effect, Bull (2003) highlighted the fact that career opportunities within higher status tiers of the framework are somewhat limited e.g. Advanced and Consultant Practitioner.

3.4.2 *The Four-Tier System of Service Delivery model: influences on the curriculum*

The document *Learning and Development Framework for Clinical Imaging and Oncology* (CoR, 2007), provides a taxonomy of knowledge and skills expected of a radiography practitioner and how they need to be developed to move to Advanced or Consultant practitioner status. Take for example the skills of reflection, research and development (CoR, 2007):

- At practitioner level there is an expectation that radiography students during their programme of study will develop the skills to reflect on their own practice and to research evidence which might inform that practice (*ibid.*, p.23). Under the skill of research and development, the practitioner is expected to be regularly involved in research and audit and publishing and presenting of findings (*ibid.*, p.25).
- At advanced practitioner level reflective practice is expected to encompass policy and legislation and to extend across professional and organisational

boundaries (*ibid.*, p.23). There is also an expectation that responsibility will be taken to coordinate and implement research and development programmes within the profession and at interprofessional fora (*ibid.*, p.25).

- At consultant level the remit is further developed to include the use of reflective practice to enhance *service delivery* (ibid, p23). Also, at this level the remit of research is extended to include cross-professional and cross-organisational research dissemination (*ibid.*, p.25).

Therefore, there is an expectation that the undergraduate curriculum should equip the radiography student with critical and reflective research skills and the ability to present the findings – a key element of the notion of lifelong learning. This would also suggest that a radiography curriculum should aim to engender leadership skills, organisational skills and the ability to communicate effectively with other health and social care professionals.

3.4.3 Widening Participation and the radiography curriculum

The White Paper *The Future of Higher Education* (DfES, 2003) set out the UK government's priorities for the HE sector. This paper built on the strategy articulated in the response to the *Dearing Report* (NCIHE, 1997), *Higher Education for the 21st Century.*

In addressing Dearing's *Recommendation 2*, the Higher Education Funding Council for England (HEFCE) proposed to reward higher education institutions which evidenced commitment to widening participation, that is, strategies and support mechanisms for students who have not traditionally studied at university.

The implication for the recruitment and selection on the BSc (Hons) Diagnostic Radiography programme at my own institution was a widening of entry requirements.

In addition to the standard route of 'A' level entry, students with Further Education Access qualifications were also eligible for entry onto the programme. In the main the students applying for a place on the programme via the access route are adult learners, that is, age 21 years or above. There is a wide body of literature examining the transition of adult learners to HE (Haggis and Pouget, 2002; Wingate, 2007). Much of the literature operates from a deficit model of these students suggesting that previous educational experiences have had a negative impact on the learner's sense of self efficacy (Ramsey, 2004) and have also shaped their expectations in terms of academic support and guidance (Lucas, 1990). Specifically, some adult learners are not used to being self-directed in their learning.

Presently, there is a dearth of literature assessing the impact of non-traditional entry students regarding both attrition and outcomes of radiography programmes. However, one study did evaluate the impact on outcome for post graduate radiography programmes at one institution. Marshall and Jones (2002) posed the question 'Does widening participation reduce standards of achievement in postgraduate radiography education?' they found no statistical difference in terms of achievement between standard (graduates) and non-standard (diplomats) students on postgraduate programmes.

3.4.4 Lifelong learning and the radiography curriculum

The notion of *lifelong learning* can also be found in the Dearing Report (NCIHE, 1997). Lifelong learning may be loosely described as the continuous acquisition of skills and knowledge throughout life (*ibid*). It can be achieved through formal study or informal experience. Sim, Zadnick and Radloff (2003, p.100) suggest that the following attributes characterise a lifelong learner in the context of Australian radiography education:

> - An inquiring mind, a learner who is propelled by the love and curiosity for learning;
> - Helicopter vision, an ability to inter-relate fields of knowledge as opposed to compartmentalized learning;
> - Information literacy, awareness of where and how to access information, plus the ability to evaluate critically the data collected;
> - A sense of personal agency, a positive image of oneself, coupled with the capacity to manage his or her own learning style;
> - A range of learning skills, having a variety of learning skills at his or her disposal;
> - Effective interpersonal skills, which enable the learner to interact and communicate effectively with one's peers and colleagues.

This would suggest that the lifelong learning may be actualised if an individual has agency to learn, a degree of cognitive flexibility, a range of communication skills and well developed critical research skills. On this view, the radiography curriculum should both raise awareness of these skills and attributes and help the student to develop them. Interestingly, Sim, Zanick and Radloff's (2003) study which assessed the impact of both the university and clinical placement culture on the facilitation of lifelong learning, found that whilst the university culture was supportive of it, the

clinical environment failed to provide an encouraging learning environment. There are no published studies to date that have challenged this finding.

3.4.5 Coalition government policies and the radiography curriculum

In 2010 a Coalition Government was elected in the UK. The document *Equity and Excellence: Liberating the NHS* (Great Britain. Department of Health, 2010) set out the government's strategy for the NHS over the next five years. The main themes articulated in this document were reminiscent of those proposed by the previous Labour government and the market driven NHS of the 1980's Conservative government. The themes include:

- A reduction in bureacratic top down control, that is, giving more control to clinicians, specifically General Practitioners;
- The continued vision (established in the previous governments NHS policies) of a patient centred service that offers patients and clients greater choice and say in the service they receive (compare with *The New NHS: Modern-Dependable*, 1997; *High Quality Care For All: NHS Next Stage Review*, 2008);
- A return to the Conservative vision of markets and competition, that is, a shift towards a productivity imperative and increased efficiency ;
- A more coherent service delivery that works across professional and institutional boundaries.

3.4.6 Government policy influences on a the curriculum: a summary

In summary, government health care and health education policies have the following implications for both the content and delivery of a radiography curriculum:

- There is a clear call from the policy makers to include key skills which will facilitate lifelong learning, that is, reflection and critical research skills, cognitive flexibility and a sense of agency. These skills should be developed and enhanced both in the university and the clinical learning environment.
- The theme of interprofessional working remains a key priority – interprofessional learning should therefore be a key feature of the curriculum. Similar to faciltating the advancement of lifelong learning skills, interprofessional education should be equally developed in both the university and clinical setting.
- There is a need to foreground teaching, communication skills, leadership and management skills in the curriculum for various reasons. The radiography students of today will be the teachers and leaders of tomorrow. As radiography practitioners they will teach and supervise student radiographers and possibly have the extended remit of supervising more Assistant Practitioners. They will require well developed communication and negotiation skills to work effectively and efficiently across professional boundaries. As improved 'productivity' is a key theme, the radiography practitioner will need to further develop their management of both equipment and workload.

3.4.7 Knowledge and skills prescribed by government policy: perspectives from the literature

Hamilton and Druva (2010) propose that radiography students see reflection as a "necessary evil rather than an opportunity for growth and development" (*ibid.*,p.1). Kember (2001) attributes three factors which influence a radiography student's

attitude to reflection and reflective writing. Firstly, Kember (ibid) suggested that the very concept of reflection is alien to the students. Given the over-emphasis of the 'technical rationalist model' in the radiography curriculum this is not entirely supprising (Baird, 1996). Secondly, it is suggested that the students' lack of engagement with reflective writing arises from the previously learned model of writing in the third person. Thirdly, because of the demands of a very full curriculum and students' perceived lack of relevance of this skill, it is not regarded as a priority. O'Connor (1996) opined that the skill of reflection is a pre-requisite to the radiographer providing an imaging service which is *patient-centred* (*ibid.*, p.53), otherwise she suggests that there will be over-emphasis on the *culture of technology* and a failer to take into account the *culture of the person* (*ibid.*, p.54). Baird (2008) argues that it is only through reflective practice that individuals and radiography communities will create or restructure radiography knowledge. She warns that if we do not engage with reflection, there is a very real danger that radiography practice will become simply mechanistic and routine at best, and at worst dysfunctional (Baird, 2008, p.2).

> [Radiography] educators face a daunting task in developing a curriculum that is strong enough to prevent it from simply reinforcing the "reproduction" of radiography in the way that it has always been performed. (Baird, 2008, p.4)

The message from the radiography literature on the need to engage with reflective practice is very clear – it is encumbent upon all radiography educators/practitioners to raise awareness and help to develop reflective skills in radiography students for reasons which go beyond those mandated by the regulatory bodies.

Castle (2009) defines critical thinking as the ability to interpret, analyse, evaluate, explain and infer concepts and ideas. The results of his empirical study demonstrated that some students were unable to perform satisfactorily in each of the dimensions of critical thinking when assessed by a 'Critical Thinking Skills Scoring Chart'.

Castle (*ibid*) concludes his paper with a warning for those who develop a radiography curriculum:

> Effort needs to put into developing a curriculum that overtly and systematicaly focuses on the improvement of critical thinking as these skills will not automatically result as a by-product of standard teaching in a content area (*ibid.*, p.76).

The notion of interprofessional learning as a means of fostering interprofessional working and the blurring of traditional boundaries within health care is a consequence of sucessive goverment health care policies (Adams *et al.*, 2006). The ultimate aim of such policy drivers is to improve *service delivery* by providing a *seamless patient journey.* Adams *et al.*,'s (2006) study found that students on a health care programme arrive with a relatively well developed sense of professional identity but with a degree of cognitive flexibility. Baxter and Brumfitt's (2008) study which collected data from qualified practitioners suggest that professional differences were clearly evident and attributed this to the depth of the particular knowledge and skills which practitioners possessed. Whilst they observed a degree of role substitution they found little evidence of role boundary blurring (Baxter and Brumfitt, 2008, p.248).

Communication skills have been investigated in the radiography literature by Booth (2006; 2004) using a Transactional Analysis approach. Booth identifies drivers for radiography students to develop high level communication skills from both the

perspectives of the patient / client and government policy. In her 2006 paper she reminds us that statistics of NHS complaints show that *communication* and *attitude of staff* have been in the top four categories of complaints since 1996 (*ibid.*, p.136) and that communication is a central tenet of the *NHS Key Skills Framework* (Great Britain. Department of Health, 2004) and the *NHS Career Framework.*

Yielder (2005, 2006a, 2006b) has written extensively about radiography education, professionalism and leadership and power in medical imaging in the context of radiography education in Australia. She highlights some of the continuing battles over the nature and role of the radiographer and the radiologist, for example, image reporting and radiographers performing examinations such as barium enemas. In doing so Yielder adds to the debate by discussing the complex political and power dimensions at large in medical imaging departments, concluding that strong leadership skills are required by those in senior radiography posts e.g. Consultant Radiographers, if radiography as a practice is to move on from its low profile of a *technical service* (2006a, p.312). The implication here is that concepts of management and leadership should be included in the undergraduate radiography curriculum.

3.5 Knowledge and skills prescribed by PSRB and government policy:a practitioner researcher perspective

The PSRB curriculum guidance and government policy does provide a useful framework on which to build a radiography curriculum. Nonetheless, the current guidance and philosophical rhetoric can be criticised on several levels. Firstly, the curriculum content is presented as broad integrated themes which are claimed to give

the HEI responsible for the delivery of a radiography programme room for flexibility and creativity in curriculum design. However, the broad nature of these themes leaves them open to variable interpretation by the radiography educators which could impact on consistency and therefore the quality of radiography knowledge acquired by the radiography student. Secondly, the social spaces in which learning occurs is given scant consideration; as such, insufficient weight is given to the importance of social interactions in effective learning. Thirdly, whilst the notion of tacit knowledge is now recognised within some of the radiography literature, it does not feature in any of the PSRB guidance nor government policy (Yielder, 2005; 2006b; Baird, 1996, 2008). Fourthly, unlike the professions of nursing and midwifery, radiography education in clinical practice does not currently require the clinical educator to have any formal teacher training. This potentially impacts upon the quality and consistency of the radiography students' clinical education. Finally, although PSRB and government policy actively promote the requirement for both radiography students and practitioners to develop and continually enhance the skills of reflection and critical thinking, they offer little advice on how this might be achieved. A criticism which is specific to radiography's professional body is the potential negative impact of advancing radiography's professional status. Studies in nursing have concluded that this can result in interprofessional rivalry and competition at the expense of collaboration, which is at odds with many of puported aims of the PSRB and government policy (Robertson, 2011).

The socio-cultural and political landscape of HE has changed markedly in the last decade. A significant impact of these changes has been the increasing marketisation

of HE which has positioned students as consumers of education (Molesworth et al.,., 2009). Whilst student status as a consumer of the many services provided by a university such libraries and accommodation remains in many respects uncontentious, concerns do arise when there is a danger that such consumerism could result in education that is reduced to a mechanistic delivery system with students as its passive recipients (McCulloch, 2009; Freire, 1996). It is widely acknowledged that in order to achieve the often espoused merits of graduates who are independent learners and critical thinkers with a strong sense of self-belief, there must be opportunities for students to be actively engaged in the development of their own education (Levy, Little and Whelan, 2011, p.3). A vehicle for accomplishing these objectives is through a radiography education community in which students and educators work collaboratively on developing the radiography curriculum (Hodge *et al.*, 2008).

Chapter Four

Research Design

In this chapter I will convey and justify the decisions that have resulted in the overarching research design and methods for this study. The key areas considered are: the inquiry paradigm, the methodology, data collection methods, sampling and sample size, data analysis and finally, ethical considerations.

4.1 Introduction

The key message from the education research literature is the need for "ontological and epistemological awareness", "methodological transparency" and a clear "instantiation of methods" (Koro-Ljungberg et al., 2009; p.687, Hammersley, 2005). The rationale for a clear articulation of the decision making process in a research design and its underpining philosophical and theoretical considerations is to create a justified and transparent approach to addressing the research questions. In doing so, the design choices and subsequent outcomes, that is, knowledge claims, can be systematically critiqued in terms of their validity in context (Oancea, 2005; Wellington, 2000). Further, where the researcher is responsible for data collection and its interpretation, reflection upon 'personal paradigms' (Guba and Lincoln, 1994), that is, epistemological beliefs and theoretical assumptions, becomes of paramount importance. It is with these considerations in mind that I will now describe in detail the decision trail in developing the research design for my study (Polit and Beck, 2010, p.498).

4.2 Establishing a research inquiry paradigm

Guba and Lincoln (1994) suggest that questions of method are secondary to the wider question of an appropriate research paradigm that will guide the research design. I adopt their definition of a research inquiry paradigm:

> [T]he basic belief system or worldview that guides the investigator, not only in choices of method but in ontologically and epistemologically fundamental ways (*ibid.*, p.105).

Guba and Lincoln (1994) proffer that a research inquiry paradigm is developed by the responses given to three fundamental questions: the ontological question, the epistemological question and the methodological question (*ibid.*, p.108). Porter (1996, pp.113-122; cited in Maggs-Rapport, 2001) suggests that each question represents a level of understanding:

Level 1 – Ontology	What is reality?
Level 2 – Epistemology	What counts as knowledge?
Level 3 – Methodology	How can we understand reality?
Level 4 - Methods	How can evidence be collected about reality?

Further, each of these questions is interconnected in the sense that the response to one question will constrain the response to the remaining two questions. I will now address each of these questions in relation to my study.

In Chapter Two I explored the ontological nature of radiography knowledge and practice, that is, what radiography knowledge and practice is and what can be known about it. Moreover, I explicated my view, supported by the radiography literature, that the radiography practioner makes use of a complex blend of both subjective and objective knowledge and skills. The language used to communicate subjective and

objective domains of knowledge and skills within a radiography education community would seem to fluctuate between a vocabulary that is both external to the radiography practitioner and known by all who practise radiography, to a more personalised vocabulary which is not subject to external attributes or influences (Niemi and Passivaara, 2007; Larson, Lundberg and Hillergård, 2008).

Now I will ask the epistemological question of what is the nature of the relationship between the subjective and objective constructs of the knowledge and skills of radiography practice and how much of this knowledge can be made visible through valid enquiry (Maggs-Rapport, 2001).

In a similar argument to that used to establish the ontology of radiography knowledge and thus continuing with the emerging research inquiry paradigm, I believe that whilst some radiography knowledge might legitimately be considered as objective, for example the physical production of x-rays, much radiography knowledge is subjective. These subjective knowledge domains include tacit or personal knowledge. However, both 'objective' and 'subjective' radiography knowledge only becomes meaningful when applied within the context of practice, that is, when utilised in the process of producing medical images. This process involves at least three actors: the patient, the referring practitioner and the radiographer. These actors interact in a social context and meaning is derived at this interface, with each actor taking a different meaning from the process. Therefore, the medical image produced by the radiographer, is in it self, meaningless without the context of its purpose.

In other words:

> Because of the essential relationship that human experience bears to its object [i.e. the medical image and the processes involved in its production], no object can be adequately described in isolation from the concious being experiencing it, nor can any experience be adequately described in isolation from its object (Crotty, 2003, p.45).

Thus, if radiography knowledge and skills comprise both subjective and objective domains and meaning is assumed to be derived through context and purpose of practice, then objectivity and subjectivity in the epistemological sense need to be brought together. This is precisely what Guba and Lincoln (1994) achieve when they explain the paradigm of constructivism.

The ontology of constructivism is described as "multiple, intangible mental constructions, socially and experientially based, local and specific in nature " (*ibid.*, p.110). This aligns with my own understanding of radiography knowledge and practice as articulated earlier. Further, they define the epistemology of the constructivism paradigm as "transcational and subjectivist – the investigator and the object of investigation are assumed to be interactively linked so that the findings are literally created as the investigation proceeds" (*ibid.*, p.111). This also aligns with my assumption that a radiography education community, as participants of this study, are best placed to conceptualise the meaning of radiography knowledge and practice. In summary, the overarching inquiry paradigm for this study is constructivism.

Finally, the question of methodology must be addressed. The methodology required of a constructivist paradigm must facilitate interaction between the investigator and the participants of the study (Miller and Crabtree, 1999). Specifically, the methodology must allow meaning to be constructed by negotiation during the data

collection process and analysis. In addition it must also acknowledge the political, social and historical context, that is, a methodology that supports dialectical and interpretive modes of inquiry (Lauckner, 2012). According to Stake (2006) a case study methodology meets these requirements.

4.3 Case study as a methodology

Yin (2003) states that case studies are "the prefered strategy when 'how' or 'why' questions are being posed" (Yin, 2003, p.1), in particular where the researcher has little control over events (McGloin, 2008; p.47). In addition, case study research is able to contexualise contemporary events, alongside political, social and historical anticedents at large in a research setting (Yin, 2003, p.5) – see Chapter 3. In other words, "the case study is particularly suited to situations in which it is impossible to separate the phenomenon's variables from their context" (Merriam, 1998, p.29).

Merriam (1998) offers a comprehensive overview to help define what case study research 'is' by consideration of its special features. These special features are defined by the characteristics of the case to be studied and include: '*particularistic*' - focusing on a particular event or situation; '*descriptive*' - where the end product of the case study is a *'thick'* description and *'heuristic'*- to further illuminate the reader's understanding.

The case study also benefits from encompassing the prior development of conceptual propositions which can be used to guide both data collection and data analysis (*ibid.*, p.14). My conceptual propositions are outlined in Chapter Two.

Merriam (1998) concludes that the single most defining characteristic of case study research may be found in the delimiting nature of the 'object' of study (*ibid*, p.27).

The notion of delimiting the object of study helps to define its nature and scope and also helps to signal the extent of the knowledge claims that might legitimately be made as its outcome.

The delimiting nature and scope of this study may be defined by its context. The study is set at a London HEI and three associated clinical sites where the radiography students undertake their clinical training. The study's population is defined as university based educators and clinical educators who teach on a BSc (Hons) Diagnostic Radiography programme, that is, the researcher's practice setting. This population also includes Level 5 and Level 6 students who are undertaking a programme of study in diagnostic radiography. The study is also delimited temporally, as the study focuses on the status quo of a current diagnostic radiography curriculum.

4.4 Methods

The sources of data interrogated included: a review of the curriculum guidance proffered by the Professional, Statutory and Regulatory bodies associated with radiography education and a critical review of radiography literature. The curriculum guidance and germane radiography literature have been analysed in Chapters Two and Three. The source of primary data collection for this study is the semi-structured interview.

4.4.1 Rationalising the selection of a semi structured interview

I did not wish to quantify the popularity or perceived usefulness of the knowledge and skills in the curriculum, rather to better understand how a radiography education

community described a curriculum's content and what role the radiography educator had to play in helping the radiography student understand this content. Thus, I wished to collect the perceptions and experiences of a radiography education community in the form of a narrative which would reveal, not only how individual 'voices' described the content, but also the rationale and context behind their choices, that is, meaning in context. The perceptions within a radiography education community will undoubtedly both differ, and at times converge. This will result in a narrative which conveys multiple meanings and insights into the radiography curriculum as viewed through the lens of a radiography education community (Crotty, 2003; Lauckner, 2012).

This stance on the construction of knowledge assumes that members of a radiography education community have both the agency and motivation to garner some understanding of the world in which they operate and where they interact in the practice of radiography (Bandura, 1977, 1993). Further, it assumes that 'subjective' meanings are given to objects and artefacts associated with radiography practice. These subjective meanings are developed and refined through experience within a radiography education community.

Eliciting these perceptions, then, would necessitate a data collecting tool "that is sensitive to the underlying meaning when gathering and intrepreting data....[and as Merriam suggests] humans are best suited for this task" (Merriam, 1998; p1-2). As the researcher I will engage in a dialectical conversation with the participants of the research. According to Rubin and Rubin (2012) the participants will be my

'conversational partners' and meaning will be both described and confirmed during our dialogue.

4.4.2 Semi-Structured interviews and the me as the researcher

As I will be collecting the main source of data and later analysing and interpreting that data it is important that I should clearly position myself in the research design. It is widely acknowledged that "interpretation flows from [a priori] personal, cultural and historical experiences" (Creswell, 2003, p.8). In order to position myself I maintained a reflexive research diary at all stages of the research process, in doing so I maintained an awareness of the influence I had on the research process and the affect it had on me. The reflexivity aspired to here takes the form of self disclosure, that is, personal assumptions and beliefs that are clearly articulated within the narrative and personal reflection which occurred during the data collection and data analysis processes (Gilgun, 2010; Koch, 2002).

Another consideration is that of the power relationships which may exist between the interviewer and interviewee during the interview process. In this study the relationships are varied and include: student /university based educator; clinically based educator /university based educator and university based educator / university based educator. It is widely accepted that the interview situation will have a profound impact on a participant when they are asked to narrate their experiences and beliefs (Karneili-Miller, Stier and Pressach, 2009; Sandelowski 1991). The narrative given by the participant will in part be influenced by where the participant positions themselves historically, socially and culturally within a radiography education

community. This may be regarded as 'positional power' and it is likely to shift during the interview process. Thus in the colloborative construction of knowledge between the participant and myself as the researcher, reflexivity will once again play a pivotal role. As stated earlier, this desire for reflexivity will be sought by the use of a research diary and field notes.

4.5 Research plan

4.5.1 Time Frame

- December 2009 – October 2012 ongoing literature review and document analysis
- April 2010 – August 2010 data collection and transciption
- September 2010 – January 2011 data analysis
- February 2011 – December 2012 write up and iterative revisions

4.5.2 Research Location

Data were collected across four sites. University radiography educators, clinical educators and radiography students were interviewed in my own Higher Education Institution.

The rationale for this decision included: (i) this is where knowledge and skills are taught and therefore constituted the 'natural' setting (ii) a reason for selecting this location was because it was relatively easy to negotiate access to potential participants as a radiography educator (iii) investigating my own practice setting aligns with the philosophy of a doctorate in education (Rubin and Rubin, 2012; Kvale and Brinkman, 2009)

Clinical Sites

Three clinical departments were selected where radiography students attended for their clinical education. This facilitated a comparison of data; as each site was perceived as having a different organisational culture and what seemed to be different working practices. (Kvale and Brinkman, 2009)

Clinical site 1 was the department which I visit in the capacity of liaison lecturer. I have been visiting this site for the past six years. It is also the site at which I work as a 'bank' radiographer on one Saturday every month. This means that I have a good working relationship with the radiographers, acting as a liaison lecturer between the department and the HEI and also as a colleague, both of which helped me in negotiating access to potential participants.

Clinical site 2 was another site where radiography students from my own insitution received clinical education. I had a close relationship with the clinical department through teaching and CPD activities.

Clinical site 3 is also a clinical site where radiography students received clinical training but I had less knowledge of the clinical educators and managers of this department.

4.5.3 The research sample

This study is interpretive in nature and as such does not aspire to produce generalisble findings. Given that a statistical generalisation of data is not the objective of the study a non-probabilty sampling framework seemed appropriate.

> [Non-probability sampling methods] are logical as long as the field worker [i.e. researcher] expects mainly to use data not to answer questions like 'how much and 'how often' but to solve qualitative problems, such as discovering what occurs, the implications of what occurs, and the relationship between these occurences (Honigmann, 1982; p. 84; cited in Merriam, 1998).

Non-probability sampling may be achieved by selecting participants by a variety of methods, for example, quota sampling, purposive sampling, snowball sampling and self- selection (Merriam, 1998). Purposive sampling is appropriately employed when the aim of the study is to "discover, understand and gain insight" (Merriam 1998, p.61). Thus, the overarching sampling goal was to achieve a degree of 'typicality' across the radiography community under investigation. I use the term typicality to signify a degree of representation in terms of the participants' characteristics including: gender, age, ethinicity and previous educational and clinical practice experience.

Radiography student population

To help achieve this 'typicality' I reviewed the Course Entry Statistical Records and Ethinicty Records for cohorts entering the BSc (Hons) Diagnostic Radiography programme over the past five years. The criteria for the selection of students was:

- Level 5 and Level 6 students as they will have had both clinical and academic experience. Level 4 students were excluded because they have a limited of experience of the clinical setting, only spending six weeks in clinical placement in their first year on the programme.
- Representation in terms of gender, educational background, ethnicity and age.

University based radiography educators

Within this sub-group of the study population there are differences in gender, experience in teaching radiography as an academic discipline and differing roles within the School of Radiography and the wider Faculty in which the School is situated.

Achieving a sense of 'typicality' with regard to gender was relatively straight forward. The level of experience of the educator posed more of a challenge for various reasons. Those new to teaching would have more recent memories of clinical practice but might be less familar with learning and teaching. The converse is probably true of the more senior teaching staff. Once again I wished to attain typicality in this sub-population in terms of gender, experience and role within the School of Radiography.

Clinically based radiography educators

Radiography students on the BSc programme at my own HEI receive their clinical education at a variety of sites. There are ten clinical sites associated with clinical training and these include Foundation Trust hospitals and Health Care Trust hospitals. The criteria for selecting clinical educators were State Registered radiographers who had completed a programme of study at my own HEI and were therefore familar with its curriculum. Four of the sample met this criterion and were employed at different NHS Trusts across London. The fifth clinical educator worked at an outer London Trust and had not completed their radiography education at my own HEI.

4.5.4 Summary of sampling strategy

Sampling strategy: Purposive

Sampling population: Level 5 and Level 6 students enrolled on a BSc (Hons) Diagnostic Radiography programme, university based radiography educators and clinically based radiography educators who teach on this programme.

Student Radiographers	University Educators	Clinical Educators
Level 5 (3 ♀ 2 ♂)	Principal / Head of School. (3♂ 1♀)	Junior (2♂ 2♀)
Level 6 (2 ♀ 3♂)	Senior (1♂ 2♀)	Senior (1♀)

4.5.5 Interview schedule

The first iteration of the interview schedule was formal and utilised too much academic language. This became evident during the intial piloting of the schedule. The use of less formal language was adopted in its second iteration and this began to produce what appeared to be more authentic data. The participants also seemed more willing to tell their own story as oppossed to answering in a way they felt was expected (Kvale and Brinkman, 2009). The interview schedule comprised an opening question about the participants' demographics and educational background. This was followed by two open-ended questions about the participants' perceptions and experiences of the radiography curriculum and the role played by the radiography educator (see Appendix Four). The rationale for selecting open-ended questions versus closed questions is given in section 4.4.1 p.92-93.

4.5.6 Interview recording and transcription

All interviews were recorded with the consent of the participant on a digital audio recorder. The recordings were accompanied by field notes during the interview. These field notes included reflexive thoughts which were included at the end of each interview transcription. The field notes helped to further develop the interview schedule and also captured my thoughts and ideas during the interview process.

An example of these reflections from an interview with student L52:

> The interview seemed to go well, conversation flowed and L52 seemed to understand what I was asking after a prompt was given. As a follow up to the first question for the next interview I will ask "if you were tasked with writing a radiography curriculum, what would be in it? " – if the participant does not understand what I mean by "knowledge required. *(*interview L52, p.9*)*

Oliver, Serovich and Mason (2005) suggest that transcription of data should not be regarded as a "behind the scenes task" but should be regarded as a "powerful act of representation" (*ibid.*, p.1). They categorise transcription practices in terms of a continuum which has two dominant modes. At one end of this continuum is the notion of naturalism in which the idiosyncratic elements of the participants' response are annotated in great detail, that is, pauses, coughs and non-verbal cues. At the other end, denaturalism does not narrate a participant's response verbatim, but describes a conversation in which meanings and perceptions are agreed between the conversational partners of the interview process (Rubin and Rubin, 2012). In doing so, the transcript produced represents the participants' construction of reality.

Halcombe and Davidson (2006) suggest that the method of transcription should be congruent with the theoretical underpinnings of a study. In order to stay true to the

epistemological underpinnings of this study, that is, constructivism (Guba and Lincoln, 1994), it seemed appropriate to transcribe the semi-structured interviews in a denaturalised format. The denaturalised form of transcribing the semi-structured interviews also aligned with the proposed analytical framework which was based on the grounded theory framework described by Charmaz (2006). Charmaz suggests that negotiations which occur during an interview result in "a construction- or a reconstruction- of a reality" (*ibid.*, p.27). She also indicates that the researcher should "take control of their data collection and analysis and in turn these methods give researchers more analytic control over their material" (*ibid.*, p.28). The resulting denaturalised transcription will therefore describe a discourse of negotiated meaning that is not obscured by the often complex intricacies of speech and non- verbal cues. In doing so the integrity and therefore the validity of the negotiated meaning of the participants' perceptions is maintained. A truly naturalised transcription could render the meaning inaccessible to the reader.

I transcribed the interviews in a two stage process. The first stage involved listenting to the recordings and transcribing these in a hand written format in combination with the field notes taken during the interview process. These hand written transcriptions were then typed up. This two stage process had both advantages and disadvantages associated with it. The main dissadvantage was that it was a very time comsuming process. Britten (1995) states that every hour of taped interview will take on average 5-7 hours to transcribe. Given the two stage process employed in this study the time taken to transcribe interviews was considerably more, averaging 8-10 hours for each hour of data collected.

The literature on interview transcription, whilst limited (Easton, McComish and Greenburg, 2000; Halcombe and Davidson, 2006), does suggest that the use of a professional transcription service does not necessarily guarantee an accurate record of the interview conversations and interactions. For example, Poland (1995) identified a 60% error rate by professional transcribers in the passages of a focus group investigation which he facilitated. The literature also suggests that there are advantages associated with a researcher transcribing data themselves. These include first hand knowledge of the interview process and expertise in the interview subject (Halcombe and Davidson, 2006). However, the main advantage of the two stage process was that it facilitated continued emersion within the data, in combination with the reflexive thoughts captured in field notes and reflexive diary (Koch, 2002).

4.5.7 Data analysis

The theoretical perspective of grounded theory offers a systematic analytical process which has been well articulated by its originators Glaser and Strauss (1967) and subsequently modified or refined by Glasser (2002); Strauss and Corbin (1998) and Charmaz (2006). This study relied primarily on the analytical guide provided by Charmaz (2006). However, this does not imply the use of preconceived concepts, only the application of guiding principles.

This systematic process of data analysis has its proponents (e.g. Miles and Huberman, 1994) who claim that the systematic nature of data analysis results in more reliable outputs and to a degree it represents a more 'scientific' means of analysing data. However, recurring criticisms of grounded theory techniques tend to focus on the 'quality' of the coding and categorisation process (Siverman, 2004).

A potential solution is to ensure that in the intial phases of analysis, coding must remain open to all theoretical directions indicated by the data collected. Charmaz (2006) reminds us that the language used by our participants and by researchers in developing codes will have a profound effect on the meaning derived from the data. She suggests that:

> coding impels us to make our participants' language problematic to render analysis of it. Coding should inspire us to examine hidden assumptions in our own use of language as well as that of our participants (*ibid.*, p.47).

This 'emic' understanding may be achieved by recursive interactions with the participants of the study, that is, agreeing and confirming meaning thoughout the conversational partnership (Rubin and Rubin, 2012). Charmaz (2006) does, however, warn the researcher to be cognisant of the fact that the language used to develop codes and subsequently categories, emanates from the researcher. To help maintain transparency in the analytic process she suggests that codes and categories are clearly defined along with their associated meaning. In the following paragraphs I will describe the manual coding strategy in some detail and in doing so I will make visble the process of generating my evidence from the interview data.

4.5.8 Coding Strategy

Phase 1 : *Intial coding (open coding)*

This coding effectly 'fractures' the data set by labeling 'actions' line-by-line and in doing so identifies conceptual categories when data sets are compared for differences or similiarities. Typical questions asked of the data are :

1. What is the basis of this point of view ?
2. Who's point of view is it ?
3. Do participants hold similar beliefs ?

(Charmaz, 2006, p.47; Priest, Roberts and Woods,2002)

Charmaz offers a few guiding principles for coding to fit the data. These include: staying close to the data set, constructing simple, short but precise codes; where possible preserving actions; comparing data with data and moving quickly through the data (Charmaz, 2006, p.49).

In -vivo coding

Participants in the study may use terms to describe their point of view that are either personally unique or unique to a particular community of practice. These 'special' terms are refered to in grounded theory as in-vivo codes. In-vivo codes may "serve as symbolic markers of participants' speach and meanings "*(*ibid, p55*)* . These codes will be compared with others derived from the data. However, as Charmaz suggests these codes should not necessarily be reproduced but should be problematised in order to derive their implicit meaning. An example of an in-vivo code would be the way in which participants refer to patients – this is normally by body part, for example, 'the abdomen' (Reeves and Decker, 2012, p.81).

The pilot interviews had generated the following domains of knowledge as being required of radiographer practitioner: physics, communication, anatomy-pathology – physiology (APP), radiographic technique, professionalism and self directed learning.

Taking physics and communication as an example, the following open coding was generated from a Level 5 student radiographer's interview transcript :

Physics
Exposure factors, how to manipulate kVp and mAs and their impact on the Image (p2)
Should be presented /delivered in practical terms (pragmatic knowledge) – not abstract concepts (p3)
Teach in terms of outcome (p3)
Need to indicate when & where knowledge might be applied in practice (p3)

Communication
People skills (p3)
Translating medical jargon into layman's terms for patients (p3/4)
Not just vocabularly – tone of voice too (p4)
Communication theory of less relevance to students with more life experience (p4)
Communication theory for 'standard' patients – in clinical most patients 'non-standard' (p4)
Communication theory would be best taught by 'authentic role play' (p4)

Phase 2 : Focused Coding

This represents the second major phase in coding. These codes are described as being more directed, selective and conceptual (Glasser, 1978; cited in Charmaz, 2006;p57). In effect focused coding involves taking the most significant and /or most frequently applied codes to filter large amounts of data. This process demands decisions about the intial open codes produced. It asks which codes, if any, facilitate catergorisation of the data. At this stage it may well be necessary to re-define or refine earlier codes to the fit the data.

Phase 3 : Triangulation

The term triangulation is used in this context to mean the use of multiple data sources, that is, the views and perceptions of students and educators, to achieve a "holistic understanding" of the phenomena under investigation (Merriam, 1998,

p204). Moreover, it was the collection of multiple opinions and the frequency with which they were described which validated the categories that emerged from the interviews (Silverman, 2004). These categories were subsequently condensed to form relational themes (Richards, 2005).

4.5.9 Rigour and trustworthiness within the study

Shenton (2004) suggests that interpretive research paradigms require a logical, consistent and transparent trail of decisions made throughout the research process to maintain a high level of trustworthiness. As a measure of the trustworthiness of a study Guba (1981) describes four criteria:

a) *Credibility* – is comparable with the construct of internal validity and aims to evaluate how congrugent the study's finding are with reality (Merriam, 1998);

b) *Transferability* – is a measure of external validity / generalisability and assesses if the context of the study been described in sufficient detail to allow comparisions to be made with similar situations (Lincoln and Guba, 1985);

c) *Dependability* – may be compared with the notion of reliability and judges if there is a sufficiently detailed description of the methodology to repeat the study with the same participants and achieve the same outcome. Lincoln and Guba (1985) suggest that there is a clear link between dependability and credibility in that one supports the other;

d) *Confirmability* – is similar to the idea of objectivity in research. In the context of an interpretive research design it is the extent to which the findings of a study as shown to be the perceptions and experiences of the participants and not a product of the researcher's characteristics and preferences (Miles and Huberman, 1994).

Table. 2 Evidencing the trustworthiness of this study (adapted from Shenton, 2004, p.73)

Quality criteria	Provision made in this study
Credibility	• Adoption of a recognised methodology and methods – case study and semi structured interviews (Chapter 4) • Familiarity with the social, political and historical antecedents of the radiography profession and inclusion of a researcher biography (Chapter 2 & 3) • Confirmation of participant meaning using a conversational partnership technique (Chapter 4) • Member checks, i.e. confirmation of transcript content by participants (Chapter 4) • Examination of previous research outside of the UK to frame the study (Chapter 2)
Transferability	• A thick description of the context and background of the study along with a detailed description of the conceptual and theoretical frameworks (Chapter 2 & 3)
Dependability	• A detailed description of the data collection, transcription and analysis (Chapter 4)
Confirmability	• A clear audit trail of descisions made in the research design, data analysis and a clear articulation of the researcher's value position (Chapter 2 & 4) • Confirmation of participant meaning using a conversational partnership technique (Chapter 4 & 5) • Member checks, i.e. confirmation of transcript content by participants (Chapter 4 & 5) • Acknowledgement of limitations of the study (Chapter 6)

4.6 Ethical considerations

This section considers the ethical, personal and political questions raised by this study.

4.6.1 Underlying ethical principles

Although research and ethics committees scrutinise and approve research proposals, it is the researcher that is ultimately responsible for protecting a study's participants. Accordingly it is critical that as the researcher I am fully cognisant of, and able to apply, the well established ethical principles of autonomy, beneficence, and justice throughout this project (Orb, Eisenhauer and Wynaden, 2000).

It is of fundamental importance that the potential participants of a study can exercise their autonomous right to voluntarily except or refuse an invitation to participate following informed consent and that they are also given the option to withdraw from the study at any stage (Lunshof *et al.*, 2008).

Beneficence, that is, action undertaken for the benefit of others and preventing harm, is applicable in this study in the context of protecting the participants' identity and participant approval of interview transcripts with the provision to withdraw part or the entire transcript from the study (Sims, 2010).

The principle of justice is applied by avoiding placing the participants in a vulnerable position or manipulating them during the process of collecting and analysing data. This is of particular significance when there is a perceived power imbalance between the researcher and the participants which is likely to be the case when I interview radiography students (Guillemin and Gillam, 2010)

4.6.2 Ethical approval to conduct the study

Ethical approval was granted by the Faculty of Health and Social Care Sciences Faculty Research and Ethics Committee (FREC). Ethical approval was also granted by the Faculty of Arts and Social Sciences FREC for the study. This is the Faculty in which I am registered for the Doctorate of Education.

Ethical approval was given to interview university educators, radiography students and clinical educators. The clinical educators were interviewed out of working hours and authorisation was sought and given by the clinical educator's line manager. The Imaging Business Managers at all three clinical sites gave their consent.

The study was conducted in accordance with the British Educational Association's ethical guidelines (BERA, 2011) which align with the underlying ethical principles outlined above:

- All invited participants were given a full explanation of the aims and scope of the study before giving their consent. This comprised an information sheet prior to agreeing to participate in the study and a signed consent form. In addition every participant was given a verbal explanation and consented to have the interview recorded prior to data collection;
- All participants were shown transcripts of their interview and asked to confirm its accuracy. The participants were given the option to withdraw part or all of the transcript;
- The interview questions were sensitively worded, however, all participants were told that should they feel the need, they were able to stop their interview at any

time. Further, counseling services were available at the university and clinical practice settings for all participants;

- All data records (audio recordings and transcriptions) were safely stored without any personal identifying features and password protected on the researcher's work and home PCs;
- All participants were offered a copy of the executive summary of the final thesis;
- Following the final write-up of the thesis all data sources will remain safety stored for a maximum period of 2 years to facilitate further research

4.6.3 Personal ethical questions raised by the study

The nature and scope of the study raised various personal ethical questions: 1) how could I remain aware of my position in the study, specifically during participant recruitment and data collection and analysis? 2) how might I deal with the fact that the study could reveal flaws within my own practice as a radiography educator?

As a radiography educator based in the university practice setting it was important for me to remain sensitive to both colleagues and students during the course of the study. In an attempt to ensure that students in particular did not feel obliged to take part in the study I initially posted a general invitation to participate on the university's Virtual Learning Environment (VLE). Once in receipt of an expression of interest I sent an information sheet and allowed a week as a cooling off period before suggesting a possible interview date. During all interviews, I made a statement to all participants that I was assuming the role of co-researcher and not radiography

educator. Further, to ensure that I remained as open-minded as possible during the data collection and subsequent analysis, iterative reflexivity was employed throughout the study.

There was also the possibility that the study might reveal flaws in my own professional practice or in other colleagues' practice. To address this issue I made a statement during the opening stages of the interview requesting that participants did not make personal comments about colleagues or peers.

4.6.4 Political questions

Issues of 'power' were addressed during the study in respect of relationships with colleagues and students. In particular students may have felt the need to offer responses which they felt the researcher would like to hear. It was therefore important to be reflexive in both recording and analysing the data. Anonymity was ensured by coding a participant's data. Participants were also assured that all data would remain confidential.

Chapter Five

Data Analysis and Discussion

This chapter examines and critically discusses the findings of this study extracted from the categories and themes which emerged from inductive analysis (Charmaz , 2006) of the 22 semi-structured interviews conducted within the radiography education community.

The chapter is presented in two main sections aligning with the two main research questions. Section One describes the perceived knowledge and skills required of a diagnostic radiography practitioner. Section Two describes the role of the radiography educators from the perspective and experiences of the study's participants. Covergence and divergence with Lave and Wenger (1991) and Wenger's (1998) theoretical construct of a Community of Practice is discussed in both sections of the chapter.

Introduction

In line with the study's epistemological framework, the inteview data should be seen as reflecting a reality jointly constructed by the interviewee and the interviewer (Searle, 1998). This chapter aims to capture the nuances of the dialogue between myself and the participants (Rubin and Rubin, 2012). The reliability of the categories is established by the frequency and consistency with which they appear in the interview transcripts (Silverman, 2004).

The very nature of the detailed and complex narratives which evolved during the data collection process has resulted in a degree of overlap in the themes which emerged. Upshur (2001, p.11) suggests that to describe themes as though they have artificial

clear cut boundaries would result in a reductive representation of a study's findings. Accordingly, there may be some episodes of minor repetition amongst the themes as this chapter unfolds.

The following coding was used to distinguish participant quotations used in this chapter:

L51-L55	Level 5 radiography students
L61-L65	Level 6 radiography students
C1-C5	Clinical educators
U1-U7	University educators

Section One – Source of Radiography Knowledge and skills

When members of a radiography education community were asked the question "What knowledge and skills does a radiographer require to practice?, " several categories emerged and were condensed into two major themes:

Theme one - *Discipline specific knowledge and skills*, although not necessarily unique to diagnostic radiography, are domains of knowledge and skills which were identified by the participants as being closely associated with radiography practice.

Theme two - *Generic knowledge and skills* are domains that were regarded by the participants, PSRB's and health care policy makers as common to all health care workers.

Theme One - Discipline Specific knowledge and skills

The theme, *discipline specific knowledge and skills*, was developed by condensing four emerging categories: anatomy, physiology and pathology, physics, radiographic technique and 'pragmatic knowledge'. These categories were condensed to form a theme because of their relational nature (Richards, 2005). Almost all of the

participants described the knowledge required by a diagnostic radiographer as discrete 'packets' of knowledge that when intergated, became a discipline specific knowledge set which they attributed to radiography practice.

1.1. Anatomy, Physiology and Pathology (APP)

A sound knowledge of anatomy, physiology and pathology (APP) was cited by 19 of the 22 participants as being a key knowledge field for effective radiography practice. Specifically, a good knowledge of APP was linked to a better understanding the imaging request and subsequently to performing the most appropriate radiographic technique.

> **L53** You need a good knowledge of APP in order to understand the x-ray requests (p.3)

> **L51** You need to know what's normal before you can comment on any abnormalities (p.4)

The volume of anatomy taught was variously described as 'excessive' and 'overwhelming' by most students. Nevertheless, two students felt that the depth and breadth of APP taught was entirely appropriate (**L63 & L61**).

Many students suggested that the university educators should delimit the volume of APP knowledge required by being more directive in terms of the depth and breadth of knowledge required rather than open ended statements about anatomical systems. This view was supported by several clinical educators (**C1,C4 & C5**).

Two university educators suggested that the depth and breadth of APP taught should be restricted in relation to the current limitations of medical imaging (**U7 & U3**)

> **U3** We could limit the anatomy that we teach in relation to the limitations of imaging ...we could also limit this by virtue of the role that the radiographer performs (p.8)

Through experience in practice the students were more motivated to learn APP and gained a better sense of how knowledge of APP enhanced radiographic technique. This was supported by various comments on the use of images to teach APP during classroom sessions. Learning APP in the dissection room was also regarded by many as an invaluable learning and teaching model.

> **L52** I tend to remember APP that I observe on a regular basis in practice (p.4)
>
> **L65** We would have benifited more from the use of pathology cases taken from practice when APP was being taught at the university (p.3)
>
> **C5** APP made much more sense when we saw it in the dissection room (p.3)

All of the 19 participants who commented on APP remarked that APP is a knowledge field that has to be rote learned[4], and that it requires a high degree of self directed learning both in the clinical and class room setting.

> **U2** A good grasp of APP is fundamental to the role of radiography ...however, it's something that you just have to learn...much of this learning could be achieved by self directed learning (p.2)

Critical discussion

APP has been a core element of the radiography curriculum since radiography became a certified programme of study in the 1920's (Bentley, 2005). In the graduate radiography curriculum APP remains a fundamental component and is included in the current curriculum guidance from the QAA, HCPC and SCoR. The rationale for students possessing a sound knowledge of APP is that it is a prerequiste to producing

[4] Rote learning is a memorisation technique based on repetition

high quality medical images which are 'fit for purpose' (Hall and Durwood, 2009). Further, there is a clear link between APP, radiographic technique and assessing the validity of a referral for medical imaging. Validating a medical imaging request is a key statutory responsibility for a radiography practitioner (CoR, 2007; HCPC, 2009). Both the students and the radiography educators appear to acknowledge the importance of a sound knowledge of APP and the rationale for possessing this knowledge.

A key concern raised by the students and, to a lesser extent, by the radiography educators was the volume of APP which a radiography student is expected to learn. The participants suggested that the depth and breadth of APP taught and assessed should align with the limitations of medical imaging, that is, the APP which is visible on the image.

However, it could be that the volume of anatomy which the students are expected to learn is not necessarily the issue. A student's preference for a particular teaching and learning model can affect their behaviour and approach to learning (Ramsden, 1992). In addition, the intentions behind a curriculum design and the associated expectations of the teacher are not always harmonious with the students' peferred model of learning (Argyris and Schön, 1978).

Kember (2004) examined the factors which shaped student perceptions of workload by asking students from a variety of different programmes of study to complete an hourly diary for one week. This was supplemented by a subsample being interviewed. The findings of Kember (*ibid*) indicated that hours spent studying are not synonymous with the perception of a heavy workload, but it can influence such

opinions. Kember (*ibid*) concludes that it is feasible to inspire students to achieve what appears to be difficult learning outcomes by paying attention to models of learning and teaching, assessment and curriculum design.

Dalley, Candela and Benzel-Lindley's (2008) research examined over-crowding in the nursing curriculum and support Kember's (2004) conclusions in suggesting that "knowledge (content) is more useful and will be retained and transfered when the context and timing for learning is considered" (Dalley, Candela and Benzel-Lindley, 2008, p.64). Put another way, the context and timing for teaching APP to students could have more impact than the volume of APP.

Hall and Durwood (2009) explored the retention of the high volume of APP knowledge required of radiography students. The results of their study indicate that the two major influencing factors associated with retention of APP are: the learning and teaching model used and the method of assessment, thus aligning with the findings of both Kember (2004) and Dalley, Candela and Benzel-Lindley (2008). Specifically, a good depth and breadth of APP knowledge should be regarded by students as having *vocational relevance*, that is, a clear application to radiography practice. From a pedagogical perspective Shulman (1992) described vocational relevance as a comprehension of purpose.

The findings in this study indicate that vocational relevance is usually developed by observing APP in the context of practice. It would seem that some clinical educators do support the students in practice by questioning their knowledge of APP from the images which they produce. Further, in the university setting, vocational relevance is sometimes emphasised by applying a learning and teaching model which combines

the use of illustrative medical images and human dissection. This model is widely acknowledged as an effective way of teaching APP (Miles, 2004; Raftey, 2006).

In summary, it is an incumbent responsibilty of the radiography educator to emphasise both the vocational relevance and the rationale for possessing a sound knowledge of APP (McMahon, 2006). This may be achieved by demonstrating its application in practice. However, it would seem that this model of learning and teaching is not consistently applied when APP is taught in either the clinical or university setting. Nevertheless, as noted by many of the participants of this study learning APP also requires a high degree of self directed learning on the part of the student.

1.2 Physics

The majority of students commented that too much emphasis was placed on theoretical concepts of physics and not enough time was spent discussing the application of these concepts. For many students a sound understanding of the concepts taught was only achieved after spending some time in clinical practice, that is, after observing the concepts being applied. However, many students felt that the clinical educators did not have a good grasp of theoretical physics themselves. This view was also supported by two of the clinical educators (**C4 & C5**)

> **L64** I think that students would understand physics more if there was a clear application...concepts remain abstract until you can apply that knowledge...you need to ask yourself when you press the exposure button what is happening inside the x-ray tube (p.4)

> **L65** Most of the radiographers did not connect the theory of physics with practice mainly because they could not recall it

> themselves ..but they still managed to conduct examinations with their practical knowledge (p.6)

Moreover, the clinical educators felt that the seeming lack of knowledge of applied physical concepts impacted on students' understanding of an area they regarded as fundamental to practice – for example the exposure parameters of kVp and mAs. These parameters effectively control the quality and quantity of the x-ray photons produced. An inappropriate choice of kVp and mAs can not only have a detrimental effect on the resultant image but may also result in the patient receiving a higher dose of radiation than necessary.

> **C1** A sound understanding of physics is fundamental to practice ...but often students arrive in the department without even a basic understanding of exposure factors...looking back at my own training I think this is because physics is still taught in an abstract way and it needs to be more applied...connections need to be made with how the physics is used in clinical practice (p.5)

The university educators' views on the volume of physics taught differed from that of the students, with two university educators (**U4 & U7**) commenting that the students were not taught enough physics. One university educator (**U3**) suggested that the volume of physics could be reduced by eliminating concepts that are no longer used in practice and do not reflect the current technology used to produce a medical image. Nevertheless, there was general concensus amongst the university educators that the way in which physics is taught needs to move toward a more applied model.

There was also a sense that the university educators had an eye to the future with regard to physics taught on the programme. It was felt that a sound understanding of the fundamental concepts of physics would help prepare the students for

technological change. However, in the view of participant **U3,** this is not always translated into curriculum content nor the model of learning and teaching currently used. **U3** was also of the opinion that there should be much more of a focus on 'informatics[5]' – which could free up more time to care for the patient.

Both university and clinical educators who had completed the DCR(R)[6] used this as a comparator with the physics taught on the graduate programme.

> **U1** I feel that the volume of physics taught is appropriate ...it's certainly less than we covered in the DCR(R)...it's not a matter of reducing the volume of physics delivered ...it's improving how we convey the application of the physics ...take exposure factors for example, you need to understand the physical concepts behind them in order to apply and manipulate them appropriately (p.3)

With regard to the knowledge of the physical principles of imaging modalities other than projection radiography, there was a general concensus by all participants that students only required a basic understanding, that is, they should be able to explain the nature and scope of the different modalities to both patients and other health care workers. In addition, knowledge of imaging modalities would also enhance the students' experience when they spent some time in these areas. Some participants had the view that Computed Tomography (CT) should be privileged over other imaging modalities as it is now a first post competency. Junior radiographers are likely to work with CT in the first year of qualifying as a practitioner.

> **L61** We should have a basic understanding of different imaging modalities ...but the focus should be on those that we are most likely to encounter (p.3)

[5] Informatics studies the structure, algorithms, behavior, and interactions of natural and artificial systems that store, process, access and communicate information.

[6] The Diploma of the College of Radiographers – the professional qualification prior to radiography becoming a graduate profession.

> **U4** I could possibly agree with the students' call for a reduction in the detail delivered for some imaging modalities..because practically they need only be familar with image generation and clinical application so that they can discuss the role of various imaging modalities in a knowledgeable way with other health care professionals (p.4)

An area of knowledge deficiency expressed by all participants was a lack of understanding of the technical applications of digital radiography (e.g. Computed Radiography – CR). This technology has replaced the acetate film which was used to capture the x-ray image.

> **C1** Students don't seem to have a good understanding of how CR works and how to get the best out of it (p.8)

> **U3** With CR/DR the students really need to know about the practicalities of using these systems (p.7)

Critical discussion

Similiarly to APP, physics has always been a mainstay of the radiography curriculum for two fundamental reasons. Firstly, the majority of medical imaging techniques make use of electromagnetic radiation and secondly, the radiography practitioner has a satutory responsibility with regard to safe use of ionising radiations (SCoR, 2007; HCPC, 2009).

This knowledge domain is a highly theoretical component of the radiography curriculum. It is an umbrella term that covers the physical concepts of x-ray production, interactions with the biological tissues of the patient, conversion of x-ray energy into a visible image and the basic understanding of a range of imaging modalities (Graham and Cloke, 2003).

The major issue identified by the participants in relation to the knowledge domain of physics was a lack of application to practice. For many students the theoretical concepts were too abstract and this could have influenced the value they attributed to them, that is, the vocational relevance. The students seemed to better understand the theoretical concepts when applied in practice. However, their learning was not always supported by the clinical educators as they themselves did not seem to have a good understanding of the concepts either. Nonetheless, the clinical educators were able to perform x-ray examinations without necessarily being able to explain the theory which underpinned their actions.

A possible explanation for this phenomena could be that the clinical educators have developed 'intuitive decision making' skills (Eraut, 2000) that are not always articulated or otherwise made visible when teaching the students. Eraut (*ibid*) proposes that this is one of three forms of tacit knowledge. Applying Eraut's (*ibid*) theoretical model within the context of this study suggests that clinical educators have routinised x-ray examinations to cope with the demands of a heavy clinical workload without the additional pressure of information overload. What was once explicit procedural knowledge increasingly has become automatic and tacit in nature. This presents a false dichotomy from the perspective of the clinical educators in relation to their comments about the students' lack of understanding of exposure factors (kVp and mAs). The clinical educators suggested that this was a result of how exposure parameters were taught in the university setting, when in fact there could be multiple overlapping reasons. Given that the students better understand theoretical physics concepts when applied to practice, their misunderstanding could be a result

of either: the current mode of teaching physics in the university setting *or* the students' capacity to apply theoretical concepts *or* the clinical educators' inability to convey the appropriate manipulation of exposure factors in practice, *or* indeed, a combination of all three potential causes. In any case this has implications for both the quality of the medical images produced and also patient safety (Castle, 2009, p.74).

A second area which was identified as deficient by the participants was a limited knowledge of digital radiography, which concurs with the findings of Mackay, Anderson and Hogg (2008) in their study examining the preparedness of newly qualified practitioners for clinical practice.

Finally, there was a general concensus that with the exception of Computed Tomography (CT), imaging modalities could be taught as a general overview of image generation. CT was singled out as it is now a first post registration competency (CoR, 2007; HCPC, 2009), a finding which also aligns with the study of Mackay, Anderson and Hogg (2008).

In summary, the two main findings in respect of this domain of knowledge are the challenge of making the abstract principles of radiation physics more accessible and introducing a more robust review of the principles of digital radiography into the curriculum.

1.3 Radiographic Technique

The students' prefered learning and teaching model for radiographic technique was a brief presentation followed by a practical demonstration. Eight students (**L51, L52, L54, L55, L61, L62, L63, L65**) would have liked more practical sessions before

going into clinical placement as it was thought that this would have improved their confidence and sense of self efficacy. Seven students (**L51, L53, L54, L55, L61, L62, L64**) thought that the clinical educators expected their radiographic technique to be more comprehensive and of a higher level. One student (**L61**) remarked that over time radiographic technique became 'second nature'. This could be evidence of a student developing 'intuitive decision making' skills (Eraut, 2000).

The students were taught what they regarded as the correct radiographic technique for the 'standard' patient. Students felt confused if the clinical educator demonstrated a variation on this technique and in some cases questioned the validity of the technique they had observed in the university setting. One student (**L62**) felt that Peer Assisted Learning (PAL) sessions helped them to appreciate that different radiographic techniques which resulted in the same outcome were all equally valid. All students agreed that the most authentic learning of radiographic technique was achieved in the clinical setting.

> **L65** I think that more practice at the university would have improved my self confidence..giving me the feeling that I can do this ...I have to say that my confidence was knocked a little because the radiographers made me feel that I should know more than I did (p.4)
>
> **L62** PALs was invaluable in making me aware of different techniques that achieved the same outcome (p.6)
>
> **L51** Technique is best learned in a clinical department ...I would say that authentic practical experiences cannot be replicated at the university (p.6)

The clinical educators supported the view that they expected a greater knowledge of radiographic technique when the students first came to their clinical department. They also acknowledged that variations in radiographic technique did intially cause

some confusion and anxiety in students. They encouraged the univesity educators to emphasise the fact that radiographic technique taught at the university was not necessarily the only way of performing an examination and that the students should be encouraged to embrace difference. Intrestingly, two students (**L53 & L62**) remarked that the clinical educators did not always adopt this philosophy themselves – students were corrected if they did not follow the radiographic technique demonstrated by a particular clinical educator. This asymmetry of power between the student and the clinical educator was said to have a negative impact on the negotiations of what should be an appropriate radiographic technique (**L53 & L62**). One clinical educator (**C3**) compared knowledge of radiographic technique between diplomat and graduate radiography students – the former programme of study was thought to have produced students who had a higher level of knowledge and skill in radiographic technique. The same clinical educator questioned the currency of radiographic technique taught at the university. This raised the question of the preparedness of student radiographers for practice, specifically, how the diplomat model (DCR) compared with the graduate model.

> **C4** Sometimes it's difficult to know what to expect from students...there does seem to be a high degree of variation in what type of examinations they are able to perform...you can work with one student who is happy to do anything and then the next will want constant hand holding (p.6)

> **C3** Overall I would say that students have a low level knowledge of radiographic technique...maybe it was taught better in the DCR days I don't know ... the other thing I find is that variations in technique performed by the radiographers tends to cause tension for the student who have been taught one method at the university...I would also say that centering points taught at the university do not reflect real life practice – the students' knowledge of

> technique would be improved if more clinical educators taught this at the university (p.7)

In response, there was an acknowledgement from two of the university educators (**U2** & **U1**) that the range of radiographic technique taught in the university could be regarded as limited. They attributed this to time constraints and capacity. It was also thought that students' intial perceptions of practice were 'näive'. Interestingly, there was no comment on how the university educators might help the students to better understand the 'reality' of radiography practice.

> **U1** The perception of practice that the students sometimes have is often far removed from reality – practice is not clear cut but complex and messy. I put this down to their näivety (p.6)

Critical discussion

Radiographic technique is a field of knowledge and skill which encompases patient positioning, manipulation of the imaging equipment and finally critical evaluation of the resultant image (Unett and Royle, 1997). It is comparable to APP and physics in that it has been an essential part of a radiography curriculum since radiography education became formalised and regulated (Bentley, 2004).

One of the most salient findings in relation to this domain of radiography knowledge was a recurring theme in this chapter, that students seem to learn theoretical concepts more easily when applied in practice. There was an overwhelming agreement from the participants that the radiographic technique taught in the clinical setting was more authentic and easier to learn by the students because it was contextualised. This could be regarded as a form of situated learning (Lave and Wenger, 1991). Lave and

Wenger's (*ibid*) theoretical construct adopts a wider anthropological definition of situated learning in which learning is situated within a social practice. This construct of situated learning emphasises "the relational interdependency of the agent and world, activity, meaning, cognition, learning and knowing" which are further situated within the historical development of ongoing activity (Lave, 1991, p.67). On this view learning, thinking and knowing are relational to people engaged in activity "in, with, and arising from the socially and culturally structured world" (*ibid.*, p.67). That is, the world is socially generated by dialectical exchange with persons in activity, resulting in the production and reproduction of both the known social world and persons in activity. In this way agents (students and practitioners) continuously recreate their shared identity by engaging in practices within their own community (White, 2010). Accordingly, this construct of situated learning may explain two of the views expressed by the participants, firstly, the value attributed to Peer Assisted Learning (PAL) and, secondly, the continual negotiation and renegotiation of radiographic technique as the students were exposed to different means of achieving the same outcome. However, the asymmetry of power between the clinical educator and the students can negatively impact this negotiation (Yielder and Davis, 2009). The findings suggest that whilst the clinical educators purported to encourage students to engage with different radiographic techniques, in reality they criticised the student if the technique demonstrated did not align with their own. This could ultimately stifle the growth and development of this domain of knowledge (Roberts, 2006, p.628).

Another significant finding was that the students felt that they could have had a more robust knowledge of radiographic technique before starting their first clinical placement; a view which was supported by the clinical educators. The students would have liked more teaching sessions which involved the practical demonstration of radiographic technique at the university. However, this would present three significant challenges. Firstly, teaching radiographic technique in the university setting seems at odds with the call from the participants for a more contexualised learning model for radiographic technique that is situated in social practice. Secondly, whilst the university educators appear to be aware of the students' preference for more teaching of radiographic technique in the univesity setting this was said to be unavoidably limited by capacity, that is, practice facilities and temporal demands from other elements of the curiculum. Finally, from the clinical educators' perspective, some of the radiographic techniques taught at the university did not reflect contemporary practice, effectively calling into question the currency of the knowledge held by the university educators.

The third noteworthy finding relates to the clinical educators unrealised expectations of the students' knowledge of radiographic technique. This misalignment appears to have had an impact on the students' level of confidence and their sense of self-efficacy (Bandura, 1997). One reason for the dissonance regarding what was expected of the radiography student could have been that the clinical educators were not fully conversant with the curriculum structure – an issue which threads throughout this chapter, particularly in relation to the content and the time of delivery of radiographic technique.

In summary, the main findings in relation to this domain of knowledge are firstly, the need to teach radiographic technique in the context of practice, preferably within the clinical practice setting. However, although this is regarded as the ideal model for learning radiographic technique, the time constraints of *service delivery* mean that this is not always possible in the clinical setting . It is therefore timely to explore alternative learning and teaching models such as simulation for example. Secondly, there is a need for university educators to regularly update their knowledge of contemporary radiographic practice. Thirdly, it is necessary to establish a robust mechanism for ensuring that the clinical educators are aware of the knowledge of radiographic technique which a student should have at a particular level of study. The findings of this study suggest that this has a relationship with the students' confidence levels and their sense of self-efficacy. Finally, there is evidence of unequal power relationships between the clinical educator and the radiography student, for example, the clinical educators power to decide what is appropriate radiographic technique.

1.4 'Pragmatic knowledge'

The coding for this catergory was derived from a label used by many of the participants to describe an overarching type of discipline specific knowledge that was not necessarily articulated but observed by watching practitioners 'in action' (Eraut, 2000). Unlike the other categories this knowledge has no specific disciplinary or academic origin and could be applied to all of the knowledge domains identified by the participants as radiography knowledge. It seems to have characteristics similiar to those attributed to tacit knowledge by Wenger, McDermott and Snyder (2002) or

more specifically the form of tacit knowledge that Eraut (2000) describes as 'intuitive decision making'. In essense, the participants described this type of knowledge as 'on the job knowledge'. This is knowledge that seems to rely more upon repetitive practice routines than theoretical concepts.

> **U4** The clinical educators provide the straightforward practical day to day stuff ...you get the academic stuff which is all about best practice and then you get the clinical side of things which is all about pragmatic practice, a sort of on-the-job knowledge. (p.9)

Pragmatic knowledge, according to the students **(L51, L54, L62, L63)** was 'acquired' by observing clinical educators performing their role and sharing their clinical experience. The following extract captures many of the participants' views and succinctly conveys the nature of what they describe as pragmatic knowledge:

> **U3** Everyone develops knowledge as they go through life ...working in the clinical environment allows you to develop that knowledge through experience and observing others ...that **knowledge and the process by which it develops is very difficult to articulate** (p4)
> There are aspects of radiography knowledge that you just can't articulate and that's **practical or pragmatic knowledge** ...it's about things that you learn from experience ..it's small pieces of knowledge that fit together ...it's knowledge that you take for granted but it's there ..(p.8)
> There are a lot of skills that radiographers have that students just don't have and the students struggle with that ...it's like they are on the periphery of practice and some radiographers puzzle over that, but they don't realise just how difficult it is to teach and learn some of those tacit skills in part because they don't know how they developed them themselves ...a good example would be spatial awareness...(p.8)

This extract also alludes to the notion of students being on the periphery of radiography practice gradually progressing, with experience, to a fuller

understanding of what practice 'is'. Parallels may be drawn here with Lave and Wenger's (1991) concept of 'Legitimate Peripheral Participation'.

Pragmatic knowledge did appear to present some challenges. For example, the student participants alluded to a tension which was created when practitioners were observed applying pragmatic knowledge. Specifically, when students observed practice which they regarded as lacking any theoretical underpinning, they questioned the necessity of some of the theory taught in the university setting, as the following comment by a Level 6 student (**L62**) illustrates:

> **L62** What's taught at the university does not always reflect what happens in practice...things like technique and manual handling ...another area that tends to be different is the use of centring points ...you just don't use these in practice, the radiographers tell you to centre to the cassette, but you still have to learn them for the OSCE[7] and I sometimes think what's the point. (p.8)

From a different perspective concerns about the notion of pragmatic knowledge were articulated by two university educators (**U1 &U2**). In effect the theoretical knowledge of clinical educators was questioned.

> **U1** Some of the clinical educators have a poor understanding of the theory behind practice which in my experience can result in the students observing poor practice. (p.6)

Critical discussion

The notion of pragmatic knowledge can be better understood when situated within the theoretical constructs of tacit knowledge described by Wenger, McDermott and Snyder (2002) and Eraut (2000). Tacit knowledge has been described by radiography

[7] Objective Structured Clinical Examination

researchers in New Zealand (e.g. Yielder, 2005, 2006b) and Scandinavia (e.g. Larson, Lundberg and Hillergård 2008) but very little has been written about this concept within the context of UK radiography education and practice. Therefore, this category represents an important finding of this study.

The literature on tacit knowledge is vast and it is beyond the remit of this chapter to articulate the multitude of views on this topic. What I aim to achieve here is better understanding of what constitutes tacit knowledge within the context of radiography practice.

What is apparent from the review the Larson, Lundberg and Hillergård (2008) study is that radiography practice involves the interplay of various types of knowledge regardless of the descriptors that might be applied to make this more visible. Ironically, a particular problem when attempting to articulate what tacit knowledge is in the context of radiography practice is its lack of visibility. Unlike codified knowledge, (sometimes referred to as public or propositional knowledge) which might be described in rules or protocols and in the curriculum content of a radiography programme (Eraut, 2000), tacit knowledge is commonly accepted to exist in a radiographer's hands and mind and manifests itself through their practice (Stenmark, 2001). Eraut (2000) reminds us that many authors use the term tacit knowledge as a catch-all category without any clear definition of what precisely the term means. For example is it knowledge which is simply not articulated by the practitioner, as one of the university educators suggested, or is a practitioner indeed able to communicate this knowledge? If so, does the extent to which this might be achieved vary? This conundrum has significance for both university and clinical

educators in terms of the ability to convey the complex application of tacit knowledge and skills in action. In raising these questions Eraut (2000) highlights the problems which a researcher may have in eliciting some understanding of this type of knowledge from participants of a study.

From an epistemological perspective Eraut (2000) proffers a definition and framework which helps us to focus more precisely on what tacit knowledge is and its connection with what he describes as non-formal learning, that is, informal learning. Eraut (*ibid*) brings together the explicit and tacit domains of "know how" and the "know that" or codified knowledge under the banner of personal knowledge, which he defines as:

> The cognitive resource which a person brings to a situation that enables them to think and perform. This incorporates codified knowledge in its personalised form, together with procedural knowledge and process knowledge, experiential knowledge and impressions of episodic memory. Skills are part of this knowledge, thus allowing representations of competence, capability or expertise in which the use of skills and propositional knowledge are closely integrated (Eraut, 2000, p.114)

This definition invites us to regard tacit knowledge as a component part of personal knowledge, which in conjunction with the other types of knowledge forms part of the knowledge recall, knowledge reframing and knowledge application which occur during the practice of radiography. On this view radiography practice cannot be described in a reductionist way, that is, by simply describing its constituent knowledge types as a sequence of cognitive events. If it were the case that radiography practice is played out as a linear algorithm whereby the radiography practitioner seamlessly moves from one type of knowledge to another when

performing an examination, then surely the knowledge that is described as tacit would not be so elusive in its nature?

It is interesting to note that whilst the wider radiography community has begun to engage with the critical discourse on the nature and application of tacit knowledge (e.g. Yielder, 2005, 2006b, Baird, 1996, 2008), policy makers and PSRB appear to have given it scant consideration (HCPC, 2009; CoR, 2007).

Theme One Summary

There would appear to be a general agreement amongst the participants about the domains of knowledge and skills that facilitate radiography practice. However, unlike the curriculum guidance of the HCPC, SCoR and QAA or the expectations of the curriculum designers (clinical and university educators), the participants describe radiography knowledge as discrete domains and not as integrated concepts which collectively facilitate radiography practice. There are arguments both for and against a modular curriculum framework in health care education. Conford (1997, p.237) argues that an inherent weakness associated with a modularised curriculum is the fragmented nature of knowledge, which may present a challenge to the radiography student who must call upon multiple domains of knowledge in the act of radiography practice. However, Grantcharov and Resnick (2008) writing from the perspective of medical education, suggest that modular education helps the student to focus on specific clinical skills. This latter argument assumes that the student will indeed recall and apply the underpining theory associated with a particular clinical skill which will often have been taught prior to experiencing that skill in practice.

For the students to value the knowledge and skills taught in the university setting and, to a lesser extent, in clinical practice, it must be seen to have vocational relevance, that is, a clear application to radiography practice. However, the models of learning and teaching which emphasise the vocational relevance of radiography knowledge are inconsistently applied. This has profound implications for the transference, development and sustainability of knowledge and skills (Sawdon and White, 2008).

A major challenge for radiography educators is to make 'pragmatic knowledge' more visible to the radiography student. There are several important reasons for such a project. Firstly, if clinical educators could articulate their experiential knowledge (a result of the application of what was once explicit procedural knowledge) it may help the radiography student better connect theory and action (Eraut, 2007). The second reason why unpacking pragmatic knowledge would be useful is that it may change the perceptions of students who observe practice which they perceive to be atheoretical because the practitioner fails to articulate the underpinning theory. The third reason for exploring tacit knowlegedge in radiography education is that it might inform policy and PSRB curriclum guidance.

Researchers from the discipline of *knowledge management* describe tacit knowledge as a phenomenon that is a characteristic of individuals and also groups who have tacit understandings of shared practices (Pan and Scarbrough, 1999). The findings of this study would infer that tacit knowledge is evident in individual radiography practitioners and is also continually negotiated within a community of radiography practice. However, power relations between the clinical educator and the radiography

student have been shown to negatively impact on these negotiations. Returning to a statement made in Chapter Two, the inherent danger is that the meaning of radiography knowledge will simply reflect the dominant source of power, presenting two problems. Firstly, a clinical educator may dismiss a radiography student's understanding of an element of radiography knowledge which does not align with their own. Secondly, it could ultimately stifle the growth of professional knowledge (Roberts, 2006, p.628).

In conclusion, acknowledging the less than benign effects of unequal power relations, there would appear to be a degree of alignment with the theoretical framework used in this study, that is, Lave and Wenger's (1991) concept of situated learning, legitimate peripheral participation and the existence of a radiography education community of practice. However, this seems to be more evident in the context of learning in clinical practice than within the university setting.

In the university setting the students seem to value the shared learning experience associated with Peer Assisted Learning (PAL). During PAL sessions students share resources such as artifacts, language and stories which suggests a sense of community (Perselli, 2012, p.422). The clinical practice context is extensively described as an authentic learning space. In particular, theoretical concepts are better understood when applied within the context of practice which implies that a form of situated learning is occuring. The knowledge domain of radiographic technique is an exemplar of radiography knowledge being a product of social relationships in which a dialectical exchange occurs between the student and the clinical educator. Again, within the context of clinical practice there is a sense that students see themselves on

a journey from peripheral to full participation within the clinical radiography community. However, this is dependent on access to authentic learning spaces.

Theme Two – Generic Knowledge and Skills

The theme of generic knowledge and skills was developed by condensing four emerging catergories: communication theory and skills, professionalism, critical thinking and self directed learning (SDL). In a similar way to the development of Theme One, the catergories that were brought together to create Theme Two were relational (Richards, 2005).

This theme captures the participants' descriptions of knowledge and skills which are not necessarily unique to diagnostic radiographers but are generic to many, if not all, health and social care professions. Specifically, they could be regarded as a cluster of knowledge and skills expected by professional, statutory and regulatory bodies and more recently the Education Outcomes Framework (Great Britain. Department of Health, 2013)

2.1 Communication theory and skills

Communication as both a knowledge and a skill was cited by all but one of the participants. They described communication as a two way exchange of information that had various purposes during the process of generating a medical image. The participants stated that from a medico-legal perspective it enabled the radiographer to confirm the patient's identity. Subsequently, it became a means of giving clear instructions to the patient in terms of the most appropriate position required of a particular examination i.e. standing, sitting, supine or prone. Finally, communication,

in particular the tone of voice adopted by the radiographer, was regarded as a means of reassuring the patient.

> **L51** Good communication skills are essential to get a patient's cooperation....it's a big part of the job (p2) on many levels from complying with the legal obligations to positioning the patient .... it is vital to role. (p.4)

Although communication was described as a two way exchange of information, the participants' comments had a clear focus on technical instructions given to the patient which appeared to be unidirectional. Further, the patient's own 'identity' seemed to be reduced to confirmation of demographic details.

The role and volume of communication theory taught was commented upon extensively by the majority of the participants. The value attributed to communication theory varied according to the participants' previous life experiences. For many of the mature students, and some of the clinical educators, much of the theory was regarded as 'common sense' or that they had well developed communication skills prior to joining the programme.

> **C4** A lot of communication theory is common sense and is acquired through life experience. (p.6)

> **L61** Communication sessions did not improve my communication skills but they did raise my awareness of different communication strategies - my previous work history meant that I was happy dealing with different types of people...I can't remember a time when I thought that I can use theory 'X' ...I always relied on my previous experience. (p.7)

Nevertheless, for some younger students communication theory was regarded as particularly useful.

> **L63** At the time I thought that the communication sessions were stupid and boring but on reflection I found them to be

> very useful...they are particularly useful for younger students with limited life experience. (p.7)

However, there were a few notable exceptions. One mature student (**L65**) found that the communication modules helped them to deal better with unfamiliar situations and scenarios.

Several participants commented that communication skills also extended to communicating with other health care workers. The participants stated that an initial barrier to interprofessional communication was discipline specific and NHS vocabulary. This vocabulary was described as jargonistic and unfamiliar.

> **L62** A big part of learning how to communicate with other health care workers is learning and understanding the NHS vocabulary and the terms used by different disciplines. (p.5)

The model currently used for teaching communication theory and skills was criticised by the majority of participants. It was variously labelled as 'inauthentic' and lacking a 'real life' context. Further, some students encountered difficulties in transfering skills taught in the classroom to clinical practice.

> **U1** Communication is covered too much in the theoretical sense ...the way it is taught does not engage the students it's out of context and to some degree is inauthentic. (p.8)

> **L61** No amount of theory taught in a classroom can be a substitute for real life experience. (p.4)

Many participants felt that in the university setting communication skills focused on dealing with the 'standard' patient which did not necessarily exist in clinical practice.

> **L65** Communication skills are taught for dealing with the standard patient ..but real patients are rarely like this, they have unique and often complex communication needs (p.4)

Various solutions were proposed to improve the way in which communication skills were taught. The participants opined that communication skills should be taught and reflected upon in the clinical practice setting. It was suggested by one university educator (**U1**) that such reflections could be recorded in context by including them in the student's clinical portfolio which is currently used to capture clinical experience. In the classroom setting it was suggested that real life vignettes taken from practice could be used in combination with reflection. One univesity lecturer (**U5**) suggested that communication skills could be improved by Peer Assisted Learning. The students could share their experiences both positive and negative.

> **C2** Reflection on communication skills in clinical would be useful ...the clinical educator should facilitate this. (p.5)

> **L62** Communication skills are best learned in the clinical environment but will only be improved by reflecting on patient/colleague interactions. (p.4)

Participants cited two main challenges to students learning and developing their communication skills in the clinical practice setting. Firstly, clinical educators do not currently teach or comment on the students' communication skills. Secondly, poor communication practice has been observed by all of the participants in the clinical setting.

> **C2** Sadly, poor communication skills are observed in clinical practice often by radiographers who are generally very poor role models. (p.6)

Critical discussion

Communication skills are viewed as a fundamental element of practice from both the practitioner and the patient's perspective (Kidd, Bond and Bell; 2011; Doyle and

Stanton, 2002). Effective communication is a central tenet of various government policy drivers and is cited by all three of the external bodies which guide the radiography curriculum as an essential skill required of a competent radiography practitioner (CoR, 2007; HCPC, 2009; Department of Health, Great Britain, 1997, 2008, 2010). Further, Snaith (2007) has suggested that sound communication skills are a prerequisite to attaining Advanced Practitioner status. Accordingly, effective communication should be a key objective for a radiography curriculum to achieve. However, it remains a neglected area of research within the context of radiography education and practice in the UK (Booth and Manning, 2006).

Intrinsic to the skill of effective communication in our multicultural society is 'cultural competence' a construct which includes cultural knowledge, cultural sensitivity and cultural awareness (O'Hagan, 2001, Murphy, 2011). If radiographers are to meet the needs of the diverse populations that they serve; cultural competence and its constituent elements must form an integral part of the curriculum (Papadopoulos, Tilki and Shelley, 2004).

The findings of this study would suggest that there are two main challenges to teaching effective communication skills to radiography students: a mode of teaching which facilitates the transfer of communication skills from the classroom to practice and appropriate supervision by radiography practitioners. In order for the students to appreciate the vocational relevance of communication theory there must be a clear application to practice. In particular, the theory should help the student to deal with particular patient communication issues e.g. patients from different cultural backgrounds or patients with some form of incapacity, skills that are not necessarily

acquired through life experience. In the view of the study's participants, the teaching and learning model currently used does not achieve this objective. Heaven, Clegg and Maguire's (2006, p.313) study concluded that without intervention, classroom teaching of communication skills may have little impact on clinical practice. The most effective intervention was found to be supportive clinical supervision (*ibid*). However, the students reported a lack of comment on their communication skills and observed poor communication by the clinical educators. In spite of policy and PSRB drives for patient centred care, the radiography literature would suggest that this is a consequence of heavy work loads which limit the time available to communicate with the patient and to pass comment on a radiography student's interaction with a patient (Booth, 2007). Another reason could be the fact that radiography educators had limited training in communication skills themselves. In a study which evaluated post graduate communicaton skills of general practitioners Kramer *et al.*, (2004) concluded that the educators' communication skills were comparable to those of the trainees and as such did not have the experience necessary to improve the skills of their trainees. Regardless of the reasons behind clinical educators not supporting students to develop their communication skills, this represents a clear area for improvement. As Baird (2008) suggests, communication along with other clinical skills may only be developed by the radiography student through systematic reflection on both patient and practitioner interactions.

In summary, there is a clear rationale for radiography students and radiography educators to develop effective and culturally competent communication skills. This is more likely to be achieved by consistent support from clinical educators in the

practice setting and by students engaging in reflection following episodes of communication with patients and practitioners (Heaven, Clegg and Maguire, 2006, p.313). There should also be further consideration given to who teaches communication at the university and practice placement settings and who teaches the teachers if the profession is to maintain and further develop its communication skills. In addition a point that will be more fully explored later in this chapter is the notion of the 'standard patient' in teaching communication and other radiography skills.

The participants' comments on observed poor communication practices and the lack of student feedback by the clinical educators could be evidence of a community of practice which is not sharing and developing knowledge (Lave and Wenger, 1991).

2.2 Professionalism

The participants' comments on the complex notion of professionalism was fragmented and varied. Level 5 students regarded the notion of professionalism as a 'big part' of being a radiography practitioner. Professionalism as discussed in the university setting was regarded as 'best practice' and sometimes this was thought to be reinforced in the clinical setting. They saw professional behaviour as a key element of professionalism, one which was intrinsically linked to their own sense of professional identity. Professionalism was said to be developed by observing and mimicking those whom the students regarded as good 'role models' and disregarding behaviours of poor role models.

> **L53** Being professional is a big part of being a radiographer...it's what gives you a sense of professional identity...I think that we get taught how to be professional at uni but that's really the gold standard...I mean you don't always see professional behaviour in clinical ...I try to

> ignore poor role models and concentrate on those radiographers who act in a way that I regard as professional. (p.7)

Interestingly only one Level 6 student commented on professionalism, describing a wider understanding of this abstract notion. They saw a clear connection between professionalism and a framework for career progression and the professional standing of radiographers. A comparison was made with what they regarded as a well-established career framework for the medical profession.

> **L63** For me professionalism is about the knowledge we have as radiographers...beyond undergraduate there should be a clear framework for career progression like the medics have...this would really help with the professional standing of radiographers ...I think that most radiographers do not pursue post graduate study as much as they should because they have a poor perception of the profession and themselves. (pp.6-7)

The clinical educators also seemed to indicate that developing the knowledge base of radiography was an essential element of being a professional radiographer. In particular it was felt that the university educators could do more in the way of preparing students for role development and career progression by raising their awareness of Advanced Practitioner roles, for example. It was suggested that role development should be high on the agenda if radiography was to remain aligned with the professional standing of other health care groups such as physiotherapy. However, one clinical educator (**C3**) opined that an over emphasis on the professional standing of radiography had created practitioners who were reluctant to engage in certain aspects of patient care – using the metaphor 'too posh to wash'. This was said to have had a detrimental impact on the quality of basic patient care.

> **C5** Part of professionalism is a commitment to develop the knowledge base of the profession...it's in our code of practice...I think that the university could do more to prepare the students for role development and career progression such as raising the awareness of the roles that an Advanced Practitioner might fulfil. We need to commit to role development if we as a profession are to keep up with our physio colleagues... (p.2)

> **C3** Professionalism to me is all about the way you conduct yourself and the way you interact with patients and colleagues - as a profession we spend far too much time obsessing over our professional status in comparison to others – this has resulted in radiographers who have a 'too posh to wash' attitude which is not good for the patients -by that I am talking about basic patient care. (p.11)

Three university educators (**U2, U3 and U6**) alluded to professionalism but only one made a direct comment. In their view the clinical educators' understanding of professionalism was rather limited, focusing for example on a student's punctuality. They added that students often witnessed poor examples of professionalism in the clinical setting.

> **U3** We need to focus on professionalism more ....something that goes beyond the students being engaged or simply turning up on time...It doesn't help when the students observe poor levels of professionalism in the clinical departments. (p.3)

Critical discussion

Conceptualising the term 'professionalism' is far from easy, in part because of the sheer volume of literature on the subject, but also because the literature is fragmented and often interwoven with differing definitions, usage and contexts. (Marks-Maran and Rose, 1997; Morell, 2007). Further, the core attributes of professionalism vary according to the philosophical perspective taken (Swick, 2000). Consequently, there

is no universally agreed definition (Hafferty, 2006b). Whiting's exploration of professionalism in radiography cites thirteen purported characteristics typical of a 'profession' (Whiting, 2009). It is therefore unsurprising that the participants' comments in this study reflected the pluralism of this long debated notion. A similar conclusion is described in a HCPC report (2011) on the conceptualisation of professionalism from the perspective of the different health care professions they regulate. Nonetheless, the findings did reveal some interesting insights into the differing views held by the participants of this study.

The university educators' lack of comment on the notion of professionalism could imply that they regarded it as a central tenet that is self-evident in all aspects of the curriculum. As such there is an implicit assumption that professionalism is developed intuitively by the students during their programme of study (Whiting, 2010). On the basis of the curriculum documentation this would be a reasonable assumption as the overarching curriculum is mapped against the professional and statutory body codes of conduct and performance (HCPC, 2009; CoR, 2007). However, as discussed earlier, professionalism is ill defined and pluralistic in nature. Whiting (2010) suggests that both the quality of the educational experience and the prominence given to the notion of professionalism will strongly influence a student's professional development. Accordingly, students are likely to benefit from support and guidance in helping them to understand its multifarious elements within the context of radiography practice (Ewens, 2003). Although this discourse is based on a speculative interpretation of the university educators' lack of comment, a

recommendation of this study will be to raise the prominence of professionalism within the university setting.

The university educators' only direct comment on the notion of professionalism was a criticism of what they saw as its narrow interpretation by the clinical educators. Specifically, a student's demonstration of professional behaviour was measured by their level of engagement and their punctuality. This focus on only two behavioural elements of professionalism is what Morell (2007, p.9) implies with his notion of *naïve functionality*, that is, an over simplistic criterion referenced characterisation of what constitutes professional behaviour. If a radiography student's understanding of professionalism is based on this limited view they may only develop 'surface professionalism' (Hafferty, 2006a).

There was a mismatch between the university educators' view and what the clinical educators themselves had to say about professionalism. The clinical educators' comments would suggest that they regarded the development of a discipline specific knowledge base as a clear indicator of professionalism in radiography and a precursor to role development, a view supported by Nixon (2001). This mismatch would advocate the need for the radiography educators to create a space for mutual engagement in order to develop a shared understanding of what professionalism means, given that they are responsible to a large extent for shaping the radiography students' understanding of professionalism within the context of radiography practice.

A noteworthy finding was the unexpected wider view of professionalism that was adopted by the student participants. Their view captured attributes of professionalism

such as identity formation developed by modelling the behaviour of experienced practitioners and the call for a more systematic framework to help career progression. The acknowledgement of the importance of role modelling would suggest that from the students' perspective professionalism is developed in the social spaces of practice, a belief which is supported in the radiography literature (Whiting, 2009). However, this point of view assumes that role models observed will be positive in the sense that they exhibit excellent standards of performance and behaviour. Several comments from the participants would suggest that this is not necessarily true. Lewis and Robinson's (2003) Australian study which examined role modelling in diagnostic radiography concluded that there was a disparity between ideal characteristics and self-perceptions of radiographers as role models. Accordingly, as implied earlier, it could be the case that the clinical educators do not fully appreciate some of the purported attributes of professionalism. Writing about the process of professionalisation in the Australian context of radiography practice, Sim and Radloff's study (2008) concluded that low professional self-esteem and apathy were barriers to professional development. This could also be the case in the UK (Yielder and Davis, 2009) and as such may be another reason why not all clinical educators exhibit 'ideal' role model behaviours.

What seems to be missing from all the participants' discourse on professionalism is patient care. The notable exception was one clinical educator who commented that the over emphasis on certain purported attributes of professionalism had resulted in practitioners who had lost sight of why professionalism is fundamental to practice, that is, its function in providing the best patient care. The same clinical educator also

highlighted what they perceived as a culture of competition rather than collaboration with other professional groups in the pursuit of professional recognition. Both of the points made seem at odds with contemporary health care policy and the philosophies exhorted by the PSRB which actively promote patient centred care and interprofessional collaboration. (HCPC, 2009; CoR, 2000; Great Britain. Department of Health, 2008, 2010). These points also bring to the fore the reasons behind the quest for professional status. There is a body of sociological literature which maintains that professional status is ultimately in pursuit of power and is driven by self-interest (Hilton and Southgate, 2007; Kermode, 1993). However, critical enquiry into monopolistic professions, such as medicine for example, can also result in improved service delivery (Yielder and Davis, 2009).

In summary, the findings indicate a pluralistic view of professionalism in radiography practice (Schön, 1991). The most influential factor which facilitates the transition from 'lay person' to professional practitioner would appear to be observation of behaviours which occur within the social spaces of practice. There is a sense that this transition is a result of an iterative negotiation within a community of radiography practice. This negotiation can also be seen to impact on the development of the radiography students' professional identity. The long debated notion of what professionalism means in radiography and how it is attained and measured will, it seems, continue.

2.3 Critical Thinking

None of the student participants commented on critical thinking directly. However, there was a degree of conjecture from the students that clinical educators did not engage in critical thinking in their daily practice themselves.

For example:

> **(L55)** Radiographers seem to follow protocols blindly without questioning the rationale or appropriateness of what they are doing. (p.3)

This view was supported by the one clinical educator **(C1)** who did comment on critical thinking skills. From this participant's perspective it was the responsibility of the university educator to raise awareness of critical thinking amongst students. Interestingly, no connection was made between critical thinking and their own daily practice.

All of the university educators commented on critical thinking skills either directly or indirectly. Collectively they regarded critical thinking as a fundamental element of a student's learning and knowledge development.

> **U5** My role as an educator is to provide the student with the basic knowledge...they need to supplement this with their own research....I don't think that we should spoon feed our students (p.4)

The university educators stated that their rationale for both raising awareness and developing a student's ability to think critically was grounded in the quest to connect theory and practice. It was acknowledged by the university educators that clinical practice is complex and fluid in nature. The implication here was that theoretical concepts taught at the university can be differently applied in practice and yet still result in the same outcome.

Specifically, they opined that radiographic technique skills taught at the university might not always exactly match those observed by the student in clinical practice. In order to reconcile this and obviate any needless confusion, the student must apply their critical thinking skills when an unfamiliar radiographic technique is observed in a clinical practice scenario.

> **U3** Clinical is a very fluid environment, one thing might be necessary in one department but not in another...the students have to somehow make sense of that...the technique that's taught at the university is not necessarily what happens in practice...it's a common theme and it really confuses students...they tend to assume that what they have been taught is incorrect rather than going back to first principles and saying that's not how I was taught but I can see how it works. (pp.9-10).

Clear links were also made by the university educators with the notion of critical thinking and, research skills, independent learning and evidence based practice.

> **U4** Without research skills the student will not be able to find out what they don't know...without critical thinking skills the student might not be able to identify what they don't know ...and even if they find the information they will not be able to assess the quality and validity of that knowledge, critical thinking underpins EBP[8](p.6)

The university educators identified two potential barriers which prevented the students from actively engaging with critical thinking. The first challenge was the view that students now seem to have an over reliance on the *World Wide Web* when seeking or clarifying knowledge. Associated with this was the notion that students appear to collect information in *sound bites* and become impatient if information is not found quickly. The second challenge was identified as the perceived lack of

[8] EBP – Evidence based practice

encouragement by clinical educators for students to engage with critical thinking in the practice setting.

> **U4** Students seem to want instant gratification when they are searching for information...if it's not readily available or free or if the web site takes too long to load they switch off...if we delivered information using their preferred sound bite model they would not develop their critical research skills or think critically about anything. (p.11)

> **U2** The university educator helps the student acquire the skills to critique and problem solve...this can sometimes be impeded by the clinical educator, some are very didactic in their method of teaching...it's the luck of the draw as to whether the student will end up being supervised by a clinical educator who has a wider educational view or someone who is highly parochial and set in their ways, not ideal at all. (p.8)

Critical discussion

Castle's (2006) study which examined the critical thinking skills of student radiographers defined critical thinking in the context of radiography education and practice as the ability to "interpret, analyse, evaluate, explain and infer concepts and ideas"(*ibid.*, p.70). However, he suggested that whilst both students and radiography practitioners are expected according to the SCoR, HCPC and QAA curriculum and practice guidance to apply critical thinking skills, these are often inadequately taught and assessed in undergraduate radiography programmes. The lack of comment on this skill by both students and clinical educators is supportive of this view. Alternatively, the students' observation that clinical educators do not engage with critical thinking whilst practising could be another example of 'pragmatic (tacit) knowledge'. The clinical educators may be problem solving but not necessarily articulating the process nor the outcome.

Whilst the university educators clearly articulated the rationale for radiography students developing critical thinking skills, there was little comment on how this might be achieved other than citing the perceived barriers and challenging clinical educators to encourage students more.

This has implications for the radiography curriculum. Firstly, there is a clear rationale for re-evaluating how critical thinking skills are introduced and developed with students in the university setting. Secondly, the apparent lack of engagement by both the students and the clinical educators in the practice setting needs to be addressed if clear connections are to be made with theoretical concepts and their application. Moreover, this has wider implications in terms of student ability to engage with *lifelong learning* and also for the profession of radiography which purports to deliver practice which is evidenced based.

In terms of situating these findings within the study's theoretical framework, this apparent lack of dialectical exchange about practice between students and clinical educators challenges the supposed iterative negotiations of meaning during a radiography student's trajectory form peripheral to full participation (Marshall and Rollinson, 2004; Lave and Wenger, 1991).

2.4 Self Directed Learning

Nineteen of the 22 participants discussed the notion of self-directed learning (SDL) as a concept in its own right and also when discussing discipline specific knowledge and skills.

Engagement with SDL amongst the students seemed to develop more as they moved from Level 5 to Level 6, with the notable exception of one mature student (**L55**) who

expressed SDL as a form of self-discipline or self-management which they had developed through previous work and life experience. This participant saw a direct connection between their degree of engagement with SDL and their previous experiences. Level 5 students appeared to be more reliant upon the university educators to establish their learning needs and to set appropriate learning objectives for them to achieve.

> **L51** I'm too lazy to think about my own learning needs....I don't need to really because the lecturer will tell me all I need to know anyway. (p.8)

A potential solution proffered by a Level 5 student (**L54**) to the lack of engagement with SDL was to make SDL compulsory by, for example, making more use of Problem Based Learning (PBL). Making SDL compulsory would in itself be a contradiction in terms, but using a framework such as PBL might help to develop the student's ability to establish and ultimately achieve their own learning objectives. A caveat here would be that the radiography educators are able to facilitate PBL sessions.

One Level 6 student (**L62**) commented on the challenges of engaging with SDL, citing a 'lack of time' as the greatest barrier, signaling a tension between a content driven curriculum and one which allows space for exploration and discovery. However, there was a general consensus amongst all participants that it was the student's responsibility to continually review their own learning and establish personal learning objectives.

> **L63** We do need to be self-directed in our learning and this cannot always be done by the lecturer....we are best placed to create our own learning objectives. (p.7)

The university educators described SDL as a fundamental skill with which all students and practitioners should engage. With regard to the future of radiography practice they considered SDL as a vehicle for students remaining up to date, aligning this with the notion of *lifelong learning*. Connections were also made with SDL, reflection and critical thinking, collectively suggesting a trajectory towards the notion of a practitioner researcher.

> **U4** The knowledge required of the radiographer will not remain static as their role evolves ...therefore they need the skills and insight to realise what they don't know and how to find things out. (p.2)

> **U1** Students should be encouraged to find out more for themselves – they should be encouraged to develop their critical research skills ...they should be critiquing more papers and practice for example. (p.5)

A general consensus amongst all university educators was that students should not be totally reliant on lectures and other face-to-face teaching sessions for all of their learning needs.

> **U7** There is still far too much emphasis on direct teaching hours, by that I mean lecturing. There is not enough time spent getting the student to work independently with guidance. (p.2)

Previous educational experience and a lack of time were two potential barriers preventing the students from engaging in SDL identified by the university educators. It was claimed that students expected to be told what they needed to know and were not used to defining their own learning needs.

> **U2** A potential barrier to SDL is the previous educational experience of the students, basically they want spoon feeding and the level of spoon feeding required is directly proportional to their past educational experience (p.6)

Whilst the university educators are clear about the ideological purpose and purported benefits of SDL, they offered no indication of how they would support students in developing the skill of identifying their own learning needs. In particular there was no comment on the pedagogical approaches used in face-to-face teaching which might encourage SDL.

Only two of five clinical educators commented on SDL. Clinical educator **C1** saw a direct connection with a student's agency to learn and engagement with SDL; whilst clinical educator **C4** felt that the demanding nature of the radiography programme could be a reason why students did not always self-direct their own learning – a view supported by a Level 6 student **(L62)**.

Critical discussion

SDL is a pedagogical term that has been widely reported in the literature on teaching and learning in higher education recently although it is not a new concept (Candy, 1991; Knowles, 1975). The renewed interest in this concept can perhaps be related to recent educational policy imperatives in health care education. Examples of this include *Continual Professional Development* (CPD) and *lifelong learning.*

CPD became a mandatory requirement for state registration by the Health and Care Professions Council on July 1st 2006. (HCPC, 2012b). The White Paper *'Working Together, Learning Together'* (2001) sets out a vision of lifelong learning in the NHS. The framework is aimed at education providers and NHS employers, and addresses the health professionals' learning from pre-registration education to maintaining professional competence after registration. (Great Britain. Department of Health, 2000).

Souto and Turner (2000) argue that CPD, lifelong learning, autonomous learning, self-managed learning and independent learning are all encompassed by the overarching descriptor of SDL. Further, they consider that these terms are interrelated and represent the development of more independent modes of teaching and learning (ibid).

Student engagement with SDL, as the data suggests, would appear to increase with the transition from Level 5 to Level 6 on the programme. Although all students considered SDL to be an important part of their learning, few stated that they actively engaged with it on a regular basis. Reasons cited for this lack of engagement were a lack of time, an over reliance on the university educators outlining learning objectives and the challenge of working in the clinical setting and studying at the same time.

The clinical educators made limited reference to SDL, CPD or the notion of lifelong learning in spite of CPD being a mandatory requirement of continued state registration (HCPC, 2012b).

Castle *et al.*, (1997) identified three major issues that impacted on a radiographer's engagement with CPD /SDL: the availability of funding / resources, curriculum coherence and its relationship to practice. Henwood and Taket (2008) suggested that radiographers were generally unaware of the holistic concept of CPD / SDL together with a limited expectation that their learning would impact on their practice. This has implications for both the advancement of radiography practice and the development of a culture which encourages and motivates radiography students to identify and act

upon their own learning needs and to contribute to the generation of practice knowledge.

The university educators commented extensively on the importance of engaging with SDL. They saw SDL as a means of attaining deeper learning for the present and as an instrument for maintaining currency of practice regardless of technological change. Direct connections were also made between SDL and the skills of critical thinking and reflection. Potential barriers to students engaging with SDL were thought to be directly related to their previous learning experiences. Specifically, it was assumed that many of the students had been used to a model of learning and teaching that clearly outlined the student's learning objectives and provided all of the resources to meet those objectives; that is, the student becomes the passive recipient of knowledge. Carnell and Lodge (2002), amongst others, describe such a model as a reception model. Friere (1990, p.54) from a critical pedagogy perspective described the relationship between the teacher and student in this model as the banking concept of education. Here the students are containers or receptacles to be filled with no regard for personal or critical thought. Nonetheless, it was a Level 5 student and not the university educators who proposed that greater use of Problem Based Learning (a co-constructivist learning and teaching model) might be a way of encouraging students to take greater ownership of their own learning (Carnell and Lodge, 2002).

In summary, there are clear drivers for radiography students to develop a high degree of ownership in identifying their own learning needs. This endeavour needs to be supported and encouraged in the university setting and in clinical practice. A consequence of non-engagement with self-direction in learning both as a student and

as a qualified practitioner has negative implications for role development and evidence based practice (Hafslund *et al.*, 2008).

Theme Two Summary

It seems artificial to begin the summary of this theme by reference to what has not been said by the participants, but omissions can be sometimes be more enlightening than the views which were expressed by the participants (Poland and Penderson, 1998; Wengraf, 2001).

From the perspective of the PSRB and health care policy, three domains of knowledge and skill were either not described at all or only in a limited way. Firstly, reflection was briefly discussed by only two university educators. The comments made related to the fundamental importance of reflection in connecting theory and practice across all domains of radiography knowledge and the students lack of understanding of its application. The skill and application of reflection is regarded as an essential component of a radiography curriculum and as a means of developing radiography practice (Hamilton and Druver, 2010). It is highly valued because it is regarded as a vehicle for reconciling theory and clinical practice (Baird, 2008). On a personal level reflection is also an effective method of self-development (Moon, 2000). However, several studies in the radiography literature have concluded that it is neither widely understood nor frequently applied by students and radiography practitioners (Hall and Davies, 1999; Chapman, Dempsey and Warren-Forward, 2008). The lack of comment could indicate a degree of alignment with the findings of these studies. As alluded to when discussing professionalism there may be an implicit assumption on the part of the radiography educators that reflective practice is

'somehow' developed by the students during their programme of study. Baird (2008) strongly advocates that the development and continuous enhancement of reflective practice cannot be left to chance but must be encouraged by an enabling and structured framework. Such a framework clearly needs to be supported and understood by both radiography students and radiography educators.

The second domain of knowledge and skill which appeared to be given cursory consideration by the participants was patient care. The notion of patient care is multifaceted within the context of medical imaging as the following College of Radiographers definition illustrates: 'patient care encompasses pre and post medical imaging care, due consideration of equality and diversity [e.g. culture, gender and beliefs], patient confidentiality, consent, dignity and respect, together with adherence to legal, moral and ethical frameworks' (CoR, 2007, p.22). Accordingly, it would be reasonable to assume that evidence of its consideration could have been found across many of the domains of radiography knowledge described by the participants. This was not the case. One student participant did indirectly discuss patient care when commenting on clinical governance and quality frameworks alongside professional and statutory body codes of behaviour and conduct. This possibly indicated an over reliance on prescribed patient care rather than their own sense of agency toward patient care. The only other comment was from a university educator who said that students tend to focus on the 'technical side' of radiography. Literature from other health care disciplines and more recently from radiography would indicate that it is not only students who focus on the task of acquiring a medical image; it would seem

that qualified practitioners have adopted a similar modus operandi (Reeves and Decker, 2012).

Nursing colleagues have suggested that medical imaging technology and the radiography practitioners who use it can be overly mechanistic in their delivery of patient care. This has resulted in the "dehumanisation, depersonalisation and objectification of patients [....] depriving patients of their individuality, subjectivity and dignity as human beings "(Barnard and Sandelowski, 2000, p367). A reason for this potential detachment is that radiographers could have been observed to treat patients as extensions of their medical imaging equipment (Calne, 1994; Reeves and Decker, 2012). This is not entirely surprising given that knowledge of technology and its applications could be argued to be a large element of a radiographer's professional identity (Murphy, 2006). Strudwick's (Strudwick, Mackay and Hicks, 2011) dissemination of the findings of her doctorate which explored whether diagnostic radiography is a caring profession has provided more insight into this phenomenon. The findings of this ethnographic study suggested three factors which impact on the level of patient care: the task focused nature of acquiring a medical image, time pressures and the need for efficiency. The latter factors could be attributed to government targets (Barlow, 2010). Strudwick, Mackay and Hicks (2011) conclude that the relationship between a diagnostic radiographer and their patient is not a caring relationship but a relationship based on a task that needs to be completed. Whiting's (2009) study would support this view in suggesting that technical capabilities take precedence over patient care during the socialisation of radiography students. This finding of a false polarisation of technical skills and

patient care evokes ethical concerns and clearly identifies a key area for curriculum development.

The final knowledge domain which has been omitted is bioethical knowledge. The lack of understanding of bioethical knowledge by radiographers has been commented on extensively by Pettigrew (2000). She suggests that this is a knowledge domain which should form an integral part of the radiography curriculum. There could well be a connection between the task focused nature of radiography practice and a lack of consideration of the moral imperatives of practice. This does present a challenge if radiography students are to develop a sound knowledge of bioethics and to make judicious ethical decisions in practice (MacIntyre, 1981; Lewis and Robinson, 2000)

The knowledge and skill of communication requires more intervention, in particular from the clinical educators if theoretical skills are to be successfully transferred from classroom to practice. Reflection on patient and practitioner interactions would appear to be the most effective means of achieving this objective. There also needs to be some consideration given to who might be the most appropriate teacher(s) of communication and who should teach the teachers.

The participants' understanding of the notion of professionalism was varied. There appeared to be an implicit assumption on the part of the radiography educators that the students would undergo a process of professionalisation in clinical practice but the precise way in which this occurred was not identified. However, the radiography students were clear that this was a result of imitating role models observed in practice. These findings present three main challenges for the radiography educators

which may be addressed by more effective collaboration between university and clinical practice. Firstly, we would need to agree a common understanding of the meaning of professionalism and how it might be exemplified by engaging in a mutual dialogue. Secondly, the university educators need to continually raise the students' awareness of professionalism in the university setting. Finally, consideration should be given to the means of attaining a culture of positive role modelling in practice.

Whilst there is a clear mandate from the PRSB and government policy for the need for radiography students and practitioners to engage in critical thinking, the findings of this study would suggest that is not adequately taught, supported or assessed. Accordingly, there is a need to review the manner in which critical thinking skills are introduced and developed in both the university and clinical settings. Failure to address this situation will impact on the ability of the students to engage in lifelong learning and evidence based practice. Further, there is an intrinsic link between critical thinking and the ability of radiography students to identify and address their own unique learning needs. In order to achieve this there must be support and encouragement from the radiography educators as well as a high degree of human agency within the student body. This may be achieved by a collaborative review of the models of learning and teaching currently used in the university and practice settings and as part of a radiography student's personal development planning (Gqweta, 2012).

In conclusion, the findings from Theme Two indicate a degree of alignment with the theoretical framework of this study but also evidence of a community of practice which does not always work coherently or synergistically.

There is evidence to suggest that the clinical setting facilitates the professionalisation of radiography students and that this transition is a result of observing the behaviours of the clinical educators. Although implicit, there is also the sense that this impacts on a student's professional identity as being mutually defined by the actors within clinical practice. Collectively, this indicates an evolving community of practice and evidence of a student's trajectory from peripheral to full participation within that community. However, there is also evidence to suggest access to authentic learning spaces is sometimes denied because of 'time pressures' and the need for 'efficiency' – both of which may be a product of government targets. The need to complete imaging examinations in a timely manner may also explain why the participants do not describe a dialectic exchange about practice which would result in the students developing a deeper understanding of their practice. This is evidenced by the apparent lack of support in developing the students' communication, critical thinking and self-directed learning skills by clinical education.

Section Two – The percieved role of the radiography educators

This section describes the participants' response to the question "what role do you think is played by university based and clinically based radiography educators, in helping the student radiographer acquire 'radiography knowledge'? One main theme emerged from the data in response to this question.

Theme Three – Convergent and divergent perceptions of the roles within a community of radiography education

This theme emerged from the participants' divergent and at times contradictory descriptions of the student, university educator and clinical educator roles in helping the student to better understand radiography knowledge and subsequently apply this knowledge in clinical practice. This theme was developed by condensing four categories: the source and validity of radiography knowledge, familiarity and understanding of the curriculum, models of teaching and learning and clinical education.

3.1 The source and validity of radiography knowledge

The students regarded the university educator as their main provider and at times their only source of radiography knowledge, with comments such as:

> **L62** Uni eds provide the core knowledge ...they provide the information you need to do radiography and to pass your assignments and exams. (p.7)

The students' dependence on the university educator as their only source of knowledge did appeared to change with academic progression from Level 5 to Level 6. Level 6 students described a willingness to take more responsibility for their own learning needs.

> **L63** A lecture is only a small part of the learning process ...it's what happens after the lecture that is important ...although I do expect guidance on what to learn and support in helping me learn, I also realise that I need to take responsibility for my own learning. (p.8)

The knowledge that the university educators delivered was variously described as 'gold standard' (**L63**) and 'best practice' (**L54**) by the students. However, this

knowledge did not always match what the students observed in clinical practice. This sometimes resulted in the students questioning the currency of the university educators' knowledge.

> **L62** What's taught at university does not always reflect what happens in practice..things like technique and manual handling ..another area that tends to be different is the use of centering points ...in clinical they tend to say centre to the cassette ...but we do need to learn them to pass OSCE's. (p.7)

The clinical educators supported the students' view that some radiography knowledge taught at the university did not always match what was observed in clinical practice. Three clinical educators' (**C2, C4, C5**) thought that the university educators could be more up-to-date with contemporary radiographic practice, in particular radiographic technique.

The university educators were said to teach radiographic technique and patient care for the 'standard' patient and that this was built upon in clinical placements (**C2, C4, C5**). However, there was a call from the clinical educators for more modified radiographic technique to be taught at the university. This, they suggested would help to build confidence in the students' own ability and willingness to attempt non-standard radiographic examinations.

> **C4** Students' confidence does vary but I think they are particularly reluctant to try non-standard examinations because they haven't been taught enough modified technique..but I suppose you could never teach everything that you might encounter in clinical. (p.6)

However, there was a division amongst the university educators about the necessity of spending time in clinical practice to observe contemporary radiography practice. Three university educators (**U2, U7 & U5**) were of the opinion that it was essential

to spend time in the clinical setting for two reasons. Firstly, to ensure currency of clinical practice and also to be seen as having clinical credibility amongst the students.

Conversely two university educators (**U4 & U6**) had the view that the currency of clinical knowledge could be maintained in ways other than spending time in clinical practice, e.g. attending conferences and reading peer reviewed journal articles.

> **U2** University educators should spend some time in the clinical department....they should be better aquainted not just with contemporary practices but also the reality of practice in an age of targets and rationed resources....keeping up to date with the literature is only part of the picture (p.11)

> **U4** I don't think it is crucial for university educators to practice clinically ...you do however, need to know what current practice is and teach that but you can maintain currency in other ways...we keep abreast of practice developments by reading, attending lectures and conferences (p.10)

Aligning with the students' view, there was a general concensus amongst the clinical educators that the responsibility for teaching the theoretical elements of radiography curriculum rested with the university educators. Moreover, the clinical educators suggested that this theoretical knowledge is subsequently filtered through them to become practical knowledge (**C1-C5**). However, when talking about their own role, the clinical educators described two main elements: the need to reinforce learning in the clinical setting and to teach the application of theory in practice (**C1, C3, C4 & C5**).

> **C1** The university educators are responsible for teaching all the theory and we turn that theory into practical knowledge by applying it in our daily work (p.7)

This would seem to contradict their view that only the university educators had the fundamental responsibility for teaching theoretical elements of the curriculum as it would be very difficult to teach the application of theoretical concepts without reference to them.

In contrast to the views of both the students and clinical educators all of the university educators **(U1-6)** gave a very clear message that one of their roles was to 'educate' rather than to teach or train and to facilitate learning and not 'spoon feed' the students. Nevertheless, the university educators failed to clarify the difference between the terms 'educate' and 'train'. There was also an indication that with their guidance they expected the students to develop into self directed learners. However, no detail was given as to how this might be achieved.

> **U5** My role is to provide the student with the basic knowledge...they need to supplement this with their own research...I don't think that we should spoon feed our students....we need to prepare the students for Higher Education....I look at the curriculum and think which elements can be self taught or self directed ...in that way the students start to take more responsibility for their own learning. (p.4-5)

The university educators described a variable level of theoretical knowledge possessed by the clinical educators and their lack of willingness to teach topic areas other than radiographic technique.

> **U3** The clinical educators do not teach theoretical knowledge in clinical practice...which is why some students have difficulty in relating theoretical models to real life practice....it's a shame because the students would better understand the theory if they were reminded of it and then experienced it in practice (p.5)

One university educator (**U5**) suggested that there should be a formalised training programme for all clinical educators which incorporated a review of the theoretical concepts of radiography practice. This, they stated, should be compulsory for all clinical educators who supervise students.

> **U5** A formalised teaching skills training for clinical educators might help the situation but the logistics of getting all of the clinical educators through a course like that would be very challenging because of work loads in the departments. (p.11)

Critical discussion

This category raises two pertinent issues: a lack of clarity about who should be the source of radiography knowledge and a mismatch between classroom teaching and the realties of practice.

The guidance in the SCoR document *The Learning and Development Framework for Clinical Imaging and Oncology* (CoR, 2007, p.16) although implicit, does indicate that radiography knowledge should be delivered by the education provider and its associated clinical partners. The HCPC *Standards of Education and Training* (HCPC, 2009) in particular pages 21, 23, 33 and 47 also indicate that both university educators and clinical educators should both have an understanding of the domains of radiography knowledge and that teaching should be a collaborative endeavour. Finally, the SCoR *Code of Conduct and Ethics* (2008, p.3) states that a radiographer has a professional obligation towards teaching and the development of competent teaching practices. In summary, the guidance from the statutory and professional bodies is clear, that both university educators and clinical educators should collectively be a source of radiography knowledge. The reasons as to why the

radiography student regards the university lecturer as their primary source of knowledge are likely to be multiple. As the findings indicate, there is an assumption by the student that the university educators have both clinical experience and higher academic qualifications. Therefore they purportedly have the expertise in discipline specific knowledge and pedagogic knowledge – a view that will be challanged later in this theme. In addition the radiography students' experience in clinical placement suggests that the clinical educators do not often engage in a dialogue about the theory which underpins practice. This signifies a disconnect within the community of practice which could be detrimental to student learning.

The message from the clinical educators is contradictory. They suggest that the university educators are a radiography student's primary source of theoretical radiography knowledge and that their role as a clinical educator is to demonstrate its practical application. However, it would be difficult to demonstrate the application of theoretical concepts without reference to such concepts. Nevertheless, this could be further evidence of the clinical educators utilising pragmatic (tacit) knowledge and not attempting to make it visible to the radiography student (Eraut, 2000).

The reported mismatch between classroom teaching and the realities of practice from both the students and clinical educators could signify a theory – practice gap or that the community of practice has little time to engage in a dialogue about radiography knowledge. As noted earlier in Theme One and again here the mismatch seems to specifically relate to radiographic technique.

The 'theory-practice gap' is a ubiquitous and perhaps overused phrase which is under researched in radiography education. Whilst a much explored notion in the nursing

literature, it remains ill defined and subject to differing and individual interpretations (Higginson, 2004). Nonetheless, there is a general agreement in the literature that the phrase relates to a distancing of theoretical knowledge from the practice dimension of nursing and equally radiography (Scherer and Scherer, 2007). If a gap does exist it is usually a result of outdated theories being taught in the classroom combined with a misunderstanding about the relationship between theory and practice (Rolfe, 2002). Much has been written about the incongruity and inconsistency which exists between what is taught about practice and what actually occurs in practice. (Roskell, Hewison and Wildman, 1998). What is important from the radiography students' perspective, who as novice practitioners tend to be governed by rules, is the anxiety that this 'theory-practice void' can create (Rolfe, 2002). Accordingly, based upon the findings of this study a potential way forward in helping to bring classroom teaching and practice together would be to ensure that the theory taught reflects contemporary practice and is seen to have vocational relevance. Both could be achieved by a continuous dialectical exchange amongst the members of a radiography education community. Such an exchange might help the radiography student to appreciate the vocational relevance of the theory with which they are asked to engage. It might also help to define which elements of theory should be taught as well as the way in which radiography educators might teach it. Although some of the university educators seem reluctant to spend time in clinical practice, from the perspective of both the radiography students and the clinical educators, time spent in clinical practice strengthens the perception that the university educator possess credible radiography knowledge (Aston *et al.*, 2000, p.184).

3.2 Familiarity and understanding of the curriculum

Three Level 5 students (**L55, L54 & L52**) and two Level 6 students (**L62 & L65**) opined that the clinical educators did not seem to be fully conversant with the radiograhy curriculum. This was variously labelled as 'frustrating' (**L55**) and 'demotivating' (**L62**).

> **L55** I don't think that the clinical educators fully understand the curriculum ...they don't seem to know what we have been taught or what we should know at the stage we are at on the course (p.9)

Three clinical educators supported this view (**C1, C2 & C3**). Clinical educator (**C1**) further commented on the importance of a better understanding of the curriculum in order to provide a high quality learning experience for the students on clinical placement.

> **C1** I would say that the majority of clinical educators do not appreciate what's taught on the course and that's a pity because we do need to because we could end up teaching things twice or worse still we could miss something out (p.10)

Three university educators (**U1,U2 & U6**) suggested that the clinical educators should learn more about the curriculum with which the students were engaged. Interestingly, two university educators (**U1 & U3**) thought that, overall, the university educators did not appreciate what was being taught in modules other than their own.

> **U2** One of the main issues here is that the clinical educators do not spend enough time teaching the students or attempting to learn more about our curriculum. (p.11)

> **U1** I don't think that the clinical educators know what is taught in the curriculum and I am sure that we don't really

> know what our colleagues are teaching on their modules other than the broadbased indicative content.(p.10)

Three university educators (**U3, U6 & U4**) thought that the clinical educators lack of understanding of the curriculum could be directly correlated with the move from hospital based to higher education based radiography education. Two of the university educators (**U3&U6**) opined that this situation might be improved by more joint appointments, that is, clinical educators who work part time in the clinical placement and part time at the univesity.

Critical discussion

The professional and statutory bodies which guide radiography education are clear that all radiography educators should be familar with the curriculum and its associated assessment strategies (HCPC, 2009; CoR, 2007). In the clinical setting this lack of familiarity was described as 'frustrating' and 'demotivating' by the radiography students. In the university setting there was a sense that the modular framework of the curriculum had also resulted in university educators not being familar with the content taught other than at an indicative level.

Recent guidance documents from the SCoR on the quality of practice placements (CoR, 2012) and on roles and responsibilities in clinical education (CoR, 2011) could indicate that the issue of clinical educators not being familiar with a student's curriculum remains a problem. The findings from this study would support this view. Given that fifty percent of the curriculum is delivered in the practice setting this is clearly a problem which requires attention.

A key advantage often stated by the proponents of a modular curriculum is the ability to assess learning and performance before moving on to another topic or a higher level investigation of the same topic (Grantcharov and Resnick, 2008). Moving from one module to the next assumes that the student has the prerequisite knowledge to engage with the content of the next module (Conford, 1997; p239). University lecturers make the assumption that the students have this prerequisite knowledge based upon the indicative content of modules preceeding their own. However, the findings of this study would indicate that this assumption may, in certain cases be erroneous – an argument that is supported by evidence in the next category of this theme.

3.3 Models of teaching and learning

The students commented extensively on the teaching and learning model used by the university educators. In their view, there seemed to be an over-reliance upon the didactic lecture which was described as 'dry and boring' **(L51)**. Their preferred teaching and learning model was described as a presentation followed by small group work or a practical demonstration.

> **L53** Having the information presented in the same way for every session does get a bit boring to be honest. What's the point of attending a lecture if all the lecturer does is read off their slides? I can do that myself at home. I like a more interactive session or small group work (p.7)

The students also commented on what they percieved as a degree of inconsistency amongst university educators in terms of style, planning and delivery of teaching sessions – a view that smooths out the often complex variables such as the context and taxonomy of learning required. Perhaps of more significance in terms of

motivating the students to learn, there was a wide variability in the way that theoretical knowledge was connected to practice.

> **L64** Lecturers do vary in their style of delivery and I think you would expect this, but they also vary in the way they link the theory to practice and that's really important because if you don't see the value in what you are learning, ..by that I mean its connection to practice, then you won't be motivated to learn it. (p.4)

The students expressed a view that they found it easier to connect theory with practice when the university educator shared their personal experience of working in the clinical setting. In doing so they gave the knowledge they were imparting some context, which resulted in the students valuing the knowledge more.

> **L52** I understand things more if the information I'm given is put into some sort of context...it's really useful when the lecturer says "let me give you an example" or I remember when I was faced with a similar situation in clinical ...that sort of thing (p.9)

The clinical educators also had ideas on helping the students connect theory and practice which aligned with the students' own views.

Two clinical educators (**C5 & C3**) suggested that the value of theoretical knowledge could be made more expilcit by the university educators by making more use of case studies taken from clinical practice.

One clinical educator (**C3**) opined that there should be more teaching by university educators in the clinical environment to help the students to connect theory and practice. However, as earlier comments suggest, some university educators are seemingly reluctant to spend time in clinical practice.

> **C5** It is difficult to see the value of the information that you are given if you can't apply it – I think it would be useful if the university could make more use of real life scenarios

> from practice and clearly state this is how this knowledge can be used. (p.9)

When asked about the pedagogic strategies or models they employed, all of the university educators described generic learning and teaching models, which were in the main based upon their own educational experiences (**U1-7**). Several university educators (**U1, U4 & U7**) acknowledged that whilst their discipline specific knowledge was evidence based this was not necessarily the case for their pedagogical approach to teaching.

> **U1** I don't vary my teaching style as much as I should do....I can be quite narrow minded...if I am honest my teaching style has been very much influenced by the way I was taught ...on the whole the type of delivery will vary with the material that's being delivered. In my defense I would say that my subject content is certainly up to date and evidence based. (pp.5-6)

Two university educators (**U4&U6**) expressed their opinion that the personal attributes of the educator are of more significance to student learning than the teaching style / model used. However, the precise nature of these personal attributes was not described nor was the term 'teaching style' further defined.

The university educators described another of their roles as 'getting students excited about radiography' (**U1**). This was thought to be achieved by the university educators sharing their clinical experiences and their own enthusiasum for the profession. This aligns with both the students' and clinical educators' view that radiography knowledge was regarded as more 'valuable' when described within the context of personal clinical experience.

> **U1** Getting the students excited about becoming a radiographer ..this philosophy should pervade everything that we do.(p.5)

> **U5** Another of my roles is to share my clinical experience and in doing so help the student to connect theory and practice. (p.5)

However, several students (**L53, L51 and L63**) commented that whilst a university educator's enthusiasm for their their subject was a great motivator to learn, it did not necessarily guarantee that the university educator is able to make it accessible or understandable (**L63**).

> **L63** A lecturer may have passion for their subject but they might not be able to transfer that knowledge or make it acessible...but being enthusiastic certainly does motive a student to learn. (p.8)

All of the university educators had completed a postgraduate teaching qualification but the percieved value of this qualification was mixed. One university educator (**U5**) commented that it had changed their view of education, whilst another university educator (**U2**) had made 'no practical use' of the course material in their own teaching.

> **U5** My opinion of the nature and scope of Higher Education changed when I completed my teaching qualification ...it impacted on the way I see my role ...it provided me with a framwork when preparing my teaching sessions like using LO's [learning outcomes] and relating the session to previous knowledge gained (p.5)

> **U2** I don't rely on any particular T&L [teaching and learning] model – I simply use one that works.....I did my teaching qualification many years after I had started teaching ...I have to say I did not find the course of any practical use...subconsciously, educational theory may impact on my teaching but my primary consideration is always what's the easiest way that this information will be absorbed by the student. (pp.10-11)

As described earlier in this chapter (Theme One), students from both Level 5 and Level 6 often felt overwhelmed by the volume of knowledge they were expected to

understand and apply in clinical practice. Accordingly, the students suggested they would like more detailed guidance from the university educators in terms of the depth and breadth of knowledge required to fulfil the learning outcomes of a particular module.

> **L53** I would have liked much more guidance from the uni eds on just what I needed to know and to what depth...take anatomy for example you could read a really basic introduction or read Gray's and get lost in the detail. (p.5)

This view was supported by one clinical educator (**C2**) who suggested that the university educators could be more directive in terms of the depth and breadth of knowledge required by the students in specific topic areas.

Critical discussion

This category revealed some enlightening views and percieved tensions around the teaching and learning models used by university educators, the difference between evidence based discipline knowledge and evidence informed pedagogic knowledge, the silence from the clinical educators on their prefered model of teaching, the gap between ideology and the practicalities of a learner centred approach and the now clearly established leitmotif of this chapter – the importance of demonstrating the vocational relevance of radiography knowledge.

Overall, the perception of the students was that the university educators used a didactic lecture model of teaching whilst their prefered model was small group work followed by a demonstration. This represents an over simplification of the complex nature of an educator's decision as to how material might be best delivered and made meaningful to the student (McMahon, 2006). In addition it stands in contradiction to

the students' perception of self-directed learning noted earlier in this chapter, given that group work usually involves a high degree of self direction (Burdett, 2003). Nonetheless, this finding does provide evidence which should be taken into account in future curriculum design, in particular because radiography practice involves team work (Probst and Griffiths, 2009, p.154).

The reasons for a university educator adopting a particular method of teaching may be examined from various perspectives. Brookfield (1995), like many other commentors, suggests that the most influential factor is the way in which the teachers themselves were taught. This was confirmed by a direct quote from a university educator (**U1**, p.177). However, in the context of this study, this generalised view fails to acknowledge the transition from clinican (clinical educator) to lecturer (university educator). This transition can present many challenges despite induction programmes and, following the Dearing report (1997), the completion of a formal qualification in learning and teaching (NCIHE[9], 1997; Sim and Radloff, 2003; McArthur-Rouse, 2008). One of the major challenges proposed by Barlow and Antonio (2007) is the tacit nature of practice in higher education, which they suggest is a neglected area of support during a period of transition. All of the university educators in this study had completed a post graduate qualification in learning and teaching. The findings indicate that the value attributed to this qualification was mixed. The participant who commented that the qualification had changed the way that they approached teaching was the newest recruit to the teaching team. Those university educators who stated that they had made little use of the qualification

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other than to plan teaching sessions, could possibly have gained a better tacit understanding of teaching from their relationships in the community of practice within the university setting (Wenger, 1998). Parallels may be drawn here with the process of explicit procedural knowledge becoming tacit over time observed in the clinical setting.

There also may have been a perception on the part of the university educators that they had developed their teaching skills in their clinical roles before moving into higher education – a view supported by Boyd *et al., 's* (2009, p.42) study. What is clearly evident from the findings is that whilst the university educators regarded discipline specific knowledge as important and deserving of their time, pedagogic knowledge and practice did not seem to have a similar imperative. Almost three decades ago Lee Schulman (1985, cited in Segall, 2004) was critical of teacher education when he suggested that either content or pedagogy were regarded as important but never both collectively. It was Schulman who first introduced the now common notion of pedagogical content knowledge (PCK) which he described as the blending of content and pedagogy resulting in the most effectual use of metaphors, illustrations, and explanations to confer meaning of content knowledge in an accesible way to students (Schulman, 1986, Glatthorn, 1990). In teacher education, understanding the interrelationship between content knowledge and pedagogy has been extensively explored (Segall, 2004). However, it remains an under researched area in radiography education. The student participants' comments in this study would suggest that this needs to be addressed; being an expert in radiography

knowledge does not necessarily mean that the radiography educator will be able to clearly articulate their understanding of their subject.

The notable silence from clinical educators on their own preferred style of teaching to some extent supports the argument made earlier that they regard the university educators as the primary purveyors of knowledge, in spite of the clear guidance from the statutory and professional bodies (HCPC, 2009; CoR, 2007).

The ideology of a 'leaner centred' approach was a core tenet of the philosophy which underpinned the move from diplomat to graduate in radiography education (Slumming, 1996). Government health education policy and PSRB guidance are clear that the learner should be at the centre of a radiography curriculum (CoR, 2007,2005; NCIHE, 1997; HCPC, 2009). Further, the radiography literature also supports the notion of learning that places the student at its core (Baird, 1996; Cockbain *et al.*, 2009). However, as the findings of this study suggest, there is a gap between the ideology and the practical application of the learner centred approach. In both the university and clinical setting, workloads are cited as the main barrier preventing its full implementation (Coombs *et al.*, 2003; Boyd *et al.*, 2009). Nonetheless, this finding does suggest that creative ways of overcoming this impediment should be a research priority in radiography education.

The participants' comments on the importance of demonstrating the vocational relevance of radiography knowledge adds to the already established imperative to make this a requirement in any instance of radiography education. The students commented that vocational relevance was often achieved by the university educators

sharing their past clinical experiencies. This is an example of a community sharing its artefacts, language and stories (Lave and Wenger, 1991; Wenger, 1998).

3.4 Clinical Education

The students' opined that the university educators should play a key role in managing their clinical education. Specifically, the students thought that they should offer more guidance to clinical educators on how to supervise and teach students in the clinical setting (**L52, L55, L54 L61**). This aligned with one university educator's (**U5**) suggestion of a more formalised education programme for clinical educators.

In addition they regarded the university educator's visits to their clinical placement as a 'life saver' (**L62**), a means of staying connected with the university and a way of connecting theory and practice through dialogue during the clinical visit.

> **L61** The university should give clinical educators much more guidance on how students should be supervised and supported in clinical...there appears to be no consistency at all (p.8)

> **L62** I really looked forward to the uni lecturer visiting me in clinical, especially if I was not feeling confident...for me they were a life saver (p.8)

The university educators shared this view in describing one of their roles as instilling a sense of self-efficacy amongst the students. This was said to be achieved partly in the university setting by constantly encouraging the students and by the university educator visting the student in their clinical practice setting.

> **U2** Students learn more if they feel that it safe to move out of their comfort zone...we need to recognise that they need support in achieving this.
> The visting uni educator plays a vital role in connecting the university with clinical practice.(p.10)

All of the students commented on the importance of the role played by the clinical educators. Specifically, the clinical educators were said to help the students to 'become a radiographer' (**L55**) by explaining and demonstrating the practice of radiography in context. However, the practice taught by the clinical educators was often described as lacking any theoretical basis, which appears to be a recurring theme. As described earlier in this chapter this 'on the job knowledge' or 'pragmatic (tacit) knowledge' seems to rely mostly upon routines of radiography practice without any recourse to theory. 'Pragmatic knowledge' was said to include modified radiographic technique and the customs and norms within a clinical placement.

> **L51** The clinical educators are the practical people ...they deal with real life situations ..in my view they have the most important role as they teach us how to become a radiographer (p.8)

> **L54** The clinical educators teach us how to perform examinations and how to modify things if the patient can't move in a certain way..but usually there is no explanation with that it's a case of watch one do one really..they comment and test you on anatomy and pathology but never the physics. (p.9)

The clinical educators stated that a key role they ascribed to the university educators was preparing the student radiographer for the clinical environment. This aligned with the students' view that the university educators had a crucial role in managing their clinical education. However, it was suggested that many students arrived at their first clinical placement with little idea about the realities of practice (**C1-C5**).

> **C4** The uni should prepare the students for clinical practice by teaching them basic technique and making them aware of the NHS environment ...but in my experience many of the students don't feel prepared at all..in fact I think it comes as a bit of a surprise. (p.9)

When asked about the role of the clinical educator the university educators described their key role as helping the student to connect theory and practice. Specifically, it was said that the clinical educators demonstrate the application of theory within the context of 'real life practice' (**U1**) supporting the students' view of clinical educators role. However, as suggested earlier in this section, the level of theoretical knowledge possessed by the clinical educators was variable.

> **U2** In some respects the clinical educators play a much more important role than we do ...we give the students the foundational knowledge ....and the clinical educators help the students make sense and expand that knowledge...(p.9)

The university educators also described a variability in the level of engagement which the clinical educators have with students. It was suggested that 'a continuum of engagement' (**U5**) existed in clinical placements. Some clinical educators seemed to enjoy their educational and supervisory role, others would engage with students most of time, whilst others although in the minority, avoided student contact whenever possible.

> **U2** I would categorically state that there are extremes amongst clinical educators, a continuum ....those who will engage with students and those that won't ....it's a very challenging issue ...often the clinical educators will not step outside of their own comfort zone.
> It's the luck of the draw as to whether the student will end up being supervised by a clinical educator who has a wider educational view or someone who is highly parochial and set in their ways ..not ideal at all. (pp.9-10)

There was an acknowledgement from the clinical educators that clinical placement should be an encouraging and a safe space for the students to learn (**C4**). However, they cited four challenges to teaching and supporting students.

Firstly, *service delivery*, that is, heavy workloads often reduced the time available to spend with students. The clinical educators stated that this situation was more pronounced in clinical placements where there were large numbers of recently qualified staff. These clinical educators were said to need time to consolidate their own knowledge before feeling confident to teach students. (**C1**).

Secondly, three of the clinical educators thought that there should be some form of renumeration for teaching and supporting students (**C2, C4, C5**) – a view supported by university educator **U5**. The lack of any renumeration was said to result in some clinical educators becoming disengaged from students. Consequently, there was inconsistency in the level of support given to the students, which aligned with the university educators' description of a 'continuum of engagement' (**U5**)

The third challenge cited by the clinical educators was the students' variable levels of motivation (**C1-C5**). However, the clinical educators did not reveal how they might motivate a student who appeared to be disengaged whilst in clinical practice. Finally, the fourth issue was a request from the clinical educators for more guidance from the university on what should be taught in clinical placement (**C1-C5**).

> **C4** I believe that clinical educators used to get an allowance for teaching students. That doesn't exist any more and that's why some of the clinical educators just don't get involved with students...for many that allowance resulted in the willingness to support student learning..so I would definitely say that the level of support given to the student does vary. (p.12)

> **C3** For me there are two issues here, the student needs to be proactive in their own learning because if they are not they tend to get left to their own devices. It would also be really useful to get some more guidance on what we need to teach (p.12)

From the students' perspective, concerns were also raised about the inconsistency amongst clinical educators in terms of their supervisory skills and general engagement with students (**L53**). Teaching students was sometimes perceived as a 'burden' (**L52**) or students were viewed as a 'hindrance' to *service delivery* (**L51**). Students stated that they would like a safe space to learn and more encouragement from the clinical educators (**L64**). The students sense of self-efficacy was said to be directly proportional to the level of support given and the provision of a conducive learning environment (**L65**). In some cases a 'bad clinical experience' had resulted in students considering leaving the programme (**L61**). The solution proffered was a more formalised training of clinical educators (**L63**) and better guidance from the university on clinical supervision (**L61**). This aligned with the comments of both the university educators and the clinical educators themselves.

Finally, the students stated they would like to be treated as individuals in clinical practice, each with their own specific learning needs (**L64**).

> **L53** There seems to be a big difference in the way that clinical educators deal with students, some seem to really enjoy it while others appear to avoid any contact with students...how welcome you feel in a department can really impact on your confidence levels and your ability to learn things (p.7)

> **L64** I have had a variable experience with clinical educators – some do provide a safe space to learn .. but on my electives it was a different story, I felt as if I was constantly being judged...it really demotivated me and I felt like I couldn't do the job. I think that the clinical educators could be more self-critical and reflect on every sphere of their professional approach...students are individuals, it's not a case of one size fits all...they should be nutured and encouraged to achieve their full potential. (p.2)

Both Level 5 and Level 6 students opined that the culture of a clinical department had a profound effect on their learning (**L51, L53, L54, L62, and L64**). Specifically, the students referred to clinical departments which actively encouraged learning and those that did not. Some made this comment in relation to student learning, but others also referred to the need for radiographers to engage with their own personal development.

> **L62** The level of support that you get from clinical educators does vary; I feel that there is a connection with the culture of a clinical department and if that department encourages learning. (p.7)

> **L64** The learning environment that the department promotes or in some cases doesn't has a massive impact on student learning...you can usually tell whether it's a learning department by the number of radiographers who are encouraged to do more courses or if they have CPD events...and that's really important because I have known students who have left the course because they have had a poor clinical experience. (p.8)

Several students perceived what was described as an 'unspoken hierarchy' amongst student radiographers, clinical educators and other health care professions. They saw themselves at the bottom and medical staff at the top of this hierarchy.

> **L53** There is a definite pecking order in the department and in the hospital...the doctors are right at the top and student radiographers are at the bottom...you are expected to behave in a particular way and if you don't it's frowned upon. (p.7)

The presence of a hierarchy was also commented on by the clinical educators (**C3, C4, and C5**). They regarded this as an institutional norm and something that needed to be appreciated by the student radiographer.

> **C3** There is a recognised, if sometimes unspoken hierarchy within the NHS. The doctors are at the top of it and it's something that students need to understand and accept. (p8)

Critical Discussion

Several of the findings which emerged in this category further support the critical arguments that have been made earlier in this chapter. Firstly, the radiography students and university educators had a perception that the clinical educators' actions appeared to evidence a limited theoretical underpinning. This has been attributed to the clinical educators use of pragmatic (tacit) knowledge (Eraut, 2000) and the difference between *espoused theory* and *theory-in-use* (Argyris and Schön, 1974). Secondly, the clinical educators commented on a purported barrier to supporting the radiography students, that is, *service delivery*. Accordingly, I shall not comment further on these findings except to say they support arguments made earlier.

The pertinent issues that do require unpacking are: the roles played by the university educator and the clinical educator in helping the student derive meaning and facilitate the application of radiography knowledge; the reported 'continuum' of support given by the clinical educators; the impact of the clinical placement culture on learning and percieved hierarchy and power.

Two key roles attributed to university educators in clinical education from the perspective of all of the participants was to prepare the students for practice and to act as a bridge between the academic and clinical elements of the curriculum.
Whilst the guidance from the PSRB has a clear expectation that a radiography student will be prepared for clinical practice, the clinical educators suggested that

this is not always achieved (HCPC, 2009; CoR, 2007, 2011, 2012). The findings of several studies which have investigated a student's preparedness for practice would support the clinical educators' view. Eyal and Cohen (2006) reported that medical students perceived that they had not been taught sufficient clinical skills nor did they feel that they had been given adequate exposure to practice. Prince *et al.*, (2005) supported Eyal and Cohen's (2006) findings and also suggested that medical students were uncertain of how to behave or act when first introduced to clinical practice. However, Ogbu's (2008) study from a Nigerian context of radiography education concluded that students felt prepared for clinical practice and although focused on post registration students, Mackay, Anderson and Hogg (2008) also supported this view. In summary, the literature indicates mixed views on student preparedness for practice. However, there is evidence to support the findings of this study which implied that radiography students felt unprepared for practice and as such there is a need to research this area further from the perspective of UK radiography students.

The university educators described themselves as an essential link between academic and clinical practice. This also reflected student expectations. A positive aspect of this linking role was the university educator visiting the students in their respective clinical sites. The findings of this study suggest that the university educators met several of the student expectations described in both Aston et al.,'s (2000) and Jackson and Mannix (2001) studies and those outlined by the SCoR (Cor, 2003, 2011, 2012) during their clinical visits. Areas of alignment included the regular visible presence of the university educator in practice and the help given to make sense of theory and build meaning around the clinical experience. What appears to be

an unrealised expectation of both the students and the clinical educators in respect of this linking role was the percieved lack of guidance on what students should be taught and how they might be effectively supervised. However, both the professional and statutory body have the view that the clinical educators have a responsibility to familarise themselves with a student's curriculum and be cognisant of effective supervision strategies (HCPC, 2009; CoR, 2003, 2011, 2012). Equally so, there is an expectation that the higher education institution responsible for delivering a diagnostic radiography programme will have overall responsibility for the effective management of clinical education (HCPC, 2009). This mismatch between expectations and responsibilities requires an appropriate resolution if the *formative* and *normative* functions of Proctor's (1987) idealistic model of supervision, the theoretical model on which the SCoR Clinical Supervision Framework (2003) is based, are to be realised. Alongside the *formative* (professional development) and *normative* (knowledge development) functions is the *restorative* function (emotional development). Recent research on clinical supervision in radiography by Whiting and Titmarsh (2009) has suggested that it may be the third function of Proctor's (1987) supervisory model which has the most significant impact. Specifically, Whiting and Titmarsh (2009) propose that the quality of the relationship between the student and clinical educator is the cornerstone of effective clinical education. The finding in this study of a 'continuum' of engagement by the clinical educators is therefore highly significant. The clinical educators attitude to teaching and supporting a student's learning has been found to strongly influence the student's sense of self-efficacy. The students reported feelings of reduced motivation and a lack of confidence in their

own abilities, which in some cases resulted in the student questioning their career choice. This finding is supported by Bandura's seminal text on self-efficacy (Bandura, 1982, p.135). Inappropriate attitudes of clinical educators have also been reported in a study which investigated the factors affecting the quality of clinical education (Williams *et al.,* 2006) , a student clinical experience survey (CoR, 2010) and more recently were on the agenda at the 2012 SCoR Annual Delegates Conference. Self-evidently, this is an issue which requires some attention and is a point recognised by the ScoR which has responded by producing two clinical education guides (SCoR, 2011, 2012).

In nursing, Saarikoski and Leino-Kilpi (2002) and Wotton and Gonda (2003) found a direct correlation between environmental culture and clinical educator attitudes to supervision. In radiography, Williams *et al.,* (2006) found that a clinical department's culture impacted on the quality of support provided. Although limited, there is evidence from this study to suggest that the perceived culture of a clinical department does impact on learning.

The student and clinical educators' explicit comments about an unspoken hierarchy in clinical placements suggests an imbalance of power in relationships. Yielder and Davis (2009) indicate that radiography students are socialised into a culture of compliance where medicine is the dominant force. Refering to Levett-Jones and Lathlean's (2009) study on nursing students' experience of conformity and compliance, Yielder and Davis (2009) propose that radiography's long history of compliance is an attempt to be included as part of a medical imaging team. The impact of such conformity and compliance is low self–esteem and apathy which acts

as a barrier to practitioners moving outside of their comfort zone. Ultimately, this will impact on the profession's ability to create new knowledge and advance clinical practice (Sim and Radloff, 2009).

The findings would also imply that there is an unspoken hierarchy between the university educators and the clinical educators, with the former assuming they are experts in both discipline specific and pedagogic knowledge. Earlier discourses on pedagogic content knowledge (Schulman, 1986) and pragmatic (tacit) knowledge challenge this view. Equally, the clinical educators' decision not to engage with the learning and teaching of radiography students could be regarded as an implicit, yet silent, declaration of power (Launer, 2006).

Theme Three – Summary

The pertinent findings explored in this theme included the divergent views held by participants on who should be the primary source of radiography knowledge; a perceived variance between classroom teaching and actual practice; the challenges of a clinician's transition to higher education; unfamiliarity with the radiography curriculum, the 'continuum' of support offered by the clinical educators and explicit / implicit hierarchies and power relationships.

In spite of the PSRB guidance and policy rhetoric the students and the clinical educators are of the opinion that the university educator should be the primary source of radiography knowledge, whilst the university educators assume that clinical educators share this role. This misunderstanding appears in part, to be attributed to the clinical educators' apparent lack of dialogue on the theoretical underpinnings of

radiography practice (also noted earlier in Theme One and Two) and an assumption on the part of the students and the clinical educators, that the university educators possess high level discipline specific and pedagogic knowledge. However, the findings would suggest that whilst the university educators make use of evidence based radiography knowledge in their teaching, little attention seems to be given to pedagogic theory and specifically, how pedagogic theory might make radiography knowledge more accessible to the student.

A confounding factor may be a result of the transition from clinician (clinical educator) to lecturer (university educator). As Boyd et al.,'s (2009) study suggested, many health care lecturers believe that they acquired the skill of teaching whilst in clinical practice. Many of the university educators interviewed completed a teaching qualification several years after moving into the higher education setting, by which time they were likely to have gained a tacit understanding of educational practices. Such a tacit understanding may have included adopting fixed practice routines which did not make reference to pedagogic theory (Schulman, 1987; Magnusson, Krajcik and Borko, 2002).

Radiography students, like other health care students, could be regarded as 'novices' and as such tend to rely on rules and protocols as they make sense of their discipline knowledge and its application in practice (Benner and Tanner, 1987; Dreyfus and Dreyfus, 1980). The student may face what Rolfe (2000) describes as a 'theory practice void' if there is a mismatch between that which is taught in the classroom and that which is observed in practice. The findings of this study propose three possible reasons as to why a student may perceive a theory-practice void. Firstly, the

students and clinical educators suggest that the university educators are not always up to date with contemporary practice. Secondly, the clinical educators make use of pragmatic (tacit) knowledge, a recurring theme throughout this chapter. Thirdly, there is evidence of what Argyris and Schön (1974) describe as the difference between *espoused* theory and *theory-in-use*. Accordingly, a picture emerges about the complexity of articulating the application of radiography knowledge in practice. The reasons for attempting to make pragmatic (tacit) knowledge more visible have been discussed in Theme One. The speculative finding of a difference between *espoused theory* delivered in the classroom and *theory- in- use* applied in practice requires further investigation.

Making reference once again to the PSRB guidance (HCPC, 2009; CoR, 2011, 2012) there is a clear expectation that radiography educators will be familiar with the curriculum, in particular as the radiography educators co-construct the curriculum when a radiography programme is developed and validated. However, the findings imply that the clinical educators are not as familiar with the curriculum as they could be. It can also be reasonably inferred from the findings that the university educators are not always aware of what is in fact taught in modules or in clinical practice. Accordingly, a recommendation of this study is to make modular content more transparent and to work more collaboratively with clinical educators to help them to not only familiarise themselves with the curriculum but also enact it across several learning spaces.

The support offered to students by the clinical educators has been described as a 'continuum' – extending from full engagement to no engagement. This has been shown to impact on the students' sense of self-efficacy to the extent that some students have considered leaving the programme. Sadly, this finding is not new despite repeated guidance from the SCoR (CoR, 2011, 2012). The findings from this study will add to the growing evidence base and further underscore the imperative of addressing the issue of sub-standard clinical supervision.

The students and clinical educators made specific reference to the 'unspoken hierarchy' that is said to exist in practice – one that places medical practitioners at the top. Of interest is a clinical educator's comment that this should be accepted and regarded as the norm. As noted earlier, Yielder and Davis (2009) suggest that radiography students are socialised into a culture of compliance which may help to explain this opinion. However, there is a canon of literature which is diametrically opposed to accepting this status quo (e.g. Price, Miller and Mellor, 2002). Further, a potential consequence of such conformity is the inability of the profession to create new knowledge and advance clinical practice (Sim and Radloff, 2009).

The findings also imply that there are unequal power relationships within the radiography education community and the wider medical imaging community which includes radiologists. This could be a product of the culture of conformity which appears to persist. Another factor which may affect the balance of power is the assumption made by the radiography educators about who the de facto authority is on radiography knowledge and practice. The clinical educators make assumptions about the university educators' contemporary knowledge of practice, whilst the university

educators make assumptions about the clinical educators understanding of theoretical knowledge.

In Lave and Wenger's (1991) original description of a CoP there is an assumption that the members within a community actively contribute to its continuous evolvement by shared mutual engagement and joint enterprise. Conflicting with this however, there is evidence from the findings of periods of passivity in a radiography education community of practice. Wenger (1998) later describes a community's development as fluid with members being more active at different times. This idea is revisited by Wenger, Mcdermott and Snyder (2002) who suggest that this active / passive mode of operation reflects real life practice. They associate episodes of passivity with periods of member observation and periods of engagement with activity which the members regard as personally relevant. Some of the clinical educators adopt a passive role as evidenced by their apparent lack of engagement with the curriculum content and their supervisory role. The findings also suggest that some university educators adopt a passive role in their failure to engage directly with clinical practice, that there is an apparent lack of credence given to evidence informed pedagogy and potentially inaccurate assumptions made about knowledge taught in modules other than their own. Finally, the students adopt a passive role in assuming that the university educators are their primary source of radiography knowledge. Nonetheless, it would be counter intuitive to accept Wenger, McDermott and Snyder's (2002) position which seems to be tolerant of passivity if members do not regard the community's goals as relevant to themselves. Radiography education is a collaborative endeavour between a higher education institution and its clinical

partners. Whilst the PSRB guidance promotes such collaboration the findings of this study would suggest that improvements and further developments are possible and desirable.

Convergence and divergence with Lave and Wenger's theoretical perspectives

In order to establish how the participants' views compared with Lave and Wenger's theoretical perspectives I posed several questions of the study's findings. (Chapter 2, p.57). In the table below I present the answers to these questions.

Table 3 Convergence and divergence with Lave and Wenger's theoretical perspectives

Questions to ask of the findings of this study	The study's findings
Do the participants recognise / describe meaning as product of relationships and negotiation within their community? Do the participants recognise/ describe a dialectical exchange about practice that results in a more fully developed understanding of practice?	• Meaning is sometimes a product of dialectical exchange which appears to be more evident in clinical practice (pp.125,131) • Students comment that clinical educators do not always engage with critical thinking whilst practising which limits iterative negotiations of meaning (p. 151) • Dissonance between knowledge taught by university and clinical educators impacts on students understanding (p.167). However, this may be a result of the limited time to engage in a dialogue with other community members (p.171)
Do the participants recognise / describe a trajectory from peripheral to full participation within their community ?	• Participants describe 'pragmatic knowledge', a personal knowledge that is acquired by observation and role modelling – this results in students gradually moving toward a more central position (pp.131, 141) Conversely, limited iterative negotiations of meaning involving students and clinical educators impacts on the students trajectory from limited to full participation (p.151)

Questions to ask of the findings of this study	The study's findings
Do the participants recognise / describe either the university setting or practice settings as an authentic learning context? Is there a sense that access to such learning spaces is present?	• Clinical placement is described as an authentic learning space (pp.125, 141). Nonetheless, access can be limited as a result of time pressures and compliance with policy targets (pp. 162, 184)
Do the participants recognise / describe interactions within their community which results in relationships being formed? Is there a sense of a common purpose? Is there a sense of a community sharing its communal resources e.g. artefacts, language and stories? Do the participants recognise / describe the power relationships within their community?	• Students learn from shared experiences / stories and role modelling (pp.124,141, 182) • Students share artefacts', language and stories when they engage in peer assisted learning (p. 125) • Asymmetry of power is noted between the student and the clinical educator when negotiating appropriate radiographic technique for a patient (pp. 126, 184) • The sense of common purpose is not always shared by the clinical educators who appear to be on a continuum of engagement with the students from full to zero (p.185) • Participants describe an unspoken hierarchy within the NHS with doctors at the top and students at the bottom (p.188)
Do the participants recognise / describe professional identity and its formation and development within their community?	• Part of professional identity is the continuous development of professional knowledge (p. 145) • Limited engagement with reflection impacts on professional identity formation (p. 162) • Attitudes and behaviours of radiography educators impact on professional identity development (pp.144, 188)

Questions to ask of the findings of this study	The study's findings
Do the participants recognise/ describe a community which creates barriers to learning? Is the culture within the community described as positive or negative?	• The enacted learning and teaching model does not always align with that preferred by the students (pp. 117, 175,176) • Teaching does not always emphasise the vocational relevance of knowledge; more specifically, how knowledge is applied in practice (p. 121) • Clinical educators did not always articulate 'theory in use' (p. 123) • Clinical educators fail to comment / offer feedback on communication skills (p.141) • Students are taught radiographic technique for the standard patient which does not reflect 'real life' practice (p.125) • Clinical educators use of 'pragmatic knowledge' can act as a barrier to learning (p.131) • Radiography educators sometimes have limited familiarity with the radiography curriculum (p.174) • Negative learning cultures exist in some clinical placements which impact on all levels of learning (p.188) • Passivity on the part of all participants impacts on both the culture and limits learning (pp.197-198)
Do the participants recognise /describe strategies that facilitate engagement with different communities of practice?	A challenge to engaging with other professions was discipline specific vocabulary (p.140)

Chapter Six

Conclusions, Recommendations and Limitations

The concluding chapter brings the threads of this study together by: (i) providing a synopsis of a radiography education community's views on the curriculum, the role played by the radiography educator and a representation of how the 'real' as opposed to the 'ideological' curriculum functions and (ii) proposing a theoretical model for a radiography education community. This chapter also includes recommendations for curriculum development based on the research findings. It discusses the limitations of the study and finally outlines the impact of the study on my own praxis.

6.1 The radiography curriculum

Whilst the external bodies present guidance on knowledge and skills content as integrated themes, all of the participants of this study described curriculum content as discrete knowledge domains, such as anatomy, physics and radiographic technique. This contradicts the beliefs of the university educators that radiography knowledge should be viewed as a series of integrated concepts which are embedded in radiography practice. It is also in opposition to the ontological view of radiography knowledge established by a critical review of the radiography literature. In particular, the participants' reductionist view of radiography knowledge does not align with the integrated models of radiography knowledge and practice proffered by theorists such as Yielder (2005) and Larson, Lundberg and Hillergård (2008). However, as Yielder (2005) concedes when describing her holistic model of radiography knowledge and practice, there is an interrelationship between theoretical and procedural knowledge but for the purposes of explaining the nature of both types of knowledge they are

arbitrarily separated, a condition which would not exist in the act of radiography practice. Therefore such reductionist descriptions of radiography knowledge by the radiography education community represents a pragmatic way of conveying a complex and integrated body of knowledge. Nevertheless, the danger of artificially separating theoretical and procedural knowledge in order to teach it, is that the radiography student will somehow be able to effectively apply this decontexualised radiography knowledge in practice (McDermott, 1993).

Although only one university educator and one clinical educator commented on the potential problems of a modular curriculum design it does raise the issue of curriculum coherence (Knight, 2001). The findings of this study suggest that students compartmentalise the knowledge delivered within a module and that this may impact on their problem solving skills in practice (Baird, 1996).

There is general agreement amongst the radiography education community about the domains of knowledge and skills which should be included in a diagnostic radiography curriculum. Further, the domains of knowledge described match those prescribed by PSRB and government policy. However, there is little with which to compare the findings, since as noted earlier, there is a gap in the published studies which challenge the content of the undergraduate curriculum within the UK context of radiography education. Schön (1983), suggests that practice is inherently unstable and constantly changing. Therefore professional knowledge and defacto curriculum content will always lag behind practice. This would indicate that the conclusion of 'agreed curriculum content' in this study is time limited and as such can only ever be made in reference to the status quo. Nonetheless, it does provide a starting point from

which the dialectic exchange between radiography knowledge and practice may begin.

The fact that there seems to be general agreement about curriculum content smooths over the tensions and notable omissions which have emerged from the data. The two predominant factors which created tensions amongst the participants were a lack of emphasis on the vocational relevance of radiography knowledge and the absence of a clear articulation of pragmatic (tacit) knowledge.

The consequence of not emphasising the vocational relevance was a perception that knowledge domains such as physics and communication, appeared too abstract. This also had a strong influence on the students' perception of workload, for example, anatomy, physiology and pathology (Hall and Durwood, 2009; Kember, 2004). Pragmatic (tacit) knowledge is multifaceted, convoluted and personal which makes the project of making it more visible highly complex (Eraut, 2000, 2004). However, unpacking this domain of radiography knowledge by the educator will not only help the radiography student to connect theory and action but will also facilitate a more critical interrogation of radiography practice which might ultimately result in its development (Baird, 2008).

Significant domains of knowledge which were not discussed by the participants were: patient care, reflection and bioethical knowledge. A body of work is begining to emerge in the radiography literature which suggest that radiography practice is dominated by a 'task focus' paradigm (e.g. Strudwick et al.,, 2011; Whiting, 2009; Reeves and Decker, 2012). However, I would suggest that the overarching purpose of radiography is to serve the patient and as such the knowledge domain of patient

care should be brought to the fore in the curriculum (CoR, 2007; HCPC, 2009). The skill and application of reflection is regarded as an essential component of a radiography curriculum and as a means of developing radiography practice (Hamilton and Druver, 2010). Further, reflection is highly valued because it is regarded as a vehicle for reconciling theory and clinical practice (Baird, 2008). Bioethical knowledge is an essential element of professional practice. If radiography students are to develop a sound moral understanding and make judicious ethical decisions in practice, its omission by the radiography education community represents a challenge. Furthermore, critically engaging with bioethical knowledge could form part of a strategy that would rebalance the profession's 'task focus' with the humanisation of its practice (MacIntyre, 1986; Lewis and Robinson, 2000).

The findings clearly establish that curriculum as a body of knowledge and product is privileged over curriculum as process, curriculum as praxis and curriculum as context (Mednick, 2006). The problem with a product orientated curriculum is that the focus is on teaching and not learning. Conversley, curriculum as a process is a model in which students are treated as individuals not objects to be acted upon (Freire, 1996). This model pays attention to the interactions amongst radiography students, radiography educators and radiography knowledge (Knight, 2001) and consequently the creation of the learning culture (Perselli, 2012; p422). The challenges of enacting a process curriculum in the context of radiography education are twofold. Firstly, a curriculum model which treats radiography students as individuals can not only result in different ways of teaching but also a difference in the content of what is taught. The latter could be regarded as being at odds with the

PSRB and government policy guidance. Secondly, what is both a potential weakness and a strength of the process curriculum model is the level of pedagogic knowledge possessed by the radiography educators as it is highly dependent upon developing meaning from knowledge and not necessarily strict adherence to prescribed content. If the radiography educators fail to engage with pedagogic theory, which the findings suggests is the case, then the application of this model will have limited educational value. Curriculum as a praxis pays particular attention to the way in which radiography educators facilitate understanding and convey meaning whilst in the act of practice. (Renner and Brown, 2006). Although this appears to happen in clinical practice more than in the academic setting, it is overall, rather limited. Schön's fundamental message in his seminal text *Educating the Reflective Practitioner* (1987) is that professionals who receive real-time feedback learn in a more profound way. Therefore, I would suggest that the curriculum as a praxis model should be further developed and more consistently applied by the radiography educators. Curriculum as context focuses on curriculum as a social endeavour in which the context and the culture of learning spaces have a profound effect on learning and vice versa. From the perspective of the radiography educators, there is limited consideration of the impact that the prevailing culture in both the university and clinical setting has upon learning. Of particular importance is the lack of thought given to the asymmetry of power which exists in the radiography education community. Equally, the contextual importance of the social spaces in which learning takes place does not feature strongly in the radiography educators' discourse on curriculum. In summary, there is currently a narrow view of what a radiography curriculum 'is' and how its design

influences not only the radiography students' acquisition of radiography knowledge and skills, but also the desired attributes and attitudes of a professional practitioner and how the radiography student develops these.

6.2 The perceived roles of the radiography educators

The findings reveal a mismatch between the perceived roles of the radiography educators amongst the radiography education community. This begins with the radiography students' and clinical educators' view that the university educators are the primary source of radiography knowledge. Conversely the university educators see the source of radiography knowledge being shared amongst themselves and the clinical educators. There is also an expectation on the part of the university educators that the radiography students will be self-directed and establish their own learning needs. This does not generally occur in practice.

Whilst the PSRB guidance on the expectations of both university educators and clinical educators are clear that the provision of radiography knowledge should be a joint enterprise (CoR, 2007, HCPC, 2009) the findings proffer two reasons as to why this may not be the case. Firstly, the clinical educators do not enter into a discourse about the theory which underpins the act of practice. The university educators are highly critical of this omission. There is undoubtedly an over- simplification here as the university educators fail to take into account the difference between the theory a particular practice purports to use, that is, *espoused theory*, and the act of practice in reality, that is, *theory-in-use* (Argyris and Schön, 1974, Ball and Wells, 2006). To compound the complexity of this situation further, clinical educators also make use of personal or tacit knowledge which is intrinsically linked with the notion of *theory–*

in-use (Eraut, 2000). Secondly, from the students' and clinical educators' perspective the university educators have high level knowledge of both discipline specific theoretical knowledge and pedagogic knowledge – but interestingly, are not always up to date with the mores of contemporary clinical practice. In other words, the perception is that university educators know what to teach and how to make knowledge accessible to the student. However, the university educators seem reluctant to engage with pedagogic theory or update their knowledge of the practice setting, whilst taking pride in their evidence based, discipline specific theoretical knowledge. Thus a paradox emerges in that the university educators themselves are making use of personal or tacit knowledge when in the act of their own practice (Boyd *et al.*,, 2009).

A key concern of both the university educators and the radiography students is the clinical educators' lack of familiarity with the curriculum, specifically the knowledge expected of a student at different levels on the programme and the clinical assessment strategies. This would appear to have a detrimental effect on the radiography students' ability to act independently and impacts on their self-transformative cooperative engagement in clinical practice. The finding of a 'continuum of engagement' ranging from full to no learning support given to the radiography students by the clinical educators further affects the students' ability to act independently because they are personally subjected to or vicariously witness sub-standard clinical supervision practices. The clinical educators and the radiography students also speak of an unspoken hierarchy that is said to exist in the

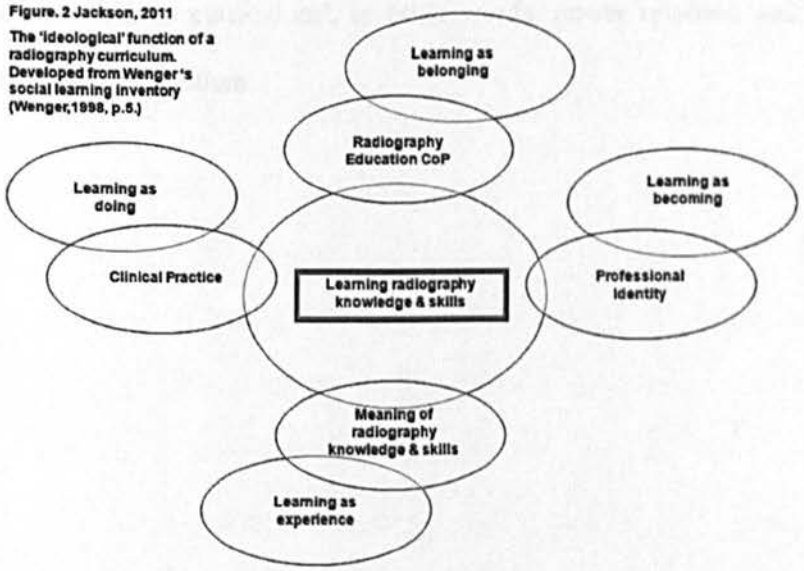
clinical setting. A consequence of this hierarchy is a high degree of *othering*[10] within the radiography education community which also impacts on the students' ability to act independently.

This finding is not new despite repeated guidance on appropriate clinical supervision and student support from the SCoR (CoR, 2011, 2012). It does however underscore the imperative of addressing this issue.

6.3 An emerging representation of the 'real' versus the 'ideological' function of the radiography curriculum.

In Chapter Two the theoretical framework for this study described a model for the functioning of an 'ideological' radiography curriculum. The ideological curriculum pays attention to curriculum as knowledge and product, as process, as praxis and as context. In this model the curriculum facilitates the negotiation of learning, meaning and the development of professional identity.

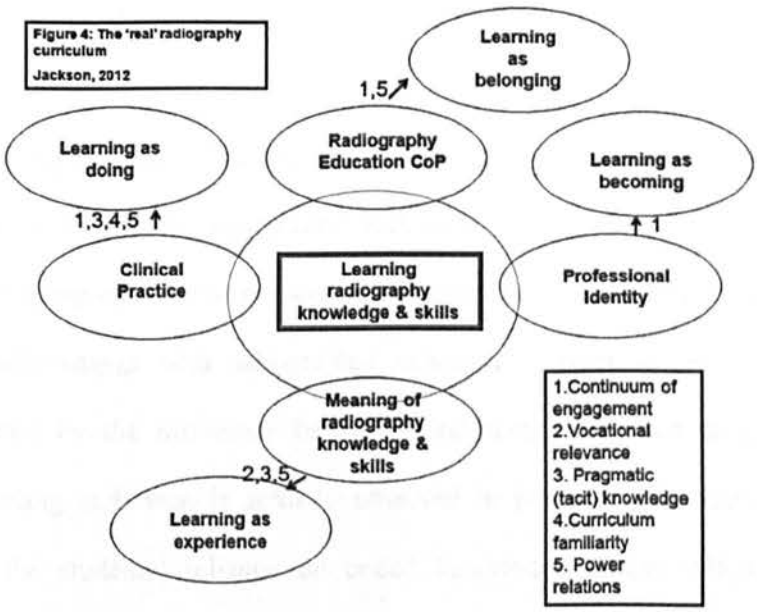
Figure. 2 Jackson, 2011
The 'ideological' function of a radiography curriculum. Developed from Wenger's social learning inventory (Wenger,1998, p.5.)



[10] Johnson, Bottorff and Browne et al., (2004; p253) define *othering* as a process that identifies those that are thought to be different from oneself [which can] reinforce and reproduce positions of domination and subordination.

The model suggests synergy and coherence between both the social spaces in which radiography education takes place, that is, the university and clinical settings. It also suggests that the clinical educators and university educators fulfil the expectations of PSRB and government policy guidance.

However, my findings reveal a curriculum whose ideological function is inhibited by a radiography education community which has a limited view of what a curriculum 'is', a community which engages in a high degree of *othering* and by several specific factors which include: (i) a continuum of engagement / disengagement, lack of familiarity with the curriculum and the use of pragmatic (tacit) knowledge by clinical educators (ii) a lack of emphasis on the vocational relevance given to radiography knowledge by the university educators and; (iii) the asymmetry of power relations. The 'real' functioning of the radiography curriculum is represented below (p205). This representation demonstrates the various disconnects (represented by arrows) and elements of the 'hidden curriculum', in other words, power relations and lack of familiarity with the curriculum.



6.4 How the radiography education community in this study compares with Lave and Wenger (1991) and Wenger's (1998) theoretical constructs

The findings of this study evidence both convergence and divergence with Lave and Wenger (1991) and Wenger's (1998) theoretical constructs. I will use Hughes' (2007) framework to present the conclusions before describing a practical model of how the radiography education community in this study evolves and functions.

Radiography education is a situated social practice but this is clearly more evident in the clinical setting than in the university setting. In the clinical setting the participants indicate their relational dependency with the act of practice by developing both their professional identity as radiography practitioners and deriving meaning from radiography knowledge. The world of radiography practice is socially generated by dialectical exchange amongst the radiography students and clinical educators which results in the negotiated production and reproduction of what radiography knowledge

'is' and how it is developed as a result of a shared sense of purpose, that is, the act of practice.

The most striking example of learning that is situated in a clinical social practice can be found in the domain of radiographic technique, that is, the positioning of the patient and imaging equipment in response to a clinical question. When radiography students intially engage with radiographic technique in practice, there is often a tension created by the difference between what they have been taught in the university setting and what is actually observed in practice. The tensions are a product of the students' reliance on coded knowledge. These differences are renegotiated by observing clinical educators generating images but using alternative methods to achieve the same outcome.

However, as stated earlier in this chapter, there are various reasons why situated learning does not occur as effectively as it might in clinical practice. These include the clinical educators' use of pragmatic (tacit) knowledge, the clinical educators' lack of familiarity with the curriculum, specifically the knowledge expected at different levels of study and assessment strategies and the perceived continuum of student engagement and support.

Inevitably, situated learning will be more self-evident in the clinical setting as this is the social space in which the act of practice takes place. Nonetheless, in the university setting situated learning is evidenced in two ways. Firstly, when the university educators share their past clinical experience which helps the students to contexualise radiography knowledge and secondly, when Peer Assisted Learning (PAL) is used as a model of learning and teaching. During PAL sessions the students

share communal resources such as artifacts, language and stories about radiography practice (Perselli, 2012; p422).

There are two main factors which inhibit situated learning in the university setting. One is the use of a learning and teaching model that fails to emphasise the vocational relevance of radiography knowledge. The second factor, which is intrinsically linked to the first, is the university educators' focus on evidence informed, discipline specific knowledge to the detriment of pedagogic knowledge. In other words there is the potential for limiting access to radiography knowledge.

Lave and Wenger (1991) propose that when a radiography student initially engages with radiography practice they do so at the periphery of that practice. As the student becomes more familiar with the act of practice, they begin a journey which takes them to a more central position of integration and familiarity. The motivating force to move to a more central position is the strong incentive to better understand the tacit situational understanding observed in more experienced practitioners. The two conditions which facilitate the radiography student in acquiring a tacit social understanding of practice are authentic learning spaces and legitimate access to these spaces. If both conditions are present the radiography student will engage with legitimate peripheral participation (ibid). In other words, the barriers to effective situated learning described earlier also apply to legitimate peripheral participation.

Lave and Wenger (1991) describe a Community of Practice as the locus or site of learning. Wenger (1998) suggests that there are three main reasons why a CoP evolves in the first place. These include: mutual engagement, joint enterprise and a

shared repertoire. Mutual engagement describes the interactions which result in relationships being formed. It is through such relationships that the values and norms of a community are established. The common purpose or joint enterprise is a feature that binds the community and the shared repertoire is developed by the community sharing its communial resources e.g. artifacts, language and stories (Roberts, 2006).

There is evidence of the radiography students and radiography educators participating in 'mutual engagement' in both the university and clinical practice setting. However, there is also evidence of conflict on several levels. The clinical educators speak of the university educators' lack of knowledge of contemporary radiography practice. The university educators claim that the clinical educators do not understand the theoretical underpinnings of radiography practice. Consequently, the students understandably become confused by conflicting information about the type of knowledge required for effective practice.

The vision of a joint enterprise is not fully shared amongst the radiography education community. The clinical educators prioritise *service delivery* over the education of students. Whilst there are obvious reasons for this such as compliance with government patient throughput targets, this passivity has been shown to impact on radiography students' engagement in clinical practice (Wenger, McDermott and Snyder, 2000). Whereas the university educators vocalise their commitment to educating radiography students, they also exhibit passivity in terms of their reluctance to engage with pedagogy and clinical practice. Then again, engaging with learning and teaching which is underpinned by appropriate pedagogy should be a priority for all of the radiography education community and not just the university

educators. Finally, the radiography students also evidence a degree of passivity in their over-reliance on the university educators as their primary source of radiography knowledge.

The findings also suggest that a shared repertoire exists within the community in terms of the language used to communicate explicit radiography knowledge.

6.5 An emerging theoretical model for a radiography education community of practice

In Chapter One I proposed a model developed from my conceptual framework to represent a radiography education community of practice. This model demonstrated overlapping connections amongst the university, clinical and student CoP's – collectively and collaboratively forming a radiography education community of practice. See Figure. 1 below

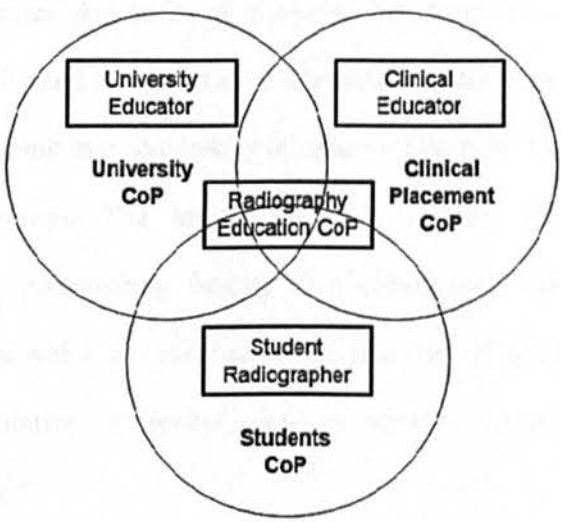


Figure 1. The proposed radiography education community (Jackson, 2011)

However, the findings from this study reveal a different picture.

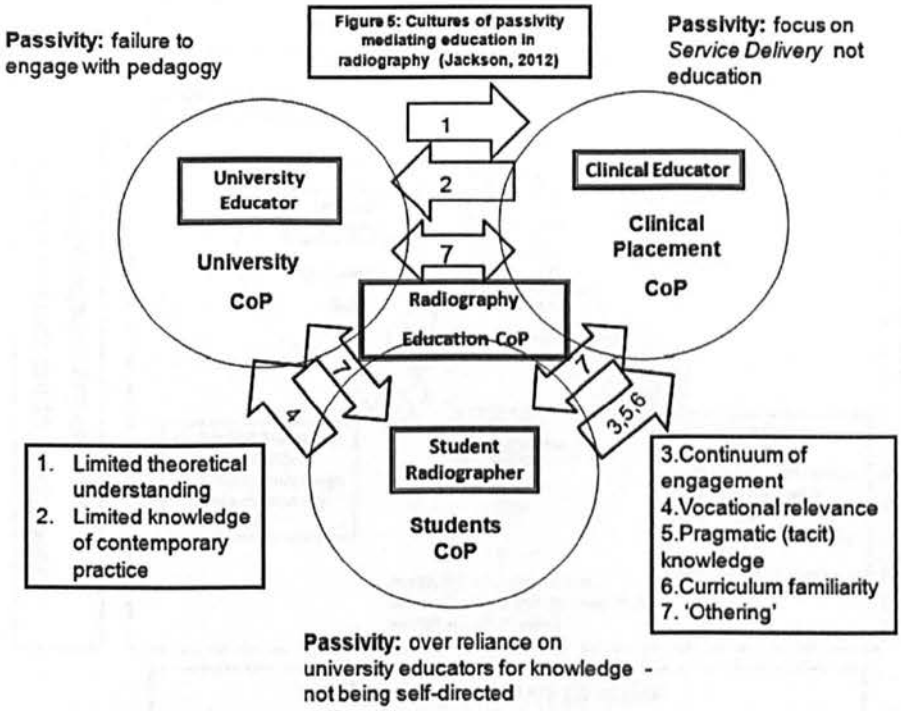
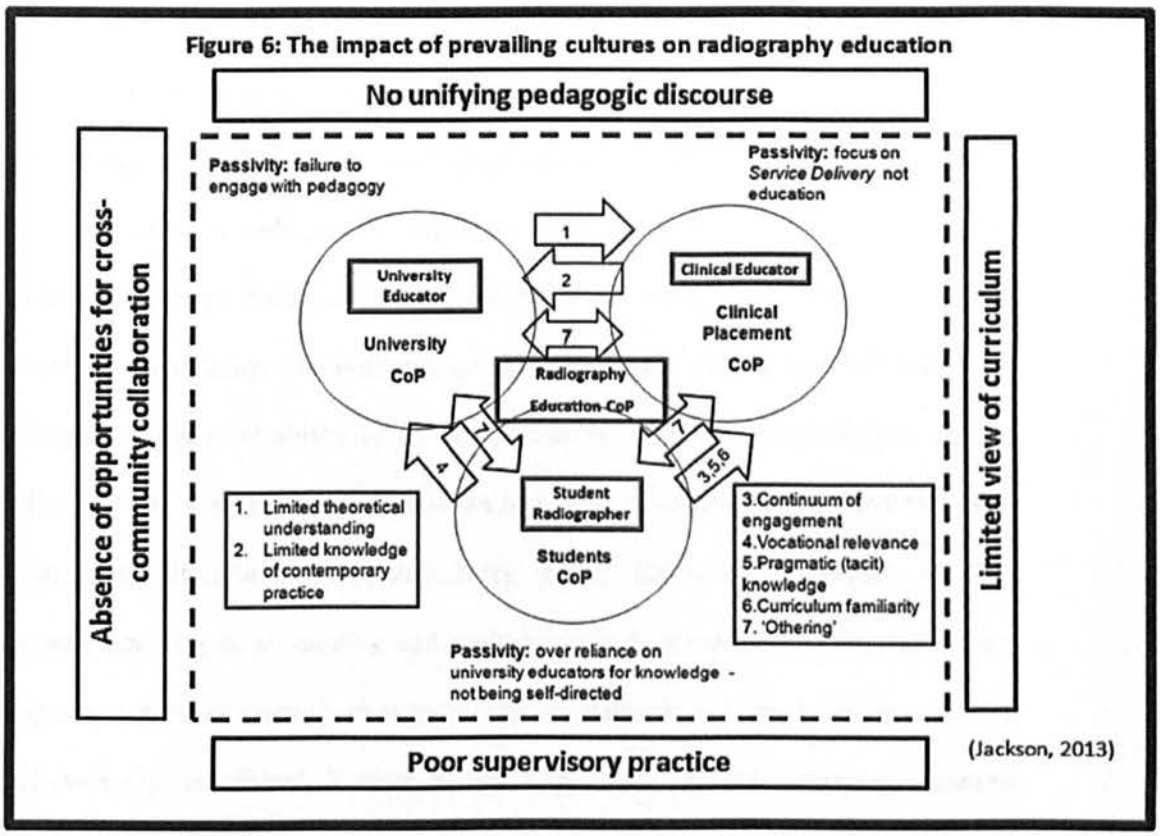


Figure 5 demonstrates the areas of passivity by members of the radiography education community and also shows the inhibiting factors (represented by arrows) which collectively result in a community of practice which does not always evidence synergistic relationships. The impact of these cultures of passivity can be summarised by the overarching finding of a community lacking in a unifying pedagogic discourse which has resulted in the abscence of opportunities for cross-community collaboration, a limited view of what a curriculum is and poor supervisory practice.

This is represented in figure 6 below (p.216).



6.6 What this study adds to Lave and Wenger (1991) and Wenger's (1998) theoretical constructs

Whilst the theoretical framework of this study has facilitated a critical interogation of the concepts of radiography knowledge, radiography practice and the role of the radiography educator, it has its own inherent limitations which may have impacted on the outcomes of this study. I shall now explore these limitations and in doing so I will highlight what this study has added to Lave and Wenger (1991) and Wenger's (1998) theoretical constructs within the context of radiography education. Of more importance to the aim and rationale of this project is how a more practical, research informed, understanding of these constructs may be used to enhance the radiography student's learning experience.

Lave and Wenger (1991) have an under developed critique of the influence of power relations on the functioning of a community of practice (Roberts, 2006). However, the findings of this study have highlighted the less than benign effects that power relations within a radiography education community can have on radiography students' learning. Specifically, an asymmetry of power within the radiography education community can limit access to radiography knowledge and affect the radiography students' ability to act independently. Equally, the prevailing micro-politics of the academic and clinical settings can affect both access and the value accorded to different kinds of knowledge (Eraut, 2002). As the study's findings suggest, learning is a complex and multifaceted phenomenon and the use of the single metaphor of *participation* to holistically capture how all learning occurs is self-evidently insufficient. Further, to better understand how a radiography student learns requires individual learner biographies to be taken into account in addition to an appreciation of the complexities of learning across the multiple communities of practice which collectively consitute the radiography education community.

6.7 Recommendations

I begin with the overarching recommendations for the radiography education community at my practice setting which will contribute towards an enhanced learning experience for the radiography students and may also improve *service delivery* in clinical practice. This is followed by key specific recommendations. Interwoven within these recommendations I will outline some of the changes which I intend to make within my own role as a university radiography educator.

The radiography education community is clearly lacking a unifying pedagogic discourse. In particular, there is an absence of opportunities for cross-community working especially in the process of enacting the curriculum. This has been further compounded by the narrow interpretation of what a curriculum is. The radiography education community should take a wider view of the radiography curriculum rather than focusing almost entirely on a knowledge and product curriculum model. This will require staff development and consideration of how the programme is managed across the community. Accordingly, there are three key areas for staff development. Firstly, process, praxis and context as well as knowledge content need to be carefully considered in the collaborative development, design and implementation of the curriculum Secondly, the university and clinical educators need to reflect on their own learning and teaching skills by engaging more with pedagogy. In particular, radiography educators need to look at ways of emphasising the vocational relevance of radiography knowledge. Developing the key skills of reflection, critical thinking and self-directed learning are fundamental if the radiography students of today are to develop the knowledge base of the profession by themselves engaging in critical research and lifelong learning. The finding of a false polarisation of technical skills and patient care evokes ethical concerns and clearly identifies a key area for curriculum development. The lack of understanding of bioethical knowledge similarly requires attention. There could well be a connection between the task focused nature of radiography practice and a lack of consideration of the moral imperatives of practice. This does present a challenge if radiography students are to develop a sound knowledge of bioethics and to make judicious ethical decisions in

practice (MacIntyre, 1981; Lewis and Robinson, 2000). Consequently, the way in which these skills are both taught and assessed demands an immediate review. Thirdly, communication across and amongst the community must be improved – put simply, we need to talk more to each other. As a university radiography educator I commit to paying attention to how the meaning of radiography knowledge is derived from personal interactions, the value of real-time feedback and the impact of the different social spaces in which learning takes place. As a member of the radiography education community I will engage in a critical dialogue about these principles with other members and in doing so develop and share best practice. Further, I intend to be more proactive in developing relationships and effective channels of communication with other community members. For example, as the Chair and as a member of various university and clinical fora I will help to develop specific agenda items to support this endeavour.

The notion of a radiography practitioner's tacit or personal knowledge requires further interogation for two reasons. Firstly, unpacking this type of knowledge will help the radiography student to connect theory and practice. Secondly, a fuller understanding of tacit knowledge will facilitate a more critical evaluation of radiography practice which might ultimately result in its development. In order to achieve this aim the radiography education community must create more opportunities for critical debate about tacit radiography knowledge and its application in practice. As a university radiography educator I will continue to reflect on personal observations of tacit knowledge in the clinical setting and to

engage in more collaborative research with the clinical educators and students to further this project.

Clinical educators need to be more familiar with the curriculum with which the radiography students are engaged. This will only be achieved by further systematic collaboration between the clinical partners and the higher education institution responsible for delivering the programme. The university radiography educators therefore need to work collaboratively with the radiography education community to ascertain the reasons why the clinical educators are unfamilar with the curriculum and devise an appropriate strategy to resolve this issue. I can maintain this project during visits to my designated clinical site by engaging with and supporting clinical educators in their role.

Reviewing and enhancing clinical supervision is a priority. The findings of this study have shown that as a result of substandard supervisory practices, radiography students have considered leaving the programme. The radiography education community therefore needs to reconnect with their professional and moral responsibilities when supervising radiography students. Hence, organisational and personal barriers to effective supervision require further investigation. In the meantime I can support this task by continuing a dialogue with clinical educators and delivering supervisory workshops at clinical practice sites and developing on line materials.

6.8 Limitations of the study

The study's aims were to conceptualise radiography knowledge and radiography practice from the multiple perspectives of a single radiography education

community. The participant sample was small and the sampling strategy was non-probability and purposive. As such, the results are not generalisable due to the specific context in which this study is situated. However, the context and decision making processes have been clearly articulated, accordingly, inferences may be drawn to inform future research set in a similar framework.

The limitations should be balanced against the fact that the diagnostic radiography curriculum and the process of its enactment are under researched in the United Kingdom. To date, there have been no published studies which have investigated the curriculum and the role of radiography educators from the multiple perspectives of radiography students, university radiography educators and clinical radiography educators, that is, *a radiography education community*. Accordingly, the findings should be regarded as base-line knowledge.

Here I restate the assertion that as the practitioner researcher I bring to bear my own social world and thinking, which has been grounded in my experiences during the transition from radiography student to university lecturer. The internalisation of socially developed knowledge from such experience will undoubtedly have influenced my ontological and epistemological perspectives on radiography knowledge and practice, in addition to my views on radiography education (Denzin, 1989). Further, it is likely that my 'life world', that is, what is self-evident to me, may differ from the participants (Habermas, 1987). Accordingly, I have given a self disclosing biography in Chapter One. In addition I have maintained reflexive field notes whilst conducting the semi-structured interviews which were reviewed during the process of data analysis and data interpretation.

Developing an interview schedule for student radiographers and radiography educators (university and clinically based) presented quite different challenges.

There was commonality for both groups of educators in the sense that experience had developed and possibly redefined their concept of what constituted radiography knowledge and practice. In addition both groups possessed a high degree of tacit knowledge (Eraut 1994; Schön 1987) which had developed over years of practice. This presented its own challenges, namely how my questions could be phrased in order to make this knowledge visible and susceptible to being captured in an interview. By agreeing meaning with interviewees during the interviews and by using supplementary exploratory questions I sought to demonstrate the integrity of the data collected. (Rubin and Rubin, 2012).

There were also challenges which were specific to either the university based educator or the clinically based educator.

Many of the university based educators had not practised radiography for many years. This brought into question their ability to comment on how the radiography student might view 'practice knowledge' and also how the clinical educators might help the student make sense of this knowledge. Conversely, many of the clinical educators had not egaged with academia for many years and may have had a problem relating to this. This problem was somewhat compounded by the fact that some of the more senior clinically based educators completed a different type of training programme – the *Diploma of the Colleage of Radiographers*, that is, before radiography became a graduate profession.

6.9 The impact of this study on my own praxis

I began this thesis by describing how engaging with pedagogical discourses had enhanced my understanding of radiography education. This study has further developed this understanding by causing me to take a wider view of what constitutes a curriculum and the impact on learning of both culture and the social spaces in which learning takes place. My philosophical view on what effective radiography education is has also shifted. When began this project I thought that the student, clinical educator and university educator should maintain clearly demarcated roles within the radiography education community. I now regard colloboration, dialogic exchange and inclusivity as the key elements of effective radiography eduction.

The completion of this study does not signify the end but the begining of a project to better understand radiography education. Future publications / disseminations of this study are planned to enrich the debate on curriculum content and process in the radiography literature and radiography education conferences. When describing my recommendations from this study I also outlined proposed changes to my praxis. In addition, it is my intention to conduct collaborative research into radiography pedagogy that will result in emphasising the vocational relevance of radiography knowledge and the project of making tacit radiography knowledge more visible.

References

Adams, K., Hean, S.,Sturgis, P.,Macleod Clark, J. (2006) Investigating the factors influencing professional identity of first year health and social care students. *Learning in Health and Social Care* 5 (2) pp.55-68

Ahonen, S. A. (2008) Radiography – A conceptual approach. *Radiography* 14 pp.228-293

Ahonen, S. (2009) Radiographer's work in Finland – A Conceptual Review, *Radiography* 1 pp.61-65

Amin, A. Roberts, J. (2006) Communities of Practice? Varieties of Situated Learning, EU Network of Excellence: Dynamics of institutions and Markets in Europe, *Durham University, UK*

Andreatos, A. (2009) On the definition and impact of virtual communities of practice, *International Journal of Virtual Communities and Social Networking* 1 (4) pp.73-88

Andrew. N., Tolson, D., Ferguson, D. (2008) Building on Wenger: Communities of practice in nursing. *Nurse Education Today*, 28 pp246-252

Ardichvilli, A.; Page, V; Wentling, T. (2003). "Motivation and barriers to participation in virtual knowledge sharing in communities of practice". *Journal of knowledge management* 7 (1) pp. 64–77

Argyris, C. And Schön, D. (1978) *Organisational Learning: a Theory of Action Perspective*, Reading M.A.: Addison-Wesley

Aroni, R. , Goeman, D., Stewart, K., Sawyer, S. Abramson, M., Thein, F. (1999) Concepts of Rigour : When Methodological, Clinical and Ethical Issues Intersect. AQR Conference Melbourne, 6-8 July 1999. http://www.aqr.org.au/local/offer/papers/RAroni.htm last accessed 7/8/12

Ashton, L., Mallik, M.,Day, C., Fraser, D. (2000) An exploration into the role of the teacher/lecturer in practice: findings from a case study in adult nursing. *Nurse Education Today,* 20, pp. 178-188

Baird, M. A., (1996) The idea the reflective practicum: overcoming the dichotomy between academia and the practice setting, *Radiography* 2 pp. 119-138

Baird, M.A. (2008) Towards the development of a reflective radiographer: challenges and constraints. *Biomedical Imaging and Interventional Journal* 4 (1)

Ball. T. & Wells, G. (2006). Walking the talk: The complexities of teaching about teaching. *International Journal of Teaching and Learning in Higher Education,* 18 (3), 188-203

Bandura, A. (1982) Self-Efficacy Mechanism in Human Agency, *American Psychologist*, 37 (2)

Bandura, A. (1977) *Social Learning Theory*, Englewood Cliffs, NJ: Prentice Hall

Bandura, A. (1997) *Self efficacy: The exercise of control*, New York: Freeman

Bandura, A. (1993). 'Perceived self-efficacy in cognitive development and functioning.' *Educational Psychologist* 28 pp.117-148.

Barlow, S. (2010) What happened to duty of care? *Synergy Imaging and Therapy Practice* – June

Barlow, J., Antonio, M. (2007) Room for improvement: the experiences of new lecturers in higher education. *Innovations in Education and Teaching International* 44 (1) pp.67-77

Barnard, A. Sandelowski, M. (2001) *Technology* and humane nursing care : (ir)reconcilable or invented difference. *Journal of Advanced Nursing* 34 (3) pp.367-375

Baxter, S.K., Brumfitt, S.M. (2008) Professional differences in interprofessional working, Journal of Interprofessional Learning 22 (3) pp.239-251

Beckett, D. and Hager, P. (2002) Life, *Work and Learning*: Practice in Postmodernity , London: Routledge

Benner, P., Tanner, C. (1987). Clinical judgement: how expert nurses use intuition. *Am.J.Nursing*, 87 (1) pp. 23-31.

Bentley, H.B. (2005) Early days of radiography, Short Communication *Radiography*, 11 (1) pp. 45-50

Bentley, H.B., (2009) Radiography Journals 1935-1940 "1936", *Radiography* 15 (1)

Billett, S. (2001) Work place affordances and individual engagement at work, Journal of Workplace Learning 13 (5) pp.209-214

Billett, S., (2009) Personal epistemologies, work and learning, *Educational Research Review* 4 pp.210-219

Booth, L.(2007) Observations and reflections of communication in health care – could Transactional Analysis be used as an effective approach. *Radiography* 13 pp.135-141

Booth, L.A. Manning, D., (2006) Observation of radiographer communication: An Exploratory study using Transactional Analysis. *Radiography* 12 pp.276-282

Bourdieu, P.,Waquant L.J.D. (1992) *An Invitation to Reflexive Sociology.* Chicago: University of Chicago Press

Boyd, P., Smith, C., Lee, S., MacDonald, I. (2009) Becoming a Health Profession Educator in a University: the experiences of recently appointed lecturers in Nursing, Midwifery and the Allied Health Professions, *University of Cumbria*

Britten, N., (1995) Qualitative interviews in medical research, *BMJ* 22 (31) pp.251-253

Brookfield, S. (1995). *Becoming a critically reflective teacher.* San Francisco, CA: Jossey Bass.

Brown, A. (2004) Professionals under pressure: contextual influences on learning and development of radiographers in England, *Learning in Health and Social Care* 3 (4) pp.213-22

Brown, G., Esdaile,S.A.,Ryan, S.E. (2003) *Becoming an advanced healthcare practitioner.* Edinburgh: Butterworth Heinemann

Brown, J.S. and Duguid, P (1991) Organisational Learning and communities of practice: toward a unified view of working, learning an innovation, *Organisational Science* 2 (1) pp. 40-57

Bull, S. (2003) Skill Mix in radiography (4) *Synergy* September

Burdett, J. (2003) Making Groups Work: University Students' Perceptions, International Educational Journal 4 (3) pp.177-191

Cain, C. (1991) Personal Stories: Identity acquisition and self- understanding in Alcoholics Anonymous. *Ethos*, 19(2). pp.210-254

Candy, P. C. (1991) *Self-direction for Lifelong Learning. A comprehensive guide to theory and practice*, San Francisco: Jossey-Bass

Carnell, E., & Lodge, C. (2002) *Supporting Effective Learning,* London: Paul Chapman.

Carr, W. (2000) Partisanship in Educational Research, *Oxford Review of Education* 26 (3&4)

Castle, A., Adrian-Harris, D., Holloway, D.G., Race, A.J., (1997) Continuing Professional Development for radiographers, *Radiography* 3 (4) pp. 253-263

Castle, A. (2000) Radiography: nature of knowledge and the academic tribe. *Radiography*, 6 pp.261-268

Castle, A. (2006) Assessment of critical thinking skills of student radiographers. *Radiography* 12 pp88-95

Castle, A. (2009) Defining and assessing critical thinking skills for student radiographers. *Radiography*, 15 pp.70-76

Chaiklin, S., & Lave, J. (1993). *Understanding practice: Perspectives on activity and context.* Cambridge, England: Cambridge University Press.

Chandler, J. (1991) Reforming nurse education 2 – implications for teachers and students. *Nurse Education Today* 11 (2) pp. 89-93

Chandrasekaran, B., Josephenson, Benjamins (1999) What are ontologies and why do we need them? *Intelligent Systems and their applications* 14 (1) pp.20-26 January / February

Chapman, C., Dempsey, S.E.,Warren-Forward, H.M. (2009) Workplace diaries promoting reflective practice in radiation therapy, *Radiography* 15 (2) pp.166-170

Charmaz K (2006) *Constructing Grounded Theory: A Practical Guide through Qualitative Analysis* London Sage Publications

Clandinin, D. J., & Connelly, F. M. (1995). *Teachers' professional knowledge landscapes.* New York: Teachers College Press

Cockbain, M.M., Blyth, C.M., Bovill,C., Morss,K. (2009) Adopting a blended approach to learning: Experiences from Queen Margaret University Edinburgh, *Radiography* pp1-5

Cole, M., & Engeström, Y. (1994). Introduction. Mind, culture and activity. *An International Journal*, 1(4), p.201.

College of Radiographers (CoR) (1986) *Syllabus and Regulations for the Diploma of The College of Radiographers and For the Higher Diploma of The College of Radiographers*

College of Radiographers (CoR) (1990) *Radiography Education and Training: a New Policy*

College of Radiographers (CoR) (1994) *Code of Conduct*

College of Radiographers (CoR) (2002) *A strategy for the education and professional development of radiographers*

College of Radiographers (CoR) (2003a) *Clinical Supervision Framework*

College of Radiographers (CoR) (2003b) *Curriculum Framework*

College of Radiographers (CoR) (2003c) *Education and Professional Development: Moving ahead.*

College of Radiographers (2005a) *Education Strategy*

College of Radiographers (2005b) *Radiography Clinical Education and Capacity*

College of Radiographers (2007) *Learning and Development Framework for imaging and oncology*

College of Radiographers (CoR) (2008) *Code of Conduct and Ethics*

College of Radiographers (CoR) (2010) *Analysis of student clinical placement experience survey*

College of Radiographers (CoR) (2011) *Roles and Responsibilities in Clinical Education.*

Conway, A, Lewis, S and Robinson, J (2008) Final year diagnostic radiography students' perception of role models within the profession. *Journal of Allied Health*, 37(4), 215-221

Coombs, C.R., Park, J.R., Loan-Clarke, J.,Arnold, J., Preston, D., Wilkinson, A.J. (2003), Perceptions of Radiography and the National Health Service: a qualitative Study, *Radiography* 9 pp109-122

Cornford, I. (1997) Ensuring Effective Learning from Modular Courses: cognitive psychology –skill learning perspective. Journal of Vocational Education and Training l 49 (2) pp.237-251

Cornford, C.S., Carrington, B.(2006) A qualitative study of the experiences of training in general practice: a community of practice? *Journal of Education for teaching* 32 (3) pp. 269-282

Crabtree, B. & Miller, W. (Eds.) (1999). *Doing Qualitative Research* (2nd edition). London: Sage

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed method approaches.* Thousand Oaks, CA: Sage Publications

Crotty, M. (2003) *The Foundations of Social Research: Meaning and perspective in the research process*, Great Britain: Sage Publications

Dalley, K.,Candela, L., Benzel-Lindley,J. (2008) Learning to let go: The challenge of de-crowding the curriculum. *Nurse Education Today*, 28 pp. 62-69

Diekelmann, N., 2004. Experienced practitioners as new faculty, new pedagogies and new possibilities. *Journal of Nursing Education* 43 (3), 101–103

Denzin, N.K.; (1989) The *research act: A theoretical introduction to research methods*, 3rd Edition, Englewood NJ: Prentice Hall

Department for Education and Skills (2003) *The Future of Higher Education*
Dewey, J. (1997) Experience & Education. New York: Touchstone

Dewey, J. (2007) Democracy and Education, Middlesex UK: The Echo Library

Dill, W.R. (1998) Specialised accreditation: an idea whose time has come, or gone? *Change* 30 (4) pp. 18-25

Doyle CA, Stanton MT., (2002) Significant factors in patient satisfaction ratings of screening mammography. *Radiography* 8 pp.159-172

Dreyfus,S.E., Dreyfus, H.L. (1980) A Five-Stage model of mental activities involved in direct skill acquisition. *University of Berkeley Operations Research Center.*

Duguid, P.,(2005) "The Art of Knowing". Social and Tacit Dimensions of Knowledge and the Limits of the Community of Practice, *The Information Society* 21 pp. 109-118

Doyle, C.A. Stanton,M.T. (2002) Significant factors in patient satisfaction ratings of screening mammography. *Radiography* 8 pp.371-72

Easton, K. L. , McComish, J. F., & Greenberg, R. (2000). Avoiding common pitfalls in qualitative data collection and transcription. *Qualitative Health Research,10* (5) pp. 703-707

Eisenhart, M.A. (1991) Conceptual frameworks for research, ideas from a cultural anthropologist : implications for mathematics education researchers. http://nepc.colorado.edu/files/Eisenhart_ConceptualFrameworksforResearch.pdf last accessed: 24/9/12

Eraut, M., (2000) Non-formal learning and tacit knowledge in professional work, *British Journal of Educational Psychology*, 70 (1), March 2000, pp. 113-136

Eraut M., (2004) Informal learning in the workplace, *Studies in Continuing Education*, 26 (2) pp. 247-273

Eraut, M., (2007) Learning from other people in the workplace, *Oxford Review of Education* 33 (4) pp. 403-422

Eraut , M. (1994) Developing Professional Knowledge and Competence, London: Falmer Press

Eraut, M. (1992) Developing the knowledge base: a process perspective on professional education, in R. Barnett (Ed) *Learning to Effect.* Buckingham: Open University Press

Eyal, L., Cohen, R., (2006) Preparation for clinical practice : a survey of medical students' and graduates' perceptions of the effectiveness of their medical curriculum, Medical Teacher 28 (6) pp. 162-170

Ewens, A. (2003) Changes in nursing identities: Supporting a successful transition. *Journal of Nursing Management* 11 pp.224-228

Flaming, D. (2004) Nursing Theories as Nursing Ontologies, *Nursing Philosophy* 5 pp. 224-229

Ferris, C. (2009) Specialism in radiography – a contemporary history of diagnostic radiography. *Radiography* 15

Freire, P.(1996) *Pedagogy of the Oppressed*, Revised (1970) edition, London: Penguin

Flowers, D.L., (2004) Culturally Competent Nursing Care: A Challenge for the 21st Century. *Critical Care Nursing* 24 pp. 48-52

Fuller, A. (2007) Critiquing theories of learning and communities of practice. In *Communities of Practice: Critical Perspectives*. Eds Hughes, J., Jewson, N., Unwin, L. London: Routledge

Gambling, T. Brown, P. Hogg, P. (2003) Research in our practice – a requirement not an option: discussion paper. *Radiography* 9 pp71-76

Gibbs, V., (2011) An investigation into the challenges facing the future provision of continuous professional development in allied health professionals in a changing health care environment, *Radiography* 17 (2) pp.152-157

Gilgun, J.F. (2010) Reflexivity and Qualitative Research, *Current Issues in Qualitative Research* 1 (2) pp.1-8

Glaser, B. G., Strauss, A. L., (1967). *The Discovery of Grounded Theory: Strategies for Qualitative Research*, Chicago: Aldine Publishing Company http://faculty.babson.edu/krollag/org_site/craft_articles/glaser_strauss.html last accessed 25.10.12

Glasser, B.G. (2002) Constructivist Grounded Theory? Forum: Qualitative Social Research 3 (3) http://www.qualitativeresearch.net/index.php/fqs/article/view/825/1793 last accessed 25.10.12

Glatthorn, A.A., (1990) *Supervisory leadership*. New York: Harper Collins

Grantcharov, T. P. and Reznick, R.K., (2008) Teaching Rounds: Teaching procedural skills. BMJ, 17 May, Vol 336

Graham, D.T. and Cloke, P. (2003) *Principles of Radiological Physics*. 4th Edition. London: Churchill Livingstone.

Great Britain, Department of Health (1989) *Working for Patients*. London: The Stationary Office

Great Britain, Department of Health (1997) *The new NHS: modern, dependable*. London: The Stationary Office

Great Britain, Department of Health (1998) *A First Class Service: Quality in the New NHS*. London: The Stationary Office

Great Britain, Department of Health (2003) *Radiography Skill Mix: A Report on the Four-Tier Service Delivery Mode*. London: The Stationary Office

Great Britain, Department of Health (2000) *The NHS Plan: A Plan for Investment and Reform*. London: The Stationary Office.

Great Britain, Department of Health (2001) *Working Together, Learning Together*. London: The Stationary Office.

Great Britain, Department of Health (2004) *The NHS Knowledge and Skills Framework and Development Review Process*. London: The Stationary Office

Great Britain, Department of Health (2008) *High Quality Care For All: NHS Next Stage Review* London: The Stationary Office

Great Britain, Department of Health (2010) *Equity and Excellence: Liberating the NHS.* London: The Stationary Office

Great Britain, Department of Health (2013) *The Education Outcomes Framework.* London: The Stationary Office

Guba, E.G., (1981) Criteria for assessing trustworthiness of naturalistic inquires. *Education Communication and Technology Journal* 29 pp.75-91

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin & Y.S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 105-117). Thousand Oaks, CA: Sage.

Guillemin,M., Gillam, L., (2004) Ethics, Reflexivity and "ethically important moments in research. Qualitative Inquiry 10 (4) pp.261-280

Gqweta, N (2012) Poor academic performance: A perspective of final year diagnostic students, *Radiography* (18) pp. 212-217

Habermas, J.,(1987) *The Theory of Communicative Action, Volume 2: Life-World and System: A Critique of Functionalist Reason*, translated by Thomas McCarthy, Boston: Beacon Press

Hafferty , F. W., (2006a) Definitions of professionalism: A search for meaning and identity , *Clinical Orthopaedics and Related Research* 499 pp. 193-204

Hafferty F.W., (2006b) Measuring Professionalism: a commentary. In Stern, D. (Ed) *Measuring medical professionalism* , New York : Oxford University Press

Hafslund, B., Clare, J., Graverholt, B., Notvedt, M.W., (2008) Evidence-based radiography, *Radiography* 14 (3) pp. 343-348

Hager, P. (2005) Current theories of workplace learning: a critical assessment, in Bascia, N., Cumming, A., Dannow, A. Leithwood, K., and Livingston, D. (eds) *International Handbook of Educational Policy*, London: Kluwer

Haggis, T. & Pouget, M. (2002) Trying to be Motivated: perspectives on learning from younger students accessing higher education. *Teaching in Higher Education* 7 (3) pp.287-292.

Hall, M.,Davis,M., (1999) Reflections on radiography, *Radiography* 5 (3) pp.165-172

Hall, S.A.,Durward, B.R. (2009) Retention of anatomy knowledge by student radiographers. *Radiography* 15 (3) pp.1-7

Halcomb, E.J.,Davidson,P.M. (2006) Is verbatim transcription of interview data always necessary ? *Applied Nursing Research* 19 pp.38-42

Hamilton, J.,Druva,R. (2010) Fostering appropriate reflective learning in an undergraduate radiography course. *Radiography* 16 pp.1-7

Hammersley, M. (2000) The relevance of Qualitative Research, *Oxford Review of Education* 26(3&4)

Hammersley, M. (2005) Countering the 'new orthodoxy' in educational research: a response to Phil Hodkinson, *British Educational Research Journal* 31 (2) pp.139-155

Handley, K., Sturdy, A., Finchman, R., Clark, T., (2006) Within and beyond communities of practice : making sense of learning through participation, identity and practice. *Journal of Management Studies* 43 (3) pp.641-653

Heaven, C., Clegg, J., Maguire, P., (2006) Transfer of communication skills training from workshop to workplace: the impact of clinical supervision. *Patient Educ Couns* 60 (3) pp313-325

Heidi, L. (2012) Using Constructivist Case Study Methodology to Understand Community Development Processes: Proposed Methodological Questions to Guide the Research Process, *The Qualitative Report* 2012 Volume 17, Article 25, 1-22

Health & Care Professions Council) (2009a) *Standards of Education and Training Guidance.* London: HCPC

Health & Care Professions Council (2009b) *Standards of Proficiency: Radiography.* London: HCPC

Health & Care Professions Council (2008) *Standards of Conduct, Performance and Ethics.* London: HCPC

Health & Care Professions Council (2011) *Professionalism in healthcare professions,* Research Report, London: HCPC

Health & Care Professions Council (2012a) *Guidance on conduct and ethics for students.* London: HCPC

Health & Care Professions Council (2012b) *Your guide to our standards of continuing professional development,* London: HCPC

Henwood, S.M., Taket, A., (2008) A process model in continuing professional development: Exploring diagnostic radiographer views, *Radiography* 14 (3) pp. 206-215

Higginson, R., (2004) The theory-practice gap still exists in nursing, British Journal of Nursing 13 (20)

Hirst, P., (1993) Education theory. In Hammersley M (Ed) *Educational Research: Current issues*, pp. 149-159, London: Paul Chapman

Hildreth,P. Kimble,C. Wright,P. (2000) "Communities of practice in the distributed international environment", *Journal of Knowledge Management*, Vol. 4 (1) pp.27 – 38

Hilton, S., Southgate, L.,(2007) Professionalism in medical education, Teaching *and Teacher Education* 23, pp. 265-279

Hodge,D.,Haynes,C., LePore, P.et al., (2008) 'From inquiry to discovery: developing the student as scholar in a networked world'. Key note in P. Levy and P. McKinney (eds) *Proceedings of the 3rd Learning Through Enquiry Alliance Conf*erence. University of Sheffield: Centre for Inquiry –based Learning in the Arts and Social Sciences, pp.3-18

Hodkinson, P., Hodkinson, F. (2003) Rethinking Communities of Practice: A case study of school teachers workplace learning (Paper No. 104) *3rd International Conference on RWL*, Tampere, July 25th –27th. http://www.tlrp.org/project%20sites/IILW/pr5%20H-Tampere,Paper%20141.htm last accessed 28/9/12

Hodkinson, P., Hodkinson, F.(2004) A Constructive Critique of Communities of Practice: Moving beyond Lave and Wenger. Paper presented at *OVAL Research Group, University of Technology Sidney 11th May*

Homenko, D.F. (1997) Overview of ethical issues perceived by allied health professionals in the workplace. *Journal of Allied Health* 26 pp.97-103

Huberman, M. A. (2002). 'Moving towards the inevitable: the sharing of research in education', *Teachers and Teaching: Theory and Practice*, 8, 3/4, pp.257-68.

Hughes, J. (2007) Lost in translation: Communities of practice- the journey from academic model to practitioner tool. In *Communities of Practice: Critical Perspectives*. Eds Hughes, J., Jewson, N., Unwin, L. London: Routledge

Jackson, D., Mannix, J. (2001) Clinical nurses as teachers: insights from students on the first semester of their study. *Journal of Clinical Nursing.* 10 pp. 270-277

Johnson, J.L., Bottorff, J.L., Browne, A.J. Grewel, S. et al., (2004) Othering and being othered in the context of health care services, *Health Communication* 16 (2) pp.255-271

Jorgensen, K. M. and Keller, H. D. (2008). The Contribution of Communities of Practice to Human Resource Development: Learning as Negotiating Identity. *Advances in Developing Human Resources,* 10, pp. 525.

Karnieli-Miller, O., Stier, R., Pressach, L. (2009) Pearls, Piths and Provocation: Power relations in Qualitative research, *Qualitative Health Research* 19 (2) pp.279-289

Kember, D. (2001) *Reflective teaching and learning in the health professions.* Oxford: Blackwell Science

Kember, D. (2004) Interpreting student workload and the factors which shape students' perceptions of their workload. *Studies in Higher Education*, 29(2)

Kermode, S. (1993) The power to be different : is professionalization the answer? *Contemp Nurse* 2 (3) pp.102-109

Kidd, M.O., Bond, C.H., Bell, M.L., (2011) Patients' perspectives of patient centredness as important in musculoskeletal physiotherapy: a qualitative study, *Physiotherapy* 97 (2) pp. 154-162

Kletzenbauer, S. P. (1996) Radiographers' attitudes to skill mix changes. Radiography 2 pp. 289-300

Klein, R., (2006) The new politics of the NHS: From creation to reinvention. 5th Edition. Oxford: Radcliffe Publishing

Knight, P. T., (2001). Complexity and curriculum: a process approach to curriculum-making. *Teaching in Higher Education*, 6(3) pp.369 -381.

Knowles, M. (1975) *Self-Directed Learning. A guide for learners and teachers*, Englewood Cliffs: Prentice Hall/Cambridge

Koch, T. (2006) Establishing rigour in qualitative research: the decision trail. *Journal of Advanced Nursing* 53 (1) 19 pp. 976-986

Koch, T (2002) Reconceptualising rigour: the case for reflexivity, *Journal of Advanced Nursing* 28 (4) pp. 882-890

Koro-Ljungberg, M., Yendol-Hoppey, D., Smith, J. J., & Hayes, S. B. (2009). Epistemological awareness, instantiation of methods, and uninformed methodological ambiguity in qualitative research projects. *Educational Researcher, 38*(9), 687-699.

Kramer, A.W. Dusman, H. Tan,L.H. (2004) Acquisition of communication skills in postgraduate training for general practice. Medical Education 38 pp.158-67

Kvale, S., Brinkman, S (2009) Interviews: *An Introduction to Qualitative Research Interviewing* 2nd Edition Thousand Oaks California: Sage Publications.

Larson, W. Lundberg, N. Hillergård,K. (2008) Use your good judgement – Radiographers' knowledge in image production work. Radiography

Laukner, H., (2012) Using Constructivist Case Study Methodology to Understand Community Development Processes: Proposed Methodological Questions to Guide the Research Process, *The Qualitative Report* 17, Article 25, pp.1-22

Launer, J. (2006) *Supervision, Mentoring and Coaching: one-to-one learning encounter in medical education.* Association for the Study of Medical Education, Edinburgh.

Lave, J. (1991), Situating Learning in Communities of Practice - Chapter 4, in *Perspectives on socially shared cognition*, Eds Resnick, L.B., Levine, J.M. and Teasley, S.D., USA: American Psychological Association.

Lave, J. and Wenger, E. (1991) *Situated Learning: Legitimate Peripheral Participation*, USA: Cambridge University Press.

Lave J (1993) The practice of learning. In S Chaiklin and J Lave (eds) *Understanding practice: perspectives on activity and context*. Cambridge, UK: Cambridge University Press, pp 3-32.

Lave, J. (1996) Teaching, as Learning, in Practice *Mind, Culture and Society*, 3 (3) 149-164).

Levitt- Jones, T.,Lathlean, J., (2009) 'Don't rock the boat': nursing students' experiences of conformity and compliance. *Nurse Education Today* 29 (3) pp.612-616

Levy, P.,Little, S. Whelan, N. (2011) Perspectives on Staff-Student Partnership in Learning, Research and Educational Enhancement. In *Student-Staff Partnerships in Higher Education*, Ed Little, S. London: Continuum

Lester, F.K. (2005) On the theoretical, conceptual, and philosophical foundations for research in mathematics education. Zentralblatt für Didaktik der Mathematik 37 (6). http://www.math.ucsd.edu/~harel/Downloadable/Frank.pdf last accessed: 24/9/12

Lewis, S.J., Robinson, J.W. (2003) Role model identification by medical radiation science practitioners – a pilot study, *Radiography* 9 pp.13-21

Lewis, S.J., Heard, R., Robinson-White, K.,Poulos, A. (2008) The ethical commitment of Australian radiographers: does medical dominance create an influence? *Radiography* 14 pp.90-97

Lincoln, Y.S., Guba,E.G., (1985) *Naturalistic inquiry* Beverly Hills: Sage

Lucas S (1990) Open College and the transition to university, *Journal of Access Studies*, 5 (1) pp.35-46

Lunshof, J.E., Chadwick, R., Vorhaus, D.B, Church, G.M. (2008) From genetic privacy to open consent. Nature Reviews Genetics 9 (5) pp.406-411

Lynch, M. (2000) Against reflexivity as an Academic Virtue and Source of Privileged Knowledge. *Theory, Culture & Society* 17 (3) pp.26-54

MacIntyre, A. (1981) *After Virtue*. London: Duckworth

Mackay, S.J.,Anderson,A.C., Hogg, P. (2008) Preparedness for clinical practice – perceptions of graduates and their work supervisors. *Radiography* 14 pp.226-232

Mackay, S. (2009) "Life on Mars" Thirty Years on: Professor Stuart Mackay compares education and training experiences in the classrooms of 1979 and 2009. *Synergy Imaging and Therapy Practice* March

Magnusson, S., Krajcik, J., Borko, H. (2002) Nature, Sources, and Develoopment of Pedagogical Content Knowledge for Science Teaching in *Examining Pedagogical Content Knowledge* Eds Gess-Newsome, J. and Lederman, N.G. Science & Technology Education Library Volume 6. Netherlands: Springer

Maggs- Rapport, F. (2001) 'Best research practice': in pursuit of methodological rigour, *Journal of Advanced Nursing*, 35 (3), pp. 373-383

Marks-Maran D, Rose P (1997) Thinking and caring: new perspectives on caring. In Rose P *Reconstructing Nursing: Beyond Art & Science*. London: Baillière Tindall.

Marshall, G. (2008) Promoting independent learning by curriculum design and assessment in a taught postgraduate MRI programme, *Radiography* 14 pp. 238-245

Marshall, G., Jones,N. (2002) Does widening participation reduce standards of achievement in postgraduate radiography education? *Radiography* 8 pp. 133-137

Marshall, N., Rollinson, J. (2004) 'Maybe Bacon had a point: the politics of interpretation in collective sense making'. *British Journal of Management* 15 S71-S76

McArthur-Rouse, F.J., (2008) From expert to novice: An exploration of the experiences of new academic staff to a department of Adult Nursing studies, *Nurse Education Today* 28 pp.401-408

McCulloch, A., (2009) 'The student as co-producer: learning from public administration about the student-university relationship' *Studies in Higher Education* 34 (2) pp.171-183

McDermott, D. 1993. Review to D. B. Lenat and R. V. Guha, Building LargeKnowledge-Based Systems: Representation and Inference in the Cyc Project.*Artificial Intelligence*, 61 pp. 53-63

McGloin, S. (2008) The trustworthiness of case study methodology, *Nurse Researcher* 16(1):45-55.

McMahon, T. (2006) Teaching for more effective learning: Seven Maxims for practice. *Radiography.* 12 pp 34-44

McLaughlin, T.H. (2003) Teaching as a practice and a Community of Practice: The Limits of Commonality and The Demands of Diversity , *Journal of the Philosophy of Education* 37 (2) pp.339-352

Mednick, F. (2006) Curriculum Theories. http://cnx.org/m13293/1.9 last accessed 15th January 2013

Merriam, S.B. (1998) *Qualitative Research and Case Study Applications in Education*, USA: Jossey-Bass

Meyer, J. Land, R.(2003) Threshold concepts and troublesome knowledge: Linkages to ways of thinking and practicing within disciplines. *ETL Project Occasional report 4*

Miles, K.A. (2004) Diagnostic Imaging in undergraduate medical education. *Clinical Radiology.* 60, pp. 747-745

Miles, M. B. & Huberman, A. M. (1994) *Qualitative Data Analysis: an Expanded Sourcebook,* Thousand Oaks, Calif., Sage.

Molesworth,M., Nixon, E.and Scullion , R. (2009) 'Having, being and higher education: the marketisation of the university and the transformation of the student into consumer' *Teaching in Higher Education* 14 (3) pp.277-287

Moon, J.A. (2000) *Reflection in Learning & Professional Development: Theory and Practice.* London: Routledge

Morrell, K. (2007) 'Re-defining Professions: Knowledge, organization and power as syntax', 5th International Critical Management Studies Conference: "Reconnecting Critical Management", Manchester Business School.

Mutch, A. (2003) Communities of practice and habitus: a critique. *Organisational Studies* 24 (3) pp.383-401

Murphy, F.J., (2006) The paradox of imaging technology: A review of the literature, *Radiography* 12 pp.169-174

Murphy, F.J., Yielder, J. (2010) Establishing rigour in qualitative radiography research *Radiography*, 16, pp. 62-67

Murphy, K., (2011) The Importance of Cultural Competence. *Nursing Made Incredibly Easy 5*

Nah, G. (2012*) Living the discourse of teaching and learning in Higher Education: the lived experience of participants of the Post Graduate Certificate in Learning and Teaching.* Unpublished doctoral thesis. Kingston University and Roehampton University

NCIHE (1997). *Higher Education in the Learning Society. National Committee of Inquiry into Higher Education (Dearing Report)*

Neese, R., (2003). A transformational journey from clinician to educator. *The Journal of Continuing Education in Nursing* 34 (6), pp.258–262.

Niemi, A. and Paasivaara, L. (2007) Meaning contents of a radiographers' professional identity as illustrated in a professional journal – A discourse analytical approach. *Radiography* 13 pp.258-264

Nixon, S., (2001) Professionalism in radiography, *Radiography* 7 pp.31-35

Oakeshott, M. (1962) *Rationalism in Politics and Other Essays*, London: Metheun

Oancea, A. (2005) Criticisms of educational research : key topics and levels of analysis, *British Educational Research Journal* 31 (2) pp. 157-183

O'Connor, G. (1996) Reflection on clinical practice: A means of fostering professional development. *Radiography* 2 pp.53-56

O'Hagan, K., (2001) *Cultural competence in the caring professions.* London: Jessica Kingsley

Ogbu, S.O.I., (2008) Radiography students' perceptions of clinical placements – A Nigerian perspective. *Radiography* 14 (2) pp. 154-161

Oliver, D.G., Serovich, J.M., Mason, T.L. (2005) Constraints and Opportunities with Interview Transcription: Towards Reflection in Qualitative Research. *Soc Forces.* 84 (2) pp. 1273-1289

Orb, A., Eisenhauer, L., Wynaden, D., (2000) Ethics in Qualitative Research. *Journal of Nursing Scholarship.* 33 (1) pp.93-96

Pan, S.L., Scarbrough, H., (1999) Knowledge Management in Practice: An exploratory case study, *Technology Analysis & Strategic Management* 11 (3) pp. 359-374

Papadopoulos, I., Tilki, M., Lees, S., (2004) Promoting Cultural Competence in Health Care Through a Research Based Intervention in the UK. *Diversity in Health and Social Care* 1 pp.107-115

Pasveer, B. (1989) Knowledge of the shadows: the introduction of X-ray images in medicine. *Sociology of Health & Illness* 11 (4)

Paterson, A. (2011) Cancer: Implications for pre-registration radiography curricula. *Radiography* pp.1-4

Perselli, V. (2012) Teaching in England: December 2010. In Cannella, G.S. and Steinberg, S.R., (Eds). *Critical Qualitative Researcher.* New York, U.S.A. : Peter Lang. pp 420-428

Peterson, R.E., (2003) Teaching How to Read the World and Changing it: Critical Pedagogy in Intermediate Grades, in *The Critical Pedagogy Reader*, Eds Darder, A., Baltodano, M., Torres, R.D. New York: Routledge

Payne, K., Nixon, S. (2001) External influences on curriculum design in radiography degrees. *Radiography* 7 pp. 249-254

Pettigrew, A. (2000) Ethical issues in medical imaging: implications for the curricula. *Radiography* 6 pp.293-298

Pittillo, M.R., Morgan, M., Fergy, S. (2000) Developing programme specifications with professional bodies and statutory regulators in health and social care. Quality Assurance in Education 8 (4) pp.215-221

Pittillo, M.R., (2006) QAA, Department of Health Phase 2 benchmarking project - final report.

Poland, B.D., (1995) Transcription Quality as an Aspect of Rigor in Qualitative Research, *Qualitative Enquiry* 1 (3) pp. 290-310

Poland, B., Pederson,A. (1998). "Reading Between the Lines:InterpretingSilences in Qualitative Research."*Qualitative Inquiry* 4 (2) pp. 293-312.

Polit, D.F.,Beck, C.T. (2010) *Essentials of Nursing Research: Appraising Evidence for Nursing Practice,* 7th Edition. China: Wolterskluwer/Lippincott Williams & Wilkins

Polyani, M. (1974) *Personal Knowledge: Towards a post critical philosophy*. USA: University of Chicago Press

Porter, S (1996) Qualitative Research. In *The Research Process in Nursing* 3rd Edn. (Cormack D.F.S. ed) Oxford: Blackwell Science

Pratt, S. and Adams, C. (2003) How to create a degree course in radiography, *Radiography* 9 pp. 317-322

Price, R. Patterson, A. (1996) Radiography : an emerging profession. In Paterson, A, Price, R. Editors *Current topics in radiography* Number 2. London: WB Saunders.

Price, R.C. (2000) Radiographers and Reporting – The Early Years. *The Journal of the Radiology History and Heritage Charitable Trust.* 14: 16-29.

Price, RC. Miller, LR. Mellor, F. (2002) Longitudinal changes in extended roles in radiography, *Radiography* 8 pp. 223-234.

Price, R.C. (2006) *Developing Practice in Radiography and Diagnostic Imaging* PhD Thesis. University of Hertfordshire. https://uhra.herts.ac.uk/dspace/bitstream/2299/1056/1/Richard%20Price.%20PhD%20Thesis%20submitted%20OCT%2006.pdf last accessed 15th November 2012

Price RC, Masurier SB.(2007) Longitudinal changes in extended roles in radiography: a new perspective. *Radiography* 13 pp.18–29

Priest,H, Roberts,P, and Woods,L.,(2002) Qualitative approaches – An overview of three different approaches to the interpretation of qualitative data part 1: theoretical issues. *Nurse Researcher* 10 (1)

Prince, K.J., Boshuizen, H.P., Van der Vleuten,C.P., Scherpbier, A.J. (2005) Students' opinions about their preparation for clinical practice, *Medical Education* 39 (7) pp. 704-712

Pring, R. (2000) *Philosophy of Educational Research*, 2nd Edition. London: Continuum

Probst, H. Griffiths, S. (2009) Job satisfaction of therapy radiographers in the UK: Results of a phase 1 qualitative study. *Radiography* 15 pp.146-157

Proctor B (1987) Supervision: a co-operative exercise in accountability. *Enabling and Ensuring: Supervision in Practice*. MM and PM Leicester, National Youth Bureau and the Council for Education and Training in Youth and Community Work.

Proctor, S (1998), Linking philosophy and method in the research process: the case of realism, *Nurse Researcher* 5 (4)

Quality Assurance Agency (2001) *Benchmark Statements Healthcare Programmes, Radiography*. Gloucester: Quality Assurance Agency for Higher Education

Quality Assurance Agency (2006) *Statement of common purpose for subject benchmark statements for the health and social care professions.* Gloucester: Quality Assurance Agency for Higher Education

Rafferty, A.T.(2006) Anatomy teaching in the UK. *Surgery*. 25 pp1-2
Ramsden, P. (1992) *Learning to teach in higher education*. London: Routledge

Ramsay E (2004) Blurring the boundaries and re-thinking the categories: Implications of enabling education for the mainstream post-compulsory sector, *Australian Journal of Adult Learning*, 44 (3) pp.273-305

Reeves, P.J. and Decker, S. (2012) Diagnostic Radiography: A study in distancing, *Radiography* (18) pp. 78-83

Renner, A.,Brown, M. (2006) A hopeful curriculum: community, praxis and courage, *Journal of Curriculum Theorizing 22 (2)*

Repper, J., & Breeze, J. (2007) User and carer involvement in the training and education of health professionals: A review of the literature. *International Journal of Nursing Studies*, 44, pp.511-519.

Ryan, A. B. (2006) *Methodology: Collecting Data.* In: Researching and Writing your thesis: a guide for postgraduate students. MACE: Maynooth Adult and Community Education, pp. 70-89

Richards, L. (1998). Closeness to data: The changing goals of qualitative data handling. *Qualitative Health Research, 8,* 319–328

Richards, L. (2005) *Handling Qualitative Data: A Practical Guide*, London: Sage

Roberts, J. (2006) Limits to Communities of Practice. *Journal of Management Studies* 43 (3) pp. 623-639

Rolfe, G. (2002) *Closing the Theory-Practice Gap.* Edinburgh, Scotland: Elsevier Science Ltd

Rommetveit, R., (1987) Meaning, context and control: Convergent trends and controversial issues in current social science research on human cognition and communication. *Inquiry* 30 pp.77-99

Rose, K. (1994) Unstructured and semi-structured interviewing. *Nurse Researcher*

Roskell, C., Hewson, A., Wildman, S. (1998) The theory-practice gap and physiotherapy in the UK: insights from the nursing experience, *Physiotherapy Theory and Practice* 14 pp.223-233

Rubin, H.J. and Rubin, I.S. (2012) *Qualitative Interviewing: The Art of Hearing Data,* 3rd Edition USA: Sage Publications.

Ryle, G. (1949) *The Concept of the Mind*, London: Hutchinson

Saarikoski, M., Leino-Kilpi, H., (2002) The clinical learning environment and supervision by staff nurses: developing the instrument. *Int J Nurs Stud* 39 (3) pp. 259-267

Salter, B. (2001) Who rules? The new politics of medical regulation. Social Science and Medicine 52 pp. 871-883

Sandelowski, M., (1991) Telling stories: Narrative approaches in qualitative research, Journal of Nursing Scholarship 23 (3)

Sawdon, M. and White, P. (2008) 'Assessing knowledge decay and improving student satisfaction of feedback using the audience response system.', New horizons in medical education : ASME Annual Scientific Meeting. University of Leicester, England.

Sawyer, R. Keith. (2006). The Cambridge Handbook of the Learning Sciences. New York: Cambridge University Press.

Searle, J. (1998) Social Ontology and the Philosophy of Society, Analyse and Kritik

Segal, A (2004) Revisiting pedagogical content knowledge: the pedagogy of content/the content of pedagogy, *Teaching and Teacher Education* 20 pp.489-504

Scherer, Z., Scherer, E., (2007) Reflection on nursing teaching in the post-modernity era and the metaphor of a theory practice gap. *Revista Latino-americana de Enfemagem* 15 (3) pp. 498-501

Schön, D.(1991) *The reflective Practitioner: How Professionals Think in Action*, UK: Ashgate

Schön, D (1987) *Educating the Reflective Practitioner*, USA: Jossey-Bass

Schön, D (1983) *The Reflective Practitioner, New York: Basic Books*

Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher, 27(2),* pp. 4-13

Shenton, A.K. (2004) Strategies for ensuring trustworthiness in qualitative research projects. Education for information 22 pp.63-75

Shulman, L., (1986) Those who understand: Knowledge growth in teaching, *Educational Researcher* 15 (2) pp4-14

Shulman, L. (1992) September-October. Ways of seeing, ways of knowing, ways of teaching, ways of learning about teaching. *Journal of Curriculum Studies*, 28 pp. 393-396

Sibbald BS, Shen J, McBride A. (2004). Changing the skill-mix of the health care workforce. *J Health Serv Res Policy*, 9 Suppl 1, 28-38

Sim, J., Radloff, A. (2008) Profession and Professionalisation in medical radiation Science as an emerging profession, *Radiography* pp. 1-6

Sim, J., Zadnick, M.G., Radloff, A., (2003) University and workplace cultures: their impact on the development of lifelong learners. *Radiography*, 9 pp.99-107

Sim, J.M., (2010) A brief review of the Belmont Report. *Dimensions of Critical Care Nursing* July/August 29 (4) pp.173-174

Silverman, D. (2004) *Interpreting Qualitative Data: Methods for Analysing Talk, Text and Interaction*, Sage Publications, London

Slumming, V. (1996) Commentary: The changing world of radiography education. *British Journal of Radiology* 69 pp. 489-490

Smith, R. (2003) Thinking with each other: the perculiar practice of the university. *Journal of the Philosophy of Education* 37 (2) pp.309-323
Snaith, B.A., (2007) Radiographer –led discharge in accident and emergency – the results of a pilot study, *Radiography* 13 (1) pp. 13-17

Snelling, P.C., Lipscomb, M., Academic Freedom, Analysis and the code of professional conduct. *Nurse Education Today* 24 (8) pp. 615-621

Stake, R. E. (2006). *Multiple case study analysis.* New York, NY: Guilford

Stalmeijer, R.E.Dolmans, D.H.J.M.,Ineke H. A. P. Wolfhagen A. J. J. A. (2009), Cognitive apprenticeship in clinical practice: can it stimulate learning in the opinion of students?, *Adv in Health Sci Ed* 14 pp.535-546

Stenhouse, L., (1983) The relevance of practice to theory. *Theory into practice* **XXII** (3) pp.211-21

Stenmark, D. (2001). "Leveraging Tacit Organisational Knowledge", *Journal of Management Information Systems*, Special Winter Issue 17 (3) pp. 9-24

Sternberg, R., Forsythe, G.B. Hedlund, J. Hovarth, A.J. et al., (2000) *Practical intelligence in everyday life.* New York: Cambridge University Press

Strauss A Corbin J (1998) *Basics of qualitative research techniques and procedures for developing grounded theory* Second edition Thousand Oaks: Sage Publications

Strudwick, R., Mackay, S., Hicks, S. (2011) Is diagnostic radiography a caring profession? *Synergy Imaging and Therapy Practice* - June
Society of Radiographers (2009) *Survey of students and recent graduates.* London: SoR

Souto, C. & Turner, K. (2000) The development of independent study and modern languages learning in non-specialist degree courses: a case study, *Journal of Further and Higher Education*, 24(3) pp.385–395

Sulkowski, L (2009) Universal sources of hierarchy and power from the perspective of neoevolutionism, *Journal of Intercultural Management* 1 (2) pp59-69

Swick, H.M., (2000) Toward a Normative Definition of Medical Professionalism, *Acad Med* 75 pp. 612-616

Sword, W. (1999) Accounting for the presence of self : Reflections on doing qualitative research, *Qual Health Researcher* 9 (2) pp.270-278

Unett,E.M. and Royle, A.J.(1997) *Radiographic Techniques and Image Evaluation.* UK: Chapman&Hall

Upshur, R.E.G. (2001) Chapter 1, *The Nature of Qualitative Evidence,* Eds J.M. Morse, J.M. Swanson and A.J. Kuzel, Sage Publications, USA

Wellington, J. (2000) *Educational Research: Contemporary issues and Practical Approaches.* London: Continuum.

Wenger, E. (1998) *Communities of Practice – Learning, Meaning and Identity.* USA: Cambridge Univesity Press.

Wenger, E., McDermott, R., Snyder W.M. (2002) *Cultivating Communities of Practice*, Boston: Harvard Business School Press

Wengraf,T. (2001). Qualitative Research Interviewing: Biographic Narrative and Semi-Structured Methods. London, Thousand Oaks, New Delhi: Sage

Westbrook, C. Talbot, J. (2009) What do MRI radiographers really know, *European Journal of Radiography* 1, pp52-60

White, C., (2010) A socio-cultural approach to learning in the practice setting. *Nurse Education Today*, 30(8), pp.794-797

Whiting, C., (2009) Promoting Professionalism. *Synergy Imaging and Therapy Practice*

Whiting, C., Titmarsh, K. (2008) Enhancing learning in the clinical environment, *Synergy Imaging and Therapy Practice*

Whiting, C. (2010) Developing professionalism: how effective are we, *Synergy Imaging and Therapy Practice*

Williams, P.L. (1998) Using theories of professional knowledge and reflective practice, *Medical Teacher* 20 (1)

Williams, P.L. Berry, J.E. (2000) What is competence? A new model for diagnostic radiographers: part 2. Radiography 6 pp.35-42

Williams, P.L., White,N., Klem, R., Wilson, S.E., Bartholomew, P. (2006) Clinical education and training: Using the nominal group technique in research with radiographers to indentify factors affecting quality and capacity. *Radiography* 12 pp.215-224

Wilson, B.G (1997) The post modern paradigm. In C. R. Dills and A. A. Romiszowski (Eds.), *Instructional development paradigms.* Englewood Cliffs NJ: Educational Technology Publications

Wingate, U (2007) A Framework for Transition: Supporting 'Learning to Learn' in Higher Education. *Higher Education Quarterly* 61 (3), pp.234-251

Woodford, A.J. (2006) An investigation of the impact /potential impact of a four-tier profession on the practice of radiography – A literature review. Radiography 12 pp. 318-326

Wotton, K., Gonda, J., (2004) Clinician and student evaluation of a collaborative clinical teaching model. *Nurse Educ Pract 4* (2) pp.120-127

Wright, J., (2008) *The Role of Discourse in the Constitution of Radiographic Knowledge: A Critical Realist Account.* PhD Thesis. Rhodes University. http://eprints.ru.ac.za/1532/2/JennyWrightPhD-TR09-180.pdf last accessed 15th November 2012

Wright, S., Kern, D., Kolodner, K., Howard, D., Brancati, F. (1998) Attributes of excellent attending –physician role models, *N Engl J Med* 339 (27), pp.186-93

Yakhlef, A.(2010) The three facets of knowledge: a critique of practice based learning theory, *Research Policy* 39 (1) pp.39-46

Yielder, J. (2005) Towards an integrated model of expertise in medical imaging-part1 overview and two dimensions of expert practice, *Journal of Diagnostic Radiography & Imaging* 5 (3-4) pp.305-313

Yielder, J. (2006a) Towards an integrated model of expertise in medical imaging-part 2 three dimensions of expert practice, *Journal of Diagnostic Radiography & Imaging* 6 (1) pp.1-11

Yielder, J. (2006b) Leadership and power in medical imaging, *Radiography* 12 pp.305-313

Yielder, J., Davis, M. (2009) Where radiographers fear to tread: Resistance and apathy in radiography practice, *Radiography* 15 pp.345-35

Yin, R.K. (2003) *Case Study Research: Design and Methods*, 3rd Edition. Applied Social Research Methods Series Volume 5, London: Sage Publicatio

APPENDIX ONE

Roles and Responsibilities in Clinical Education

Responsible person: Samantha Jewell
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Summary

SCoR publishes this guidance and advice document to provide information and support for the many stakeholders involved in clinical education within the diagnostic imaging and radiotherapy professions. The quality of clinical education is paramount to the profession; academic rigour is only part of the education process and in order to have the highest quality workforce, the learning of clinical skills must be as important. This document explores the roles and responsibilities of the stakeholders, the Higher Education Institutions (HEIs), the departments providing clinical placements and the learners themselves.

1. Acknowledgements

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Also special thanks to the members of the working party for their contribution:

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2. Introduction

The Society and College of Radiographers publishes this guidance and advice document to provide information and support for the many stakeholders involved in clinical education within the diagnostic imaging and radiotherapy professions.

The quality of clinical education is paramount to the profession; academic rigour is only part of the education process and in order to have the highest quality workforce, the learning of clinical skills must be as important.

This document explores the roles and responsibilities of the stakeholders, the Higher Education Institutions (HEIs), the departments providing clinical placements and the learners themselves.

This document incorporates examples of good practice and considers how to identify and deal with failing learners. It also aims to raise awareness about the importance of creating a supportive and effective clinical learning environment and hence it is a valuable reference document for the profession.

3. Glossary of terms

Learners

Whilst the Society and College of Radiographers recognises that all individuals should be involved in continuing learning in order to maintain the currency of their knowledge and skills, it uses the term 'learners' in this document to refer to:

- Learners at pre-registration level including:
- individuals training to be assistants;
- assistants learning to become practitioners;
- direct entrants to undergraduate and postgraduate programmes leading to accreditation at practitioner level and registration with a statutory regulatory body;
- returners undertaking updating of their knowledge and skills to gain HPC registration;
- overseas radiographers developing their knowledge and skills for registration and practice in the UK.

Practitioner

The term 'practitioner' is any recognised professional employed at practitioner level (the level achieved on qualification) or above, involved in the support of learners. Normally, a practitioner would be a radiographer.

Educational Provider

The educational provider will, in most instances, be a Higher Education Institution (HEI) that is responsible for the delivery of an approved, accredited and validated programme of study. A member of the teaching team from the

HEI who visits a learner's clinical placement is usually described as the liaison tutor/lecturer or similar.

Clinical Placement

The nature of a learner's clinical placement will vary but may be broadly defined as the place where the learner develops and enhances their clinical skills, professional conduct and behaviour. A radiography practitioner who helps to coordinate a learner's clinical education and acts as a link between the clinical placement and the HEI is usually referred to as the liaison/link radiographer or similar.

4. Background

It is essential that the radiography profession continues to attract and retain those individuals committed to achieving excellence in diagnostic imaging and radiotherapy/oncology services and that their experiences as students equip them to be 'fit for purpose' in the delivery of effective services. This is fundamental to retaining and developing a workforce with the skills and knowledge to meet future service requirements.

Timely and effective teaching, learning and assessment strategies within the clinical environment are crucial as they empower and enable learners to acquire and develop their knowledge and skills. With approximately 50% of each training programme being clinically based, the Society and College of Radiographers (SCoR) recognises the essential contributions made by departments in providing clinical training and support for radiography programmes.

The organisation of clinical placements is a vital element in the preparation of competent practitioners. It is here that clinical radiographers, and other healthcare professionals, have a fundamental role as educators. However, there is often tension between the roles and responsibilities associated with meeting workload demands and providing support for learning.

Nevertheless, as a member of the radiography profession, the Code of Conduct and Ethics[1] [1] states that *'you should be willing to be involved in the supervision, teaching, training, appraising and assessing of student radiographers, assistant practitioners and trainees ...When involved in any such activities, you need to develop the skills, attitudes and practices of a caring and competent teacher/trainer. You should be objective and honest when supervising, appraising, evaluating or assessing the performance of others as service users will be at risk if you describe as competent someone who has not yet met or maintained a satisfactory standard of practice'.*

In addition, SCoR's Learning and Development Framework for Clinical Imaging and Oncology 2008[2] [1] states *'A strong relationship between the learner, the clinical department and the education provider should operate to facilitate professional development'*.

It is in this context that the subsequent sections of this document explore the roles and responsibilities of the stakeholders involved in clinical education, ie, clinical placement providers, the education providers and the learners.

5. Good Practice in Clinical Education

The following framework is based upon recommendations from the Professional, Statutory and Regulatory bodies (PSRBs) associated with radiography education. Government Policy and more recent research by Jackson[3] [1] has examined the role of the university-based and clinically-based radiography educators. Further, the framework promotes the notion of a 'learner- centred' approach to radiography education that is both evidence-based and encompasses the use of innovative learning technologies.

The documents that are particularly salient to the nature and scope of this framework include:

- Learning and Development Framework for Clinical Imaging and Oncology (CoR, 2007)
- Clinical Education and Training: Capacity and Quality – Executive Summary (CoR,2004)
- Code of Conduct and Ethics (CoR, 2008)
- Standards of Proficiency (HPC, 2009)
- Radiography Bench Mark Statements (QAA, 2001)

A Framework for Good Practice:

- Learning should be acknowledged as a core activity within diagnostic imaging and radiotherapy departments and, within the constraints of service provision, should be made a priority for both staff and learners at every level.
- Emphasis should be placed on the fact that teaching, learning and assessment of learners are both statutory and professional obligations. Evidence from both the CoR study[4] [1] and Jackson's 2010 study[3] [1] suggest that the level of learner support and supervision is variable. Similarly, both studies revealed that the culture in the clinical placement and the personality of clinical supervisors have profound effects on the learner and the learning process. Accordingly, where weaknesses or risks are identified, collaborative robust solutions should be sought by the HEI and the practice placement in a timely manner.

- There should be an acknowledgement that learners achieve learning outcomes at different times over a period of study or training. The learning process should therefore involve negotiation and a degree of flexibility, for example, this may include accommodating a range of patterns of work (where feasible) and the use of innovative learning technologies.
- Learning should be subject to regular and systematic auditing for quality to ensure that a congruence of expectations is achieved amongst all stakeholders in radiography education, ie, practice placements, HEIs and learners. Audit should include:
  - the quality of the learning experience;
  - provision of learning resources;
  - physical capacity for learning;
  - feedback from the learners and the supervisors;
  - proposed enhancements and action plans;
  - governance of the learning experience should be maintained by close collaboration amongst all stakeholders involved in radiography education, ie, practice placements, HEIs and learners;
  - clear lines of communication should be established and maintained between practice placements and HEIs, such that all stakeholders are familiar with the expectations of the radiography curriculum and the constraints placed on learning by service provision. This should include timely notification of any changes of circumstance.

- HEIs should work collaboratively with current and potential clinical education providers to:
  - develop innovative learning opportunities by exploring, for example, use of placements in the primary care and independent sectors;
  - fully utilise available technology, where appropriate, to support learning;
  - facilitate the development of teaching and supervisory skills for professional practice from pre-registration level onwards;
  - monitor capacity and regularly review, scope and evaluate potential learning capacity;
  - ensure that learning is both current and evidence-based;
  - ensure that the integration of theory and practice is central to the learning process.

6. Dealing with Failing Learners Effectively

Concerns have been expressed, mainly within clinical departments, that unsuitable learners might 'get through' their radiography education programmes and go on to register as radiographers. It has also been suggested that some clinical mentors/clinical assessors or other clinical staff with roles in the assessment of learners do not see it as their role to fail a learner. Rather, they feel this needs to be the role of the academic educators or the HEI.

Reasons for not failing a learner

Failing a learner can be problematic and this can lead to 'failing to fail' a learner. Some tentative reasons for this phenomenon have been highlighted by the seminal work of Duffy[5] [1]:

- Clinical staff find assessment documentation confusing and full of educational terminology with unclear guidance.
- Clinical assessment criteria are deficient, allowing learners to pass when they are not sufficiently competent.
- Learners spend insufficient time on placements to allow clinical staff to work with them and, owing to other commitments, clinical staff feel unable to assess learners competently.
- Although recognising the professional responsibility to prevent unsafe learners from becoming registered, it is often difficult to take action which could have serious personal consequences for the individual learner, eg, discontinuation on a programme.
- There may be a fear of the consequences of failing a learner and opening up a 'hornet's nest'.
- Clinical staff may feel like they have failed the student themselves.
- It can be viewed as an uncaring practice, given that radiography is caring profession.

The potential impact of not failing a learner

- A failing learner may become a radiographer who does not have the requisite skills to perform their role safely and in an effective manner.
- Such an individual may become a radiographer with potential adverse consequences for the public and him/herself.
- These occurrences and situations cause tensions between clinical placements and educational providers

A good practice model for supporting failing learners

It is imperative that the approved assessment criteria and the established guidelines for the clinical performance and behaviour of learners are followed. If the programme documentation provided by the educational provider is unclear, clarification should be sought at the earliest opportunity. Non compliance with the agreed processes makes it very difficult to support the learner in a timely and appropriate way. **The key message here is that it is of paramount importance that learners who are failing should be clearly identified as early as possible in their learning, and support provided as soon as is practicable.**

All educational providers will have established policies and procedures to support a learner who is failing and these will outline the stages for identifying

the failing learner and the support mechanisms in place to address clinical performance and behavioural issues. The nature and degree of failure will vary, as will the context and implications for the safety and well being of patients, the learner and the supervising practitioner(s). In the first instance, supervising clinical staff should assess the situation and act accordingly. If the situation permits a planned course of action, the following offers a model that might be adopted:

- Stage one – should a learner not be achieving the expected level of attainment or progression, in the first instance, the supervising clinical staff should meet informally with the learner and a representative from the educational provider. This meeting should result in the development of an action plan for the learner which encompasses the support agreed by the educational provider and the clinical placement, and a review date.
- Stage two – if there is no tangible improvement or if the situation escalates, the clinical placement staff should seek the advice of the educational provider who will apprise them of the appropriate course of action to be taken.
- Learners may visit various clinical placement sites during their programme of training. Where appropriate, the educational provider should communicate any issues that a learner may have to subsequent clinical placements. Where such communication takes place, care must be taken to ensure that it focuses on the learner's needs and how these are best addressed by the clinical placement.

7. The Role of the Clinical Placement Provider

It is expected that all clinical placement providers will organise placements for students that are of acceptable quality. It is the joint responsibility of the HEI and the clinical department providing a placement to ensure that clinical supervisors/mentors/assessors or similar are prepared for their roles so they can confidently facilitate student learning through supervision and assessment.

While many departments have adopted a pro-active approach to the development of life-long learning, there is evidence to suggest that, in some, teaching is not considered an important role and/or staff are not sufficiently prepared to carry out teaching responsibilities. The behaviour of staff towards learners has a significant effect on the quality of learning. Further, the departmental culture and general motivation to support learning are identified as key factors in the creation of high quality clinical learning opportunities.

The Society and College of Radiographers expects that there will normally be a main agreement or contract in place between an education provider and associated clinical placement providers, under the aegis of the local

education commissioning, contracting or funding arrangements as appropriate. This should assist in safeguarding the quality of clinical learning for learners.

As part of the service manager's role in clinical education, there is the responsibility for ensuring that:

- there is a clear policy on the management of learner placements in the department;
- all staff understand the importance of having learners within the clinical environment and that they all assist in the learners' development;
- the roles of clinical assessor/mentor/practice educator or similar are reflected in job descriptions;
- learners are provided with an induction to the department;
- an identified member of staff takes responsibility for student placements, including communication, liaison and feedback to the HEI and clinical staff;
- issues concerning learners are a standing item on the agenda at staff meetings, providing regular opportunity for dialogue and that the service responds to issues that arise;
- the learner's attendance is recorded and remains at an acceptable level. It is important that the programme director or course leader is informed of notable absenteeism to be able to deal with this effectively.

As part of the clinical staff's role in clinical education, there is individual responsibility for ensuring that:

- they are familiar with the programme curriculum and design;
- they understand the standards and achievements expected at each level of training and have a clear understanding of the learning outcomes expected to be achieved by each learner;
- they offer a level of supervision appropriate to the competence and experience of the individual learner; both learner and supervisor should at all times be aware of their direct responsibilities for the safety of patients in their care;
- they act as a resource for learners seeking specialty information and guidance;
- special consideration is given to identifying learning opportunities for first year undergraduate students, as this is where the highest level of attrition occurs;
- they meet the learner to establish a supportive relationship;
- the learner is provided with opportunities to comment on their training, support is provided and the learner is able to discuss any problems he or she has identified;

- they hold regular review meetings to evaluate the learning objectives to ensure they have been met, giving feedback and highlighting areas that may need additional assistance.

Service managers and staff should work in partnership with HEIs to ensure that:

- there is good communication and effective feedback between HEIs and placement providers. This is essential in ensuring that both learners and supporting staff are clear about the expected outcomes, the relationship between theory and practice, and the criteria for teaching and assessment in the clinical department;
- clinical supervisors are fully supported;
- the learners are making the necessary clinical and educational progress;
- where a learner's performance is not reaching the required standard, the proper discussions and actions take place, and records are made and maintained. It is important that discussion with the learner takes place and remedial measures are put in place as soon as possible, with clearly defined written objectives to assist the learner in reaching the required standard;
- learners have an opportunity to correct any deficiencies identified and this is recognised as being a very important and supported part of the learning process;
- learners' supervisors/mentors/assessors or similar provide the relevant information about all learners' progress and performance to the programme director/course leader, informing them immediately should any individual learner give rise for concern.

8. The Role of the Education Provider

The following sections outline the roles and responsibilities of the education provider in supporting both the learner in their clinical education and the clinical staff.

Preparing learners for a clinical placement

Whilst it is acknowledged that a learner on their first clinical placement or those practitioners who are returning to practice are in particular need of support and guidance, the preparation and support of the learner is a continuous process.

The role of the education provider in preparing learners for clinical placement is to ensure that learners are:

- made aware of their professional responsibilities and expected professional conduct and behaviour. Here, reference should be made to

the SCoR Code of Conduct and Ethics1 and those related documents published by the Health Professions Council;
- aware of the radiation protection measures in place and their role in ensuring that such measures are always applied;
- able to contribute to medical imaging examinations/protocols for patients receiving radiotherapy, appropriate to their level of study, under the direct supervision of a registered practitioner. This may be reinforced by simulated learning exercises organised by the educational provider or placement provider;
- conversant with medical imaging/radiotherapy terminology appropriate to their level of study;
- given a generic overview of what to expect, how they fit into the imaging/radiotherapy team and the wider interactions with other health care professionals. This may be achieved, in part, by giving learners the opportunity to meet with clinical staff prior to attending their clinical placement where possible;
- fully conversant with the methods of assessment employed in clinical practice; these will vary with educational level and programme of study.

Supporting learners in clinical practice

Support during clinical placements by the education providers is pivotal and can take a number of forms. Below are some examples:

- An identified academic tutor/lecturer or similar from the education provider may visit learners on a regular basis. This helps the learners to connect the academic and clinical skills components delivered during their programme. Additionally this helps to establish a good working relationship between the education provider and the placement provider. If such clinical visits are not feasible, regular contact should be maintained with the learner and a meeting should be scheduled at least once per semester/period of study.
- The liaison/clinical tutor/professional development facilitator or similar may provide academic and pastoral support for the learner. This may involve apprising clinical colleagues of changes of circumstance or particular needs that a learner may have.
- Attendance at clinical placement should be documented and a learner's progress should be reviewed on a regular basis. Appropriate action should be taken where necessary.
- Support for the philosophy of lifelong learning through emphasis on key skills and learning strategies during the preparation of learners for clinical practice, with continuous reinforcement of these throughout the programme of study.

Supporting service managers and clinical staff

Service managers and clinical staff require continuous support to enable them to deliver a high standard of clinical supervision and to facilitate timely learner progression and achievement. To accomplish this:

- education providers need to fully acquaint service managers and clinical staff with the curriculum that the learner is engaged with. This includes models of assessment and assessment criteria and expected stages of attainment according to level of study. This may be, in part, fulfilled by the provision of up-to-date programme documentation;
- it is advisable that educational providers deliver regular training sessions to service managers and clinical staff including how to support a failing learner;
- a designated member of the academic teaching team should be easily contactable should a query arise about a learner's curriculum or progress;
- it is of paramount importance that education providers build and maintain a good rapport and excellent working partnerships with their placement providers. This may be achieved through clinical visits and inviting clinical staff to appropriate committee meetings convened by the education provider. Such committees also help to maintain curriculum developments that align with changes in clinical practice;
- the quality and consistency of clinical supervision should be regularly audited. Where risks are identified, they should be jointly addressed by the clinical placement provider and the education provider working together;
- issues relating to professional suitability and conduct should be jointly discussed and addressed by the education provider and the clinical placement provider.

9. The Role of the Learner

The characteristics of each learner will vary with age, educational and life experiences. However, every learner has a key role to play in developing themselves and identifying their own specific learning needs during a programme of study. Accordingly, all learners should:

- be proactive in identifying their own learning needs and able to articulate these;
- take responsibility for planning and auditing their own learning and progress in conjunction with the clinical staff and their educational provider;
- be conversant with the curriculum of their own programme of study, including methods of assessment and the role played by the clinical supervisor in the assessment process;

- be aware of, and be compliant at all times with local rules, placement providers' policies, statutory and professional regulations and codes of conduct and behaviour;
- inform the education provider of any changes to personal circumstances. This includes illness and criminal record bureau (CRB) status;
- maintain high levels of attendance and punctuality. If learners are unable to attend clinical practice, it is their responsibility to inform both the education provider and the clinical placement;
- attend clinical placement in a uniform that complies with workplace regulations and standards.

10. Summary

This document has explored the roles and responsibilities of all stakeholders involved in clinical education. It is clear that there needs to be close links between the education provider and the clinical placement and that learners also need to take responsibility for their own learning. The best learner experience occurs where the education provider makes clear their expectations and supports service managers and the radiography workforce to enable them to provide a high quality clinical learning experience. In this way, the learners understand what it means to be a member of the radiography workforce and are clear about the standards they have to meet to be successful.

SCoR recommends that education providers and clinical placement providers review their current procedures and, if necessary, make the changes necessary to take into account the examples of good practice described in this publication.

11. References

1. The Society and College of Radiographers, Code of Conduct and Ethics, London SCoR 2008
2. The Society and College of Radiographers, Learning and Development Framework for Clinical Imaging and Oncology, London SCoR 2008
3. Jackson M T, Conceptualising radiography knowledge and the role of radiography educators: Perspectives and experiences of a radiography education community.Doctor of Education Thesis, 2011
4. The Society and College of Radiographers, Clinical Education & Training: Capacity & Quality - Executive Summary, London SCoR 2004
5. Duffy K, Failing students: a qualitative study of factors that influence the decisions regarding assessment of students' competence in practice, 2003

APPENDIX TWO

Email to Potential Participant's

Date xx/xx/xx

Dear .....

Re: A research study to investigate *"Conceptualising radiography knowledge and the role of radiography educators : Perspectives and experiences of a radiography education community"*

As part fulfilment of my doctorate of education I must complete a research study. The aim of my study is to investigate how radiography educators (university and clinically based) might help the radiography student acquire 'professional knowledge'

I write to you to ask if you would be willing to take part in this study. You have been selected as you form part of the radiography community in my own practice setting.

Please carefully read the attached participant information sheet which has more details about the study. Please note the participation is voluntary. If you are willing to participate please contact me at your earliest convenience.

With kind regards

Yours sincerely

Marcus Thomas Jackson

APPENDIX THREE

Participant Consent Form

CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Provisional Title: *"Conceptualising radiography knowledge and the role of radiography educators : Perspectives and experiences of a radiography education community"*

Investigator: Marcus Thomas Jackson

Statement of consent by participant

- I can confirm that I have read and understood the study's information sheet and letter of invitation. I have been informed of the purpose, risks and benefits of the study.
- I understand the participation is voluntary and that I may withdraw from the study at any time without giving a reason.
- I fully understand what my involvement will entail and that all my questions have been answered to my satisfaction.
- I understand that all interviews will be recorded for the purposes of transcription and analysis. I also understand that I will be shown a transcription of my interview with the option to amend or delete any comments before this included in the study.
- I understand that I will not be identified on any transcriptions and that these transcriptions along with the investigators notes will be securely stored.
- I understand that all conversations will remain confidential.
- I agree that research data gathered may be published provided that I cannot be identified as a participant.
- Contact details have been provided should I wish to contact the investigator during or after completion of the study.

Participants signature .....Date .....

Statement by Investigator:

I have explained the purpose and methods of this study, implications of participation and the right to withdraw. I believe that consent to participate is fully informed.

Signature of Investigator : M T Jackson Date .....

APPENDIX FOUR

Interview Schedules

Radiography Educators (university & clinically based) 1 hour

Re-iterate the purpose and method of the study, re-emphasise confidentiality and anonymity of the participants responses. Confirm that the participant is happy to proceed. Remind the participant that they may withdraw from the interview at any time.

Ice breaker

The participant's education and professional background

Opening question: I wonder if you could tell me a little bit about your educational and professional background?

Prompts & areas to explore:

- Prior education DCR or BSc / post registration education & development
- Professional experience (radiography / before joining the radiography community)

1. **Professional knowledge required of the contemporary radiography practitioner**

   What 'professional knowledge and skills' do you think a radiographer practitioner requires in the 21st Century?

Prompts & areas to explore:

- Process, propositional, tacit domains of knowledge (clarify terms if necessary)
- Particularly important knowledge domains for effective practice
- Domains of knowledge currently not included in the radiography student experience but should be
- Domains of knowledge which should be brought to the fore / emphasised more

2. **The role of the radiography educator in helping the radiography student construct and garner some meaning of professional knowledge**

   What role do you think you play in helping the radiography student acquire professional knowledge?

Prompts & areas to explore:

- What do you see as your role in the process
- Do you evaluate the radiography students professional knowledge (if so how ?)
- What teaching and learning models do you use
- How might you improve / enhance the process of professional knowledge acquisition
- Do you make any assumptions about the radiography students existing knowledge (if so what is this based on?)
- How important is the theory of radiography in relation to day-to-day practice
- The relationships that exist between university based and clinically based radiography educators

Other comments

Prompts & areas to explore:

- Is there anything you would like to add
- Are there any important questions or areas I should have included

Thank the participant for their time. Ask the participant if they would be happy to be approached again following transcription of the interview if clarification is required. Remind the participant that they will be shown the transcript and that they can amend /delete any comments before it is included in the final study.

Radiography students (Level 5 and Level 6) 1 hour

NB: Reassure the participant that this research is in no way connected to their assessment or progress on the radiography programme

Re-iterate the purpose and method of the study, re-emphasise confidentiality and anonymity of the participants responses. Confirm that the participant is happy to proceed. Remind the participant that they may withdraw from the interview at any time.

Ice breaker

The participant's education and professional background

Opening question: I wonder if you could tell me a little bit about your educational and professional background?

Prompts & areas to explore:

- Prior professional and educational experience before becoming a radiography student
- Any prior knowledge or experience which will or has been used during radiography education

1. Professional knowledge required of the contemporary radiography practitioner

What 'knowledge' and skills do you think a radiographer should have in the 21st Century?

Prompts & areas to explore:

- If necessary explain the question
- Process, propositional, tacit domains of knowledge (clarify terms if necessary)
- Particularly important knowledge domains for effective practice
- Domains of knowledge currently not included in the radiography student experience but should be
- Domains of knowledge which should be brought to the fore / emphasised more

2. The role of the radiography educator in helping the radiography student construct and garner some meaning of professional knowledge

What role do you think the university lectures and clinical staff play in helping you acquire professional knowledge?

Prompts & areas to explore:

- Start with the university lecturers, then the clinical staff
- Does the setting making any difference to your learning
- Tell me about the methods of teaching used by university staff and clinical staff – does this match your preferred way of learning
- Do staff make any assumptions about your existing knowledge (if so what is this based on?)
- How important is the theory of radiography in relation to day-to-day practice
- The relationships that exist between university based and clinically based radiography educators
- How could the university staff or clinically based staff help / enhance your acquisition of 'professional knowledge'?

5.Other comments

Prompts & areas to explore:

- Is there anything you would like to add
- Are there any important questions or areas I should have included

Thank the participant for their time. Ask the participant if they would be happy to be approached again following transcription of the interview if clarification is required. Remind the participant that they will be shown the transcript and that they can amend /delete any comments before it is included in the final study.