Transfer of learning in undergraduate radiotherapy education - An Exploration of the Recontextualisation of Patient Safety Knowledge in the Curriculum

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I, Kumud Titmarsh confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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Abstract

This empirical case study explores what constitutes patient safety knowledge in the therapeutic radiography (TR) curriculum and how undergraduate students transfer this type of knowledge from the classroom to the workplace. Drawing on Guile and Evans' theory of recontextualisation (2010), the theoretical framework examines how the curriculum content and pedagogic practices from an undergraduate TR programme, based in a UK higher education institution, transfer to a placement programme based in a Foundation Trust Hospital where the students undertake workplace experience.

The methodology used a qualitative, interpretive paradigm. Data collection between January and April 2015 involved documentary analysis of course documents and semi-structured interviews with undergraduate students, workplace educators and faculty staff. Observation involving level five students was undertaken in the workplace.

Research findings showed that knowledge was recontextualised in the operation of the radiotherapy equipment, in the implementation of infection control measures and in the identification of patients. Additionally, content recontextualisation of professional and regulatory guidance showed that the safe use of ionising radiation constituted the core knowledge of radiography practitioners. Conclusions were that patient safety was multidimensional in practice thus defying the attempt to contain this concept as a discrete entity.

This research forms the first study in the field of TR showing a socio-cultural understanding of how professional statements are recontextualised in the practice of patient safety. Curriculum statements regarding skills development and proficiency constitute an informal, self-directed workplace curriculum that is driven by students' motivation to become competent practitioners. This study contributes to the literature on patient safety in the undergraduate healthcare curriculum and highlights the omission of the systems approach in the TR curriculum. In the application of the theoretical framework of recontextualisation, recasting of practice knowledge from the workplace into the formal TR undergraduate curriculum is shown thus demonstrating the explanatory power of this conceptual lens in this radiography discipline.

Keywords: patient safety, healthcare, recontextualisation, therapeutic radiography, knowledge transfer, undergraduate education, workplace learning

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Abbreviations and Glossary

CHFG	Clinical Human Factors Group
CQC	Care Quality Commission
DH	Department of Health
HCP	Healthcare professional
HCPC	Health and Care Professions Council
HE	Higher Education
HEI	Higher Education Institution
ICRP	International Commission on Radiological Protection
IPEM	Institute of Physics and Engineering in Medicine
IR(M)ER	Ionising Radiation (Medical Exposure) Regulations 2000
MRSA	Methicillin-resistant Staphylococcus aureus
NHS	National Health Service
NPSA	National Patient Safety Agency
PHE	Public Health England
PRSB	Professional, regulatory and statutory body
RCR	The Royal College of Radiologists
SCoR	The Society and College of Radiographers
SOP	Standards of proficiency
TR	Therapeutic radiography
UK	United Kingdom
VERT	Virtual Environment for Radiotherapy Training
WHO	World Health Organization

Linear accelerator (Linac)	Specialist equipment used to produce high energy x-rays for cancer treatments so they are able to penetrate deep inside the human body.
Justification	The process of determining whether the planned radiation exposure is likely to benefit the patient and that it outweighs any harm.

Optimisation	The process of determining what level of protection and safety measures should be applied to ensure the radiation exposure to the patient is as low as reasonably achievable. This process may be extended to consider the workspace and public safety too.
Therapeutic radiography	A discipline in cancer care in which ionising radiation is used to treat people diagnosed with cancer. Also known as radiotherapy.
Therapeutic radiographer	A practitioner qualified in the field of therapeutic radiography is entitled to use this title following membership of the Health Care Professions Council.
Tumour site	A named site corresponding to the anatomical location of the cancer in the human body.

Reflecting on my doctoral journey

I began my doctorate in education for personal and professional development. From a professional perspective, the field of radiography is still developing as a graduate profession with few members of the profession holding credentials at doctoral level, therefore my intention is to achieve this qualification. Reflecting back on my journey over the past seven years, I concede that the EdD has given me more than I had anticipated. In this context, both definitions of the word 'journey' in the on-line Oxford dictionary hold true (Oxford University Press, 2016). For example, travelling to the Institute of Education (IoE) has been highly beneficial as I have developed a broader perspective of education through shared learning with students from different disciplines. I have forged new relationships with peers and staff that have resulted in new friendships. During periods of angst, being in the IoE space has provided reassurance and comfort. The second definition relates to the process of 'personal change and development', which is discussed further. In the following account, I reflect on how my EdD experience has impacted upon my professional practice as an academic in HE and in my discipline of therapeutic radiography as I began exploring my own position on subjects relating to my practice. Thus, my journey focuses on three key areas: knowledge improvement, the emergence of my research, and the impact on my professional practice.

Development of knowledge

In reviewing my EdD journey thus far, it is evident that my professional practice as a therapeutic radiographer has been an underlying theme throughout the various modules. My interest has been foregrounded in the education of therapeutic radiographers. Consequently, I have a dual identity - as an academic and a therapeutic radiographer. During this journey, I feel the former has developed a stronger presence as the EdD has offered an opportunity to explore the teaching and learning of my disciplinary practice through scholarship and research, characteristics that have been identified with the work of academics (Archer, 2008). These have been evident in the research in my first module, foundations of professionalism, where I explored the concept of professional values and how these were enacted by students on placements

in the undergraduate TR curriculum. This small-scale research set me on my path to develop understanding of my professional practice. My findings confirmed my views that pursuing a newly adopted linear model that developed professional values throughout the three years of the programme was appropriate. The model had resulted from a colleague's EdD thesis, and findings from my own empirical enquiry inspired me at this early stage of my education.

Furthermore, I was able to explore one particular professional value: the concept of respect from a psychoanalytical perspective. This endeavour was particularly challenging as the concepts were new to me, and attempting to learn and understand new terminology and language resulted in great anxiety, which interfered with my learning during this time. On several occasions, I doubted my ability to rise to the challenge of the complexity of thinking required at doctoral level, considering myself to be a 'deficit model' (Andrews and Edwards, 2008:4). As many of the issues were relevant to my practice in education and in the clinical environment, I persevered with the specialist course module.

Nevertheless, the knowledge and understanding of defensive behaviours have impacted in other ways in everyday practice, such that they have influenced my communication with individuals in my workplace. For example, with some people, I have modified my interaction and persevered to understand their concerns. I have observed how insecurities have manifested in work practices and attempted to support people where these have involved me. At other times, adopting the paternal role and tolerance with some individuals has also challenged my patience.

The research modules have deepened my knowledge through discussions in the workshop sessions and my own research with two significant consequences. The first concerns the impact on my research supervision skills where I have been able to share my knowledge with students at both undergraduate and Master's level. With the latter, I have greater confidence in guiding students during the research process, which has been important in building rapport with experienced radiographers in the early stages of their

careers and steering them towards success. The second relates to my skills development in data collection and analysis for research. For the Methods of Enquiry (MoE) 2 assignment, the importance of rigour in the research process was a particular highlight that required further attention. I had previously used content analysis for a phenomenological study in the early 1990s. During my recent efforts, I began to make changes to demonstrate the necessary rigour to illustrate a scientific pathway of knowledge production (Holloway and Biley, 2011). Consequently, Miles and Huberman's book on qualitative data analysis became an invaluable aid that has been used since in the Institution-Focused Study (IFS) and has been built upon for the thesis.

Another area of development involved using NVivo for data analysis. This activity also generated considerable anxiety in the early stages. However, perseverance with NVivo proved to be valuable as I now feel more comfortable in using the software although I still have more to learn. Nevertheless, I feel better able to explore these issues after completion of a short course on analysis of qualitative research data at the University of Surrey.

Emergence of doctoral research

In my doctoral application, I outlined my interest in researching technology-enhanced learning. My focus was students' experience of situated learning using a virtual environment for radiotherapy training (VERT), which was a new acquisition in my School. So the concept was developed further in the research outline for MoE 1. Thereafter, the research design was executed for my IFS, which posed significant challenges with the selected methodological tool. As I grappled with the concept of activity theory, my insecurity began to resurface. On occasions, I felt overwhelmed as the concept of the 'deficit model' began to take hold (Andrews and Edwards, 2008:4). Regardless, I persevered with my research to a successful conclusion, and in the next section I will reveal how this research has affected my practice.

As the premise for simulation based learning was to improve patient safety, I began exploring the concept of patient safety. The idea for my thesis was therefore based on how undergraduate students practise patient safety in the

NHS where students routinely have placements. I underestimated the time that was required in the crafting of the proposal and the preparation for the formal review, which mainly resulted from indecision regarding the focus of the research. However, the feedback from the reviewers has been helpful in shaping this aspect of the thesis. Whilst I was aware of the logistic issues of access for data collection, this too was challenging in securing permission from the relevant agencies. Main concerns related to fulfilling the remit of the ethical approval processes, which were different for each of the three institutions involved with this research. The principal NHS gatekeeper's change of mind resulting in refusal of access for data collection induced considerable anxiety at one stage. Subsequently, in the following three months, I reviewed my options when the gatekeeper emailed me with news about the reversal of the original decision. Whilst this was welcome news, this event also revealed the nature of unforeseen circumstances in destabilising scheduled plans and the emotional self in research - an example of a 'journey that is aided and sometimes hampered….' (Miller and Brimicombe, 2003). Nevertheless, the journey continued and in the next section, I consider the impact of the EdD in Education on my professional practice.

Impact on professional practice

Undertaking empirical research for the MoE 2 module has led to embedding an alternative way of incorporating the service user experience in my teaching. Consequently, I presented a poster at the Annual Radiotherapy Conference in 2014 to showcase my research findings and disseminate them to a national audience. In Sept. 2015, I shared the results of my IFS research with peers in my discipline at the 5th Annual VERT Conference because the pedagogical approach was unique and therefore warranted dissemination and discussion within the TR profession. My research findings revealed that using a workbook as a tool for self-directed learning had engaged students. Furthermore, the activities provided a tool for 'legitimate peripheral participation', allowing students to learn the language and practices of TR thereby engaging students in their quest to join a community of practice (Lave and Wenger, 1991:29). Consequently, this is now embedded in the undergraduate curriculum. As a result of these activities, I feel I have embarked on the path of research-

informed teaching where my teaching is ‘underpinned by research’ (Lea, 2015:61). Here, I offer one interpretation although I am aware of the ongoing discussion regarding the research-teaching nexus.

Confidence in my own understanding of the subject matter also enabled me to move outside my ‘comfort zone’ by taking part in broader professional issues. For example, in 2012, I undertook the role of External Examiner at a post 1992 University to fulfil a long-held personal ambition to contribute to my profession. My first exam board was daunting as I was the chief examiner for the radiotherapy and oncology course. During my term with the University, my role in scrutinising the curriculum, teaching, and assessment methods on all the modules, together with my attendance at module and programme boards allowed me to uphold the University’s standards. I know my advice was valued as it was actively sought on several occasions by the Course director and the Chair of the Assessment boards.

In December 2014, I became involved in my Institution’s application for the Race Equality Charter Mark following an internal announcement regarding the attainment gap between white and Black and Minority Ethnic students. This stemmed from a personal interest to support the diverse group of students that constitute both radiography disciplines. By applying my EdD knowledge of research skills, I contributed to the student pipeline team by reviewing questions for data collection. I have also assessed and analysed data that impact upon students’ experience, as well as early career researchers which has been very satisfying.

In conclusion, the EdD has allowed me the space to explore my own professional practice through various discussions with peers on my course. Occasionally, engaging in a discussion in my workplace kept my intellectual curiosity alive, which was necessary to develop my own thinking for the doctoral studies as being a part-time student meant that I mostly interacted with my peers during the contact sessions. As we all had a ‘day job’, maintaining contact with my peers at the Institute became problematical when we were juggling busy workloads and family commitments with our new identity as a part-time student. These tensions of fulfilling multiple commitments were frequently

mentioned by my peers in both student communities, which was also reflected by Butcher (2015:32) in his report on part-time learners. This awareness enabled me to deal with some of the challenges and frustrations of being a part-time student. Nevertheless, my involvement with both groups also fostered problem-solving, which enabled us to mutually support each other during our learning journey thereby embedding that sense of being part of a community. Frequently, I have engaged in an 'internal dialogue' with myself, otherwise referred to as 'mindchatter' (Stanley, 2015) and over time this has become a normalised part of everyday practice. And finally, the following lyric resonates deeply as I begin the last stage of this journey:

'*Though the road's been rocky it sure feels good to me*'

Bob Marley (1991, Rainbow Country).

Chapter 1- Introduction and rationale

1.1 Introduction

This is an empirical case study of patient safety education in the undergraduate TR curriculum. This chapter sets the scene for my research. I examine the public image of patient safety and briefly explore its impact on the professions in order to locate the role of education in the delivery of safe care. I then explain my position within this research as a TR educator and consider the implications of patient safety education in my professional practice. Thirdly, I outline the features of my research for context, rationale, and to frame the research questions. The final section of the chapter outlines the structure of this thesis.

1.2 Public image of patient safety

Medicine has always been fraught with risk where potential benefits have continually been considered alongside the possibility of harm (Miles, 2004:144; Vincent, 2010:3) implying that healthcare has never been an exact science. In the quest to save lives, physicians have performed interventions such as the Halstead mastectomy involving removal of all the breast tissue and underlying muscles for breast cancer surgery effectively maiming patients. Rush promoted draining of half of the total blood volume for treatment of yellow fever, which killed patients (Sakorafas & Safioleas, 2009; Vincent, 2010:4). In the mid 19th century, infection posed a threat to clinical outcomes. This observation prompted Florence Nightingale to note that hospitals should be required to cause ‘no harm’ to the sick (Sharpe and Faden cited by Vincent, 2010:5).

In my profession, concerns about safety involving x-rays and radioactivity can be traced back to 1898 when early pioneers noted hair loss (epilation), reddening of the skin (erythema), and lesions that failed to heal (Mitamura, 2010). Six years after Roentgen’s discovery of x-rays in 1895, the first fatality involved an x-ray worker (Brodsky and Kathren, 1989). Although the hazards of radioactive sources were generally accepted, the dangers of x-rays were regarded with scepticism by scientists, medical practitioners and the general public (Brodsky and Kathren, 1989). Whilst the visibility of the radioactive

materials provided proof of their existence, the lack of such concrete evidence raised doubts about the dangers of x-rays, as noted below,

> '*After all, what harm could there be from something that could not be seen, felt, tasted, heard, or detected in any way by the senses?*' (Brodsky and Kathren, 1989).

Then, public pressure coupled with media support and publicity promoted the drive for protective measures in radiography. Principal areas focussed on 'state licensing for radiographers and asserting that injury of a patient was a criminal act' (Thomas, 2010).

Seventy years later, from the mid-1990s, the notion of patient safety in healthcare began to register in the public and professional consciousness (Waring, 2009). The catalyst was the publication of research identifying the magnitude of hospital acquired injuries in developed countries. Data suggested 44,000 - 98,000 deaths from medical errors in America (Brennan et al, 1991; IOM, 2000), and just over half (51%) preventable adverse events in Australian hospitals (Wilson et al, 1995). These findings influenced policymakers action resulting in the publication of seminal research reports namely 'An organisation with a memory', and 'To Err is human*'* (DH Expert Group, 2000; Institute of Medicine, 2000; WHO: Europe, 2010) thereby placing the issue of patient safety into the public arena.

Moreover, in the modern health service, the notion of quality care became synonymous with patient safety (DH, 2001), which was attributed to the Bristol Inquiry concerning the high mortality in paediatric heart surgery (Butler, 2002). The Inquiry was remembered for various events such as the bereaved parents' collective group action to understand their children's care process; for the resulting media scrutiny, which dubbed the incident as a scandal; for the focus on surgeons' competence and actions, and the public's mistrust of the medical professions (Laurance, 2000; Butler, 2002; Sandford, 2003; Smith, 2010). These different elements highlighted the complexities and deficiencies of the healthcare system, as a result of which clinical governance was introduced in the NHS and regular revalidation of doctors, including appraisal, became a requirement in the medical profession (Elliot, 2015). In recent years, re-

emergence of the concept of patient safety led Vincent (2010:14) to comment that,

> '*One of the great achievements of the last ten years is that medical error and patient harm are now acknowledged and discussed publicly by healthcare professionals, politicians and the general public*.'

This point was strengthened further by Palmer and Murcott (2011:13) who wrote that media coverage of 'serious or fatal patient safety incidents' together with strategies and appeals for safety improvement have become a common feature in the UK's broadcasting media. The Francis enquiry also attracted considerable attention from the British press highlighting the inadequate standards of patient care affecting hundreds of lives in one English hospital (Francis, 2013). Furthermore, a systematic review of individual patient complaints showed a third of the 113, 551 issues concerned the safety and quality of clinical care (Reader, Gillespie and Roberts, 2014).

The national discourse surrounding health has evoked both a political and emotive response reflecting public concerns. To understand this issue, I investigated literature in the field of psychoanalysis where Sandler's (1960) seminal paper on 'The Background of Safety*'* explained this notion of a state of sense. Sandler suggested that the perception of feeling safe was an integral part of the ego that influenced normal behaviour to the extent that the self strived to maintain 'a minimum level of safety feeling'. Forming at a very early stage in the development of the psyche, perhaps soon after birth, this sense of safety was juxtaposed with the sense of well-being. He wrote,

> '*Genetically, this feeling must be a derivative of the earliest experiences of tension and satisfaction. It is a feeling of well-being, a sort of ego-tone. It is more than the absence of anxiety, and reflects, I believe, some fundamental quality of living matter which distinguishes it from the inanimate'* (Sandler, 1960:353).

Later the link to perception was extended to include 'all aspects of psychobiological functioning' (Holder, 2005), which meant that the feeling of safety was seen as an integrated component that emanated from the interrelated influences of the biological, psychological and social functions. Nevertheless, perception was a key part in Sandler's conception. Further

exploration of a psychoanalytical perspective on safety is beyond the scope of this thesis. However, Sandler's work positions the feeling of safety as a deeply subjective experience. It seems that this sense of being safe and feeling safe may be generated in the situated practices that vulnerable patients experience from practitioners in the workplace.

Another factor that may influence the public relates to a vested interest in the health service. For example, a recent poll of public attitudes regarding the NHS found that 85% of the public support a tax-funded health service that is free at the point of delivery (Health Foundation, 2015). This finding indicates that service users value access to technical, high cost care as well non-technical services. Confirmation like this may be linked to the individual's need to maintain physical health and preserve psychological well-being. In this context, the sense of safety may be regarded as a motivator guiding the individual's action. However, this attitude signals a degree of generosity that is extended to the community.

Exploring this attitude from the perspective of community psychology where mental well-being is associated with the social environment (Perkins, 2011), it seems that the sense of belonging to a community may generate emotional safety. So, adopting certain attitudes and behaviours allows individual investment for both personal and community gain that may further fulfil emotional needs (McMillan and Chavis, 1986). Furthermore, such personal investment confers a sense of having earned membership of the community. So, exploring the concept of patient safety, from the perspective of community psychology, indicates the existence of a mutual relationship between the individual and the community in securing resources that maintain physical health and preserve psychological well-being.

Research undertaken to assess measurable standards for quality care also revealed that standards concerning safety received high scores from healthcare practitioners, policy makers, service users and carers (Dorning, 2015) inferring that greater importance was assigned to preventing harm. By outlining the background, it should become clear that patient safety has become a significant

issue in the public arena. Consequently, in the next section I explore how public awareness of patient safety has influenced professional practice.

1.3 The changing face of professional practice

Within the healthcare professions, such as medicine, standards of patient care have historically been set by the professional body, thus retaining some autonomy regarding its work (Freidson, 1986:158; Ham and Alberti, 2002). Similar approaches have also been adopted by the nursing and the allied healthcare professions, which include radiography. The role of the professional and regulatory bodies is to craft rules, mainly signified in standards, which members are expected to comply with to assure safe care of their patients in everyday practice (Baumann et al., 2014).

However, increased public awareness of patient safety combined with recommendations from the aforementioned Bristol Inquiry and the Francis report have challenged the autonomy and internal regulation of professional practice. To demonstrate this, I focus on the professional practice of trust, communication, reflective practice and changes in service provision where this can be seen.

1.3.1 Trust

Publicised failures of clinical competence identified in the aforementioned Bristol Inquiry (Butler, 2002) led to an erosion of trust between the professions, the government, and the public (Ham and Alberti, 2002). Professional autonomy has also been questioned whilst professional standards of practice have been further scrutinised with increasing concerns about patient safety (Donaldson, 2008). Such interrogation may be attributed to increasing national expenditure on healthcare requiring greater accountability of practitioners and transparency in practices (Ham and Alberti, 2002) regarding health improvement. Together with political and economic concerns, there has been an underlying view that healthcare providers and practitioners were not reflecting on past errors in order to prevent future incidents, as noted below:

'.....as in many other countries - there has been little systematic learning from adverse events and service failure in the NHS in the past' (DH, 2001).

Such views have influenced action within the professions. For example, both the General Medical Council (GMC) and the Nursing and Midwifery Council issued an initial response to the Francis report, which was followed with an update six months later (GMC, 2014; Smith, 2015). Since the first update, six-monthly reports illustrating measures that were actively taken to address the Francis committee's recommendations suggest greater sensitivity to accountability. Such actions convey an instrumental approach to trust where macro level action is taken to address policymakers' assessment of systems level performance (Brown, 2008).

Whilst radiographers were not implicated, the professional body namely the Society and College of Radiographers (SCoR), opted to review guidance for its members to uphold standards of care (Beardmore, 2013). Common themes from each profession's responses centred on accountability, collaboration with other regulatory agencies, professionalism, and a review of the education and training provision. This level of activity from the professions testifies to the gravity of the report, especially in actions that have already been taken to review professional codes of practice and the ongoing work that continues at the present time to repair and regain the public's trust.

For practitioners on the frontline, personal responsibility is also tinged with anxiety about clinical outcomes, a concern that is acknowledged by Henry Marsh in his autobiography (2014:83). Reflecting on his surgical career, Marsh wrote that,

'*with responsibility comes fear of failure, and patients become a source of anxiety and stress as well as occasional pride in success*' (ibid).

Such anxiety amongst staff may also result in the adoption of defensive behaviours that can impede relationship building with patients and carers consequently affecting the development of trust. Marsh's account reflects communicative trust, which is relational, cognitive, veering between the affective and rational requiring the practitioner to skilfully navigate through these states to

support the patient and maintain personal confidence (Brown, 2008; Brown et al., 2011). In such contexts, 'ontological security' (Giddens,1990:92) to reflect 'self-identity' and 'one's place in the world', apply to both the patient and practitioner as each progresses along this path of trust-building.

1.3.2 Communication

Additional measures by the state involve the attempt to transform what was once a subservient relationship between the healthcare practitioner (HCP) and the patient to a 'partnership' through the publication of a White Paper with an assertive message - 'No decision about me, without me' (DH, 2012). Within this partnership, both parties are expected to contribute to the decision-making about a person's care. Therefore learning new ways of communicating with patients is important in order to provide understandable information (Tallis, 2006). However, this so-called partnership is likely to vary from one individual to another and is dependent on the person's needs and wishes as well as the relationship forged between practitioner and patient. Reflecting on the consent process that is fundamental to any medical procedure, Marsh offered the following insight from his interactions with patients undertaking surgery,

> '*I asked him if he had any questions but he shook his head. Taking the pen I offered him he signed the long and complicated form printed on yellow paper and several pages in length, with a special section on the legal disposal of body parts. He did not read it - I have yet to find anybody who does*' (Marsh, 2014:38).

Marsh's observation suggests that in life threatening events patients have little choice but to trust their practitioner. To do otherwise may create further personal anxiety for the patient that may compound the threatened sense of safety and their own fragility.

Greater access to information on the internet has also raised public expectations who seek 'high standards of competence' and 'personalised care' (Sullivan, 2000). Furthermore, access to a vast compendium of knowledge has emboldened the public to challenge professional expertise and decisions about care (Tallis, 2006) that have attributed to changing cultural influences within the profession. Indeed following the Francis report, the professions have been

required to provide greater patient support regarding its members' role in clinical care. For example, the GMC now informs patients about its role in the education of doctors through to the regulation of its members to assure patients' safety (GMC, 2017a). The SCoR has also responded by informing the public about the various roles its members undertake in clinical practice and the information that patients may expect regarding their care (SCoR, 2017a). However, there is no mention of education for the various radiography roles except for TR where education is implied in the explanation of the therapeutic radiographer's role. This omission of measures, its members' take, to develop and embed safety standards for patients appears to be an oversight from SCoR as it is responsible for the accreditation and approval of all radiography programmes.

1.3.3 Reflective practice

The promotion of self-reflective practice has also led professionals to acknowledge the variations that exist in individual practice causing some uncertainty within the profession (Tallis, 2006). However, variations in practice should not be surprising given that the Hippocratic Oath expects the physician to meet the needs of the individual. Raymond Tallis' comment highlights a degree of honesty and perhaps opens the discussion about standardising practices that may lead to the identification of acceptable standards of healthcare in specific disciplinary practices although the degree to which this is possible is beyond the scope of this thesis.

Additionally, reflection on personal practice has supported practitioners' acknowledgment of gaps in their own knowledge and encouraged the search for evidence-based practice. Changing behaviours have been noted here too with physicians, in a Canadian study, making greater use of the internet to respond to patients' questions during their interactions (Bjerre, Paterson, McGowan, Campbell et al., 2013). Such actions provided evidence of practitioners reflecting upon their own practice. This finding suggests that Web based platforms, such as the real-time librarian service, have assisted practitioners' reflection-in-practice thereby changing the quality of interaction with the patient.

1.3.4 Changes in service provision

Since its inception, the NHS has been a contributory element of the British national identity. Consequently, it has frequently been the focus in the 'political battleground' (Elliott, 2015) between the national parties who have used the topic of patient safety to imprint their own stamp. These have frequently led to inevitable changes in the infrastructure of the NHS that have affected healthcare practitioners' responsibilities, and disciplinary practices.

For example, in January 2016, patient safety became the main topic of discourse in both the local and national media due to the junior doctors' impending 24 hour walkout following a breakdown in negotiations regarding contractual terms. There was talk of 'jeopardising patient safety' from the Conservative Government's Health Secretary (Cecil et al, 2016), which was evidenced by the space allocated to the topic in newspapers and the broadcasting media. This concern was supported by the Care Quality Commission's (CQC) 2014/15 report in which it claimed that:

> *'a major reason for failings in safety is insufficient numbers of staff and use of temporary staff*' (CQC, 2016a).

Inevitably, such discourse also polarised opinions nationally. Doctors were rebuked for their action by people such as the Chief Medical Officer for England,

> *'…I urge junior doctors to think about the patients that will suffer……'*
>
> (Davies cited by Donnelly, 2016).

However, doctors also had some supporters who defended the institution of the NHS and claimed that doctors should be able 'to work safely and feel valued by the NHS' (Lonsdale, 2016). At the centre were doctors who were equally anxious about 'patient safety and doctors' wellbeing' (British Medical Association (BMA), 2016a; BMA, 2016b). Whilst this snippet of patient safety involved a specific professional group, the safety of patients is an everyday concern for all HCPs, regardless of their discipline, which I can attest to from my past experience as a clinical practitioner. In principle, society expects high quality care, an expectation that is value based. In healthcare, the quality of care is embodied in technical competence, interpersonal skills, continuity of care and cleanliness of the environment (Coulter, 2005; Cheragi - Sohi et al.

2008; Dorning, 2015), factors which contribute to and remain significant to the notion of safety.

The public confrontation between the doctors and the government exposes the contested notion of safety. It underscores the subjectivity highlighting the different criteria that are applied by people in what counts as safety, thereby demonstrating the influence that public awareness has come to have on frontline care provision.

1.4 Locating my research topic

Having outlined in the previous sections, the importance of patient safety to the public and its influence on the professions, I now turn to the role of education and training in developing and maintaining patient-centred care that includes safety and improved outcomes in the modern health service (Moore et al., 2009).

The thesis topic stemmed from my previous research for the IFS which explored undergraduate students' learning in a virtual reality simulation of a radiotherapy treatment room, known as VERT. Findings from the IFS revealed that students began to understand the concepts of TR practice with the VERT tool. By working in small groups undergraduate students developed team-working skills, and engagement in deliberate practice (Issenberg et al., 2005; Kneebone et al., 2004) enabled learners to operate the virtual linear accelerator (linac).

In the real environment, the linac is commonly regarded as the 'workhorse' of the radiotherapy department as the majority of cancer patients are treated on these machines. The linac machine produces high energy x-rays for external beam radiation treatments. Such x-rays are commonly used in cancer treatments causing changes in the atomic structure when the radiation interacts with atoms (Sibtain, Morgan and MacDougall, 2012:7). Known as ionisation, this process inflicts damage to the cancerous cell eventually causing cell death in human tissue (Symonds et al., 2012:51). Consequently, the safety of patients is an integral aspect of care in TR, which is implicit in the following explanation of the therapeutic radiographer's role.

> *'Therapeutic radiographers are responsible for the planning and delivery of accurate radiotherapy treatments using a wide range of technical equipment. The accuracy of these are critical to treat the tumour and destroy the diseased tissue, while minimising the amount of exposure to surrounding healthy tissue. Their degree qualified training solely in oncology and the care of cancer patients makes them uniquely qualified to undertake this role*' (SCoR, 2017b).

Also embedded within the above statement from the professional body is the education and training that develops professional practice. Like other healthcare professions such as medicine, nursing and physiotherapy, part of that education and training occurs in the workplace environment where undergraduate students develop skills for practice to enable them to perform at the level of a newly qualified practitioner upon completion of the course. My thesis builds on the IFS by exploring what education and training is provided to ensure patient safety in clinical care. As an educator, I am interested in discovering what students learn about patient safety in the undergraduate curriculum and how this supports their development as safe TR practitioners in order to meet the regulatory body's requirement '*to practise safely and effectively within their scope of practice*' (Health and Care Professions Council, 2013: 7). In this context, scope of practice is defined as 'the knowledge, skills and experience to practise lawfully, safely and effectively…. and does not pose any danger to the public' or the practitioner (op.cit.). These standards indicate expectations, but an important question is how students come to know about professional statements on patient safety and how these are interpreted in the development of their practice at pre-registration level. Thus my study differs from Bosk's research (2003), which investigated the ways in which graduate surgeons and residency trainees recognised and dealt with medical errors in the workplace.

1.5 Nature of healthcare education

Healthcare programmes in pre-registration education have traditionally involved learning in the academic and workplace setting. For example, qualitative research in interprofessional education involving medicine, nursing

and pharmacy faculty perspectives reported that the culture of the clinical environment was influential in learning and challenging the integration of patient safety knowledge (Tregunno et al., 2014). This should not be surprising. According to Vincent (2009), the impact of organisational and cultural factors on patient safety practice has not been fully explored yet.

In the workplace setting, novice healthcare students' active participation in team activities enables them to contribute in a social and professional manner to an extent where personal transformation is more than likely to influence their own professional practice. Such transformative experiences eventually enable healthcare students to join communities of practice (Wenger, 1998:56-57; Morris, 2012:13). How learners negotiate situational factors that impact upon learning is of equal importance in understanding the development of patient safety practice. For students, there is a process of transformation in becoming a practitioner, which may involve 'the construction of new knowledge, identities, ways of knowing, and new positions of oneself in the world' (Tuomi-Gröhn, Engeström and Young, 2003:28). This transformation involves the application of knowledge from one context and its recontextualisation to a different context and herein lies a problem. Learning that takes place in the educational setting may be difficult to recall and apply in the workplace setting (Taylor, Evans and Pinsent-Johnson, 2010). Indeed, this is crystallised in Guile and Ahamed's report (2011) on modernising the pharmacy curriculum for undergraduate education and pre-registration training. The authors noted that,

> '*although the subjects of law, ethics, communication skills were included in their pharmacy curricula they [students] did not find it easy to relate this theoretical knowledge to practice settings*' (Guile and Ahamed, 2011:13).

Additionally, the application of knowledge to a different context invites a socio-cultural interrogation of the ways in which learners change as they engage with concepts and work practices to become competent practitioners. In this different context, learners are exposed to 'schools of thought, the traditions and norms of practice' and others' experiences, all of which contribute to the development of knowledge and practice (Evans, 2012:8). Central to the concept of learning and implementing patient safety is the social, cultural and political context involving interactions with people in different roles and in different

environments. Focusing on the concept of patient safety, learning may involve the dissemination of specific 'values, norms and ideologies' (Waring and Currie, 2011:134). Although Waring and Currie's idea may suit learning through participation in situated practice, in the workplace where learning by doing takes centre stage (Guile, 2006), healthcare educators still have a conundrum. The problem for educators concerns how the curriculum, pedagogy and the workplace can be connected in a meaningful way that allows learners to apply learned principles in a different context and begin the process of interrogating ideologies that will advance disciplinary knowledge and understanding.

Having sketched the context of workplace learning in the development of professional practice at pre-registration level, I explain the motivation for my research in the next section.

1.6 Rationale for research

In this section, I briefly outline the current status of knowledge regarding patient safety at pre-registration level to identify the inspiration for my research.

Mansour's (2012) review examining faculty and student views on the quality, content and delivery of patient safety education in undergraduate nursing found 'limited evidence' about how nurse educators integrated patient safety in the programme. The review, based over an 11 year period from 2000 to 2011, resulted in only 5 primary research studies undertaken in England, Iran and the USA, thus highlighting the paucity of research in this field. Furthermore, the UK lagged behind considerably with only one study on patient safety research in education programmes.

The UK research revealed that explicit naming of 'patient safety' was not evident in the written curricula in nursing, *'*except for mentions of components such as hand washing or infection control' (Steven et al., 2014). Vincent (2010: 11) concurs with this observation stating that,

> '*Thirty years on, iatrogenic disease [physician induced illness] and safety issues are still finding only a small corner in some medical and nursing curricula…….*'

Steven et al.'s research showed that the curricular content was based on programme leaders and teaching teams' interpretations of patient safety. Indeed, the authors found that some programme leaders 'struggled to define patient safety as a discrete concept' (ibid) suggesting that participants were concerned about compartmentalising the topic as this risked the possibility of a silo approach where the learning would be archived instead of students integrating it in everyday practice.

Amongst policymakers, education is seen to have an important role in 'shaping the attitude and practice' of future healthcare professionals (Picker Institute, 2006:5). Indeed, this aspiration is reflected in the WHO (2011), curriculum guide for healthcare professionals which aims to optimise the undergraduate programmes so that patient safety becomes an embedded feature of professional practice. As a healthcare educator in radiotherapy, and in line with the philosophy of the education doctorate, my research examines the notion of patient safety in the TR discipline. In this field, there is no evidence of research on patient safety knowledge in undergraduate education.

1.7 Significance of my research

My research makes a contribution to the evidence base on pre-registration patient safety education, which to date has focussed on medicine, nursing, pharmacy, and physiotherapy (Cresswell et al, 2013; Mansour, 2012; Steven et al., 2014; Tregunno et al, 2014). Furthermore, Mansour (2012) found that the knowledge base in nursing was lacking. This dearth of research on patient safety is echoed in my own discipline too. Therefore, my research makes an original contribution to the understanding of how patient safety is taught in TR and then embodied in the practice setting in pre-registration education.

My research strategy is also influenced by Atkinson's assertion (1997:14) about the lack of 'published work on sociological and anthropological understanding of knowledge' production and reproduction in the healthcare environment. Whilst Atkinson focussed on medical students, my research involves undergraduate TR students, making an original contribution to another

healthcare discipline thereby expanding the knowledge base of this type of methodological approach.

My overarching research questions are: what constitutes patient safety knowledge in TR and how do undergraduate students transfer this type of knowledge from academia to the workplace setting. On this basis four research questions were formulated:

1. How are statements of professional practice recontextualised in the undergraduate therapeutic radiography curriculum?
2. How are curriculum statements recontextualised in the clinical workplace setting?
3. What types of pedagogic practices are utilised in the workplace to support recontextualisation of curriculum knowledge?
4. How do undergraduate learners account for recontextualisation of knowledge in the workplace?

1.8 Outline of the thesis

In this chapter, I have outlined the development of my interest, the background of my research and what I set out to achieve in this study. Chapter two further contextualises the research by considering the literature associated with patient safety. Chapter three explains the conceptual framework for this research. Chapter four gives an account of the methodology including methods that were utilised for this empirical study. Chapter five explores how the PRSB standards are recontextualised in the TR curriculum. Chapter six demonstrates the recontextualisation of curriculum statements in the workplace environment by focussing on TR specific safety practices. In Chapter seven, I discuss my findings of the recontextualisation of patient safety in TR education and consider the limitations of this study. Chapter eight concludes the thesis and presents recommendations for future research.

Chapter 2 - Review of patient safety literature

2.1 Introduction

My overarching question is what constitutes patient safety knowledge in TR and how do undergraduate students transfer this type of knowledge from academia to the workplace setting. In this chapter, I explore the epistemology of patient safety by examining published literature. In the second part, I outline the various disciplines of safety science that currently influence healthcare practice. This is followed by an exposition of how and where patient safety education is situated in pre-registration healthcare courses. Then, I consider the role of the regulatory bodies in the healthcare professions. At each stage, literature is critically analysed from a patient safety perspective to situate TR education and practice within the context of other healthcare disciplines.

2.2 Searching previous research

Here I outline the search strategy. Literature on general concepts and specific practices regarding patient safety was sought from the British Education Index, the Cumulative Index of Nursing and Allied Health Literature, PubMed, and Web of Science. The search concentrated on English Language, peer-reviewed journals to support access, readability and understanding. Focussing on publications between 2000 and the present time enabled me to capture developments concerning the understanding and practice of patient safety and its place in healthcare education although seminal work pre-dating these time-frames was considered and included.

Search terms included ‘patient safety’, ‘quality of care’, ‘patient safety education', ‘healthcare professionals’, ‘healthcare education’, ‘undergraduate education', ‘pre-registration education’, ‘human factors’, ‘crew resource management’ and ‘root cause analysis’. The Boolean terms ‘and’, ‘or’ were used to filter the search. Professional journals in radiography, medical education, nursing, and patient safety were also scrutinised for discipline-specific perspectives.

To locate literature on education transfer, the search terms included, ‘transfer of learning’, ‘workplace learning and development’, ‘vocational

education', 'healthcare education', 'professional bodies', 'recontextualisation', 'Evans and Guile', 'putting knowledge to work' and 'recasting knowledge'. Here the majority of the search results identified Bernstein's theory. The aforementioned time frame was applied here also to understand the broader context, and to seek out the application of Evans and Guile's theoretical framework which was only conceptualised seven years ago.

2.3 What is patient safety?

In Chapter 1, the brief consideration of safety to understand the public interest in this topic resulted in the emergence of a value-based construct that could be ascribed at an individual level and within groups. In this section, I examine this value-based notion and extend my investigation to explore how else patient safety is interpreted. Focussing on two other perspectives, I examine safety as an attribute of care and as a scientific discipline.

2.3.1 Is patient safety a value?

The notion of value arises from assumptions based on 'psychological needs' and society's expectations. Consequently, the fulfilment of these beliefs results from learned behaviour, personal experiences, interaction with the group and societal culture, choices, and actions (Schwartz and Bilsky, 1987; Rokeach, 1979:2). Given that individuals and cultures evolve over time, then values are likely to change although it may be argued that some values such as safety remain constant because they form a fundamental need in living beings. Consequently, it may be surmised that the notion of safety transcends societal and cultural differences to such an extent that safety is then regarded as a 'universal value'. Here, the notion of its universality concerns biological needs, the social interaction involved in interpersonal relations, and at a higher level, the institutional support for the social welfare of groups (Schwartz and Bilsky, 1987). Furthermore, the value of safety has a relational aspect to society that is underpinned by conformity, caring for others and tolerance - facets that transcend cultural differences (Clawson and Vinson, 1978; Cieciuch, Schwatrz and Vecchione, 2013).

Continuing on the social aspect, groups are also present in the workplace community of practitioners. In this community, practitioners undertake responsibility for the physical and psychological safety of others, including team members, from novices to experts. Edwards et al. (2013) support this view defining safety as:

> *'a state of being in which individuals are protected from the likelihood of harm'.*

The authors do not explain their interpretation of harm. However, it may be assumed that harm involves 'impairment of structure or function of the body' resulting in 'disease, injury, suffering, disability or death' (Runciman et al., 2009). Edwards and colleagues' (2013) value-based statement of safety appears to adopt a broader stance that embraces all individuals. Approaching the topic from the perspective of organisational culture, their definition promotes a shared value that extends to service users as well as the providers, i.e. the employees who form the workforce. In so doing, the notion of safety as a value system promotes an aspiration that requires a certain attitude and behaviours to achieve such goals. However, Edwards et al.'s (ibid) broad definition also lends itself to adaptation by others.

For example, reflecting an institutional viewpoint, the universal value of safety is embedded in the definition crafted by the WHO (2016), shown below, which illustrates a modified statement in which specific institutional values have been integrated;

> *'safety is the prevention of errors and adverse effects to patients associated with health care'.*

In the above definition, the individual is central. The values are implicit in the expectations of practitioners who are reminded of their obligations to exercise greater vigilance in their practice. In so doing, it is anticipated that 'errors and adverse effects' may be prevented. In this context, error constitutes the process [of doing] whereas adverse events are outcome based (Wachter, 2012:4).

The notion of safety then is regarded as a personal and social value. The problem with a value-based approach is that it is open to subjective interpretations. In the workplace, social norms of behaviours influence the microsystem where the focus resides with the individual thus resulting in

personal actions. At the level of the macrosystem, values are influenced by single or multiple groups with their own sub-cultures meaning that actions may reflect the group norms, a view that is supported by Edwards, Davey, and Armstrong (2013). Having explored the notion of value, I now consider another dimension of patient safety.

2.3.2 Is patient safety an attribute of care provision?

Since the mid-sixties, debates about quality of care have focussed on issues concerning structure, process and outcome in relation to the provision of patient care (Donabedian, 1966; Berwick and Fox, 2016). Indeed, concern about the process has been weaved into the definitions of patient safety, shown below, by policymakers such as the American Agency for HealthCare Research and Quality (AHRQ),

> *'freedom from accidental or preventable injuries produced by medical care. Thus, practices or interventions that improve patient safety are those that reduce the occurrence of preventable adverse events'* (AHRQ, 2014).

In the UK too, process of care is important to policymakers. In recent years, care has been extended to involve patients as partners inferring that they must be informed of what they should expect from the thirteen fundamental standards of healthcare, one of which involving safety is reproduced below:

> '*Providers must assess the risks to your health and safety during any care or treatment and make sure their staff have the qualifications, competence, skills and experience to keep you safe'* (CQC, 2016b).

In this way, service users are enabled to check whether their treatment includes risk assessment and care provision by educated and competent professionals. However, such assessments demand knowledge of the diagnosis and 'know-how'. Some service users acquire the latter after repeated exposure to certain procedures. For example in undergoing a blood test, the patient will come to know the various elements of the test and in time will begin to assess the venepuncturist's skill. Eventually, the patient may even assist in the process by indicating from which arm the blood sample should be drawn, thereby contributing to their own safety.

Practice is known to differ between practitioners and only becomes apparent in their actions, that is, in the ‘way of doing things’ (Emanuel et al., 2008). Even minor differences in the sequence of actions between individual practitioners can provoke anxiety in recipients who are unfamiliar with the different methods. However, the development and promotion of safety checklists and protocols in surgery (Gawande, 2010:159-162; Haynes et al., 2009; Takala et al., 2011; WHO, 2009a) and adoption of specific communication methods (Kim et al., 2012) may ameliorate variations to ensure greater standardisation in the quest to improve safety. For example, in radiotherapy practice, steps in procedures are expected to be explicit and clearly documented in protocols for specific tumour sites (RCR et al, 2008:8). However, such a recommendation anticipates good knowledge of language to ensure the process is understood by all and assumes that the written text is an adequate learning method that suits all practitioners. Furthermore, protocols are usually written for local application therefore differences are likely at a national level.

Returning to the aforementioned CQC standards, enlisting service users’ contributions ‘to make care better together’ reflects the adoption of one of the many recommendations from the Francis report (2013) mentioned in Chapter 1. The implementation of such standards illustrates the commitment ‘to learn from and follow-up on incidents’, that was originally identified in the definition of patient safety by the NPSA in 2004. For example, in cancer care, patient satisfaction surveys since 2000 have informed policymakers' actions (DH, 2009:51) although results from the latest survey in 2015 reveal that progress has been slow. Focussing on radiotherapy, the National Cancer Patient Experience Survey (NCPES) revealed that 34.6% of 17,897 patients were unable to fully understand whether this form of treatment was effective (Quality Health Limited, 2016). In reality, the efficacy may not be fully known until 6-12 months after completion of the treatment course, which only 11.4% of the 17,897 participants were able to understand. Moreover, safety was not directly mentioned in the 59 questions that constituted the questionnaire. Therefore, it can only be assumed that the notion of safety as an attribute may have been deduced from data relating to questions regarding the explanation of short and long-term treatment side effects and their self-management, ‘control of pain’,

‘enough nurses on duty’ to provide care, ‘confidence and trust in ward nurses’ and ‘confidence and trust in doctors treating you’ (op.cit.).

However, confidence and trust was not evident in the three questions pertaining to radiotherapy care which only focussed on information and the communication process. This finding was surprising for two reasons. Firstly, cancer treatment involves multidisciplinary care where confidence and trust at each stage are of equal importance to the patient’s outcome. The second point is that radiotherapy involves high energy x-rays which can also damage healthy tissue. In recognition of this potential for harm, the ICRP requires three key principles to underpin all radiographic practice. These principles involve the ‘justification’ of radiation exposure in the first place, its ‘optimisation’, and the ‘limitation’ of radiation exposure to ensure patient protection (ICRP, 2007; Boyd, 2012). Whilst patients may not be expected to know the technical aspects of practice, it is reasonable to surmise that their confidence and trust is as valid in radiotherapy where individuals commonly attend for a course of radiation treatment, mainly as outpatients, for five days a week over a period of three to six weeks.

Additionally, comparing the cancer care measures with metrics on an inpatient cardiac care ward in a London hospital has highlighted differences between outpatient and inpatient care. For example, safety metrics on the ward concerned the time interval, in days, since the last recorded fall; the occurrence of pressure ulcers; and contagious infections such as MRSA and Clostridium difficile. The latter is a harmful infection occurring in the colon which can be transmitted through hand contact putting highly susceptible, vulnerable groups like the elderly population to potential harm (Centre for Disease Control, 2015). Other metrics included the identification of the number of ‘medication-related incidents’, staffing levels, sickness and vacancy rates as well as the ratio of ‘registered nurse to patient’. However, similarity was noticed in the information provision relating to treatment (Anonymous, 2014). These comparisons of radiotherapy with inpatient metrics reveal the unique character of care that exists in different areas of healthcare. They also exemplify the utility of ‘regulatory instruments’ in specific workspaces (Gherardi and Nicolini, 2000) where ‘disciplinary power’ imposes particular expectations upon employees

(Henriqson et al., 2014). For example, contractual sanctions involving a sum of £10,000 are presently applied to hospitals where the infection rate of Clostridium difficile exceeds the provider's goal (NHS Improvement, 2017). The aforementioned metrics reflect how specific measures are associated with the quality of care.

It is worth noting that the concept of quality of care does not have a universal definition. Quality is generally associated with access to care, utilising processes that are appropriate for planned care, and effectiveness, thus signalling the intention of the outcome (Campbell, Roland, Buetow, 2000). The essence of these characteristics is captured in the following definition:

> '*Quality is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with professional knowledge'* (Runciman et al, 2009).

However, the definition begs the question of whose professional knowledge counts? Runciman's definition of quality may be concerned with guidance issued by the professional body in which case it may infer collective knowledge. Equally, quality may concern embodied practice reflecting the practitioner's personal, professional knowledge that is developed over time. Nevertheless, even competence is prone to serendipity in healthcare as some actions become unpreventable. Such events only become evident as the situation begins to unfold as illustrated in the following excerpt from a neurosurgeon:

> '*Each brain tumour is different. Some are hard as a rock, some as soft as jelly. Some are completely dry, some pour with blood - sometimes to such an extent that the patient can bleed to death during the operation. Some shell out like peas from a pod, others are hopelessly stuck to the brain and its blood vessels. You can never know from a brain scan exactly how a tumour will behave until you start to remove it'* (Marsh, 2014:9).

The above example highlights the vagaries of the human body which also threaten the individual's safety in healthcare while at the same time challenging the practitioner's proficiency and skill in the quest to deliver quality care.

The notion of quality of care also deserves further comment. The concept is ambiguous as it has different meanings for stakeholders such as managers,

healthcare practitioners and the service user. Stakeholders are likely to reflect perspectives that align with their respective roles in the organisational structure, professional standards and personal requirements. So quality may have multiple meanings that are defined by the context and the intended goal as illustrated in the comparison of the safety metrics on the ward and in radiotherapy. These issues highlight the complexity inherent in identifying and assessing safety and thus in determining the quality of care, a view that Campbell, Roland, Buetow, (2000) concur with. Regardless, in the modern health service, the notion of quality care became synonymous with patient safety (DH, 2001) and this was attributed to the Bristol Inquiry (high mortality in paediatric cardiac surgery) which adopted a systems approach to retrospectively analyse events in 53 children. Vincent (2010: 20) reported that:

> '*this approach revealed the role of contextual and system factors much more powerfully and demonstrated that the actions of individuals were influenced and constrained by the wider organization and environment'*.

In the next section, the systems approach will be explored further.

2.3.3 Is patient safety a discipline?

Borrowed from engineering, the systems concept accepts the potential for human fallibility and therefore attention focuses on reducing error by incorporating defence mechanisms into the system. This approach enables a broader perspective of error management in which attention focuses on the impact of human behaviour in relation to the context (Wachter, 2012:446-7). Therefore, the individual, the team dynamics, 'task, workplace and the institution as a whole' is examined to understand how and why defences may be breached (Reason, 2000; Vincent, 2010: 136). The preceding list suggests that each element may have associated tasks that influence actions. Consequently, a systems approach may be viewed as process laden. Indeed, analyses of incidents in organisations have revealed that interlocking factors may trigger a chain of events that eventually result in unintentional outcomes (Vincent, Taylor-Adams, Stanhope, 1998) indicating that in examinations of this nature, the focus shifts from individual culpability to exploring issues bound in the system. As a result, it is anticipated that the ensuing sense of fairness supports staff to share concerns more openly (Dolansky et al., 2013). However,

I suspect that such anticipation is only realised if the organisational culture moves from blaming individuals to supporting openness.

Additionally, a systems approach introduces the notion of complexity theory, which is purported to be concerned with the 'ecosystem of care' (Wachter, 2012:26). Focusing on systems, the theory explains how behaviour is influenced by interactions between interdependent parts of the systems or subsystems (Anderson, 1999; Cairney, 2012). There is general consensus in the literature about specific features of complexity theory. For example, it is understood to be nonlinear therefore even small changes in one or two parameters may result in large effects in outputs due to interaction via 'a web of feedback loops', thus making this a dynamic system. Historicity associated with previous activities may influence behaviours resulting in changes to improve performance. Behaviours generally emerge and evolve from interactions at a local level. Environmental factors may also influence activities thus making this an 'open' system. As a result, subsequent interactions make it difficult to control the endpoint in a dynamic system although some behaviours are known to display specific patterns. It is anticipated that such pattern-inducing behaviours known as 'attractors' signal order in the system and enable organisations to tap into them to manage change. Moreover, organisations may adopt rules of interaction and monitor workers' level of adherence to mitigate against undesirable outputs (Anderson, 1999; Cairney, 2012; Johnson, 2009:37; Levy, 2000:83; Wachter, 2012: 26-27). Further explanation of complexity theory is beyond the scope of this thesis. However, these general features also apply to the healthcare system, a point that Delamothe (2008) concurs with as shown below;

> ' …*the NHS is a truly complex system, and it's hard to work out cause and effect with any confidence. Interventions that should work don't always do so as intended*'.

2.3.4 A response to the questions

Before I continue, it is worth pausing for a moment to consider the aforementioned questions regarding patient safety. Evidence from literature indicates that an affirmative response can be provided to each question. First,

the notion of safety as a value is integral to personal and societal expectations which are adopted at institutional level to reflect specific organisational contexts. As an attribute, safety has been woven into the concept of quality of healthcare and here variations are prominent, reflecting the context of delivery in specialist areas of healthcare. With respect to the third question, safety science is regarded as an emerging discipline.

In their definition, Emanuel et al., (2008) incorporate the application of;

> *'…..safety science methods toward the goal of achieving a trustworthy system of health care delivery'.*

In this context, trustworthiness is synonymous with human reliability, which is essential for consistency in the correct execution of tasks. Reliability contributes to the systems approach in safety management, particularly the role of human factors (Proctor and Zandt, 2008:54). Consequently, human reliability may be seen as an attribute too.

In radiographic practice, the notion of safety has an additional dimension. The ICRP (2007:32) define safety as,

> '*the achievement of proper operating conditions, prevention of accidents, or mitigation of accident consequences*'.

In this definition, the system-based approach takes prominence. Here, the avoidance of harm to patients, the public and healthcare professionals is implicit in the expectation that appropriate rules and regulations must be observed and implemented in the workplace. Nevertheless, this raises the question of how these aspects of patient safety are portrayed in undergraduate healthcare education.

2.4 Systems-based approaches in safety science

In this section, three systems-based approaches have been outlined to understand the discipline perspective of safety.

2.4.1 Root cause analysis

Root cause analysis (RCA) is a retrospective, structured approach for analysing errors. Originating in psychology and human factors engineering, it is frequently used to investigate industrial accidents (Wald & Shojania, 2001:51). Although formally approved by healthcare policymakers in countries such as the USA, UK, Australia and Denmark (Nicolini, Waring, Mengis, 2011), the efficacy of RCA as an investigative toolkit has been criticised as shown below:

> '*like many innovations in medicine, RCA has never been evaluated for effectiveness*' (Wu, Lipshutz, Pronovost, 2008).

Nicolini et al. (2011) also note that this methodological approach is not well understood. The interpretation of RCA and its application seems to be problematic to those involved in investigating incidents (Rooney and Vanden Heuvel, 2004; Latino, 2015). The authors note that different interpretations may have influenced subsequent application of the process. Until the various interpretations are clearly defined, it is difficult to understand the different perspectives that are employed within institutions.

Nevertheless, Rooney and Vanden Heuvel (2004) expand on four features identifying root cause as 'specific underlying causes', which 'can reasonably be identified', and management can 'fix', with the aim of preventing future 'recurrences'. There is a belief that mistakes generally occur from recurrent patterns of actions (Reason, 2000). Taking account of this systems approach and reflecting the International Classification for Patient Safety, RCA has been defined as a,

> *'systematic iterative process whereby the factors that contribute to an incident are identified by reconstructing the sequence of events and repeatedly asking why? Until the underlying root causes have been elucidated*' (Runciman, 2009; WHO, 2009b).

Thus, RCA enables a comprehensive investigation involving an interdisciplinary approach. Here, representatives from the relevant disciplines are involved in understanding system factors that may have contributed to the error or incident (Wachter, 2012:245-246). Incorporating more than 40 investigative techniques, RCA enables a sequential consideration of 'what happened, how it happened and why it happened' (Woloshynowych et al., 2005:

19). However, utility of a diverse range of techniques presents its own problems. For example, investigators need to be well-trained and knowledgeable in the selection and application of relevant techniques so they can explore and analyse information and events at different stages of the investigation. In reality, Nicolini et al.'s (2011) ethnographic study of the RCA process found that the emphasis on producing a good report overshadowed the organisational learning that could be achieved. Furthermore, systems factors were mainly investigated in the form of a timeline of event occurrences, which did not allow for sufficient understanding of issues. Consequently, recommendations were mainly based on achievable goals rather than a broader organisational perspective.

Exposing the structure of the macro-system may help the institution to better understand where weaknesses in the defence system lie. Such knowledge may prevent situations that give rise to 'latent conditions' in the system, consequently provoking future errors in the local environment (Reason, 2000). Here, latent conditions refer to inherent features in existing systems that remain unknown until they are exposed by events that result in accidents. However, in such systems, hidden features relating to workload, 'lack of training, and inadequate supervision' (Flin, 2007) only become known due to the goodwill and professional integrity of staff who report errors (Lambton and Mahlmeister, 2010). In so doing, retrospective systems like the RCA overlook the anxiety that staff frequently experience when they have been involved in actions resulting in errors. As 'second victims', those involved in such errors re-live the events during the reporting stages, a point that is confirmed by Kelly, Blake and Plunkett (2016) who write that fear of retaliatory actions in the form of disciplinary events and 'workplace discrimination' may lead some to withdraw from reporting of incidents in the workplace.

2.4.2 Human factors

Promoted as a scientific approach, human factors also focus on systems. Here, systems are studied from an ergonomic perspective to better understand how workers' interaction with the equipment and environment in the workplace can be utilised effectively to improve safety for patients (Russ et al, 2013).

Catchpole's (2016) definition of human factors reflects the various elements that encompass the broad base of this particular systems approach:

> ***'****Enhancing clinical performance through an understanding of the effects of teamwork, tasks, equipment, workspace, culture, organisation on human behaviour and abilities, and application of that knowledge in clinical settings'.*

Indeed, the Health and Safety Executive (HSE) suggest (n.d. a) that designated tasks should take account of personal ability. In essence, the task ought to be matched to the individual's competence taking account of their workload, and the influence of the workplace culture on the behaviour of the individual and the team. Here, workplace culture is defined as,

> '*the values, attitudes and assumptions which guide and underpin staff relationships and communication. This includes local notions of hierarchy, loyalty and professionalism, and perceptions of the work environment, patients, other staff groups and management*' (McCulloch and Catchpole, 2011).

Although the authors' model was based on 'microsystems' in surgery, the definition of workplace culture may be applied to other areas of healthcare in which team-based activities may impact upon safety. In these environments, individual beliefs may be influenced by local perceptions that inform interaction and communication with others, consequently impacting upon personal practices in the workplace. However, culture is only one facet of human factors. Interaction with information technology, drugs and medication may also compromise safety as technologies in healthcare are acquired at different times, and may not be compatible with previous systems implying that the use of deficient systems may hamper processes or introduce unforeseen issues (Catchpole, 2013). Furthermore, the number of technologies that HCPs interact with, and the variations therein together with timely availability and location are other factors to contend with in the consideration of a human factors paradigm (Karsh et al, 2006).

So in this systems approach, the wellbeing and behaviour of the healthcare worker is central to this 'sociotechnical' concept (Karsh et al, 2006).

> '*From an HFE [human factors ergonomics] viewpoint, patient safety activities should not only reduce and mitigate medical errors and improve patient safety, but also improve human well being, such as job satisfaction, motivation and technology acceptance'* (Carayon, Xie, Kianfar, 2013).

Employing proactive and retrospective actions is supported by Gurses' team (2012) who also believe that this systems approach allows the HCP to evaluate and highlight factors that impact upon other procedures to jeopardise patients' safety. Additionally, the authors draw attention to the tardiness of the uptake of the human factors approach in healthcare practice (ibid). Interestingly, their suggestion of promoting the integration of human factors in healthcare practice encourages education at postgraduate level for HCPs which includes 'Masters in nursing', and 'continuing education requirements for clinicians and healthcare administrators'. Whilst acknowledging the inclusion of a 'systems-based' competency in graduate medical education, the lack of expertise in teaching faculty is also noted (op.cit.). However, suggestions to improve upon this deficit are lacking, which is disappointing given that skills for competence and practice in healthcare begin at pre-registration level. I now turn to the third systems approach.

2.4.3 Crew resource management (CRM)

CRM is a process driven systems-based approach that focuses on optimising available resources to enhance safety and efficiency (Pizzi, Goldfarb, Nash, 2001: 511). In CRM, team-members train together ensuring that standard language is utilised effectively in their communication with each other to ensure the clarity of tasks and systems is understood by all (Wachter, 2012: 28). So communication underpins all activities.

In healthcare, CRM is better known as crisis resource management (Salas et al. 2006). 'Crisis' was adopted because of the familiar use of this term in the field of anaesthesia where CRM training was first instigated (Gaba et al., 2001). The terminology is commonly applied to life threatening emergencies where the team member's urgent actions are critical. Such teams typically include two or more individuals from different healthcare disciplines and/or professions to work

together (Baker et al, 2003:9; CHFG, 2015). Therefore, the coordination of team-working is important in securing the safety of patients' care (Fung et al., 2015). Such co-ordination accounts for the 'task interdependency' requiring individuals to adjust and adapt practice in the moment (Baker et al., 2003). However, team-working constitutes only one element of CRM. Other features include 'leadership and followership', use of material resources and 'situational awareness' (Cheng, Donoghue, Gilfoyle, Eppich, 2012). Drawing upon human factors, CRM has been adopted in multidisciplinary practices in the operating room and intensive care (Sexton, 2000), in obstetrics (Haller et al., 2008) and in the resuscitation of 'critically ill children' (Cheng, Donoghue, Gilfoyle, Eppich, 2012).

However, literature mostly focuses on activity at practitioner level in which there is little mention of pre-registration students' involvement. Thus it may be surmised that generally undergraduate students are not exposed to CRM training (Hicks, Bandiera, Denny, 2008; Ziesmann et al., 2013).

CRM mainly involves simulation of clinical scenarios in interprofessional teams (Fung et al., 2015). Salas et al.'s (2006) systematic review, utilising the Kirkpatrick typology, reported that whilst the learning experience was generally positive, results concerning behaviour were mixed with team-working skills reflecting a positive outcome whilst leadership was found to be lacking. Subsequent impact on clinical practice indicated partial support for skills transfer. Where used, CRM has mainly involved senior pre-registration students and practitioners suggesting that context may have greater relevance in this systems-based learning. For example, senior students have greater experience of clinical practice and therefore behaviour is likely to be enhanced as they are better able to connect the simulation experience to the real situation (Flanagan, Nestel, Joseph, 2004). Nevertheless, similar findings regarding lack of skills transfer and skills retention were reported in a systematic review of simulation-based training for CRM (Fung et al., 2015). Only two out of the twelve studies in the systematic review demonstrated sustained behavioural change in which fewer adverse outcomes were recorded. Both studies involved care for obstetric patients (Riley et al., 2011; Phipps et al., 2012; Fung et al., 2015). These findings show promise and suggest that future studies need to collect data

regarding skills transfer and retention in the workplace to support analysis of learning and behaviour modification.

Safety culture reflects the powerful influence of social factors upon people's behaviours in a given environment (Vincent, 2010:123). Even in 'highly organised and ultrasafe processes such as radiotherapy' (op. cit.), unplanned events may have serious consequences on controlling tumour growth, acute toxicity and long-term effects (Valentin, 2000).

2.5 Patient safety education at pre-registration level

In this section, I appraise the systems-based approach before progressing to other patient safety related literature in undergraduate education.

2.5.1 Systems approach in pre-registration education curricula

In a case study involving a pre-registration nursing student, Dolansky et al. (2013) wrote about how understanding contributory factors was enhanced by utilising an RCA approach in their investigation of medication error on a medical-surgical unit. The team's investigation of the clinical environment, culture, communication and the student's involvement on the unit assisted in identifying personal and situational factors that contributed to the student's error. The RCA was potentially beneficial for revealing areas for the educators to review, and for highlighting the student's collaboration in sharing her experiences. However, the case study remained unclear in demonstrating change in the student's awareness and knowledge of a system's approach as a result of participating in this type of analysis.

Also adopting the RCA approach, Lambton and Malhmeister (2010) reported that poor judgement, lack of confidence in communicating with other professionals and distraction in busy clinical environments contributed to nursing students' errors involving care of patients with central line, and needlestick injuries respectively. Consequently, the concept of preventing errors by reflecting on personal responsibility including preparation for the procedure and correction of mistakes was introduced in simulation scenarios, although there is no evaluative research to identify the outcomes of such modification in

pre-registration education. Therefore, little is known about how tools like the RCA contribute to students' understanding of the systems approach to safety.

RCA has also been used to support development of critical skills thinking among senior, undergraduate nursing students. Tschannen and Aebersold (2010) report on two projects resulting from collaboration between faculty and clinical units. Here, students applied the RCA format to assess workplace compliance with protocols regarding the patient's care plan, and pain assessment respectively. In so doing, senior undergraduate students gained experience of utilising the RCA tool whilst developing insight into how such tools assisted in improving the quality of care.

As a practitioner, one may speculate that effective utility of the RCA tool requires sensitivity both within the team and outwith in the team's approach with involved practitioners. Therefore, pre-registration students may not be invited to participate in RCA investigations in the clinic suggesting that learning about this particular systems approach remains limited. In his outline of pharmacy graduate's education, Fassett (2011) concedes that, 'it is challenging to provide a student with a guaranteed opportunity to be involved on an RCA team'. Lambton's group concur with this view citing evidence from a telephone survey undertaken by the authors involving nine hospitals in California. However, the reasons for not involving students were not identified by the authors (Lambton and Mahlmeister, 2010). Reflecting on the omission of student involvement, I suggest that the lengthy nature of RCA events in which processes and actions are examined to determine the unanticipated harm may be a possible factor. However, none of the authors refer to the timelines that such investigations may entail. Nevertheless, providing pharmacy graduates with knowledge of the purpose and processes of RCA (Fassett, 2011) suggests that the concept may have greater relevance at postgraduate level when autonomous practice together with experience of professional responsibility become more tangible.

Moving on, human factors is generally advocated at postgraduate level (Russ et al., 2013; Paterson-Brown, 2011). At graduate level, practitioners are accountable for their practice and have a degree of autonomy whereas undergraduate healthcare students are generally supervised in the clinic.

Additionally, improved awareness of organisational culture and the effect of teamwork on successful patient care and completion of tasks may be a contributory reason for promoting the human factors approach to practitioners at graduate and postgraduate level.

However, a survey on the teaching of patient safety and human factors in undergraduate nursing programmes revealed that twelve of the thirteen respondents included ‘decision making, situation awareness, teamwork and fatigue’ (Robson, Clark, Pinnock, White et al., 2013). Environmental ergonomics and human-machine interface were only addressed by one-third and one-quarter of the educational institutions (ibid). These findings suggest that components of human factors are included in the undergraduate curriculum but they indicate a narrow focus. However, Attree et al.’s (2008) research highlighted that the individual’s fitness for practice and competence took precedence over the systems approach although these components were not mapped to specific competencies. The results of these two studies show that progress has been slow in including the systems approach in undergraduate healthcare education meaning that the progression to a holistic understanding of patient safety is diminished. Furthermore, the interpretation of statutory standards is vague with no explicit reference to how these are implemented in the curriculum.

Research evaluating the WHO multi-professional patient safety curriculum in a pre-registration nursing programme reported improvement in two of the four topics, namely, knowledge about errors in the context of systems approach and personal influence in ensuring safety (Mansour, Skull, Parker, 2015). The authors noted that the third year students valued the explicit reference to patient safety but also expressed the view that the topic should be introduced earlier in the programme. However, on the specific perceptions of patient safety, Mansour et al. (ibid) present limited data of self-reported pre-and post-test questionnaires thereby preventing appraisal of the full results of their research.

2.5.2 Research on Patient Safety Education

Progressing to other safety-related issues in education, one nursing study of curricula in four UK University programmes revealed that 'patient safety' was not explicitly identified in the curricula (Steven et al, 2014). These findings suggest that the curricular content was based on interpretations of patient safety inferring contextualisation of the topic. Cresswell et al. (2013) also noted a similar finding reporting that the course leaders conceptualised patient safety as an 'overall outcome of their programmes'. In their comparative case studies involving four different healthcare disciplines, the topic of patient safety was seen as an underlying theme that integrated different learning activities constituting 'good practice', being a good healthcare practitioner or being 'patient-focused'. Additionally, examination of documents and interviews with participants and observation of teaching and learning revealed that patient safety 'was implicit in curricula as an overall programme outcome as opposed to a distinct area of competency'. This finding begs the question of what knowledge is transferred to the workplace if the topic is not signposted? The authors also reported that systems such as team safety culture, incident reporting, RCA, were not evident in the curriculum documents or in the observation of teaching (op.cit.).

In TR education too, there is an expectation for patient safety, including systems approach, to be included in the education curricula to reduce radiotherapy errors (Robson, Clark, White, 2014). Whilst Probst et al. (2014) support this view, they suggest a need for further investigation of errors in clinical practices to identify specific issues,

> '*we need to assess where gaps in training or competence have led to set-up errors [in clinical practice] so that appropriate educational programmes can be developed to reduce the potential for future errors*'.

Such a claim also presumes knowledge and skills transfer to the workplace environment.

Moving on, organisational and cultural factors necessary for creating a safety culture may include: 'shared attitudes, beliefs and practices' related to safety, including understanding of what constitutes danger; appreciation of the 'systems approach'; openness, trust and the sharing of information; a reflexive

attitude towards safety improvement; and 'effective leadership that promotes the goals of safety' (Rowley and Waring, 2011:2). This view suggests that the academic curriculum representing the knowledge base is only one component of the undergraduate curriculum with learning in practice placements forming the other element. The argument being that knowledge alone may not be sufficient in developing the attitude and reflexivity that is necessary for safe practice.

However, learning in the practice setting also brings its own problems. In a qualitative study of medical, nursing and pharmacy faculty perspectives of patient safety in Canada, Deborah Tregunno et al. (2014) found that participants talked about the culture of the clinical environment impeding the development of safe practice. The authors also confirm other researchers' assertion regarding the lack of patient safety content in healthcare curricula (Mansour 2012; Robson et al, 2013). These studies highlight the need for further research.

In the next section, I focus on the professional regulatory body to understand the influence of this external agency in supporting patient safety in the clinical workplace.

2.6 Role of the regulatory bodies

In the health and care professions, the overarching measures of the nine regulatory bodies in the U.K. include national standards for education, proficiency and behaviour. Other instruments entail keeping registers of proficient practitioners, ensuring members' proficiency through re-registration, and dealing with shortcomings in competency and conduct (Law Commission et al., 2014). Deviances from these minimum standards may result in punishing practitioners through civil liability, criminal charge or disciplinary action. Sometimes all three actions may occur as noted with Shipman and the more recent Paterson case where unnecessary breast cancer surgery was performed by exaggerating cancer risk (GMC, 2017b). These statements portray an institution whose role is steeped in authority where the creation of standards and monitoring their implementation is the primary focus.

However, there are some issues. There is insufficient public awareness regarding the regulatory body's role in ensuring safety (Baumann et al. 2014) inferring that those people whose interests are central lack the necessary knowledge to raise concerns. In discourse regarding their function, clarity concerning terminology is necessary to understand concepts, definitions and the application of guidelines although it is conceded that such a view may be ideological. On the notion of regulation, Braithwaite et al. (2007) offer an organisational perspective where regulation is associated with governance of processes and behaviours in its broader context. This may involve rules as well as cultural norms that dominate social structures in the workplace. In relation to professional practice the role of the regulatory body mainly entails the provision and distribution of prescriptive standards that its members are expected to adhere to (ibid). Such standards provide an explicit instrument to assure the public of the way in which their interests are safeguarded. However, there are problems with written professional standards. First, there is an assumption of a collective way of interpreting them. On the other hand, individual interpretation is likely to result in variations in education although broad standards may allow for changes that form an inherent part of healthcare practice (Ralph, Birks and Chapman, 2015). Other concerns include the reliance on the agency of its members to understand the standards and cooperate in their implementation (Yeung & Dixon-Woods, 2010).

Regulatory bodies frequently have a dual role whereby their allegiance to the public is juxtaposed with their responsibility to their fee-paying members. Here accountability to the public and its members create tensions for employees of the organisation, a view that is supported by Baumann et al.'s (2014) research on accountability. The authors revealed that such tensions were explained by way of service provision in the form of information regarding 'qualifications and standards of practice' for its membership, and 'complaints investigations' to fulfil its obligation to safeguard the public.

On the other hand, others consider the regulatory body as an external instrument for monitoring and upholding rules (Freshwater, Fisher and Walsh, 2015; Ralph, Birks and Chapman, 2015). However, the rules are similar insofar as individual practitioners are expected to demonstrate minimum standards of

practice commonly acquired through education and training. There is an understanding that professional regulation is generally on a quid pro quo basis meaning that the regulatory body assures public safety in return for self-regulation which is granted by the government (Lunt, 2008:86). To some extent acting as an arm's length organisation, the regulatory body maintains its position by ensuring its standards are adhered to by its members in their daily practice. Such adherence usually involves clinical supervision and autonomy (Freshwater, Fisher and Walsh, 2015). In this context, supervision is seen as the surveillance of each other's practice. As a result each practitioner's actions come under observation making them visible to the other. Perpetuating the reach of the regulatory body in this way also benefits employers (Devers, Pham and Lui, 2004) who utilise the standards to impose boundaries to practitioners' roles which are commonly identified in job descriptions. These boundaries are further embedded by workplace protocols requiring compliance. Such actions ensure that each practitioner becomes accountable for their own practice.

Education and training therefore has a significant role in developing the fundamental knowledge and understanding of the rules and standards stipulated by the regulatory body. For example, the UK pre-registration courses in nursing, medicine and the allied health care professions require approval from statutory bodies such as the Nursing and Midwifery Council, the GMC and the HCPC respectively in return for demonstrating the standards in the curricula (Glasper, 2010; GMC, 2017c; HCPC, 2016a). Such actions enable respective institutions to monitor that standards/competencies are achieved to ensure the healthcare practitioner is 'fit for practice, purpose and award' (Glasper, 2010). However, these prescriptive standards also encourage some students to view professional practice as a fixed body of knowledge. Discursive exploration of professional practice in HE curricula may create dissonance for such learners who may find the liberal perspective as superfluous to practice (McIntosh et al., 2012). Indeed, the regulatory body's focus on skills acquisition, competence and safety is incompatible with the ethos of HE where knowledge is contested and negotiated. This suggests that educators on vocational programmes have to balance the professional practice requirements with the philosophy of HE where enquiry and knowledge development are central. However, a dearth of

such knowledge indicates that research is necessary to understand how regulatory standards are embedded in undergraduate healthcare education.

2.7 Summary

Patient safety is multidimensional. It is value-based appealing to personal and societal expectations. Safety is woven into the quality of care and thus becomes a feature of care provision. The review of the literature has revealed that in pre-registration education, patient safety forms a component of the classroom curriculum where it is identified in specific topics that mainly focus on the quality of care although my experience with students indicates the presence of safety values too, which begs the question of how and where these are embedded in the curriculum. Whilst a system-based approach supports the understanding of contributory factors that jeopardise the practise of safe care, literature indicates limited evidence of such approaches in the pre-registration healthcare curricula including radiography. Additionally, the lack of explicit signposting appears to influence skills transfer to the workplace resulting in further questions of how students transfer knowledge of patient safety and what knowledge is transferred if the topic is not signposted? In the workplace, socio-cultural factors are integral to the culture of safety. This raises the question of how students manage the socio-cultural aspects that dominate the workplace experience in undergraduate education. Competence in nursing and other healthcare professions generally incorporate standards of the PRSBs but this point is not explicit in any literature and therefore highlights a gap in how such standards are re-contextualised in pre-registration healthcare curricula.

So this review raises two questions:

1) which aspects of patient safety are portrayed in professional standards and in educational curricula?

2) how are professional standards interpreted in pre-registration education?

Chapter 3 - Developing the conceptual framework

The review of the literature has identified specific problems regarding the lack of explicit signposting in the pre-registration curriculum; different interpretations of patient safety, and lack of understanding of the interpretation of professional standards in the education curricula. Nevertheless to address the issue of what constitutes patient safety knowledge in TR, this chapter considers the professional curriculum that is commonly found in healthcare programmes.

Hereafter, curriculum is defined as a deliberate 'set of educational experiences' (Barnett and Coate, 2005:4). To support understanding of how the construct of patient safety is appropriated in the curriculum, this chapter begins by considering the concept of recontextualisation. The second part explains the relevance of context and explores the notion of recontextualisation in pre-registration education curricula. The last section focuses on the theoretical framework of recontextualisation and outlines the key concepts for this research.

3.1 Concept of Recontextualisation

The notion of 'recontextualisation', attributed to Bernstein (2000:31-33) has been used to explore how 'discourses' or forms of 'knowledge, practice and identity are constituted and changed in different educational contexts' (Horden, 2014). Taking Bernstein's notion, Barnett (2006:144) simplifies recontextualisation as the 'appropriation and transformation of knowledge for various purposes' possibly inferring the movement involved in curriculum design and its subsequent application. Influenced by Vygotsky's concept of mediation in which individuals engage in self-construction through socio-cultural systems (Daniels, 2015), the notion of recontextualisation has evolved further. Guile (2006) contests the socio-cultural theory of situated learning and the dualistic notion of 'learning by doing' and 'learning by abstraction' conceding that there is a place for the 'everyday' and 'theoretical' knowledge. However, he argues that although these different forms of knowledge may be acquired separately, they are still 'related to one another dialectically' (ibid). So conceptualised on a social model of learning, Guile and Evans' (2010) theoretical framework predicates

that all knowledge is *'*context dependent*',* therefore users are likely to recontextualise knowledge according to the context in which it is employed. For example, the aim for pre-registration students in the TR discipline is to facilitate a successful transition from the academic setting to the patient-centred environment of clinical practice. So taking account of the previously mentioned dialectical relationship, instead of seeing teaching and learning curricula as different from one another, it is important 'to consider their relation to one another' (Guile, 2011). Consequently, contexts are also relevant for their impact on these activities.

3.2 Relevance of context in pre-registration healthcare education

In examining the curriculum content, England et al.'s (2016) research of patient safety topics in pre-registration radiography courses revealed that national guidance documents were highly influential in determining the content of the radiography curriculum. How such guidance was recontextualised was not examined and therefore remains unknown. Additionally, greater reliance on workplace experience was noted for supporting learning of specific topics such as radiation protection, infection control, the use of contrast agents, patient identification, communication and team-working. These findings suggest that course teams expect learning to occur in specific environments that enable context-laden experiences.

Cresswell et al. (2013) also reported that learning topics were context-bound in their investigation of pre-registration students' formal and informal learning in medicine, nursing, pharmacy, occupational therapy and physiotherapy courses. For example, physiotherapy's concern for physical safety involved the inclusion of manual handling and prevention of falls, the pharmacy curriculum included 'medication errors', nursing highlighted 'infection control and safe drug administration'; whilst medicine focussed on 'diagnostic errors and high risk procedures' although examples of the latter were not identified. Given the overlap on topics such as communication skills, manual handling, and medication practice, the authors noted the absence of interprofessional learning. This is surprising particularly as collaborative practice

and good communication skills continue to be valued and promoted in the WHO's patient safety multi-professional curriculum (2011).

The importance of context in ensuring relevance, and opportunity for application of knowledge and skills development is also emphasised by researchers in an observational study concerning pre-registration nursing students' ability to identify prescribing errors (Whitehair, Provost, Hurley, 2014). However, this idea poses the question of how the clinical or workplace curriculum is determined and what input and support workplace educators have in shaping and implementing such curricula. Indeed, there appears to be a dearth of research on the clinical curriculum with most researchers focussing on students' experience on practice placements (Timmins, 2012).

With respect to context, Allan et al. (2016) explore how knowledge and practice learned during education and training are applied by newly qualified nurses in the delegation and supervision of other staff. Using Guile and Evans' (2010) framework, which theorises a systematic consideration of how knowledge is recontextualised from curriculum content to pedagogy, workplace and the learner, research in nursing focussed on learner recontextualisation. From participant interviews and observations, the research demonstrated construction of knowledge occurring through 'invisible learning' in which a supportive workplace environment was important for embodied practice to occur (Magnusson et al, 2014; Allan et al., 2016). However, the authors failed to explain how the theoretical framework was applied in their research. Another publication from the same ethnographic research of newly qualified nurses' (NQN) transition in the workplace showed that the theoretical framework allowed better understanding of the contexts in which participants' progression to the nursing role took place (Allan, Horton, Magnusson, Evans et al., 2015). Focussing on learner recontextualisation the authors use the example of the drug round to support competency in managing workload,

> '*In many cases NQNs [newly qualified nurses] described routines such as the medicine round as rituals which had specified, meaningful and symbolic actions to be followed to enable them to conform to the expected conduct and show their passing from one stage to another. In this*

example, the expected ritual behaviour of the medicine round is described by an NQN as not speaking:.....' (ibid).

In this account, the authors fail to explain the rituals including the significance of 'not speaking' in this embodied practice. It may indicate the embodiment of theoretical and/or practical reasoning (Guile, 2011) as nurses are expected to wear a tabard notifying 'Drug round in progress, please do not disturb'. Such specific instructions intend to reduce nurse interruptions, and consequent risk of drug errors (Scott et al., 2010). Whilst the process of recontextualising knowledge is not explicit, this account highlights the notion of 'acting' and being' (Barnett and Coate, 2005:4) that is likely to occur through recontextualisation. Allan et al.'s (2015) account depicts the student engaging with the curriculum thus adopting certain ways of thinking and acting to become a practitioner.

In their explanation of the recontextualisation framework, Evans' team (2010) write that:

' *For knowledge generated and practised in one context to be put to work in new and different contexts, it has to be recontextualised in various ways that simultaneously engage with and change those practices, traditions and experiences* '.

Whilst Allan et al.'s, research (2015) illustrates a change in understanding of prioritising workload, the authors fail to mention what specific knowledge was being recontextualised by NQNs during the ritual.

However, in a third publication from the same research, Allan et al. (2016) focus on the practices that support learners' recontextualisation of delegation and supervision in the workplace environment. Although the content and pedagogic recontextualisation is not explicitly identified, the following account suggests that these aspects were considered:

' *Timetabled sessions and instruction in nursing preceptorship programmes can introduce codified, procedural and work process knowledge but unlike disciplinary or subject knowledge, where there are clear criteria leading to the goal of greater abstraction and depth in understanding; there are few rules about how to structure and sequence the content towards the goal of knowledgeable practice, as the latter depend on invisible learning. The invisible learning is often triggered by activity and context* '.

The authors illuminated informal methods that supported practice development, and revealed forms of invisible learning in which 'subject knowledge, procedural knowledge and ... personal knowledge' were 'used, refined and reworked' (ibid). However, gaps remain about how the workplace curriculum is constituted and recontextualised. Furthermore, this review highlights the lack of empirical research on the theoretical framework of recontextualisation.

The lack of explanation from research in nursing suggests that further study may support discourse on Guile and Evans' (2010) theoretical framework. Beyond healthcare, the recontextualisation framework has been utilised in diverse fields such as aircraft engineering, banking, financial services, pharmacy, management and leadership development in the glass industry and defence, respectively although detailed application was only found in education relating to aircraft engineering (Evans et al., 2010). Regardless, Taylor, Evans & Pinsent-Johnson (2010) claim that the explanatory power of the recontextualisation framework has been tested in work-based programmes in Canada and the UK although it is difficult to comment on this without all the evidence. However, the framework has not been tested in radiography.

To recap, review of the literature indicates gaps in knowledge regarding the form of patient safety knowledge, how and where it is embedded in the curriculum; how professional standards are recast in the curriculum, and how the curriculum statements are then employed in the workplace. Therefore, my research questions are:

1. How are statements of professional practice recontextualised in the undergraduate therapeutic radiography curriculum?
2. How are curriculum statements recontextualised in the clinical workplace setting?
3. What types of pedagogic practices are utilised in the workplace to support recontextualisation of curriculum knowledge?
4. How do undergraduate learners account for recontextualisation of knowledge in the workplace?

3.3 Theoretical framework

As the theoretical framework of recontextualisation focuses on how knowledge is used in different contexts, this lens seems appropriate to investigate how standards regarding patient safety are recontextualised from the classroom to clinical practice in pre-registration TR education. Guile and Evans (2010) write that:

> '*..forms of knowledge are not entities that remain the same but that are just used in a new context (i.e. place or setting). Rather for disciplinary knowledge to be put to work in new and different contexts, lecturers, mentors and learners have to make it engage with and change the practices, traditions and experiences of the new context*'.

My interrogation of professional practice that I have come to know over the past two decades also draws upon another researcher's wisdom who suggests that theory provides a tool to distance oneself from the known,

> '*The purposes of such theory is to de-familiarize present practices and categories, to make them seem less self-evident and necessary, and to open up spaces for the invention of new forms of experience'* (Ball, 1995).

Therefore, the aforementioned theoretical framework affords a tool to understand practice from a different perspective to aid effective teaching and learning.

3.3.1 The framework of recontextualisation

The framework expands two concepts. One is Bernstein's idea (2000) that 'concepts change as they move from the disciplinary origin to the curriculum' content where it may be used in a different context. van Oer's (1998) notion that 'context is integral to practice and changes from one workplace to another and between sectors' also influenced the development of this theoretical framework (Taylor, Evans, Pinsent-Johnson, 2010). Next, I explain the four components of the framework namely content, pedagogy, workplace and learner recontextualisation (Guile and Evans, 2010).

Content recontextualisation focuses on how knowledge from disciplinary and/or vocational origins is put to work in the programme curriculum - figure 3.1. In this process, the programme team selects codified knowledge and recasts it for teaching and enhancing students' learning (Evans et al., 2010; Guile & Evans, 2010). In professional and vocational programmes, this involves selecting subject and work knowledge and its organisation in the curriculum (ibid).

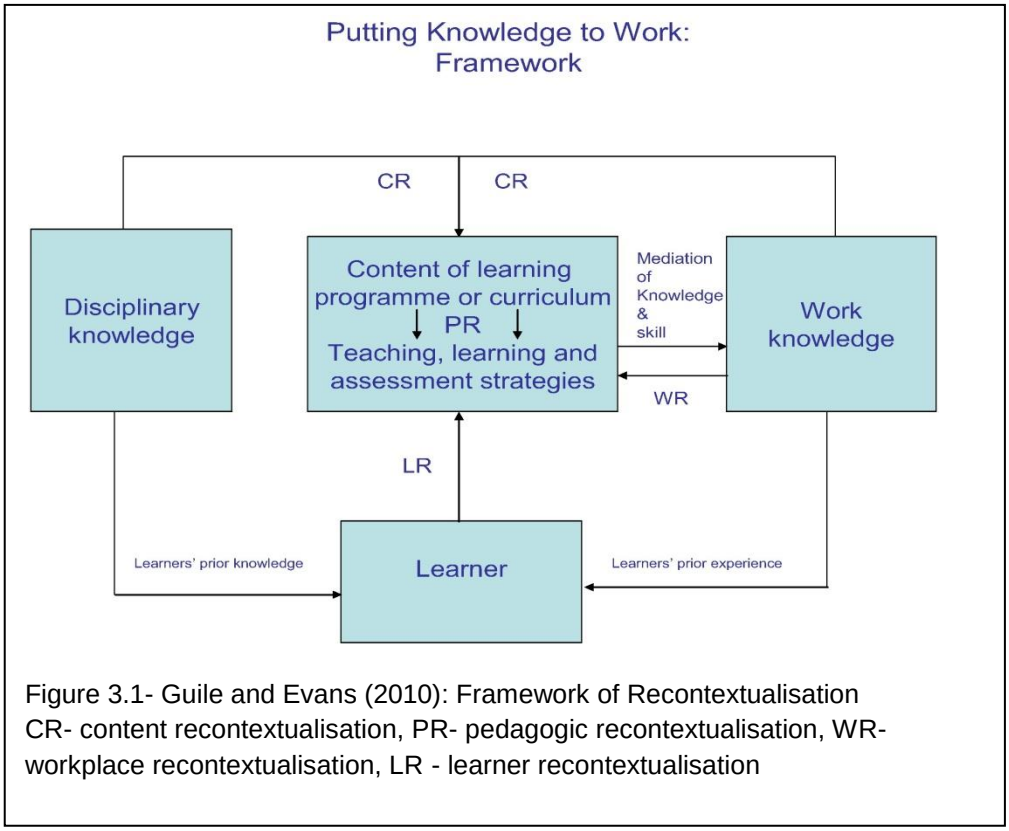

Figure 3.1- Guile and Evans (2010): Framework of Recontextualisation
CR- content recontextualisation, PR- pedagogic recontextualisation, WR- workplace recontextualisation, LR - learner recontextualisation

Programmes may also need to fulfil the requirements of the professional and regulatory bodies' requirements adding another dimension to content recontextualisation. Based on Bernstein's (2000) concept of 'framing', Guile and Ahamed (2011) explain,

> '*the latter [framing] refers to the locus of control over the selection, sequencing and pacing ..... of the knowledge to be acquired*'.

Therefore, the concepts I draw on relate to what, how and where patient safety knowledge is situated in the curriculum. To examine the curriculum structure, I consider the selection [what counts as knowledge and what signifies practice], sequencing [order in which knowledge and practice are organised] and pacing [time assigned to knowledge and to practice] (Gamble, 2009).

These rules of combination may also inform the order of specific content in relation to one another (ibid). For example, in the recontextualisation of content for aircraft engineering, academic elementals included maths and physics, seen as 'traditional subjects' by Bernstein (2000). These subjects were recast and formed the underpinning knowledge in the opening modules for the aircraft engineering course. Guile (2011) writes:

> '*Stated another way, the maths and physics modules were not designed to assist learners to become mathematicians or physicists, rather their purpose was to prepare learners to analyse and determine the best way to repair a plane'*.

Pedagogic recontextualisation, figure 3.1, focuses on decisions about suitable teaching and learning activities employed to engage students thus moving knowledge from curriculum statements to teaching (Evans et. al., 2010; Stephenson, 2012:5-6). Evans et. al. (2010) write that,

> *'PR takes place as vertical and horizontal forms of knowledge are organised, structured, and sequenced into learning activities, options, modules, for the purposes of effective learning and teaching*'.

Here vertical knowledge relates to the ability to apply basic disciplinary knowledge in different contexts (Guile and Evans, 2010), for example relating the logic to the clinical context. Horizontal knowledge integrates knowledge between subjects to support a holistic understanding (Snyman & Kroon, 2005). Key considerations for tutors include the organisation, structure of content, and sequencing of these elements to support students' learning and integration of content in the classroom and the workplace (ibid). This is developed further in Chapter 6.

Consequently, pedagogic methods need to take account of learning that occurs for, and on placements. So the use of simulation as well as other methods such as storytelling, and work shadowing to develop safe practice, can be examined. Module assessments allow consideration of which aspects of the subject and when specific content should be assessed. So here consideration is given to formative and summative assessment to explore how and which aspects of patient safety knowledge are assessed (Guile and Ahamed, 2011).

Workplace recontextualisation, figure 3.1, occurs through observation of and involvement in activities, where ‘knowledge is embedded in routines, protocols and artifacts’ (Evans et al., 2010). Such activities assist learners in the process of recontextualising codified knowledge to practice. However, they require a different approach from students who have to learn the skill of negotiating their learning (Guile and Griffiths, 2001). Practice educators and supervisors play a critical role by creating expansive environments that enable students’ participation (Evans et. al., 2006:57-58).

Concepts also focus on the placement experience. Key considerations involve the organisation of the student experience, the workplace practicum, and assessment. Concepts of supervision include guided participation through interaction with co-workers (Billet, 2002) and 'gradual release', which relates to sequencing knowledge-based components of the programme such that theoretical understanding develops alongside skills. The latter also includes 'gradual iterative release of responsibility from educator to learner in educational and workplace contexts' (Evans et al., 2010).

Learner recontextualisation focuses on students developing professional competency and identity through their educational experiences. Guile and Griffiths’ (2001) assertion that learners have to learn to negotiate learning suggests that personal agency is important in developing and maintaining momentum. Learners also learn to navigate the social and cultural aspects of the workplace environment, meaning that horizontal knowledge is significant in optimising learning. Horizontal knowledge extends beyond 'know-how' and refers to the 'process of change and development' that accompanies an individual as they move from one context to another (ibid). In so doing, learners may integrate prior learning and develop new mediating tools for the workplace. Evans et al. (2010) write that,

> '*Learner re-contextualisation takes place through the strategies learners themselves use to bring together knowledge gained through the programme and gleaned from working with more experienced people in the workplace’*.

Concepts focus on the forms of negotiation for learning experiences, the social and cultural factors that influence learners’ experience in the workplace and

strategies that learners adopt to develop skills for safe practice. So this implies that learner engagement is based on a curriculum of 'knowing, acting and being' (Barnett and Coate, 2005:59). 'Knowing' is personal to the individual who is making certain claims about propositional knowledge, 'acting' is overt and demonstrated in conscious actions whilst 'being' requires the student to interact with the 'inner self' (op. cit.).

This theoretical lens enables the examination and understanding of how knowledge in the TR discipline is put to use in the different contexts of curriculum content, pedagogy, workplace and the learner. My empirical research using the lens of recontextualisation makes an original contribution to literature on methodology by adopting this theoretical framework. That said, the focus of my research is not the methodological framework per se but the curriculum content, knowledge and application of patient safety.

3.4 Summary

The premise of this chapter is based on recontextualisation where knowledge is appropriated and transformed for utility in another context. So context is equally important and highly pertinent in TR and other healthcare programmes where the curriculum encompasses education in the workplace environment. Taking account of the socio-cultural aspects of education, engaging with the HE curriculum possibly supports 'knowing, acting and being' that occurs through recontextualisation.

Thus, the framework of recontextualisation offers a systematic approach to interrogate what constitutes patient safety knowledge in TR, how it is represented in the curriculum and recast in the workplace. The application of Guile and Evans' framework in radiography also provides an opportunity to explore the socio-cultural influences on learning and simultaneously examine the transferability of this theoretical framework, which is underdeveloped in healthcare programmes. My conceptual framework has been greatly influenced by literature on the notion of patient safety and by research on the presence of safety in healthcare education reflecting Trafford and Leshem's (2008:85-86) assertion of the relatedness of reading, analysis, personal experience and

reflection on the development of this roadmap. In the next chapter, I provide the details of my plan.

Chapter 4 - Methodology

In my quest to better understand my disciplinary field, I begin with the rationale for the methodological choices regarding the theoretical framework and ontology, which were informed by the epistemological conceptualisations of safety as values, quality of care and systems that are constituted in embodied practice. Then I focus on my research design where context is accounted for as this has been instrumental in the interpretation of safety in specific disciplines. The last section considers ethical matters.

4.1 Ontological framework

In chapter 1, I claimed that safety is a subjective experience. The various notions of safety as ‘a state of being’; the 'collective effects of cultural and contextual factors' on safety culture (Edwards et.al., 2013), and the proposition of safety science focusing on actions that enable safety (Hollnagel, 2014) point to a constructivist worldview which suggests that *'people mentally construct, rather than receive, their ideas of the world'* (Giacomini, 2010:133). Therefore, it is appropriate to align this research with a constructivist view in which social and individual viewpoints inform the concept of patient safety.

Focussing specifically on social constructions of reality in which 'the social and the psychological worlds' are constructed through interaction foregrounds the subjective understandings of participants (Young and Collin, 2004; Weinberg, 2009:283; Denscombe, 2010a:118; Furlong and Marsh, 2010:185). ‘Everyday knowledge’ is shaped by participating in a given community suggesting that the genesis of knowledge may be rooted in community negotiations (Gergen and Gergen, 2003:3). Including the affective component offers the researcher the opportunity to consider the dynamics of the interactions (LeCompte and Schensul, 2010:68). Therefore, a constructivist worldview is better suited to understand how notions of patient safety are embedded in the curriculum and recontextualised in the workplace.
As a reminder my sub-questions are:
1. How are statements of professional practice recontextualised in the undergraduate TR curriculum?

2. How are curriculum statements recontextualised in the clinical workplace setting?
3. What types of pedagogic practices are utilised in the workplace to support recontextualisation of curriculum knowledge?
4. How do undergraduate learners account for recontextualisation of knowledge in the workplace?

4.2 Research design

In considering the design for the four sub-questions, key considerations included the research paradigm and the methodological approach.

4.2.1 Research paradigm

To better understand the socio-cultural construct of patient safety, I selected a qualitative, interpretive paradigm to comprehend how the concept of patient safety is interpreted and practised by TR educators and learners. This approach allowed me to explore the 'social construction of realities' by gathering information from participants' daily practices (Flick, 2008:15). Commonly, qualitative research takes place in the natural setting providing the researcher with opportunities to gather 'representations', which are then examined closely to 'make sense' of the phenomena, making them visible in the interrogation (Denzin and Lincoln, 2008:4). In an interpretivist approach, reality is knowable to a degree insofar as it is based on the interpretation of social life (Radnor, 2002:4).

Furthermore, Flick (2008:15) postulates that in specific disciplines such as nursing, the 'principle of appropriateness' in qualitative research may need to be studied in particular ways meaning that sensitivities and ethical concerns of the research environment may impact upon data collection methods. Such a principle infers that context may also influence actions and decisions. Next, I turn to the second consideration that guided this research.

4.2.2 Methodological approach

A case study approach was adopted to explore the 'whole' thus allowing an in-depth examination of various elements such as the infrastructure of

workplace education and the exploration of relationships to understand how participants interpret and attribute meanings in social processes (Cohen, Manion and Morrison, 2011:289; Denscombe, 2010b:53; Swanborn, 2010:16; Saldana, 2011:8). Although various definitions exist, common elements of a case study include 'understanding of social phenomena' in a 'natural context by studying the process' of interactions within a system using 'various methods for data collection' (Gerring, 2007:16; Swanborn, 2010:13; Woodside, 2010: 1; Yin, 2014:16).

In this research, the inquiry begins at meso-level focussing on the institution by considering the course curriculum. This then extends to micro-level research to examine the 'person & interpersonal relations' (Swanborn, 2010: 6) where transfer and implementation of knowledge are examined. Macro-level investigation involving the larger community is not warranted as the aim is to understand how knowledge is recontextualised in practices.

The setting for this study of how educators interpret the curriculum and teach patient safety is a post-1992 HEI in Southern England, which I have given the pseudonym of Cambourne University. The University provides education to over 19,000 students from the United Kingdom (UK), European Union (EU) and other overseas countries. The institution actively promotes outreach activities to various groups such as mature learners, those with learning difficulties, first generation applicants, and care leavers to encourage their access to HE. The faculty of health and social care is one of five faculties at Cambourne providing courses in nursing, midwifery, paramedic sciences, physiotherapy, diagnostic and therapeutic radiography. Including other disciplines like social care, the faculty educates a total of 7,000 students.

Until September 2016, places for the twenty-four students on the TR healthcare course were commissioned by Health Education England (HEE), which funded provision for UK and EU students to fulfil its principal responsibility of developing the NHS workforce (HEE, 2015). Like other courses in the University, the programme lasts three years. The role of the TR practitioner combines all the essential skills required in healthcare such as communication, caring, empathy, compassion, commitment and competence.

Additionally, radiographers are required to use complex technology for accurate cancer treatment.

Students on the undergraduate TR course are required to have a science background and may begin the course at the age of 18 years. The latter requirement is explained in Chapter 5. The majority of the student cohort is female, with the female to male ratio around 6:1, which reflects patterns in the NHS workforce (NHS Employers, 2015; Yar, Dix & Bajekal, 2006).

<table>
<tr><td></td><td colspan="2">Summer
May – Sept</td><td>Autumn
Sept – Dec</td><td colspan="2">Spring
Jan - April</td></tr>
<tr><td rowspan="2">Year 1</td><td colspan="2" rowspan="2"></td><td>Term 1</td><td colspan="2">Term 2</td></tr>
<tr><td>University Interprofessional Foundation Programme</td><td>Placement intro</td><td>University</td></tr>
<tr><td rowspan="2">Year 2</td><td colspan="2">Term 3</td><td>Term 4</td><td colspan="2">Term 5</td></tr>
<tr><td colspan="2">Placement</td><td>University</td><td colspan="2">Placement</td></tr>
<tr><td rowspan="2">Year 3</td><td colspan="2">Term 6</td><td>Term 7</td><td colspan="2">Term 8</td></tr>
<tr><td>University /project</td><td colspan="2">Placement</td><td>University</td><td>Placement (capstone)</td></tr>
</table>

Figure 4.1: TR undergraduate course structure

Similar to other healthcare courses, students attend lectures at the University for fifty percent of the course as shown in figure 4.1, where codified knowledge is provided. The remaining time is placement based, where students apply knowledge and develop practice skills under the supervision of TR practitioners. TR students from Cambourne attend placements in the radiotherapy department at one of three NHS institutions located within a twenty mile radius of the University. The course structure expects students to cross the

boundaries from HE to the practice environment where knowledge is mainly situated and frequently tacit, necessitating learners to review and adopt their approach (Guile and Young, 2003: 67-69), which is encapsulated eloquently by Tuomi-Gröhn, Engeström and Young (2003:4):

> '*Crossing boundaries involves encountering difference, entering into territory in which we are unfamiliar and, to some significant extent therefore, unqualified*'.

Data collection for this research involved gathering evidence from the University and one placement site, which is discussed further in the next section.

To examine the recontextualisation of knowledge in the workplace environment, the case focussed on Cambourne University's students during their second practice placement thus it was time bound. Furthermore, students' practise of patient safety focussed on a specific treatment unit where patients with prostate cancer were treated. Thus, the case was place bound. Locating specific features in a bounded system is a characteristic feature of the case study method according to Creswell et al. (2007). By adopting this approach, I could explore specific issues concerning the recontextualisation of curricula statements, workplace pedagogic practices and what knowledge of patient safety pre-registration students recontextualise in TR education and practice in the workplace. The selection of the Trust hospital was strategic insofar as the radiotherapy department is typical of many others in the UK. For example, the department treats patients with various cancers including the most common, namely cancers of the breast, prostate, lung and bowel; it embraces multidisciplinary cancer care and provides placements to undergraduate students. Thus, the setting of this research provides another example of the bounded system that is typical of the case study method (Creswell et al., 2007).

4.2.3 Fieldwork: workplace recontextualisation

My empirical data collection to understand participants' everyday practices of patient safety took place in a radiotherapy department situated in a Foundation Trust hospital in Southern England, which I have given the pseudonym of Galensfield hospital. In addition to general care, Galensfield hospital provides specialist tertiary cancer care serving over 300,000 people

each year. Thus, Galensfield provided the ‘naturalistic’ setting to study how practices were embodied in the radiotherapy discipline. The Care Quality Commission (CQC), which regulates health and social care in England rated Galensfield’s services as ‘safe, effective, responsive and well-led’ (CQC, 2013). Indeed, Galensfield is keen to portray its commitment to safety. For example, the sign in figure 4.2 is prominently displayed in the entrance lobby to the main hospital building.

Figure 4.2 - Hand-hygiene awareness

Cancer care at Galensfield is located in a separate wing at the far end of the hospital although still connected to the rest of the institution by a long corridor that is typical of many hospitals. The wing consists of three floors with the top floor consisting of wards providing day care to patients and longer hospitalisation. Chemotherapy drug treatment and outpatient clinics are on the middle floor and radiotherapy services are located on the lowest floor.

The radiotherapy department has six treatment machines, colloquially known as Linacs, each located in purpose-built rooms called bunkers. All bunkers are adjacent to each other, sited along one side of a long rectangular hall. Patients with prostate cancer are mostly treated on two Linacs, C and D, see figure 4.3, where ethnographic data was collected.

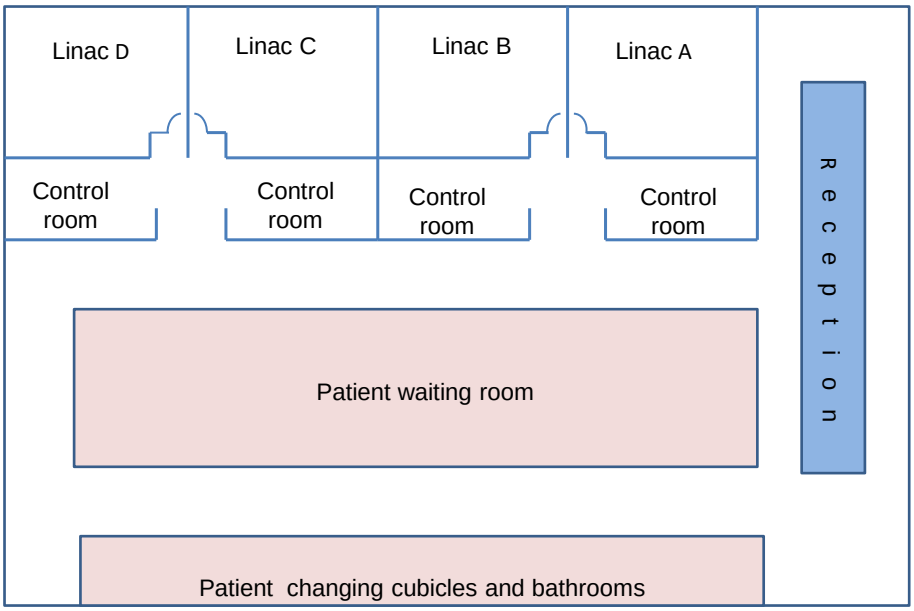

Figure 4.3 Illustration of the radiotherapy treatment floor plan

4.2.4 Gaining Access

To undertake this research, access was sought from two institutions. In the first place, access was sought from the Head of my School to involve students on the TR programme. In seeking permission, details of the data collection process and involvement of specific cohorts of students was outlined. Here, gaining access was relatively straightforward.

However, gaining access to Galensfield was more challenging. Because of my good relations as the link tutor mediating with this placement site, I was relatively confident of my knowledge of the organisation and relationship with relevant decision-makers. Positive signals during informal discussions about my proposed data collection had reinforced my confidence. However, the situation changed following various organisational changes causing a senior manager to retract support for my research. Occurring three months after starting the ethical approval process, this news was incredibly disappointing causing me to review my research, and reflect on my professional relationship, and judgement as I had established good rapport during six years as the link tutor.

Four weeks later, in an apologetic email, the same person informed me that I could proceed with my research citing other issues that had induced the withdrawal of support. This encounter brought into sharp focus the messiness regarding access to fieldwork. Two issues were underlined: it reinforced the powerful position of the gate-keeper who has enormous impact on the direction of the research and subsequent shape of the outcomes. The second was the realisation that gatekeepers are also prone to internal, institutional issues that impact upon their web of networks, which inadvertently influence decisions that may jeopardise researchers' access. As Okumus, Altinay and Roper (2007) note, the dynamic activities within an organisation influence political and personal decisions.

Thereafter, arrangements for data collection were delegated to a senior practitioner with whom I negotiated access to the Linacs, and to practitioners operating these units. As well as developing resilience, the experience highlighted that I was still an ‘outsider’ causing a degree of ambiguity in my relationship building. This temporality and re-strategising led me to bring forward the data collection process. My experiences echo others’ claim that re-strategising is a necessary element of the research process (Pettica-Harris, deGamma and Elias, 2016). Overall, the process of gaining access from all gatekeepers took eight months, an issue that is infrequently mentioned in research literature.

4.2.5 Population and Sampling

The population involved all the radiotherapy lecturers, and undergraduate TR students at my institution as they hold significant information about knowledge and practices of the TR discipline. Practice educators involved in students’ placement learning were also invited to participate in the research.

Purposive sampling was undertaken as the criteria included specific students, namely those from the second (level 5) and third year (level 6) of the course (Cohen, Manion and Morrison, 2011:156). Level 5 students were selected because they had all experienced at least 12 weeks of placement thereby gaining some experience of clinical practice. All were beginning their

second block of placements thus providing the opportunity to observe how knowledge was recontextualised in the placement setting. At the time of data collection, Level 6 students had achieved all their competencies over 45 weeks of placements and were nearing completion of the undergraduate course. Therefore, this was a suitable juncture to understand their views of patient safety. By selecting these groups of students, I was able to gain in-depth understanding from these 'information-rich' participants (Patton, 2015:230).

4.2.6 Recruitment of participants

Participants were only recruited after securing ethical approval from the Institute of Education, Cambourne University and Galensfield Hospital Trust. Invitations to all potential participants were sent by email to empower them to make a considered, and informed decision in their own privacy (Appendix A). Speaking to them personally may have compromised their decision-making as I was known to all of them either as a tutor or colleague.

Although all level 5 students were at the same stage of their education, only students on placement at Galensfield were invited to participate as ethical approval had already been achieved. Time constraints meant that observation of practices in the other sites could not be pursued as the ethical approval process would have delayed progress.

Of the eight students on level 5 placement at Galensfield, four volunteered to participate in the observation and interviews. They involved three females and one male student, all aged between 20 to 34 years. This profile was representative of the gender and age of this cohort with females forming the majority of the group.

Five out of 25 level 6 students volunteered to participate in the interviews. They were between 22 and 24 years old reflecting the young demographic profile of this cohort. Two males and three female students participated in the interview. They had followed the same curriculum at the University and on placement although two female students were at different placement sites. Therefore local practices would have influenced their clinical experience. In this

cohort, female students also formed the majority, which was reflected in the group participating in the interviews.

Practitioners working on Linacs C & D who were involved in students' education were invited to participate in the interviews. At Galensfield, the practice educator, two team leaders and two senior practitioners accepted the invitation to participate in the research. Similarly, the course team including module leaders and the course director accepted the invitation to participate in the interviews as all were involved in teaching both level 5 and 6 students.

The sampling described above illustrates the interplay that occurs between the selection of participants and the population thus supporting Uprichard's (2013) assertion that the process is 'compacted together' in qualitative research. Ethical considerations regarding the recruitment process are discussed further in section 4.6.

4.3 Research methods

Data collection methods included documentary analysis, semi-structured interviews and observations. This approach was similar to Allan et al. (2016) and Cresswell's team (2013) who used the same research methods to illuminate their understanding of learner recontextualisation, and patient safety curricula respectively. In this section, I shall briefly outline the three methods and explain how they were used to gather data for this research.

4.3.1 Documentary analysis

Here analysis of the undergraduate TR course handbook was undertaken to examine the structure and content of classroom and placement modules. Learning outcomes and indicative curriculum were examined to locate explicit patient safety-related topics in the content and identify topics where this may have been implicit. Similarly, professional and regulatory standards were examined to assess direct mapping in the course documents and identify those that reflected interpretation. Additionally, Table 4.1 was used as a guide to inform the assessment of terminology in the content of the course documents including individual modules.

Concepts	Operational terms
Patient safety values	Preventing harm, injury, suffering, disability to personhood
	Social welfare - conformity, caring for others, tolerance, advocacy
	Prevention of errors, or adverse side effects [recognising and managing TR side effects]
Patient safety as attribute	Competence, professional knowledge and skills
	Safety checklist and protocols; quality
	Confidence, trust
Safety discipline - human factors	Appropriate communication methods
	Team-working
	Working with technology, drugs and medication
RCA	Error investigation / reporting
CRM	Discipline specific team-working; communication, and situational awareness

Table 4.1 Operationalisation of patient safety concepts

To inform recontextualisation, content was assessed to understand how 'singulars' and 'regions' (Bernstein, 2000:33; Horden, 2014) - table 4.2 were appropriated in individual modules. Additionally, content was examined to assess rules of combination (Gamble, 2009) - previously mentioned in Chapter 3.3.1 and explained in table 4.2. Searching for specific topics in the indicative curriculum assisted understanding of the organisation of content, vertical and horizontal knowledge.

Curriculum concepts	Operational terms
Singulars	Pure subjects such as physics, maths, biology, anatomy
Regions	Appropriation of one or more singulars, behavioural sciences, social sciences, organisational theory - e.g. NHS, leadership
Rules of combination	Sequencing, selection, pacing
Sequencing	Order in which knowledge and practice are organised
Selection	Crafting of learning outcomes, location of topics - indicative curriculum (classroom knowledge and what signifies practise)
Pacing	Time allocated to classroom teaching and to placement

Table 4.2 - Operationalisation of content recontextualisation concepts

Pedagogic recontextualisation was undertaken by reading programme and module documents to understand the pedagogic strategy of the programme e.g. intended methods for engaging the student (Barnett and Coate, 2005:124). Minutes from meetings with practice partners, students, and course committees were also examined to trace the history of curriculum changes and glean information about workplace partners involvement in the curriculum. Examination of such artefacts affords the researcher 'indirect access' to interpret past decisions (Scott, 1990:3). The programme specification and module documents were also read for information on intended teaching methods. Appraisal of formative and summative assessments gave some insight into how learning was embedded. These actions echo Atkinson and Coffey's (2010:82) stance that careful examination of documents contribute to a holistic understanding of events and simultaneously provide a representation of

the institution's reality. They also contextualise the research participants' environment (Bowen, 2009).

Analysis involved consideration of the organisation of learning outcomes by noting how they were grouped in the various modules in terms of content, vertical and horizontal dimensions. Operational terms associated with patient safety concepts, Table 4.1, were checked against named curriculum topics to understand their interpretation and context. Such actions reflected Scott's (1990:5 -7) assertions that documented text enables the researcher to examine the evidence and infer meaning from it thereby gaining a 'frame of reference'. Simultaneously, the researcher is able to appreciate the context. In moving between the context and text, I was able to examine the authenticity and accuracy, which grounded my interpretations that Scott (1990:31) refers to as the 'hermeneutic circle'. This active dialogue is necessary for the researcher to develop grounded inference as misinterpretations are possible without such diligence.

4.3.2 Semi-structured interviews

Semi-structured interviews provided data on the recontextualisation of curriculum statements, workplace pedagogic practices, supervisors' accounts of facilitating learning and students' accounts of knowledge recontextualisation in the workplace reflecting questions two, three and four. All participants were interviewed once between January and April 2015 and all interviews were audio-recorded. Prior to the interviews, all participants were given a verbal outline of the research topic and process to enable them to clarify any issues before signing the consent form (Appendix B). Gillham (2000:38) writes that this introductory phase conveys far more than information,

> *'…the trouble to consult and inform people carries its own message; that you are taking the interview seriously; that you appreciate their cooperation; that the occasion is important to you; that you respect their rights and feelings…'.*

Using a set of themes that serve as the interview guide, the researcher is able to facilitate talk by adapting, modifying, and probing questions to improve flow and develop understanding of the subject (ibid). Formulating an interview

guide enabled me to identify specific questions and sequence them in advance. Additionally, the guide permitted a systematic approach so that the same data were collected from each participant for comparative analysis. Cohen, Manion and Morrison (2011:413) support this view adding that the guide improves 'the comprehensiveness of the data'. Using the guide also enabled me to adhere to the timeframe of one hour, a factor that I was conscious of as all my participants had interrupted busy schedules to talk with me. Additionally, the interview guide included some flexibility to accommodate individual experiences of practice.

After the first interview, which was a pilot, I then reflected on my questions as the following memo shows,

> *'My first question is quite a broad question requiring the participant to think hard so review this - it's hindering the flow of the interview, and uneasy for the participant'. 23rd Jan.2015*

In subsequent interviews, I changed the question to a biographical one inviting participants, especially practitioners, to talk about their role. In addition, I reviewed the sequence of the questions and re-ordered them to ease participants into the discussion, and improve the flow. Nevertheless, flexibility during these interviews was exercised to maintain conversational flow, as the following feedback from a participant illustrates,

> '*yes, all the questions felt appropriate including the prompts used to gain more information. They seemed to have a natural progression and lead on from each other'.* Amy

Thus, the interview is an active process of communication enabling information gathering. Holstein and Gubrium (2011:143) concur with this view referring to it as the 'active interview' and further explain that:

> '*we use the term to highlight the inherent interpretive activity of the process as a hallmark of all interviews*'.

Data for question two involved individual interviews with the University course team to explore decisions about the curricular content for patient safety, and how students are taught and informed about safety-related topics

(Appendix C). Additionally, interviews with the practice educator, two linac team leaders and two senior radiographers at Galensfield were conducted to ascertain information about the clinical practicum; how it was interpreted and integrated to support students' clinical practice development. As the practice educator is also responsible for coordinating the placement experience in the radiotherapy department, the interview included questions on how they organise the placement experience to ascertain to what extent vertical knowledge is integrated in the workplace experience (Appendix D). Types of pedagogic practices used to support students' learning in the workplace were also explored with all practitioners for question three.

Individual interviews with four students from year two and five students from year three were undertaken to understand how students recontextualised codified knowledge from the University to the practice setting to answer question four **(**Appendix E). Furthermore, the nature and content of vertical and horizontal knowledge in the radiotherapy setting was explored in these interviews to gain each student's perspective. Perceived challenges and how these were addressed was also elicited to better understand learner recontextualisation.

The use of interviews allows the researcher to construct an in-depth account of the individual's experiences, and understand their perspectives (Cousin, 2009:71). Factors such as gender, age, class, race and group membership are all issues that may cause 'social distance'. Lack of trust, ambiguity of questions and group membership may also result in distortion of subjective understandings (Miller and Glassner, 2004:128). Consequently, the notion of 'naturally occurring data' sometimes needs to be viewed cautiously by the researcher. The influence of these factors implies that the researcher has a critical role in developing rapport with participants. Kvale (2007:1) concurs with this view adding that the research interview can also be a tool for knowledge construction in which interaction between the interviewer and the participant takes centre stage. Nevertheless, it has to be acknowledged that interviewees' responses may impact on the perspectives and understandings that the researcher constructs inferring that concepts from such research may either

confirm previous research that support transferability or they enable development of concepts that may be further tested.

4.3.3 Observational data

Borrowing principles from ethnography, observation focuses upon the 'understanding of the social and organizational life' from which insights of everyday practice - 'what people do every day to get their work done' can be obtained (Miettinen et al., 2009). Practice is situated; it involves 'embodied learning and sensuous relations to the material world' (Calhoun and Sennett, 2007:6). At an individual level, the practise of patient safety is embodied in personal behaviours. Everyday practice is predicated on knowing, actions and sayings. As Green and Hopwood (2014:25) write;

> '*Knowing how to go on, what to do next, etc, is a matter of practical reason…., and this reasoning is always embodied in the sense that it is tacit, experiential ('body') knowledge, or knowing, realised and expressed in what is done, in and through practice'.*

Nonetheless, these behaviours are influenced by the organisational culture (Krause and Hidley, 2009:6) as well as professional doctrine. Additionally, in a patient safety environment, culture is likely to be influenced by team dynamics and 'credibility' meaning 'honesty, consistency and competence' (op.cit.). So principles of ethnography were utilised to understand the workplace environment.

Observations of events, activities and interactions on the treatment units were undertaken to gather 'live' data from 'naturally occurring social situations'. (Cohen, Manion, Morrison, 2011:456). Based on Blumer's work on interactionism, participant observation has a primary role in understanding the realities of the actors in the field, including their 'points of view' (Gobo, 2011: 31).

So events from greeting the patient through to actions relating to the giving of the radiation dose were observed on two treatment units, Linacs C and D. Observation of behaviours between supervisors and students focussed on communication, physical space during the supervision interactions, gaze,

speech and use of artefacts to aid learning. All field notes were recorded in a pocket handbook. Such data allowed me to answer questions three and four**.** Four students were observed for one day, equating to eight hours with each student. The first two hours were allowed for participants' habituation with the observer to reduce the possibility of the Hawthorne effect, which is discussed later in this section.

Data also focussed on how students become involved in the radiotherapy treatment activities and the care of specific cancer patients. Observations of interactions revealed how codified knowledge was ascertained by practitioners, thus providing data relating to vertical knowledge and its integration in the workplace. Moreover, the observation enabled me to compare interviewees' accounts of what they said with what they did.

For the fieldwork, I adopted the workplace dress code by wearing a white, short-sleeved tunic, navy blue trousers and black, low heeled shoes. To comply with the NHS policy, I embraced the 'bare below the elbows' requirement by taking off my wrist watch during observations. On my tunic, I pinned a film badge just below waist level to comply with the radiation regulations and I tied my hair in line with the uniform policy. My appearance was noted by several students in the department who commented on how 'different' I looked.

Although, I had anticipated being a participant observer, I reviewed this idea within the first hour of observation as the following memo shows:

> *'Assisting in the preparation of the treatment room is hindering observation of actions and behaviours around me. So REVIEW and MODIFY strategy'*. 9.30 a.m., 6th Feb. 2015.

My immersion in the tasks impeded observation of others, leading me to review and adopt the observer-as-participant role. In this role, the researcher is known to the participants but relates 'solely as a researcher' (Angrosino, 2007:54). Subsequently jotting the occasional memo after short periods of observation legitimated my purpose, and presence on the treatment unit. My observational activity was necessarily punctuated by a short coffee break of 15 minutes in the morning and a lunch break of 30 minutes providing invaluable time for recording jottings. During lunch, I chose to part from participants to contemplate my field

notes. Applying the concept of ‘synchronic reliability’ which involves seeking out consistencies in the observations (Gorman and Clayton, 2005:56), I was able to establish similarities and consistencies in the procedures undertaken by participants as these were repeated with several patients throughout the day. For example, the treatment technique for prostate cancer followed the same pattern for all patients, so the lunch break allowed a reflexive review of my content which occasionally informed a change in focus to different aspects of the activities and interactions as shown below:

> *'Used alcohol rub after pat. set-up but not when using pendant only - CHECK if standard practice*'. 17th Feb. 2015.

This pause was invaluable for recording thoughts and developing my understanding. On other occasions, I sought refuge in the changing room to note jottings. My account portrays how an emic approach was achieved in the field. Tracy (2013:22) claims that an emic approach enables the researcher to understand local rules and behaviours in situated activities.

However, observation may also influence other people’s behaviours. For example, during observation, behaviours within the group had changed to some degree causing one student participant to comment on other team members’ attentiveness towards her. Known as the Hawthorne effect, the term was derived from a workplace study at the Hawthorne plant in Illinois. It is frequently applied to experimental and observational studies to describe a change in behaviour in research participants (Denscombe, 2010a:142-143; Sedgwick and Greenwood, 2015). Throughout the four observations, I noted students’ eagerness to share their everyday knowledge of department practices with me, possibly indicating their effort towards inclusiveness. On the other hand, such actions may be interpreted as an attempt to demonstrate their knowledge of the workplace to their tutor. Two participants also disclosed that they had been anxious at the beginning of the observation but this had dissipated as the day progressed. As a practitioner researcher, I was proud of student participants’ contributions to the team. On several occasions, I slipped into my educator role by providing encouraging feedback when students had shared their anxiety about specific actions because I could see that they had conquered these doubts. During the last two observations, the most satisfying experience was

the warmth that was extended to me by ex-students who were now employed as radiography practitioners in the department. Next, I consider the strategy for analysis.

4.4 Data analysis

Full verbatim transcriptions of all interviews was followed with an initial line-by-line coding on Nvivo10, which formed the first stage of the interview analysis. Guile and Evans' (2010) theory of recontextualisation was used as the framework for the analysis of all data. Below, I explain how principles borrowed from grounded theory were applied to my data.

For the analysis of content recontextualisation, initial coding of documents sought to identify the operational patient safety terms identified in Table 4.1 to locate such topics in the curriculum (Appendix F). These curriculum topics were then grouped according to principles of technique, treatment planning and patient care - figure 4.4, illustrates the focussed coding where codes are directed and selected to establish their adequacy; subsequently revealing the emerging concept (Charmaz, 2006:57). As these three codes related to radiotherapy practice, this category together with equipment formed the 1st level sub-categories. Axial coding led to the emergence of two specific categories relating to discipline-specific and general safety categories. Further consideration of these two categories led to the emergence of professional practice as the overarching concept. Analysis of transcriptions also assisted in identifying how content was organised in the vertical and horizontal dimensions as this was not clear in the curriculum documents (Appendix F).

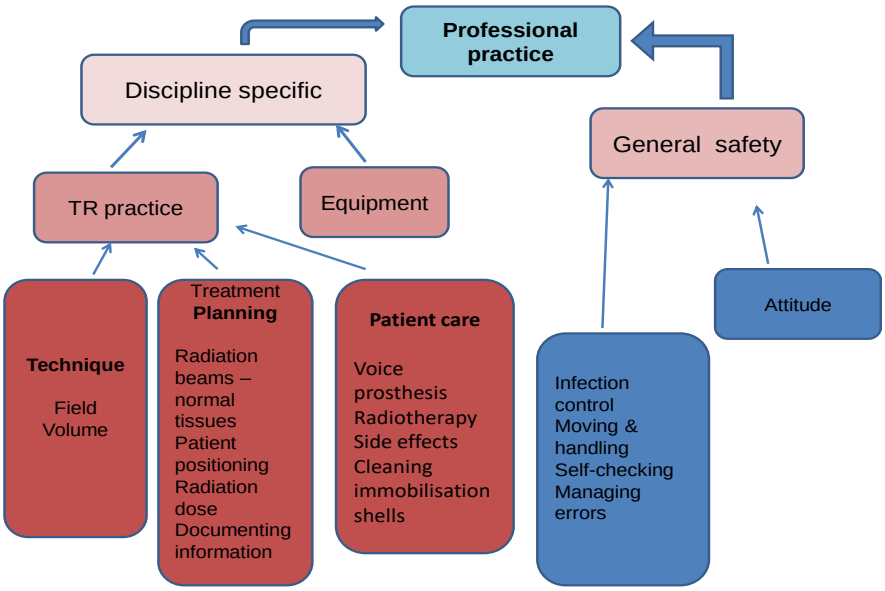

Figure 4.4 Curriculum content - outline of the coding process.

To assess the 'indicative' teaching and learning methods, data from the course documents was aggregated to ascertain the intended strategy at Cambourne University. Data from the interview transcripts assisted in the initial identification of different methods employed by educators in the University and in the workplace environment. Focussed grouping of codes helped to distinguish the methods that were commonly employed by the educators in the two different locations where student teaching occurred.

Analysis of observation data involved ‘incident-by-incident coding’. This allowed me to discover patterns regarding the use of objects, types of activities and who was undertaking these in the treatment unit environment. I examined activities inside the radiotherapy treatment room and outside for similarities and consistencies in behaviours. By comparing data from Linac C with that on Linac D, I could identify practices common to both and explore the differences. Observing in this way created distance between the familiar world of radiotherapy practice and my researcher role, as shown in the following memo:

> *‘So the question is where and how do students learn about this language [workplace terminology] and how do students begin to apply it in their own practice?’* Feb 2015

Charmaz (2006:55) uses the metaphor of studying a 'familiar landscape with a fresh eye' to explain these types of ruminations. However, such reflections allowed me to review the interview questions with level 5 student participants thus illustrating the iterative process of research involving grounded theory.

4.5 Ethical considerations

Over the years, my involvement with clinical research in oncology practice and in HE has made me aware of the researcher's obligation to protect participants from physical and / or psychological harm. Furthermore, in practitioner research, the researcher's professional responsibility and integrity is important in safeguarding the well-being of participants by ensuring that moral and legal codes are observed (Denscombe, 2010a:60).

During this research, the BERA ethical guidelines for educational research 2011 were observed throughout the process. As mentioned in section 4.3.4, ethical approval was obtained from three institutions: Institute of Education (26 November 2014); Cambourne University (9 December 2014); and Galensfield Hospital Trust (19 December 2014). The process of securing formal ethical approval should not be underestimated even from one's own institution. For example, the process is frequently dictated by ethics committee meeting dates, and establishing the correct procedures both within and outwith the institution may delay progress.

Voluntary, written informed consent was gained prior to interviews and observations. Anonymous data coding was undertaken to observe participants' confidentiality. Additionally, in the reporting of the data, pseudonyms were adopted to protect the participants' anonymity as shown in table 4.3. These pseudonyms convey each participant's views in chapters five and six.

Pseudonym	**Location**	**Role**	**Experience in Education**
Alex	Cambourne	Student	Year 3
Amy	Cambourne	Lecturer	11-20 years
Becca	Cambourne	Student	Year 2

Chrissy	Galensfield	Supervisor	1-10 years
Daisy	Cambourne	Student	Year 3
Dylan	Cambourne	Lecturer	1-10 years
Hannah	Cambourne	Student	Year 3
Jamie	Cambourne	Student	Year 2
Karen	Galensfield	Supervisor	1-10 years
Linda	Cambourne	Lecturer	11-20 years
Lisa	Galensfield	Supervisor	1-10 years
Marcia	Galensfield	Manager	1-10 years
Mel	Galensfield	Supervisor	1-10 years
Nicole	Cambourne	Student	Year 2
Ryan	Cambourne	Student	Year 3
Sam	Cambourne	Student	Year 2
Suki	Cambourne	Student	Year 3
Tara	Cambourne	Lecturer	1-10 years

Table 4.3 - Participant profiles

Research data were stored on a password-protected personal drive. Furthermore, the research data corpus are password protected. The data will be kept until successful completion of my doctoral studies and future publications. However, this data will be destroyed upon completion of the dissemination process, in line with good research practice and Cambourne's requirement.

To reduce the effect of power differences, all interviews were conducted in a neutral space that afforded privacy, implying that it was away from my office to ensure that my role as a staff member did not inhibit participants' views. However, finding physical space that enabled privacy proved to be challenging at Galensfield where enlisting the support of a senior practitioner helped. In a couple of interviews, I sensed participants' concern about being judged during disclosure of their experiences. Whilst appreciative of being trusted, I took steps to remind participants about the confidential nature of this interaction.

Additionally, participants were sent the full transcription of their interview. This type of informal communication, known as member-checking enables

accuracy of content and reveals the interdependency of researcher and participant in the research process (Sandelowski, 1993). Member-checking was also undertaken at a later stage when emerging inferences from my data were sent to participants with appropriate quotations from their interviews. Shenton (2004) writes that this form of member-checking involves 'verification of the investigator's emerging theories and inferences' as they originate from the dialogue. However, sharing this inner dialogue with participants revealed a range of unexpected emotions. It was unsettling because I was anxious about the accuracy of my inferences from the data. The experience was also exhilarating when participants' validated my interpretation. These processes illustrate the ways in which credibility in qualitative research can be sought. My action reflects Maxwell's (1992) claim that participants' involvement in member-checking is a significant part of the process:

> '*the meanings and constructions of actors are part of the reality that an account must be tested against in order to be interpretively as well as descriptively valid*'.

Reflecting on the fieldwork, patient care in radiotherapy is balanced with the use of technology, and potentially harmful substances that require careful administration. As a researcher, the *'principle of appropriateness'*, mentioned earlier - 4.2.1, was duly considered during data collection as reflected below:

> '*In reality, there is also a third space in the control room where observers like myself and others position themselves forming the background. This is usually located between the filing drawers and the image verification space'.* Memo, Feb 2015.

These memos exemplify the insight the researcher begins to develop regarding the 'rules and standards' (Kuhn, 2012:11) of practices that constitute specific research paradigms.

During observation on the Linacs, I realised that my attempt to be a participant observer - 'an insider'- caused some confusion for others. Although, I had adopted this strategy to gain access to the treatment environment, practitioners on the treatment unit continued to view me as the link tutor. I noted this because of comments throughout the day including one sharing concern about a student's progress. The temporal shift that I had made to be a

‘researcher’, which I thought might have been noted from my questions about various artefacts in the workplace, had not been interpreted in the same way by practitioners. Metaphorically speaking, it seemed that workplace colleagues at Galensfield viewed my research like a ‘side-dish’.

4.6 Summary

Given that patient safety is subjective and socially constructed, my ontology is based on a constructivist worldview. Thus, adopting a qualitative approach for this case study assists in gaining a rich understanding from a systematic investigation of how patient safety is recontextualised in HE and in the workplace. The justification of purposive sampling for participant recruitment and the data collection methods aims to illuminate the decision-making process regarding the design choices so that subsequent research outcomes that infer knowledge claims can be appraised logically to examine their credibility, transparency and trustworthiness (Denzin, 2009; Maxwell, 1992; Shenton, 2004). Furthermore, the operationalisation of the concepts assesses the transferability of the recontextualisation framework.

Focussing on the justification for the three research methods, documentary analysis was necessary to understand the interpretation of professional statements. Examining the documents before the interviews provided a better understanding of the context of patient safety topics and the pedagogy that tutors then employed in their teaching. In interviews with students, this context enabled me to explore what content they were learning; how and where this was occurring in the curriculum; how the learning outcomes and indicative curriculum from the course documents were interpreted. Such information assisted my understanding of what knowledge students then transferred to the workplace. The context gained from the documents also assisted in understanding to what extent the curriculum informed supervisors’ facilitation of learning in the workplace. It should be noted that the HCPC standards for education refer to a specific period in time to reflect the benchmarks at revalidation. These standards have since been updated by the regulatory body (HCPC, 2017). Observation of actions and behaviours supported my understanding of the workplace culture and the ways in which students learned

and contributed to safe practices in this setting. This account explains how the three data collection methods contributed to my understanding of the recontextualisation of the patient safety curriculum, which is explained in the next two chapters.

Chapter 5 - The TR curriculum: developing capability

5.1 Introduction

The influence of external agencies upon the TR curriculum is inescapable. In this chapter, the first part outlines the four external agencies that influence curriculum design. I also examine each organisation's perspective on patient safety. The second half appraises Cambourne's TR curriculum and considers how PRSB statements are recontextualised at institutional and programme level, and where content of patient safety is situated in the curriculum. Pedagogy is also considered to understand how curriculum statements are operationalised by the course team.

5.2 The Influence of External Agencies

Four key institutions influence the TR programme content: the quality assurance agency (QAA), the statutory and professional bodies, and the DH - figure 5.1.

Figure 5.1 External Influences on the TR Curriculum

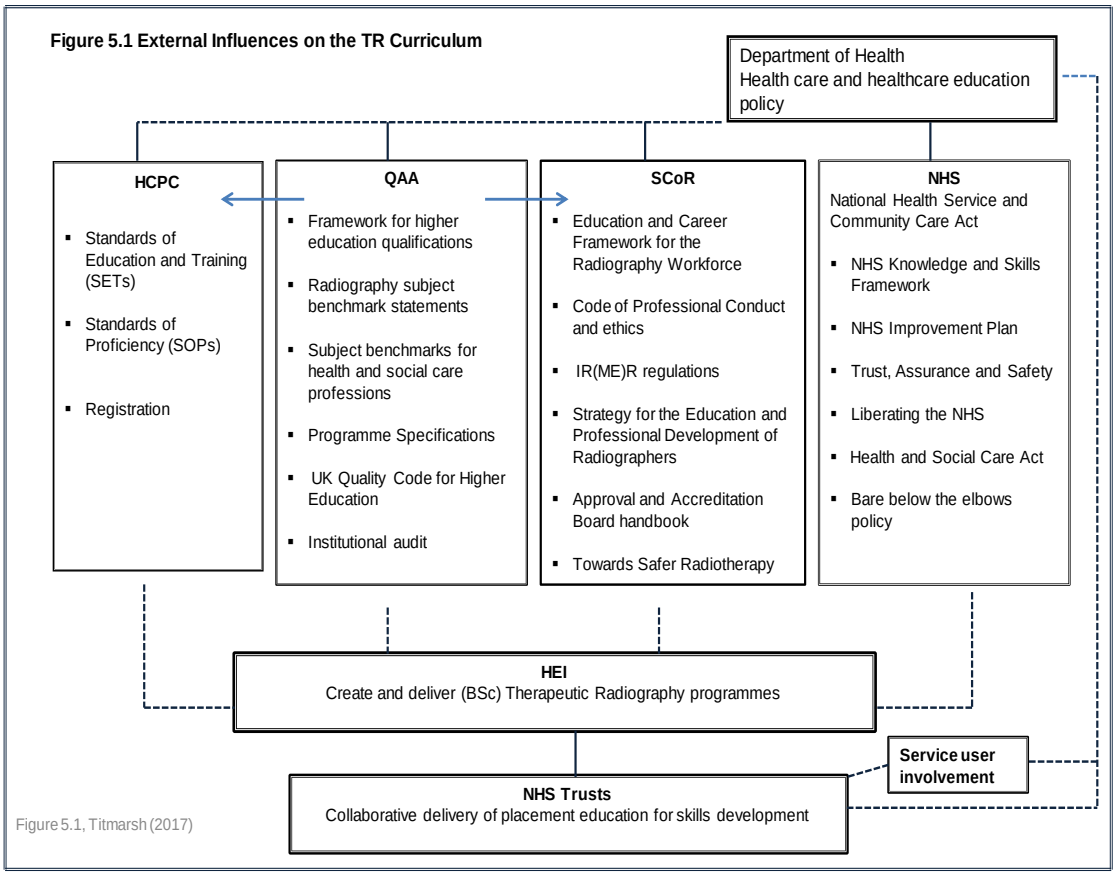

Figure 5.1, Titmarsh (2017)

5.2.1 Quality Assurance Agency

The QAA is an independent body responsible for upholding standards and improving the quality of the UK higher education (QAA, n.d.). By auditing standards, they also ensure that students who successfully complete the programme of study are fit for award, i.e. they have achieved the attributes, characteristics and skills required for the level of award (op. cit.).

In 2000, the QAA was contracted by the DH to produce subject benchmark statements for eleven health care professions including nursing and allied healthcare (Pittilo, 2006). Involving experts from HEI's, service providers and the PRSBs, emerging commonalities initiated the development of the common purpose benchmark statements for the eleven professions. These health and social care benchmark statements are presented under themes that embrace 'values' such as 'respect for patients', achieving trust and preventing harm; 'the practice' recommending information seeking, identifying and assessing care needs, planning and evaluating care (QAA, 2006). The third theme of knowledge and understanding includes basic knowledge of the human body, legislation, professional and statutory bodies. The TR benchmark statements also grouped in three categories include:

1. 'Expectations held by the professions, employers and public' [of a therapeutic radiographer]. These focus on professional values and behaviours.
2. 'Principles and concepts' that are applied to 'secure, maintain, or improve health and wellbeing' mainly concentrate on professional knowledge and practice.
3. 'Knowledge, understanding and skills that underpin the education and training of therapeutic radiographers' (QAA, 2001).

The third benchmark is significant to this research for its focus on the development of specific codified knowledge, procedural skills and professional behaviours and practice that are relevant to pre-registration TR education. This content is organised in two sub-categories that identify benchmarks for 'knowledge and understanding' and 'skills'. Further constituents of the skills category include 'capacity for reflection', 'gathering and evaluation of information and evidence', 'problem solving', 'practice', 'communication', 'numeracy', and 'technology' (QAA, 2006). Applying table 4.1 to the QAA statements regarding

knowledge and understanding of radiation; professional competency in appraising practice; and cognisance of scope of practice point to a notion of patient safety as an attribute, shown in this example,

> '*reflect on the potential and limitations of professional knowledge*' (QAA, 2001).

Values pertaining to patient safety constitute 'care for patients and carers' and 'patient care needs' (QAA, 2001). However, overt reference to safety is mainly found in the domain of TR practice as shown here,

> '*immobilise the patient for safe and accurate treatment preparation and delivery* ' (QAA, 2001).

These statements reveal that patient safety is distributed in various aspects of education and training where the context is significant in classifying the notion of patient safety as a value, attribute, or system in the form of human factors. However, it also raises the question of whether patient safety can be classified in these ways in healthcare.

5.2.2 Health and Care Professions Council

The HCPC is a regulatory body that was established under a government statute to regulate the professional education and conduct of members on its register, which currently numbers 16 allied healthcare professions. The HCPC's other remit is ‘to protect the public’ (HCPC, 2016b). Eligibility for membership is achieved by successfully completing an HCPC approved education and training course, which then confers the use of the protected title for the associated profession. For example, the title of ‘therapeutic radiographer’ may be used only by HCPC registrants.

5.2.2.1 Approval of educational programmes

To gain approval, the HEI must fulfil the HCPC's ‘Standards of education and training’ (SET) and 'Standards of proficiency’. For example, BSc (Hons) TR is a 'threshold entry route' for registration to practise as a therapeutic radiographer (HCPC, 2014). This requirement is interrelated with the QAA's benchmarks for education and training, which should be embedded for HE validation of the TR programme (QAA, 2006).

Of the six prescribed SETs that HEI's 'must have' and 'must make sure' (HCPC, 2014) four that are most relevant to this research include programme admissions, programme management and resources, curriculum, and practice placements. These four SETs are discussed next.

5.2.2.2 Recruitment standards

Three noteworthy admissions standards stipulate that HEIs 'must apply selection and entry criteria' that:

1. demonstrate competency in literacy and communication skills in the English language;
2. include 'criminal conviction checks' for all enrolled students;
3. include 'compliance with any health requirements' (HCPC, 2014).

However, specific guidance regarding the assessment of literacy and communication is not evident, thus variations are likely between programmes.

The vetting for criminal conviction introduces a mechanism to safeguard 'vulnerable groups' such as hospital patients and children. Introduced after the 2004 Bichard inquiry [murder of two schoolgirls in Soham], currently checks are performed by the 'Disclosure and Barring Service' (DBS). Set up under a government statute, the DBS works with the police to contribute to recruitment decisions concerning the protection of 'vulnerable groups' from 'unsuitable people' (GOV.UK, n.d.). At Cambourne, the DBS check provides a mechanism to assess the student's probity and overall suitability to work in the healthcare sector.

With respect to 'health requirements', offer holders at Cambourne complete an occupational health screening questionnaire regarding immunity and infection. At the beginning of the course, enrolled students undergo an assessment of their 'functional capacity' entailing assessment of mobility, vision, hearing and speech, concentration, learning ability and skin integrity. This assessment informs whether the student has the ability to achieve the SOPs. With the student's consent, programme leaders are informed of impairment so the necessary supportive adjustments for learning can be made. However, course leaders are not privy to details of the impairment which is known only to

the occupational health assessors (Higher Education Occupational Health Physicians/Practitioners, 2013). This account reveals how the admissions standards are recontextualised at institutional level to fulfil the HCPC's requirements. These activities reveal that patient safety extends beyond the teaching and learning of specific curriculum content and involve other agencies. They underline the interrelationship between the various assessment elements that inform the recruitment decision about the students' potential for 'fitness to practise' and collectively contribute to the goal of achieving patient safety.

5.2.2.3 Curriculum and placement standards

The HCPC is categorical in stating that learning outcomes 'must ensure' that potential registrants will 'meet the standards of proficiency for their part of the Register' (HCPC, 2014:7). The QAA benchmarks for education and training together with the standards for 'professional autonomy and accountability' (QAA, 2001) are implicit in the following HCPC curriculum standard:

> *'The programme must reflect the philosophy, core values, skills and knowledge base as articulated in any relevant curriculum guidance'* (HCPC, 2014:7).

The inclusion of the standards of conduct, performance and ethics can also be traced back to the values, practice, knowledge and understanding in the QAA's common purpose benchmark statements. Values are also reflected in the prescriptive 'guidance on conduct and ethics for students' where the phrase 'you should' precedes each of the thirteen expected standards (HCPC, 2012). Such expectations are juxtaposed with the standard to develop autonomous thinking presenting a conundrum for some students who become accustomed to the instructive guidance, and struggle with the autonomous thinking that is required in the advanced stages of the undergraduate course. This requirement reflects Freidson's assertion (1984:11) that all professionals are 'expected to exercise judgement and discretion on a routine, daily basis in the course of performing their work'. However, Freidson does not expand on the characteristics of autonomy or discretion in this article. A later Norwegian study of autonomy in nursing expands on the concept to identify four features (Skår, 2010). Having a 'holistic view'; knowing the patient; confidence in knowledge, that is, 'knowing that you know', and having the courage to assume leadership are features that

characterise autonomy (op.cit.). I suggest such features epitomise autonomous thinking in TR too.

Furthermore, the requirement to satisfy specific criteria means that independence in curriculum design has to be necessarily tempered for approval with the HCPC so that students are able to gain registration for future employment. Also noteworthy is the guidance that the ‘integration of theory and practice must be central to the curriculum’ although its interpretation rests with the programme leader who 'must be' an HCPC registrant (HCPC, 2014), for example a therapeutic radiographer. The requirement for specific credentials attests to the value that is placed on discipline specific expertise in the management of the programme. The counterpoint is that such a requirement points to a protectionist view insofar as the position of programme leader is limited to specific member groups.

The practice placements SET is rather directive with an expectation that 'placements must be integral to the programme' (HCPC, 2014), thereby assuming a mechanism for the expected integration of theory with practice. Here, the SET outlines its expectations of the placement providers too. The only explicit mention of safety in this document is the expectation that:

> ‘*learning, teaching and supervision must encourage safe and effective practice, independent learning and professional conduct'* (ibid).

Situating this standard in the practice placement section signals the HCPC's expectation of the setting in which the outcome should occur and reflects the QAA benchmark for practice skills (QAA, 2006:22). However, the interpretation of the standards rests with the HEI. On placement, undergraduate students are required to be supervised at all times. Therefore, there is an expectation for placement educators to possess skills necessary for facilitating learning although this is not monitored. Recently, the HCPC acknowledged ‘variable delivery’ of placement education with subsequent development of further guidance to improve the quality of practice education (British Dietetic Association, 2016).

5.2.2.4 Standards of proficiency

The QAA's threshold standards are reflected in the fifteen major prescriptive SOPs for the radiography profession although the HCPC (2013) does not define 'proficiency'. SOPs set out the expectations of what constitutes ‘safe and effective practice’ to protect the public. Each must be reflected in the curriculum. The SOPs also constitute the ‘scope of practice’ although the HCPC (op.cit.) concedes that scope may change during a practitioner’s career therefore responsibility for maintaining competency rests with the individual. To be 'fit to practise' as a therapeutic radiographer, that is have the 'skills, knowledge and character to practise their profession safely and effectively’ (HCPC, 2015), a radiography student must attain the SOP, adhere to the ‘*Standards of conduct, performance and ethics*’ and successfully complete the HEI's assessments during the three years of the programme.

Content analysis of the 141 SOP statements reveal five major categories namely, knowledge, application, skills, behaviour and values. The following examples pointing to safety illustrate my interpretations:

'Registrant radiographers must:

' be able to practise within the legal and ethical boundaries of their profession ' (HCPC, 2013:7) - knowledge;

' *be able to demonstrate effective and appropriate verbal and non-verbal skills in communicating information, advice, instruction, and professional opinion to service users, colleagues and others '* (op.cit.) – application;

' be able to perform the full range of radiotherapy processes and techniques accurately and safely ' (op.cit.) – skills;

' be able to practise safely and effectively within their scope of practice ' (op.cit.) - behaviour;

' *recognise that relationships with service users should be based on mutual respect and trust, and be able to maintain high standards of care even in situations of personal incompatibility* ' (op.cit.) - values.

In these five categories, patient safety is explicit meaning that the word safe or safely is evident in the standard. However, some standards are implicit implying that the unpinning safety is assumed. For example, demonstrating proficiency in basic life support, infection control and moving and handling

(HCPC, 2013:19) require different types of actions in their application but the end goal with each is the safety of others. Personal safety is also implicit in all three areas. Other standards extend beyond these simplistic conceptions and entail 'meta-understanding'.

For example, to '*be able to keep accurate, comprehensive and comprehensible records in accordance with applicable legislation, protocols and guidelines* ' (HCPC, 2013:11) requires the practitioner to know the workplace conventions of recording data, the implications of providing such information, and the target audience in order to ensure accurate, clear and full documentation. Practitioners including students also need to understand the end goal. Additionally, practitioners require knowledge and understanding of the legislation, know where to find protocols and guidelines, and understand the purpose, the 'what and why' of such instruments in ensuring the quality of care provision. This analysis further illustrates the complexity of patient safety and highlights that the idea of a discrete component pertaining to patient safety is likely to be problematic.

5.2.3 The Society and College of Radiographers

SCoR is the professional body for radiographers; it has provided guidance on educational requirements for radiography practitioners since its establishment in 1920 (Jordan, 1995:26). The organisation has two distinct roles: the College of Radiographers having principal responsibility for educational and professional issues whilst the Society undertakes the trade union activities.

The organisation's webpage portrays a safety conscious institution,

> ‘*Together, we shape policy and standards, pioneer new ways of working, and ensure safe and fair workplaces*’ (SCoR, 2016).

In this context, safe workplaces cannot be taken literally as safeguarding members’ interests only, although supporting its membership is a key characteristic of a professional body (Higher Education Better Regulation Group, 2011:8). In the context of healthcare safety, the notion of safe

workplaces involves consideration of a safety culture with the ultimate goal of ensuring safety for patients. Therefore securing the commitment of healthcare staff is central to engendering interest in the science of safety including safe work systems, learning from errors, team-working and safety conscious leadership at organisational level (Matthews and Pronovost, 2012). This commitment is critical in the radiography profession where safe use of radiation forms the essence of everyday practice in the clinic, which is reflected in SCoR's (2017b) commitment 'to ensure patients are protected from unnecessary radiation'.

To achieve programme approval, SCoR advises institutions that,

> ‘*all formal programmes of study should conform or relate to the Learning and Development Framework for Clinical Imaging and Oncology developed by the SCoR to support, in part, the development of programmes related to professional practice*' (SCoR, 2009:15).

The QAA's threshold standards are reflected in the SCoR's ' Education and Career Framework for the Radiography Workforce ' (SCoR, 2013a). These were developed in response to The Health and Social Care Act (DH, 2012) and expect accountability from the professions. Pre-registration education is central to SCoR's framework (SCoR, 2013a) where the QAA's radiography benchmarks are nested in the education outcomes for practitioner level. Hence, successful TR graduates enter the profession at the second of the four tier professional framework that culminates in consultant practitioner level. Other DH guidelines in SCoR's educational framework include the NHS Knowledge and Skills Framework (KSF) which promote the use of a competence-based framework for personal development and progression in the NHS. The KSF applies to all healthcare professionals regardless of their discipline and includes six core dimensions: communication; personal and professional development; health, safety and security; service evaluation; quality; equality and diversity (DH, 2004).

Additional requirements for SCoR approval entail the inclusion of SCoR's professional code of conduct, and the HCPC's SETs, SOPs, and standards of conduct, performance and ethics (op.cit.). This account provides further evidence of the ways in which the QAA's benchmark statements are interwoven

in professional and regulatory statements to ensure approval and compliance at programme level in TR education.

5.2.3.1 Guidance on curriculum

The education outcomes for practitioner level specify thirty-three outcomes. My analysis of the content demonstrates four emerging themes relating to knowledge and understanding, professional practice, evidence base, and skills. However, safe practice is noted in four outcomes as shown below:

> ‘*practise safely within relevant legal, ethical, professional and managerial frameworks’*- knowledge and understanding;
>
> ‘*ensure the radiation safety of all individuals in the working environment'* - professional practice;
>
> *'select and justify evidence for safe, effective, professional practice’*- evidence base;
>
> ‘*select and justify imaging and treatment modalities and operate equipment safely and effectively*’- skills (SCoR, 2013a).

Also included with SCoR's education framework is an indicative curriculum in which content is listed under three broad themes of:

> 1)‘*behavioural and social science; 2) physical science and technology; and 3) clinical context and applications’ radiotherapy*’ (SCoR, 2013a).

Examples include:

> *'principles of psychology, sociology and social psychology*'- theme 1;
>
> *'physical principles of matter, atomic structure, radioactivity*'- theme 2;
>
> *'molecular biology related to tumour genesis*'- theme 3 (ibid).

Such a specific indicative curriculum lays the foundation for the expected propositional knowledge. Thus highlighting the boundaries that shape 'legitimate academic knowledge' (Barnett and Coate, 2005: 86). Furthermore, it anticipates that students’ knowing is conjoined with 'ways of being and acting' (op.cit.).

Alongside the indicative curriculum content for TR is the guidance entitled ‘Towards Safer Radiotherapy', which provides guidelines on detection, prevention and reporting of errors in radiotherapy (RCR et al, 2008). Radiotherapy is acknowledged to be a ‘highly complex, multi-step process’ involving professional groups such as oncologists, physicists, therapeutic radiographers and medical engineers in the planning and delivery of treatment (op.cit.). Whilst errors in radiotherapy have historically been uncommon; potentially they may induce life-changing effects for patients. Therefore the guidance promotes personal responsibility in the delivery of accurate treatment and encourages a ‘safety-conscious culture’ (op. cit.). In Cambourne's indicative curriculum, this guidance features in the level 6, Radiotherapy & Oncology 3 module focussing specifically on the topic of radiotherapy errors. In 2016, I introduced RCA in teaching and assessment to support knowledge development of safety systems. As I am the module leader, such action identifies the ways in which practitioner research informs teaching in HE.

Turning to SCoR's ‘Code of Professional Conduct’, guidance on appearance is associated with safety as well as upholding the reputation of the profession,

> *‘you should ensure that your appearance is such that it inspires confidence in patients, reduces the risk of cross-infection and maintains the health and safety of all involved’ (op. cit.).*

This expectation reflects the Government’s ‘bare below the elbows’ policy, introduced in January 2008 (DH, 2007a). However, the policy was controversial with several authors attributing the reduction in hospital acquired infections to better hand-hygiene rather than wearing clothing with short sleeves (Herbert, 2008; Farrington et al., 2010; Willis-Owen et al., 2010; Burger et al., 2011). Regardless of this debate, all HCPs have adhered to this policy, including visiting government ministers who have frequently appeared in short sleeves on television broadcasts. The real issue here relates to the practicalities of the hand-washing technique which requires the whole wrist to be rubbed with the opposite hand (NPSA, 2007). In Cambourne's programme, this guidance is recontextualised as part of the 'uniform policy' which is first introduced in recruitment presentations, reinforced in the briefing for placements and written in the placement handbook for students as shown here:

'Control of infection is one of the most serious considerations within the NHS. In order to control infection, we subscribe to a 'bare arms' policy for clinical and pseudo clinical environments.

This means that students are not permitted to wear long sleeves in these environments. This does not apply to the normal classroom environment ' (Clinical handbook, 2015).

5.2.3.2 Informed consent

Continuing with the Professional Code's guidance on 'relationships with patients', obtaining consent from patients also forms a sub-category (SCoR, 2013b). However, guidance for undergraduate students is addressed in a separate document entitled 'Student radiographers and trainee assistant practitioners: verifying patient identification and seeking patient consent'. The document states that students on placements must be supervised at all times thus identifying the boundary that a HCP is expected to observe. The guidance is prescriptive in stating the method that should be utilised for identifying patients. SCoR stipulates 'three-point patient identification', which consists of seeking the patient's 'first name, last name, date of birth' (SCoR, 2010). The method arose from the requirements for employers under the 'IR(ME)R 2000 and IR(ME)R Amendment Regulations 2006 & 2011'. The guidance aligns with the HCPC requirements, which state that patients must be made aware of students' participation in clinical practice procedures and must have granted permission for this to occur before seeking consent. Students who are deemed to be competent are allowed to seek consent from the patient provided this is supervised by a practitioner (SCoR, 2010).

SCoR's guidance was a reactive measure to address concerns reported by the NPSA and The Healthcare Commission (HCC) regarding errors in patient identification,

'increase in errors involving porters collecting the incorrect patient, and more importantly, radiographers not following the patient identification procedure after collection' (HCC, 2008).

HCC has now been replaced by the Care Quality Commission.

In summary, the SCoR provides frameworks to develop propositional knowledge that supports curriculum content and together with the HCPC SOPs contributes to practice in the workplace environment. However, explicit reference to patient safety is limited in the education framework where it is evident in four learning outcomes. In the next section, I consider how the PRSB statements are recontextualised in the curriculum.

5.3 Overview of the TR programme

My examination of the programme specification reveals a transformative approach that is stated in the nine educational aims of the TR curriculum. Two are exemplified in the following statements:

'*Provide the students with the knowledge and skills to equip them for a career in therapeutic radiography;*

Develop the students' competence in applying clinical skills to the practice of therapeutic radiography'.

These statements signal transformation through knowledge and skill development where experiential learning is implied in the application of clinical skills. Thus reflecting a curriculum that encourages student engagement through knowing, being and acting mentioned earlier in 3.3.1. The first educational aim vis-à-vis career is recontextualised in the student course handbook as follows:

'*It is important to be aware that university is very different to school or college; while you are with us you will develop into a professional radiographer. The course has been designed to educate you to be an independent thinker and learner, to evaluate evidence from a variety of sources and in due course contribute to those sources'*.

Indeed, scrutiny of the programme specification (2013) indicates specific themes that facilitate the transformation to TR practice. In the document, twenty-eight learning outcomes grouped under the four themes of 'knowledge and understanding; cognitive skills; practical skills and transferable skills' contribute to the learner's experience. These four themes also reflect Mezirow's 'frame of reference' consisting of 'habitual ways of thinking, feeling, and acting', and 'specific point of view'. Habitual ways are influenced by a 'set of codes'

whilst points of view are expressed through 'belief, value judgement, attitude, and feeling' that affect interpretations (Mezirow, 1997). The QAA threshold statements are evident in all four themes and therefore, may be regarded as the set of codes in this context. Patient safety is explicit in the theme of practical skills.

5.3.1 Content organisation and structure

The curriculum content identifies fourteen modules organised over three years as shown in Table 5.1. Four are placement modules whilst the remaining are classroom-based with teaching situated in the HEI. Optional modules do not form part of the radiography portfolio. Therefore, it seems plausible to infer that the fourteen modules form the core curriculum. Drawing on Harden and Davies' theory (2001), this inference is made because the curriculum is 'common to all students'; covers the necessary competencies for practice; requires mastery; is underpinned by knowledge, skills and attitudes; and lastly, is designed to be additive in that elements are introduced at different stages. So, these five characteristics epitomise the 'core curriculum' in the TR programme.

5.3.2 Classroom modules

The classroom-based modules focus on propositional knowledge. Drawing on table 4.2, pure sciences like physics and maths are reflected in the level 4 science module where the indicative curriculum topics of atomic structure and principles for calculations provide the underpinning knowledge of radiation practice. Rules of combination are evident insofar as the atomic structure teaching precedes x-ray production. Drawing on the field of radiation physics supports the codified knowledge for radiotherapy practice and maths underpins the knowledge and application to calculate radiotherapy doses.

Interprofessional learning in years one and three involve two or more disciplines and aims to develop understanding of the different healthcare roles and responsibilities, the value of communication in patient care (Suter et. al., 2009), and the importance of using correct terminology that is understood by all HCPs. For example, this begins with the learning of the correct anatomical

terminology to ensure language is used accurately and appropriately in communicating a patient's condition.

Table 5.1 illustrates a 'sandwich-type course' in which periods of front-loading are alternated with workplace placements. Front-loading is defined here as the formal knowledge that is acquired in the classroom for practice (Hager, 2004). This model anticipates integration of classroom knowledge with practice (ibid). For example, referring to figure 4.4, knowledge of infection control and moving and handling in the classroom supports subsequent understanding and skills development for placement. So, theoretical knowledge is arranged at periodic intervals to underpin TR practice in a dispersed placement practicum. Consequently, knowledge and practice evolve over time as shown in figure 4.1 in the preceding chapter.

<table>
<tr><td></td><td>Year 1/ level 4</td><td>Year 2 / level 5</td><td>Year 3 /level 6</td></tr>
<tr><td rowspan="3">Modules</td><td rowspan="3">Interprofessional learning
Introduction to TR concepts; Professional practice 1; Science of radiation physics and calculations; Radiotherapy & Oncology 1</td><td>Placement</td><td>Placement</td></tr>
<tr><td>Radiotherapy & Oncology 2; Radiotherapy planning & calculations; Professional practice 2</td><td>Radiotherapy & Oncology 3; Professional practice 3</td></tr>
<tr><td>Placement</td><td>Placement</td></tr>
</table>

Table 5.1: TR curriculum structure at Cambourne.

5.3.3 Placement curriculum structure

As a reminder, the placement curriculum for the development of TR practice forms fifty percent of the entire undergraduate programme. A specific practicum for placement does not exist as shown in the following response to a question on how workplace supervisors decided on the content of patient safety topics in clinical education:

'I*n terms of patient safety, I would probably say we probably don't, or haven't in the past, put as much emphasis on it as maybe we should. I think we rely a lot on the fact that they've had the general training at the university, you know, basic life support, manual handling*'. Marcia

Essentially, the workplace curriculum supports Cambourne's programme requirements by enabling the TR students' skills development and acquisition of practice. Figure 5.2 illustrates arrangement of the planned endeavour through the 3 years of the undergraduate programme.

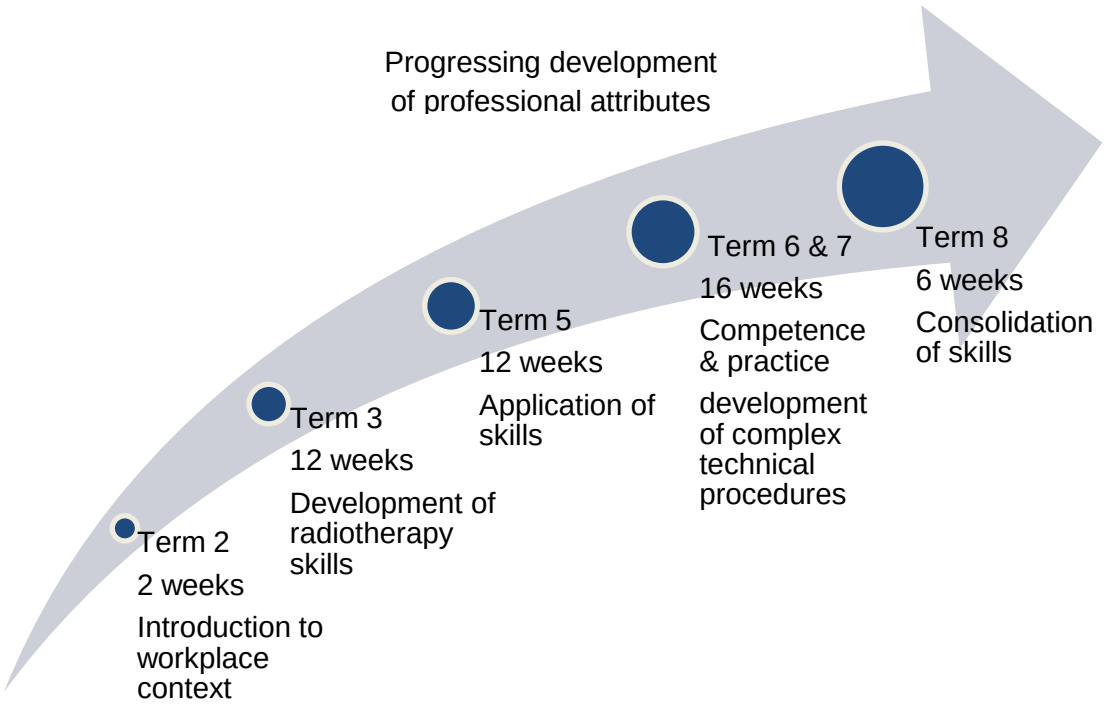

Figure 5.2: Organisation of the TR placement curriculum.

In a twelve week block, students will typically experience placements on four different units, moving from one to another about every three weeks. These placements are organised and managed by Galensfield's practice educator who delegates responsibility to workplace practitioners/supervisors, and is assisted by a faculty link tutor. This description exemplifies the collaboration between Cambourne and the Trust hospital.

The overarching approach is that of a student-centred curriculum where students direct and manage self-learning and skills development by identifying 'clinical learning objectives' for each placement. For the majority of the students,

the drive to become competent practitioners by the end of their clinical placement motivates such engagement.

Furthermore, safety-centred care in the workplace is predicated on an expectation that team members, including students, will have the theoretical knowledge to support their actions. Thus practice is based on propositional knowledge, which informs TR supervisors' decisions about how and when to allow radiography students to participate in the treatment process. So, in the workplace, students begin the development of safety practices with the application of knowledge:

> *'we encourage them to look at those [radiation] regulations and the fact that where they are working is a radiation controlled area*'. Chrissy

Such actions support the development of future practitioners. Other dimensions of safe practice are also initiated where team members, including students, are expected to cultivate self-awareness of their own competency and acknowledge their limitations. This was indicated in the following response to a question on what should be the elements of patient safety in radiotherapy practice:

> *'an understanding of their own capabilities, an awareness of, you know, what they are capable of and when they need to ask for help*'. Marcia

Other skills expected in the workplace include anticipating actions, communication with staff and patients, team-working, and problem-solving ability.

5.3.4 Recontextualisation of professional and regulatory standards

Patient safety is distributed in various classroom and placement modules. It is explicit in the module learning outcomes at level 4 where aspects of patient safety are incorporated in various forms. In the example below, communication skills and teamwork in the learning outcome infer human factors and a systems approach:

> '*Demonstrate communication skills that are essential for team work to provide appropriate, safe and effective person-centred care*' (Interprofessional module).

In another module, the introduction of values is explicit in the following learning outcome and reflects how professional standards are recontextualised in the curriculum:

> '*Describe professional and statutory standards, ethics & codes of conduct and their role in promoting values and standards of practice*' (Professional practice1).

Standards relating to values are incorporated in modules focussing specifically on professional practice, which begin at level 4 where the notion of respect, and caring is introduced. This is reflected in the learning outcomes and indicative curriculum.

Knowledge and understanding also begins in academic modules and is then expected to be applied in the placement modules as identified in the following level 5 learning outcome:

> '*Give information and advice to new patients beginning a course of radiotherapy and to patients on completing their treatment*' (Undergraduate module directory, 2013).

This example illustrates how rules of combination are used in the practicum.

5.4 Recontextualisation of curriculum statements for practice placements

The workplace clinical curriculum is guided by the placement module learning outcomes, the proficiencies that students are required to achieve and the student's performance assessment that is undertaken at the end of each rotation on a placement unit. So these three elements underpin the development and assessment of safe TR practice and may be viewed here as 'know-how'. Based on Ryle's concept, Posner (2004: 80-81) writes that 'skills', performance ability and practice embody 'know-how'. However, elements such as hand hygiene, basic life support and moving and handling training are expected to be taught by the University prior to students' placements thus constituting part of the vertical knowledge that is provided in the first term of the programme.

Specific elements relating to patient care, safe operation of the equipment, and communication with patients and team members are embedded in the

development of proficiencies of practice skills. Proficiencies are based on an occupational standards model that accounts for specific skills development and facilitate transferability of key proficiencies across the sector (National Occupational Standards, 2014). Additionally, knowledge of infection control, professional responsibilities, radiation regulations and other relevant legislation is incorporated in the assessed proficiencies that students are required to achieve during their time on placement. Specific topics identified here support learners to develop and integrate knowledge (Harrison and Mitchell, 2006).

Curriculum statements are also embedded in the assessment of skills and learners' performance with a particular focus on the attributes of patient safety as shown in this example:

> '*safe & accurate application of basic multiple field radiotherapy techniques using megavoltage equipment*' (level 5 competency).

Furthermore, assessment of learner performance is graded across a spectrum of practice as shown below:

> *'safe in all 4 dimensions [technical skill; dependence; communication with patients & staff; team skills*]' to *'unsafe without supervision*' resulting in a fail.

Refinement and maintenance of the skill is then captured in the assessment of each learner's performance, which occurs at the end of every rotation on a placement unit.

5.5 Recontextualisation of curriculum for learning

This section reveals modes of learning and activities commonly used by tutors and workplace supervisors to purposefully engage students (Guile and Evans, 2010).

The pedagogical intent reflects a learner-centred curriculum with only one fifth of the total contact hours dedicated to lectures whilst learner-centred pedagogies in the form of case-studies, seminars, placement, and simulation predominate as shown in figure 5.3. This schema is reflected in the programme timetables that students experience.

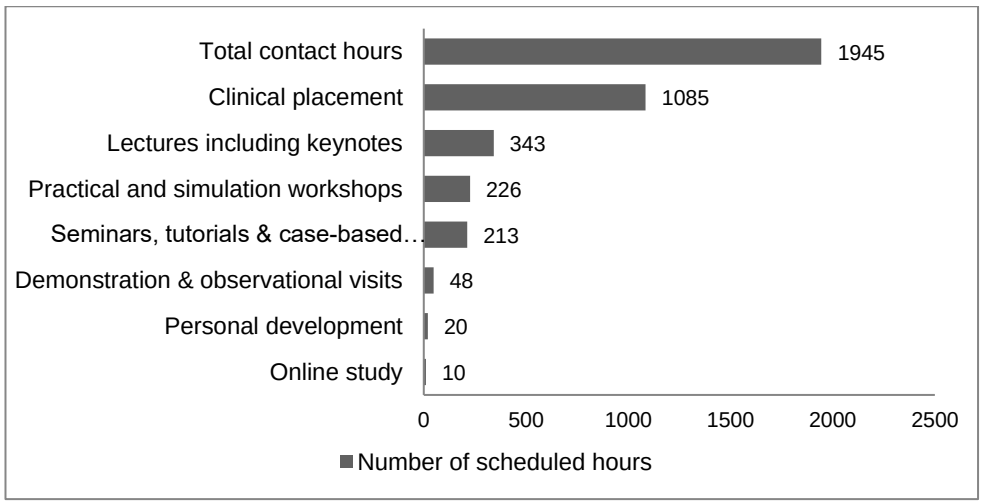

Figure 5.3 Key pedagogies employed by the course team

Didactic teaching generally occurs at the beginning of the programme with transmission of new knowledge to students. Drawing upon expertise of the subject matter (Ramsden, 2003:108), lectures are mainly utilised to identify the content and ensure that specific concepts are understood (Perrin and Laing, 2014), as shown in this reflection to a question on how lecturers adapted their practice of patient safety teaching across the three years of the course:

> '*people do not want to come into year one and be told to go away and find out. It's very disorientating, especially for [undergraduate] level. And for subjects where there is a lot of advanced material out there but very little introductory material'*. Linda

So, the choice of pedagogy is also determined by the type of information that is accessible to a novice in the field of radiography. As students' progress in the programme; changing pedagogy is noted suggesting a dynamic and flexible approach from the course team. This is evident in supporting students' understanding of radiation related responsibilities.

> *'So in year one if I'm introducing radiation protection through biological effects to diagnostic and therapeutic radiographers, and introducing the concept of their responsibility under, you know, IRR and IRMER and ALARP and all the rest of it. …….. and then that leads into year two when we begin to talk specifically about what happens to patients' bodies when you press the button. It is that radiographer who is signing to say I am doing this and it's safe, and what are the effects of radiation to tumour and*

normal tissue. So I think that is about patient safety and their realisation of their responsibility, their individual and shared responsibility.' Linda

This comment reflects a holistic view of patient safety which was also expressed by the rest of the course team when asked about what patient safety meant to them:

'it's sort of an integral part of what we do, and probably just needs to be a thread throughout everything'. Amy

Such a holistic perspective entails caring about the well-being of the individual that is combined with issues regarding the quality of treatment.

'what's happening at home, are they eating, is anyone taking care of them? If they are on concurrent chemotherapy and getting a fever who is going to do something about it'? Dylan

Directed study is also utilised to support skills development and independent learning although this is constituted as non-contact time. Here skills development may entail finding suitable resources that will support development of a future resource base for practice. Examples include the use of specific web-based resources like the British National Formulary to seek out information on named drugs to aid understanding of their use in cancer treatments. Such activities extend students' knowledge of cancer care. At the same time, students begin to appreciate the scope of their clinical practice as shown in the following interview discussion about awareness and management of side-effects:

'the two lectures on pharmacology, there are two areas really, there is a drawing, enabling them to research a specific drug so that they have the skills and the breadth of knowledge to research any drug, because then they can look at its contraindications, which is part of what they have to look at, look at any other side effects, that sort of thing, but also helping them to appreciate the limitations of their competence in that they cannot at any time even recommend a patient take an aspirin'. Linda

As students' progress through the programme, the use of case studies and independent learning involving directed or self-directed study become prominent as they promote the development of higher order learning skills. The

following comment on developing students' knowledge across the three years illustrates this thought:

> '*They have got it, it [information] is somewhere, and they can dig that out either from the originals...and then do something with it because it's that moving to application and then out again from application into synthesis of theory'.* Linda

Other methods involve simulation in workshops and tutorials enabling course tutors to focus on skills development for specific practices such as calculations of radiation prescriptions, documentation of information and operating the linac.

> '*In treatment planning in the second year I get them to think about documentation, so I've designed, I mean it's completely rubbish, but it's kind of a freestyle setup sheet, and I get them to think about where they would tattoo and why they would tattoo there what they would record and why what they record at pre-treatment, how that impacts further down the line*' Tara

Here the tutor's workplace experience also informs activities as shown in the following comment from a tutor reflecting on their clinical experience of supporting students' development of safe practice in the workplace:

> '*what I said was imagine you are operating the gantry, your colleague speaks to you, somebody comes in the room and asks you something, you continue, turn away, you are still moving the gantry, what's going to happen?*' Dylan

The use of simulation to develop knowledge and understanding of radiation practice points to a common pedagogical approach in radiography education that is confirmed in England et al.'s (2016) research of patient safety knowledge and practice in 33 European institutions.

5.5.1 Workplace pedagogy

Pedagogy in the workplace falls into two main categories that are considered next.

5.5.1.1 Formal teaching

Formal teaching involves the whole group and includes didactic presentations, interactive demonstrations and ‘practical' to support learning of departmental practices in areas such as moving and handling, and in the activation of the radiation treatment beam commonly known as the ‘beam on’. Workbooks are also used to support skills development for specific TR practices. For example, all radiotherapy treatments are planned and verified to ensure the correct anatomical volumes are treated to the prescribed radiation dose. This entails matching the planned geographical volume with the treated volume. By using x-ray images from the workplace to support guided activities, students are able to apply prior anatomical knowledge and develop decision-making skills to judge the accuracy of the radiotherapy treatment.

5.5.1.2 Informal teaching and learning

Informal teaching and learning forms the predominant teaching style and occurs on an ad-hoc basis that is mainly context dependent and opportunistic in nature, commonly involving interaction with individual students.

Learning through observation is encouraged by all supervisors to engage students in practice as shown in the following discussion about expectations of students:

> *‘we expect them to notice what goes on and take it in. I think...we do stop and explain sometimes, probably not all the time, but again we would be hoping, if they don’t understand what we did that they would ask, why have you done that, why is that person going in before this person*’? Mel

In this environment, observation serves multiple purposes; it provides a tool through which students learn, supervisors assess skill development, and two-way communication between the supervisor and the student allows each to question the other’s knowledge and practice. Using observation allows students to situate their knowledge and contextualise the activity to the workplace practice before actively participating in the team as the following response to a question on how students begin to participate shows:

> '*To start with took an observation role to see how everything was operating in the department, rather than seeing how I assume it should be*

done, or how I was taught it should be done, and saw how it was realistically being done. And then get involved in, and be proactive in the context that they do their practice with'. Alex

However, learning from observation is problematic for both supervisors and TR students. Practice educators become apprehensive about students acquiring bad habits. Learners also face a dilemma when practitioners' actions differ, motivating some to initiate a dialogue that informs the rationale and justification for practice as shown:

'*But yeah, I think if I asked them and they justify why they do it that way and I understand and I am happy with why they do it that way, then I'll replicate it myself*'. Nicole

Socratic questioning is also utilised to assess students' knowledge of anatomy, physical properties of the radiation beam, radiotherapy practice and regulations, and professional responsibilities as reflected in the following conversation about the use of questions in the facilitation of workplace learning:

'it's the only way really to know what's going on behind the facade, because to look at some of them [students] you think nothing's going on, and then when you ask the question you find out nothing is going on, but other times you'll ask them a question and you'll end up having a whole discussion about anatomy or immobilisation or imaging'. Mel

Supervisors also utilise Socratic questioning as a tool for assessing students' understanding of practice. Probing the subject through this active dialogic interaction reveals students' gaps in knowledge, understanding, and supports development of critical thinking:

'*asking why do you think we are doing this? Because sometimes when you put the question to them like that they think about it in a completely different way, they see us doing these things all day long, and they just take that as read, that's what we do, but they don't know our thought process, they don't know why we are doing it'*. Chrissy

Although such interactions offer the opportunity to understand knowledge in a meaningful way (Yang, Newby and Bill, 2005), Socratic questioning can also challenge students' learning and confidence. For example, on a busy linac, this

form of teaching can interfere with learning about the treatment room procedures which is central to skills development and participation in the team:

> '*they've got to think about all the questions that the radiographers are firing at them, and have I done this right, because it's not something that comes naturally*'. Marcia

On the other hand, some students begin to contextualise what counts as safe practice in the workplace as shown in the following response to how supervisors signpost patient safety matters:

> *'asking why do you think we shield this, what sort of organs are we trying to protect, why are we checking all the sheets, why are we doing second - checks, just things like that I think just made me naturally be aware of the patient safety*'. Daisy

5.6 Learner recontextualisation

Self-identified learning objectives provide students with a tool to direct their learning during placements. These objectives are mainly based on the course proficiencies recontextualised from the HCPC's SOPs. Nevertheless, they also steer supervisors' involvement in the student's placement education as revealed in the following discussion on development of skills:

> '*quite often they'll [supervisors] ask what you want to achieve, they are quite good like that, but sometimes they see so many different students that they assume it's the same thing, and you might be working on a different competency to most people, so it's making them aware I need to get breast patient set up done, or I really need thoraxes or something*.' Hannah

5.6.1 Patient safety knowledge and skills development

Supervisors identified three specific activities where knowledge transfer was evident naming infection control procedures in the treatment room, operating the linac and, identifying patients.

Correct identification of patients is taught in the level four professional development module to fulfil the following learning outcome.

'*Describe the professional responsibilities that arise from current legislative frameworks and policies including IRR and IR(ME)R*'.

Patient identification is then recontextualised in a workplace proficiency regarding 'daily pre-and post-treatment administration' (level 5 and 6 proficiencies, 2015). Here, identification forms one of seven criteria for the correct execution of the radiotherapy treatment process.

A patient's identification forms a significant part of the safety process enabling the team to check that the intended treatment is given to the right person. This task occurs at two points in the treatment process - inside the treatment room and outside in the adjoining control panel area. The first occurs when the patient walks into the radiotherapy treatment room where any member of the team, including students, may instigate the process by asking the patient for their '*details*', although novice students usually require time to develop the confidence to talk with patients. Nevertheless, supervising radiographers have clear expectations:

> '*from day one we stress that importance, if you've got the wrong person with the wrong information you are on a loser before you started, so that's very important'.* Mel

In this context '*details*' is a euphemistic term that signifies the process of identifying the patient. This involves the patient stating their full name, date of birth, and full address whilst two radiographers check that it matches with written information on the treatment sheet, which is usually held by one of them. When students undertake this process, practitioner supervision is evident with the radiographer looking over the student's shoulder with their gaze on the patient's treatment sheet.

These actions support formal documentation of the patient identity check with the supervising radiographer signing the treatment sheet as one of the two signatories. Additionally, the patient's name is checked for correct match with information pertaining to the treatment dimensions displayed on the monitor screen mounted inside the treatment room. This particular check is not verbalised but evidence of the action becomes obvious when the order of the patient queue is changed. On these infrequent occasions all the written

information is gathered together and removed from the room.

As radiotherapy for prostate cancer requires 20-37 daily treatments, some patients become familiar with the process. In these instances, the patient, without prompting, announces the '*details*' as they enter the treatment room. Then the checking of '*details*' becomes a confirmation eliciting an obligatory response from the radiographer holding the patient's treatment sheet:

'Yes, that's correct'. Karen

For a transitory moment, the patient becomes a co-participant in ensuring their own safety before resuming the status of a recipient of care. The final check inside the room occurs after setting up the patient for treatment and involves one radiographer verbalising the name and treatment details on the screen whilst the other checks it against the written document before departing from the treatment room.

In the control panel area outside, the radiographer checks the treatment sheet data against information on the display monitor screens that includes the patient's name and a passport-style photograph before activating the treatment beam.

Sometimes the identity process falters involving the omission of one the checks inside the treatment room. In these instances, those at the bottom of the hierarchy are often censured for the omission revealing the vulnerable position they occupy by virtue of their role in the team. This was exposed in a discussion regarding expectations of students' general safety knowledge:

> *'….the students ID the patient, they [staff] don't necessarily check and then an issue's come up and it's not been the right patient, and then they kind of blame, it's always the blame on the student, but actually, you know, everybody should be taking responsibility, if you are in that room, be it as a student or member of staff, you all should be taking responsibility'.*
> Marcia

This practitioner's view was corroborated independently by others highlighting the significance of the process and practices in the identity check as shown in the following response to a question about errors in radiotherapy practice:

'they didn't say the full name and a different person went in and the students all got told off but it wasn't a student, it was a member of staff'. Suki

Awareness of local actions and language also assists undergraduate students' participation as the following excerpt from a discussion on patient identification demonstrates:

'When I first went to placement, I would always want to ask but the other radiographers would also be there and if they didn't ask then I would just maybe say, 'did we check ID?' [identity] and they would go ahead but then kind of when I got more comfortable with the placement, I would just ask [the patient] with the radiographer present so they knew that I was asking'. Ryan

This description provides an example of horizontal discourse where local language and its meaning are invoked in very specific contexts both inside and outside the room. Novice students therefore need to become cognisant with the vernacular and practices to participate in this team process. Formality is also evident in the final action requiring two signatories, usually radiographers, to document the execution of the process. Such actions demonstrate the inherent accountability in the patient identification process. This account demonstrates how professional statements are recast in the curriculum and recontextualised by practitioners and TR students in the practice of radiotherapy. Next, I consider another general safety measure.

On the placement units, including the linac, infection control measures are integrated in the delivery of care. Such measures include the linac couch hygiene, which is learnt from observation. Thus, a student's integration in the team commonly begins on the first day of the linac placement.

'*making sure the bed, the couch is clean, you are using the alcohol gel'*. Mel

Keeping the couch clean entails cleaning it with a disinfectant wipe after each patient vacates the couch then covering most of the couch with a paper towel. To prevent spread of organisms, all team members also use alcohol gel after each patient's radiotherapy set-up procedure. On the linac, these actions are repeated up to 40 times each day. Therefore, a surprise during interviews with students was the oversight of this particular procedure although I had observed

each participant performing these actions. When I probed, their replies were frequently dismissive referring to these actions as 'second nature'.

> *'so hand washing, wiping the bed down, that all came second nature by the end of the first morning'. Alex*

This finding suggests that development of tacit knowledge begins early in the practitioner's career. This development is aided by repetitive tasks, routinised actions and socialisation in the norms of the workplace culture (Eraut, 2000).

5.7 Summary

Concepts of patient safety values, attributes and systems are distributed throughout the domains of knowledge, understanding, and skills in the PRSB statements. Additionally, the recontextualising of professional statements extends beyond the teaching and learning curriculum. In pre-registration education, patient safety begins with assessment of the individual's suitability to practise in the healthcare environment. Such action attests to the institution's accountability to the PRSBs, and indirectly to the public.

Pedagogy recontextualisation suggests a philosophy for transformation. The classroom curriculum incorporates SCoR's indicative curriculum forming the propositional knowledge. However, the systems approach is not explicit in the designed curriculum. Nevertheless, patient safety is ultimately realised in workplace practices. In this environment, both the HCPC and SCoR unanimously stipulate the supervision of students on placement thereby conferring the role of apprentice. In the workplace, informal teaching forms the main teaching strategy. Although, a workplace curriculum does not exist, the performance assessment across the four dimensions in section 5.4 implies a human factors system that is not signposted to students to develop their knowledge of systems-based safety. In the workplace, development of tacit knowledge is also noted at pre-registration level.

Chapter 6

Workplace recontextualisation of radiation knowledge

In chapter 5, I focussed on the recontextualisation of general safety such as patient identification, by considering everyday measures that ensure patient safety. In this chapter, I consider embodied practices related to the use of ionising radiation, which are central to the therapeutic radiographer's practice.

I begin with a brief examination of the context. Then, I discuss how radiation safety measures are instigated during the radiotherapy treatment process focussing on elements that are generic because they apply to every patient undergoing this form of treatment. In the third part of this chapter, I consider specific measures that mainly relate to the treatment of prostate cancer, the most common diagnosis in males over the age of 50 years (CancerResearchUK, 2014) with 25,000 men undergoing radiotherapy each year (Ball et al., 2016).

6.1 The Ionising Radiation Regulations standards

The use of ionising radiation in TR is enshrined in health and safety legislation stipulating that radiotherapy treatment is implemented by qualified practitioners who have the necessary knowledge and understanding (HSE, n.d.b; RCR, SCoR, IPEM, 2008). This stipulation is reinforced in the PRSB guidance. For example, the HCPC threshold standards of proficiency expect safe measures to be evidenced in everyday practice. Statements regarding such standards expect skill and competency as the following examples illustrate:

> '*be able to operate radiotherapy equipment safely and accurately; be able to scrutinise and interpret the radiation prescription in such a way that radiotherapy is delivered accurately and reproducibly*' (HCPC, 2013).

However, competency in conducting specific actions only forms one element of the therapeutic radiographer's practice. Other standards make explicit reference to the knowledge and understanding of radiation principles that should underpin the use of this intervention in cancer treatment as exemplified below:

> *'know the concepts and principles involved in the practice of*

radiotherapy and how these inform and direct clinical judgement and decision making;
understand the radiobiological principles on which the practice of radiography is based' HCPC (2013).

Thus, knowledge and understanding form two of the three pillars constituting the therapeutic radiographer's practice. As a reminder, mandatory membership of the regulatory body is a pre-requisite for registration to practise. Therefore radiography students' knowledge, understanding, and practice development is implicit in two educational aims of the TR programme. The first relates to provision of the underpinning knowledge and skills for a career in TR and the second explicitly references the influence of the regulatory and professional body as shown below and discussed in the previous chapter.

'*Provide education and training that is approved by the HCPC/SCoR* (Programme Specification, 2013).

Furthermore, SCoR's indicative curriculum guidance is embedded in the module learning outcomes and indicative curricula content at various stages of the course, which will be further discussed in the next section.

6.2 PRSB ionising radiation guidance in the curriculum

In content recontextualisation where knowledge is put to use in the programme design (Evans et al., 2010), Cambourne's programme documents reveal that knowledge of the *concepts and principles* of radiotherapy are introduced at level 4 with the following learning outcome.

'*Describe the professional responsibilities that arise from current legislative frameworks and policies including IRR and IR(ME)R'* (Module directory, 2013).

The aforementioned standards have been interpreted to include topics ranging from production of ionising radiation from the x-ray source through to the interaction with components in the equipment, and detection of the radiation in the environment. Biological interaction with human tissue is also introduced at this level and revisited in year two for consideration of its impact at a cellular level. The topic of protecting both the patient and staff from radiation is also

presented in year one and subsequently applied in placement modules in years two and three - see figure 6.1.

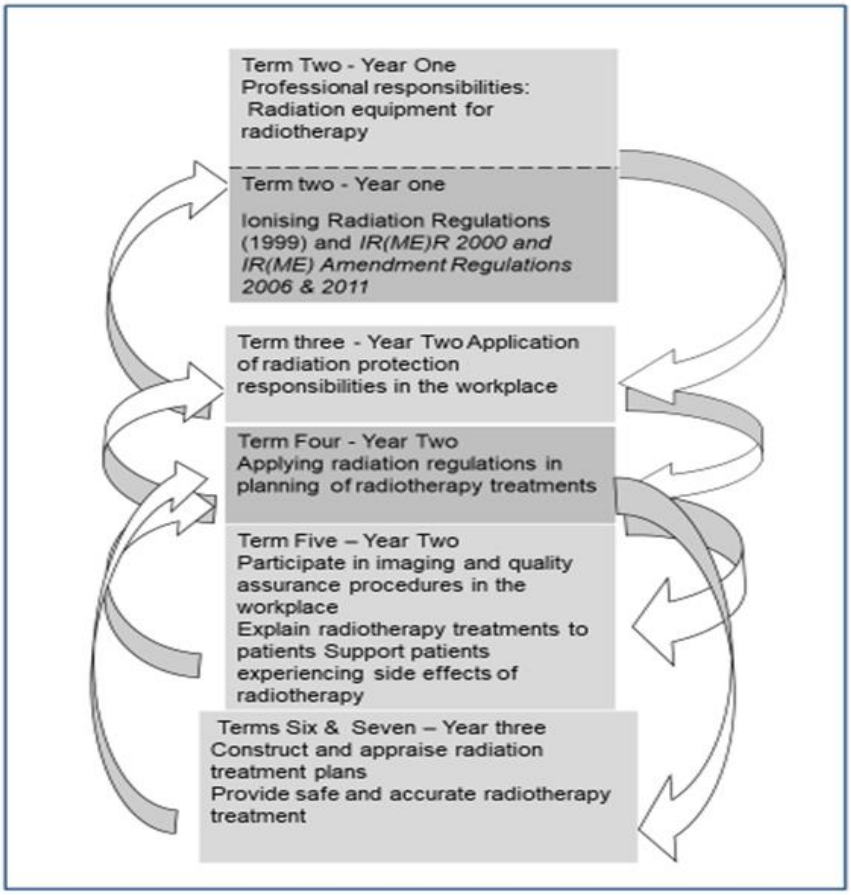

Figure 6.1 Scope and sequence of radiation regulations; dotted line, ------ indicates learning outcomes in concurrent modules

Analysis of the course curriculum revealed a pattern in which the subject was revisited at various points during the three years of the programme as shown in Figure 6.1. Such a pattern reflects the concept of a spiral curriculum in which iterative revisiting of subject matter is intended to deepen knowledge by building on previous content thus extending levels of complexity. Furthermore, understanding is developed by drawing on prior knowledge to form new linkages that support application and practice (Harden & Stamper, 1999).
In Figure 6.1, the notion of scope refers to the intended learning outcomes relating to the topic or theme, and sequence indicates where and at what level the learning outcomes are expected to occur (Posner, 2004:6-7).

Term 2 demonstrates several topics that are taught concurrently in different modules indicating Posner's (2004:129) concept of the horizontal dimension, which describes topics that are taught within the same timeframe. Such an

occurrence suggests that topics may need to be integrated with each other. Therefore, it is anticipated that the operationalising of the classroom curriculum involving organisation, structure and sequencing of the content resides with the module leader who may plan this with the course team. As an insider researcher, experience indicates that there is little discussion within the course team regarding the sequencing of topics across different modules. This suggests that the student is expected to integrate knowledge themselves.

However, such integration is frequently mediated by the Faculty link tutor's discussions in placement tutorials. The student's discussion with practice supervisors during placement tutorials also support integration of prior codified knowledge thus identifying informal methods that assist the student's learning. Evidence of such learning is implied when practice supervisors sign off the student's proficiency regarding '*Local radiation regulations*' thereby declaring them to be competent in specific tasks or practices exemplified below,

> *'Demonstrate an awareness of local rules and ability to work in accordance with them.*
>
> ***Discussed with Radiographer : ……. Date : ……***
>
> *Display knowledge of IR(ME)R regulations and the importance of them within the department.*
>
> ***Discussed with Radiographer : ……. Date : ……'***

So discussions in small group learning reflect one form of pedagogic recontextualisation, where knowledge is put to use in the 'teaching and facilitating environment' (Evans et al., 2010) as shown in the following discussion about signposting patient safety:

> '*It is that radiographer who is signing to say I am doing this and it's safe, and what are the effects of radiation to tumour and normal tissue. So I think that is about patient safety and their realisation of their responsibility, their individual and shared responsibility'*. Linda

Whilst student participants confirmed the above account, interview conversations revealed that codified knowledge provides a sense of familiarity with content whereas know-how supports application and acknowledges progression of the student's professional practice (Coelho and Moles, 2016). TR students frequently mentioned that observation of workplace practices assisted

in the assimilation of knowledge and contextualised know-how prior to participation in the procedures, which is disclosed in this discussion about knowledge transfer:

> *'we've gone over IRMER and the other ones, and you know that patient safety, people don't walk in and out the rooms, you know about the lights and everything else, but then when you are there [radiotherapy department] and you kind of see it,….., it doesn't feel like that's the first time you've learnt it, it feels like you know it, but yeah, I would say that kind of puts the last dot on it when you are physically having to think about it and use it. It's one thing reading about it and talking about it but when you actually have to use it and to abide by it it's, yeah, it's a bit different.'*
>
> Becca

Observation then becomes a tool that assists peripheral participation in situated learning (Lave and Wenger, 1991:95). In this way, the learner begins to construct an understanding of the ways in which rules are recontextualised in everyday practices.

6.3 Developing knowledge of ionising radiation

As a reminder, workplace recontextualisation is demonstrated in the embodied practices that constitute processes in this environment (Guile and Evans, 2010). In this section, I explain practices that are embedded to implement legal requirements concerning radiation regulations. To illuminate how practitioners, including radiography students, display knowledge of IR(ME)R regulations in the workplace, it is necessary to refer to the radiotherapy treatment floor plan illustrated in Figure 4.3. The topography demarcates two specific areas - the control room and the treatment room housing the linac. Rules and artefacts determine who is allowed to enter these geographical spaces and how each should be used. For example, during the working day when the equipment is designated for 'clinical use', only radiographers, and TR students may enter the linac room with a patient. Any other member of the public is granted access by invitation only.

Furthermore, all radiographers entering the linac room for patient preparation must wear a small rectangular badge on their body for personal

protection as the device detects radiation exposure. Loss of the badge or accidental laundry washing must be reported to a designated radiation safety officer in the department from whom a replacement badge must be obtained. Such rules enable the employer to monitor accidental radiation exposure to staff working in designated areas. At the same time, rules such as these make explicit the institution's obligations under safety legislation. They highlight the mutual cooperation that is implicit between the employer and staff in the workplace to ensure safety for employees and patients, and draw attention to the multidimensional nature of working in this environment.

Additionally, rules require that upon setting up the patient, all radiographers must depart from the treatment room leaving the patient on their own. The last radiographer pulls the entrance gate shut thus preventing access to the linac room. This physical action also triggers an interlock which makes it possible for the radiographers to switch on the radiation beam from the control room. At the same time, two red warning lights are illuminated, one is attached to the ceiling above the entrance gate whilst the other is located on the wall by the entrance gate illuminating the following notice 'DO NOT ENTER'. Such artefacts provide a visual signal of the radiation to all outside the linac room. However, the warning light forms only one of several visual signals in this physical space. Another sign on the push gate to the linac room identifies the function of the room '*Treatment room Linac C*'. Below this identity are various signs indicating the hazardous nature of this boundaried space. They include '*Radiation Controlled Area*'; '*No Unauthorised Entry*', '*No Flammable Gas*' and '*No Compressed Gas*' thus highlighting the physical limitations of this environment. At all other times, the linac room gate must be left open as this forms another protective mechanism preventing the radiation beam from being switched on. These design-based approaches utilise the architecture of the environment and technology thereby assisting practitioners to observe rules that support safe practice.

In the control room area, hospital staff such as nurses and administrative clerks are allowed access to obtain information although queries during radiation beam delivery are not attended to by the principal radiographers requiring another team member's intervention. Such actions limit access to this

physical space. Patients too are denied access at all times. Reasons include inadvertent errors caused by interruptions to staff during the administration of radiation beams. Equally important is the risk of breaching the privacy and confidentiality of the patient who is being observed on the CCTV monitors by the radiographers. Consequently, the physical space of the control room is mainly occupied by radiographers and occasionally by other staff such as radiotherapy technicians and physicists. These actions identify the nature of this closed group where membership is dictated by a specific role involving the use of equipment generating ionising radiation.

Additionally, this physical space is dominated by computer technology signifying the technical nature of radiotherapy. For example, in the farthest corner of the control room, located on a large metal case with two shelves are the linac computers used for the delivery of radiotherapy, figure 6.2. Close to the entrance are three computer screens located next to one another on a worktop surface. Each has a specific function relating to the patient's treatment - one screen shows all the treatment parameters, the other displays data such as the patient's name and the anatomical treatment area, and the third shows imaging data from x-ray images taken at the beginning of the treatment. Located between the treatment parameter screen and the patient data screen is a keyboard and a box which allows radiographers to move the linac machine from outside the room. In front of the patient data and imaging screens is another computer keyboard and mouse to operate the other 2 screens. Adjacent to the third screen are two further monitors displaying activity inside the linac room that is captured by the wall mounted CCTV cameras in the aforementioned room.

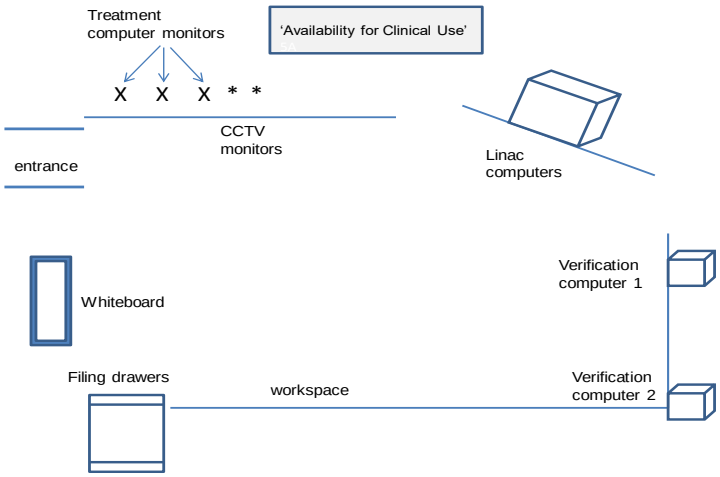

Figure 6.2 Diagrammatic outline of the radiotherapy control room

Next to the computer screen are two filing trays containing patients' radiotherapy cards with records of each day's treatment. Two further verification computers with specialist software allow radiographers to check the accuracy of the radiotherapy treatment in the control room.

Of significant importance in this space is the signage on the wall by the 3 computer screens indicating the status of the linac where 'Availability for Clinical Use' signals that radiographers may use the equipment for patient's treatments. At the end of each day, radiographers hand over the equipment to the technicians and physicists by turning the signage to expose the reverse side, which reads: 'Out of Clinical Use'. This simple action changes the status enabling the latter group to conduct performance checks at the beginning of the next day in readiness for the radiotherapy treatments. Moreover, such actions denote the formal handover of equipment thereby symbolically transferring responsibility from one group of designated staff to another. In this multidisciplinary team, each group fulfils a specific function in a process that observes legislation and ensures safety of patients and HCPs. This practice is typical of the process undertaken in many radiotherapy centres located in NHS institutions across the country. In the next section, I shall outline how radiotherapy practice coalesces in these highly regulated spaces by focussing on the treatment of prostate cancer.

6.4 Ensuring safe treatment of patients with prostate cancer

The underpinning knowledge regarding the use of external beam radiotherapy for the treatment of prostate cancer is introduced in year one of the curriculum. Anatomy of the prostate gland, its physiology, disease trajectory, treatment management options, and patient care constitute knowledge. This pattern echoes the curriculum content in other HEI's, a claim that is based on my professional experience as an external examiner.

6.4.1 Managing the appointment schedule

In the workplace, practitioners and students need to be knowledgeable about several processes that take place in the control room area and others that occur inside the linac room. The management of the appointment schedule; patient preparation (including correct identification), and safe operation of the control panel involve processes that are instigated or occur in the control room area. On the other hand, the safe operation of the linac equipment and care of the patient before, during and after the scheduled radiotherapy transpire inside the linac room. Other activities pertaining to the verification checks of the patient's radiotherapy begin in the treatment room, previously mentioned in Chapter 5.2, and continue outside in the control room area. The activities depicted in these processes constitute the procedural knowledge also contributing to 'know-how' that Billet (2009) defines as knowledge that is used 'to do things'. He explains that,

> *'this form of knowledge is required to be engaged with and practised in order for its development to occur'*.

Such situated knowledge is known to those experienced in the local practices of the department. For example, the management of the appointments schedule requires local knowledge involving navigation of the computer software to access information from the relevant web-page. Awareness of local language to communicate and decipher information specific to an individual's treatment is also necessary as the following observation shows,

> *'Sam walks over to the appointment list and places a tick by the patient's name. [This action signifies that the patient has arrived in the waiting room]. While looking over the list, I ask what the different colours on the*

list mean? Sam tells me that Red signifies finish [of treatment course], Dark Green is a new course of RT [patient], Yellow - patient needs to be seen by radiographer or doctor' Field notes, 17 Feb. 2015.

Each colour code signifies a different action that contributes to the care of individual patients. Here, care has several contexts where attending to personal needs sits alongside the quality of the experience.

6.4.2 Preparing patients for treatment

The drinking protocol refers to the preparation that patients are required to undertake prior to their prostate cancer treatment. Commonly referred to as 'bladder filling' within the profession, ensuring that patients drink a specific volume of fluid prior to each treatment enables radiographers to achieve consistency in the accuracy and reproducibility of the radiotherapy treatment. Furthermore, such action is anticipated to reduce the potential side-effects of treatment (Pinkawa et al., 2006). Distinctive practices such as these are derived from empirical research in the workplace, which in turn form codified knowledge as the practice becomes established within the profession. The impact of bladder motion on the accuracy and efficacy of radiotherapy is beyond the scope of this study. Nevertheless, such research has contributed to greater awareness of involuntary, internal organ motion which can also compromise safe treatment of prostate cancer with radiotherapy (Crook et al.,1995; O'Doherty et al., 2006). As a result, it may be inferred that knowledge of the impact of the bladder upon prostate cancer treatment forms the conceptual knowledge, 'knowing that', whilst knowledge of the 'bladder filling' protocol constitutes the 'know-how' which involves educating the patient about the process thereby seeking their compliance.

The bladder filling protocol is applied similarly to patients receiving radiotherapy for gynaecological cancer. The following account illustrates measures that are taken to ensure compliance with this protocol.

'Can you talk to her and check that she understands about the drinking'. Becca walks into the waiting room to talk to the patient. "Mrs X - you know you have to drink 3 cups of water". The patient pulls a small bottle of water from her bag and shows it to Becca. Becca then asks if she has been to

the toilet. The patient responds by asking if Becca would like her to get ready. At this point Becca walks back into the control room and communicates the exchange of information to Mel who asks, "how large is the bottle?"

Becca - "small bottle".

Mel - "ok so that's 500ml - so she needs to drink almost all of it". Becca returns to the patient in the waiting room and tells her to start drinking. The patient asks if she should get ready and Becca replies, "yes, if you would like". In the control room, Mel tells Becca to "keep an eye on the patient - make sure she drinks it all now". Thereafter Becca walks back and forth between the waiting room and the control room ..... about 4 times, to check if the patient is drinking the water from the bottle. Outside in the control room, Mel asks Becca a question, "How much movement of bladder and prostate is tolerated?" Becca responds, "3 cms"

Field notes, 24 April 2015.

Observing whether a patient has drunk all the prescribed fluid enables practitioners to check patients' compliance and understanding of instructions. Thereafter, practitioners continue to monitor patient's behaviour for a further 30-45 minutes to ensure bladder filling is not jeopardised by a visit to the lavatory, an action that would result in repeating the process. Such actions enable practitioners to uphold protocols enacted for specific safety purposes, in this case bladder filling reduces radiation dose to the bladder and small bowel which become displaced from the radiation field as the bladder fills up (Chen et al., 2016; O' Doherty et al., 2006). In complying with the practitioner's instructions, the patient is also signalling their responsibility in contributing to a process that enhances personal safety. The bladder filling process highlights the interdependence that exists between practitioners and patients in ensuring the safety of the latter. However, other processes are covert involving appraisal of the patient and the environment. One such process involves the assessment of the patient before radiation treatment is given.

6.4.3 Caring for patients undergoing radiotherapy

For TR practitioners, the action of escorting the patient in the treatment room also enables assessment of the patient's fitness for radiotherapy. Covert actions include observing for signs of change in physical appearance such as pallor, balance, and gait, which was shared in a discussion about everyday practice:

> '*even just walking through the maze you are still looking at the patient, looking for signs that would indicate …… if they were a bit wobbly, or you need to support them in any way'.* Alex

Changes in physical health alert the radiography practitioners to probe beyond the routine interaction regarding day to day health and well-being. In such habitual interactions, radiographers prompt patients to disclose information about side-effects and personal well-being. Indeed, patients are notified about such interactions during the information giving discussion about radiotherapy that occurs on the patient's first day of the treatment course.

> *'the question we always ask on the way in is how are you feeling? And then, you know, they'll tell us if they've been sick, if they've got diarrhoea, anything like that, if they are feeling generally unwell. So me, myself, I talk to the patient on the way in, and if I have any concerns, or if the patient is not looking as well as maybe they were yesterday, then I would always say to the radiographer that I'm with, oh Mr or Mrs whoever said that they are not feeling a hundred percent, saying they've had diarrhoea last night and been up being sick, and then so it's almost, not passing the buck, but it's, you know, just making sure that the person I've seen in charge knows, or maybe say something to the patient in front of the radiographer as well, to start them into the conversation, and then they can get involved and ask the questions that they want to ask as well'*. Becca

The above accounts demonstrate ways in which TR students develop skills for the daily assessment of patients before treatment. Communicating such information to the team leader develops the student's team-working skills. Minor health changes where the patient is able to continue with daily activities do not necessitate an interruption of treatment. Such side-effects are normally managed by advising the patient about self-help measures. TR students normally impart advice under the radiographer's supervision. Thereafter, the

patient's health is monitored in the routine day-to-day interaction before treatment. Occasionally, side-effects may be managed with medication. In such cases the team leader refers the patient to the treatment review radiographer, who has achieved the credentials required for non-medical prescribing and is thereupon delegated with the responsibility of managing the patient's health for the duration of the radiotherapy treatment course. Delegation of such tasks by clinical oncologists to experienced post-graduate TR practitioners mainly occurs through agreed departmental protocols. This ensures that patient safety is observed when medication is prescribed by 'non-medical' health care professionals of the multi-disciplinary team. Processes such as these foreground the importance of communication in teams, and highlight the inherent hierarchy that exists in local practices concerning the management and safety of radiotherapy patients.

Another activity critical to the radiographer's practice involves the delivery of radiotherapy treatment. Here, knowledge of local practices involves using specific aids that assist with reproducing the same patient position each time. Examples include the use of foam pads placed under the head when the patient is lying down on the couch and a shaped knee rest that is raised slightly to elevate both knees and support the lower legs. Indeed these actions are central to patient safety as they enable geometric accuracy ensuring that the radiation dose is delivered to the target area. Knowledge of the local abbreviations and acronyms used to communicate instructions about the patient's treatment position and the related anatomical target area also contribute to the process of radiotherapy treatment. Additionally, identifying the reference marks that aid the alignment of the anatomical area with the radiation beam is critical. In readiness for treatment, reference marks are made on the patient's skin during the planning stage. These marks are usually permanent and the size of a pinhead as shown in figure 6.3 (Fletcher, 2015).

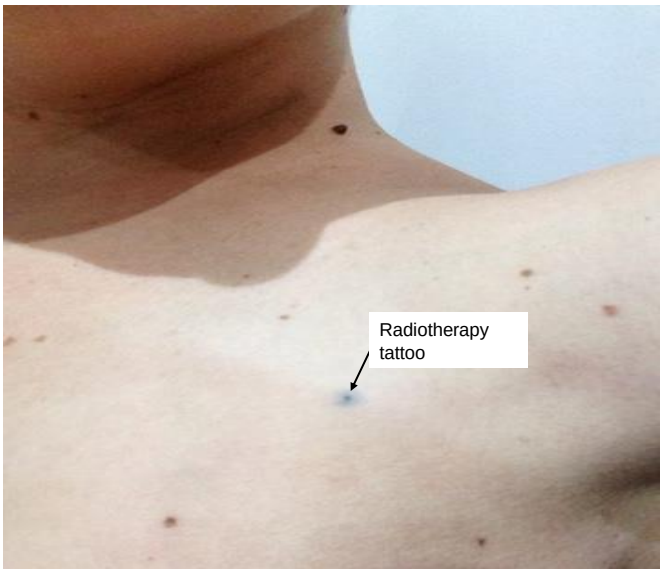

Figure 6.3 The radiotherapy skin reference mark, aka tattoo
Source: https://theultimatecword.blogspot.co.uk/2015/09/things-they-never-tell-you.html

Radiographers anticipate that the small size may afford the patient some discretion. The radiotherapy tattoo is critical in the positioning of the geometrical volume in relation to the reference marks. To achieve alignment with the radiation beam, which is represented by a light beam, radiographers routinely read the data that is displayed on the treatment room monitor to calculate the correct location of the centre of the geometrical volume from the reference marks. Calculation normally involves subtracting from or adding to the figures on the screen. Here too, a process is evident whereby the radiographer completing the calculation first calls out the figure which is then confirmed by other members of the team. However, the situation changes when there is a TR student in the team. During such occasions, radiographers remain silent and wait for the student to complete the calculation and verbalise the figure before acknowledging with an affirmative or otherwise. This type of action represents a radiotherapy 'check' which is defined as 'data generated by calculation or other form of manipulation such as image fusion' (RCR et al., 2008:34). Actions like these place students in the spotlight allowing radiographers to assess numeracy skills and determine their reliability as a member of the team inside the treatment room. Not surprisingly, such assessments promote the student's anxiety in the early stages of skills development occasionally denting their confidence as the following account illustrates:

'They [radiographers] are almost used to the numbers that are expected to come up, so they just sort of need to add or take away a little bit, whereas

you're not as confident with that, so you can do it but it may take you slightly longer than them, and obviously they are in a rush so they jump in and they are on it.' Hannah

The speed mentioned in the above account is a constant factor directing practitioners' actions on the treatment unit to adhere to appointment schedules. Delays of 20 minutes and longer propel speed where less experienced students may be discouraged from participating in the alignment of the reference marks with the radiation beam. However, proficient students may be allowed to operate the linac indicating that proficiency in certain spheres of practice may enhance and possibly accelerate integration in the team. Such actions reflect the notion of an expansive environment in which technical skills and team-working is valued (Evans et al., 2006:40-41).

These accounts reflect a local discourse where everyday knowledge of specific practices and linguistic conventions is critical to the safe care of the patient.

6.4.4 Safe operation of the equipment

In previous research for the Institution Focussed Study, my exploration of learning in the radiotherapy virtual environment (VERT) revealed that students were better able to transfer skills of operating the linac from simulation to the workplace environment. Indeed, learning with such tools enabled students to integrate confidently in the workplace teams. These conclusions were based on interviews with students. However, in the research for this thesis, my findings were confirmed by radiographers who compared TR students' skills to their own experiences of learning to operate the linac:

'*they seem slightly more confident with the hand pendant, and they are picking it up quicker than we used to when we didn't have the VERT practice, so the controls they are more familiar with, and most of them I would say are putting it into practice. There's the odd one or two where when you first of all let them go in [the treatment room] to get the patient down on their own and you are looking in the camera thinking please don't do anything stupid, and they'll say oh yeah, I've got to move the gantry*

first, and then you can almost hear the cogs clicking, so they move the gantry out of the way, and then they start bringing the bed down'. Mel

These findings mirrored Nisbet and Matthews (2011) research with VERT, which revealed improvement in students' confidence. However, the above account also reveals anxieties that practitioners' experience when students in the workplace are permitted to operate the equipment. They disclose procedures that entail a specific sequence to secure the safety of the linac equipment. Accounts such as these imply that spatial awareness and alertness is expected of all practitioners including novices like TR students. Other nuances involve positioning oneself such that the movement of the equipment is always within the operator's visual field thus enabling them to take appropriate action if necessary. Operating the equipment safely enables the practitioner to achieve the correct orientation of the radiation beams that forms one aspect of the patient set-up and reveals how the proficiency of operating radiotherapy equipment safely is recontextualised in the workplace.

'you always say if you are on the opposite side to where the gantry's moving around the head of the machine you should go around and check, ……but actually you could have that bed just a little bit too far off on that side, that day and you are going to hit a patient's arm or you are going to hit the side of the bed'. Marcia

Whilst the safety of the equipment is important, it is worth noting that practitioners' accounts and personal experience reveal that for the majority of the working day, safety inside the room involves a dual element. Notwithstanding the safety of people involving the patient and other team members, the radiographer is also responsible for the safe use of the equipment, all of which contributes to the safety of the environment. In the control panel room, safe use of the equipment is foregrounded in the process of activating the radiation beam after the patient has been positioned correctly by the radiographers for the radiotherapy treatment.

6.4.5 Switching on the radiation beam

The prelude to the activation of the radiation beam begins after the push gate has been shut by the last person leaving the treatment room, and involves

a sequence of procedures that epitomise a verification process, which is defined as 'confirmation that data recorded are consistent with source data' (RCR et al., 2008:34).

Verification begins with the radiographers checking the patient's name against information on a separate monitor to ensure that data for the correct patient has been loaded on the system. Thereafter, the focus shifts to technical data regarding the patient's treatment where team members verify transcribed, handwritten information against the uploaded data on the computer. For example, patients treated for prostate cancer will usually be treated from up to five different directions or 'fields'. Each will have specific data regarding the named area, which is usually based on the angle of radiation beam with respect to the patient's position on the treatment couch. Other data relate to the numerical dimensions of the treatment area, and the position of the linac machine:

> '*Jamie reads out the dose units & radiation energy which signify the prescription dose for this patient, the X and Y dimensions which signify the length and width of the treatment area, the gantry angle which identifies the position of the machine and the collimator angle which signifies the position of the head of the machine. This is continued for each of the 5 fields specific to this patient's treatment. Mel who is sitting in the chair looks at the parameters on the screen to check that they match*'. Field notes, 6 Feb. 2015

Verbal verification is usually interspersed with covert action associated with ensuring the patient's well-being as well as compliance with the treatment position. The latter is determined by zooming in on the reference mark that identifies the centre of the treatment volume as explained in the following account of patient safety beyond the treatment room:

> *'It's radiation safety, that is more important when you come outside the room, but also I don't just switch on a button, I look into those [CCTV] cameras, the patient's not jumped off the bed, they are not waving for help, before you then switch on, am I then giving the right dose to the right area'?* Chrissy

The lead radiographer then presses the button to switch on the radiation beam. Upon activating the beam, numerical units in two separate windows count up to the set figure depicting an independent fail-safe mechanism that is incorporated in the linac equipment that all radiographers know about from their undergraduate education.

Simultaneously, an audible and visible signal in the vicinity of the treatment room warns all those in the locality of the hazard that radiation poses. Additionally, emblematic colours on the equipment's control panel portray danger and safety as the following account shows:

> *'Karen then turns the key on the pad and presses the 'Beam on' button which is coloured green. Located next to it is the 'Stop' button which has a red colour. During the beam on, the light above the gate to the treatment room comes on showing the instruction 'DO NOT ENTER' in red.' The beam automatically ceases to irradiate when all figures align, usually just under one minute'* Field notes, 15 April 2015.

Record keeping is evident in the patient's prescription card. Handwritten information regarding the date of each treatment, the radiation dose to each treatment field, and the accumulated dose is documented by the lead radiographer who signs off with their initials. However, verification of the patient's identity, which is also recorded on the same card requires the initials of two radiographers in the team to illustrate identification inside the linac room and in the control panel room. The verification of the patient's identification reflects the professional mandate that 'correct identification is essential at every step' (RCR et al., 2008:36) and highlights measures that are taken to achieve such an edict.

The processes outlined in the previous sections describe how embodied practices inside and outside the room coalesce to ensure patient safety in the radiotherapy department. Nevertheless errors occur. Data for 2013-15 from the IR(ME)R inspectorates of the four countries in the UK indicated that 47.1% (n=206) of the 437 reported errors occurred during the 'treatment unit' process illustrating that the patient was most vulnerable in this part of the radiotherapy pathway. 'Movements from reference marks' constituted 21.6% (n=25) of the

treatment unit errors (Public Health England, 2016:22-23) suggesting human fallibility. However, it should be noted that such errors were not sustained indicating that harm to the patient was limited as the majority occurred on a single occasion. Regardless, the nature of the error warranted reporting it to government agencies. In an attempt to reduce errors, local protocols have been written to standardise radiotherapy practices.

However, access is necessary to gain knowledge from such protocols. At Galensfield Trust hospital, local protocols are stored electronically and access depends on the availability of the computer, which also functions as the treatment unit's 'appointment diary'. In this dual role, the computer is the 'go-to' resource providing a list of expected patients' names together with their check-in time thereby supplying a dynamic feed that is updated each time a patient arrives for treatment. Consequently, access to local protocols is opportunistic for novices such as students as the electronic appointment diary is checked regularly by team members throughout the day, a view that was shared by a practitioner.

> *Computer spaces are limited here, I think that doesn't help, if they are one student to a machine, which is rare now I know, but if it does happen then we expect them to be running. We are now using the computer with the xxx on it as another Aria so there might always be someone on there. And obviously it's up to them whether they then say can I use this computer please'*. Chrissy

Furthermore, the terminology in the content raises questions about the level of understanding that practitioners achieve from reading local protocols intended to guide their practice. Doubts are also raised about the language used to communicate and standardise practice in the workplace. Such occurrences highlight that instruments developed to guide safe practice can themselves become problematical as disclosed in the following discussion about raising awareness of local protocols:

> '*a protocol should be written in a way that anyone reading it should be able to understand, but I also know that one of my colleagues was going through a document that needed updating, and she asked me on a sentence and we both read it and we went I don't actually know what that*

sentence mean. So, clearly one of the radiographers who'd done it thought it made sense but to someone else it doesn't, and I remember thinking when I did one of the breast techniques as well I thought I'll sit down, I knew a patient was coming up that needed this, I read the protocol and the protocol to me confused matters, but as soon as I did it I then knew what it was talking about, so often you need to see, sometimes you need to see the technique before you read the protocol that explains what you're doing. So from the student point of view I can imagine sometimes reading the protocols can be more confusing'. Lisa

In such events, the situated nature of practice allows participants to learn from observation of others' performance thus enabling them to make sense of the workplace guidance, a view that was frequently voiced by student participants. However, such occurrences highlight the ambiguity that arises when attempting to document practical tasks of a highly technical nature in a fashion similar to a cookbook recipe. Essentially, they underestimate the skills that are required to provide clarity through the written word.

6.5 Summary

In this chapter, the recontextualisation of regulatory and professional body guidelines regarding safe use of ionising radiation have been shown to constitute the core knowledge of the radiography practitioner. Here, codified knowledge begins with the curriculum content in undergraduate education which is applied periodically during placements as a student. However, application in the workplace is critical to develop skills for safe practice. For the radiography student, situated learning in the workplace affords opportunities to develop practice and hone skills both inside the linac room and in the control panel area where attention to the myriad of checking and verification processes supports patient safety. For radiographers working in such environments, knowledge and understanding of protocol content, as well as attention to workplace practices assist in sustaining safe practice for team-members and patients in the radiotherapy department.

Chapter 7- Discussion

7.1 Introduction

This qualitative case-study explores what constitutes patient safety knowledge in TR and how undergraduate students transfer this type of knowledge from academia to the workplace setting. The literature review reveals a multidimensional concept of patient safety constituting values; attributes of quality of healthcare and sub-disciplines that form a systems-based approach. So combining these constructs with the lens of Guile and Evans' theoretical framework of recontextualisation, this research shows how PRSB guidance is recontextualised in the TR curriculum, addresses pedagogic recontextualisation involving educators and reveals how learners recontextualise knowledge of patient safety in the workplace.

7.2. Recontextualising statements of professional practice

The PRSB standards identified in this thesis encompass the state's legislated requirements illustrating forms of public accountability. They reflect collaboration between state and the regulatory body to enable patients' safety (Baumann et al., 2014). Chapter 5 shows that patient safety measures are integrated in PRSB standards of education and training in the form of values; attribute of care and human factors system. In the curriculum, these are then recontextualised into learning outcomes that are grouped into specific categories: knowledge and understanding; cognitive skills; practical skills and transferable skills. These four categories are then dispersed through the three years of the TR curriculum. Embedding professional statements in this way results in approval of the programme from the professional and regulatory bodies demonstrating their powerful influence on promoting their ethos of professionalism and public service through education and training; a view that is substantiated by Hampton and Hampton (2004:1004).

Section 5.2.2 shows that in pre-registration courses, patient safety matters are considered at the recruitment stage where the assessment of probity through the DBS, suggests that the value-based construct of patient safety is important in healthcare. Thus, patient safety values are assumed to form the foundation for professional practice upon which constructs for quality and

systems-based approach are built. Therefore, this is possibly the first study, to my knowledge, to demonstrate how values are incorporated by the PRSBs and implemented by the HEI's to ensure public safety.

This value-based construct possibly demonstrates the notion of the universal values of caring that underpin social welfare that Schwartz and Bilsky,(1987) and Cieciuch, Schwatrz and Vecchione (2013) espouse in their writing on human values. Furthermore, the assessment of probity is conjoined with trust, which is important for professional practice. Indeed, in Chapter one, Sullivan (2000) and Cohen (2006) remind medical practitioners that trust forms a cornerstone of the social contract with the public. However, my data suggests that team-working in the workplace also requires members to trust one another so they may function cohesively as a unit. In environments utilising sophisticated technology, shown in 6.4.4, the human factors system involving team-working and communication is essential to safe practice. Such workplace situations embody the notion of communicative trust, which is relational, requiring practitioners to manage affective states with the rational self to maintain confidence in each other's ability, thus upholding Brown's, (2008; Brown et al., 2011) assertions regarding trust.

Section 6.3 describes specific features in the treatment room, control-panel area, and the linac equipment, which identify design features that enforce actions. Such actions are context-bound requiring practitioners to draw on their knowledge and proficiency to ensure safety. In highly technical environments, features incorporated in the equipment and workplace environment reflect 'design-based regulation' where technical constraints prevent initiation of certain actions in the workplace (Yeung and Dixon-Woods, 2010). Such features reify the system-based approach of human factors encompassing equipment, human behaviour and ability, and the workspace (Catchpole, 2016).

Turning to education, my research concurs with the view that standards generated by the PRSBs are powerful initiators influencing the inclusion of specific knowledge in healthcare curricula (Chisholm et al., 2013; Bradshaw and Merriman, 2008). Additionally, the TR curriculum incorporates a practical element that calls upon learner agency and action; both are vital to engage with

the workplace and achieve the necessary proficiencies. Thus, the curriculum reflects the schema of the professional subjects in which the learner's 'being' (Barnett and Coate, 2005:128), their willingness to engage with the curriculum is paramount. Indeed, 5.6.1 illustrates how knowing about the patient identification process can influence engagement and acting in specific ways. So my thesis supports Barnett and Coate's conceptualisation of the dynamic between knowing, being and acting in the curriculum. Furthermore, my thesis contributes to the sparse literature on professional standards and progresses it by illustrating that patient safety is constituted in knowledge in the classroom curriculum, and recontextualised in embodied skills and practice in the workplace.

Although patient safety is integrated throughout the three years of the programme, section 5.2.2.4 shows that patient safety matters are occasionally implicit. Consequently, learners' knowing of safety-related matters may be impeded. Therefore, signposting of the different constructs of patient safety may assist with learners' development of holistic, patient-centred care, which is central to clinical practice.

My findings are similar to others who reported that patient safety was integrated in the curriculum. They also commented on the lack of explicit identification of curricula content (Cresswell et al., 2013; Steven et al., 2014). Moving to the organisation of the curriculum, the WHO (2011) propose two models: one is similar to the integrated curriculum mentioned here, the other is a discrete, stand-alone module. The latter structure introduces a fragmented curriculum that further complicates the learner's integration of knowledge and practice.

Focussing on curriculum content, my study revealed that patient safety values and attributes were evident in the proficiencies. However, the systems approach was sparse. Therefore, signposting of safety needs to be improved to highlight its multidimensional facet. The lack of such pointers may be attributed to insufficient expertise in subject matter and pedagogy. This finding matches earlier studies (Gurses et al., 2012; Chisholm et al., 2013) that have identified similar issues regarding knowledge of topic and teaching practices. Inadequate

signposting of patient safety in the curricula is also corroborated by other researchers (Cresswell et al., 2013; Robson et al., 2013), which may impede development of knowledge. Additionally, patient safety content needs to be linked to the teaching of professional ethics that incorporate philosophical perspectives. These considerations also highlight the importance of expertise, team-working and co-operation that is necessary for successful integration of topics in the curriculum.

Turning to professionalism, section 5.2.3.1 discusses SCoR's prescriptive curriculum guidance, which forms the core knowledge of the TR profession. Such action suggests 'informative learning' where knowledge acquisition and skill development for expertise becomes the key focus (Frenk et al., 2010). Combined with the teaching of professional standards to newcomers and their enactment in practice embeds the professional codes of conduct together with the expectation to demonstrate high levels of integrity. This feature depicts a key characteristic of a profession that reflects Crook's (2008:16) discussion on the specific traits of a profession.

With respect to patient safety and professionalism, there are two emerging issues. The first is that 'personal fallibility' is recognised as a human trait. Therefore, patient safety education should also support individuals to become comfortable in disclosing uncomfortable occurrences that jeopardise safety. This personal development contributes to the collective, public accountability of the professions mentioned in Chapter 1.3. Furthermore, the resulting personal confidence may reduce the 'blame culture' that was revealed in chapter 5.6. My second point is that in concert with such development, reflective practice is given due consideration. Reflexivity is essential to enable the practitioner to learn from errors in order to understand personal limitations and to improve personal practice, a view that draws on Schön's proposition (1987:78-79) that reflective conversations may lead to new meanings. Next, I address my second question.

7.3 Recontextualisation of curriculum statements in the workplace

In exploring how curriculum statements are recontextualised in the clinical workplace setting, section 5.3 reveals that a curriculum for placement education does not exist in the TR programme. This finding reflects a deficit that is common in medical, nursing and the allied healthcare professions thus supporting other research (Holmboe, Ginsburg & Bernabeo, 2011; Budgen and Gamroth, 2008; Rodger et al., 2008).

My research shows that practice education is directed by an outcomes-based approach where the attainment of proficiencies forms the principal driver for learners. Here, structure is evident insofar as skill development begins with low accountability proficiencies in which low level errors may be addressed through 'just-in time' actions and 'near-misses' preventing harm to the patient but supporting the novice's learning (Higher Education England, 2016: 9). This approach assumes the development of skills that form the foundation for progression to advanced level tasks (Billet, 2006). Indeed, Anema and McCoy (2010:3) write that the competency-based approach ensures that graduates in entry level positions possess 'essential knowledge, skills and attitudes' to join the workforce. This view is corroborated by QAA Scotland (2012) who define practice based learning as learning that is 'explicitly designed to relate to professional and practice standards'. However, my research presents a specific model for workplace recontextualisation warranting further research to ascertain what models exist and discover their effectiveness in developing safe TR practitioners.

Additionally, the healthcare education literature is remarkably silent on the concept of rules of combination, table 4.2, in the curriculum. Nevertheless, it is possible that these are considered given that pre-registration healthcare students commonly receive classroom-based teaching. Guile (2011) has previously challenged 'curriculum planners to generate their own set of rules of combination for practical knowledge so that it too can be selected, combined and sequenced in vocational curricula'. Consequently, in the TR curriculum, section 5.4 illustrates that hand hygiene, basic life support and moving and handling training form the general patient safety topics where knowledge combined with simulation is sequenced to occur in the HEI. This is then

recontextualised in the workplace, commonly occurring in the first week of placement where the management of the pace and sequence of learners' participation is aided by workplace supervisors. Similar rules of combination are evident in the selection and recontextualisation of the safe operation of the linac equipment. So supervisors' guidance combined with the use of workplace artefacts begins the process of accessing socially acquired knowledge. According to Billet (2002), such a process supports the development of the novice's 'intrapsychological attributes' that are necessary for workplace functions.

In the recontextualisation of curriculum statements, section 5.3 identifies collaboration between Cambourne and the TR workplace implying division of labour whereby the practice educator oversees the placement rotation. Students' rotations on the linac are supervised by senior practitioners in the team, thus begins the learner's socialisation into the workplace. This includes development of horizontal discourses to support students' integration in the workplace teams. Concurrently, students are exposed to the procedural aspects of specific proficiency standards. Further mediation between the HEI and placement site involves the academic link tutor who has an overview of the programme outcomes and curriculum proficiencies. Shared understanding arising from their experiential knowledge of radiotherapy practice enhances the collaboration between the link tutor and the workplace educators. Such orchestration suggests that co-operation between the agencies is essential to facilitate students' achievement of the threshold experience.

However, in specialist disciplines like TR, completion of the proficiencies can become problematic. Contributory factors include limited services with linac placements, and expanding student numbers necessitating the sharing of insufficient resources, which I can attest to as a practitioner. These organisational issues previously influenced by the NHS commissions (Allan and Smith, 2010) and recent changes in this system (HEE, 2015) impact upon learners' attainment of the requisite experience, which consequently threatens safety standards. Next, I consider teaching practices in the TR workplace to address my third question.

7.4 Workplace pedagogic practices for recontextualising curriculum knowledge

In this section, I focus on the informal learning that is dominant in placement learning. Section 5.5.1 shows that in the TR undergraduate programme, recontextualisation of curriculum knowledge is facilitated through the preceptor model where a student is supervised by a registered practitioner in the team. This practice demonstrates observance of the professional code, and consent guidelines respectively (SCoR 2013b; SCoR 2010) illustrating their influence upon everyday workplace practice. My finding supports other research in healthcare education by identifying that the educator, or supervisor is frequently a member of the clinical staff workforce (Croxon and Marginnis, 2009; Andrews and Ford, 2013; Needham, McMurray, Shaban, 2016; Thompson, Smythe, Jones, 2016).

My research shows that supervision by experienced staff support learners development of professional practices. Such practices involving 'cross-generational mentoring and coaching' acknowledge the expertise of the mentors and promotes the transfer of knowledge from experienced staff to novices (Daniels, 2013). As supervisors are experienced practitioners, there is an assumption that their facilitation is likely to develop practices that are robust because they focus on everyday processes (Garrick, 1998:2). Thus my research concurs with others (Billet, 2002; Kilminster et. al., 2007) that this type of supervision may enable learners to recontextualise practice in similar workplaces adding value to the formal learning arrangements.

However, this presumption is predicated on the idea that the workplace supervisor is able to assume the role of a tutor in supporting the application of propositional knowledge and skills development in the workplace. Similar assertions are made by others who mention the lack of attention regarding this role (Paton, 2010; Thompson, Smythe, Jones, 2016), which is highly influential in enabling learning in healthcare environments. Consequently, I suggest that collaboration between the HEI and workplace is also necessary to support practitioners' development of pedagogic practices in healthcare education.

Section 5.6 shows that the context influences students' engagement in connecting the classroom theory to clinical practice concurring with Crookes, Crookes, and Walsh (2013) who make a similar observation. It highlights the importance of interpersonal relations between the supervisor and the supervisee in this situated learning context; a relationship that is central to the learning that results from participatory practices in everyday activities. Thus my research reflects others' view that reciprocal engagement combined with social structures, and workplace practices are key factors in enabling affordances through guided activities (Eraut, 2000; Billet, 2002; Evans et al., 2006:163).

Section 5.5.1 shows that the Socratic questioning approach is commonly used in placement education where students' knowing is assessed supporting others' views (Jarvis and Gibson, 1997:86; Tofade et al., 2013; Field et al., 2014:53; Stoddard and Dell, 2016). Indeed, Tofade et al., (2013) identify this form of practice as low level cognitive questioning. Developing Tofade's assertion, I suggest that such questions interrogate disciplinary vocabulary and technical knowledge to assist the transition into a community of practice.

However, Socratic questioning can also expose the power relations in the workplace that intimidate some students, consequently influencing learning. This finding reflects similar views (Billet, 2002; Stoddard and Dell, 2016). This is heightened in healthcare settings where the lack of physical space curtails privacy for such conversations. Consequently, these types of questioning techniques then become a performance in which bystanders in the vicinity inadvertently become the spectators. This observation highlights issues that learners have to learn to manage in the workplace.

My discussion contributes to the literature on clinical supervision in TR, which is underdeveloped in radiography. By identifying issues of placement learning, it is anticipated that such practice may be further researched and discussed to inform learning in the workplace environment.

Moving to organisational matters regarding quality of care, review of the literature highlights the CQC's (2013) omission of undergraduate healthcare students in its document on effective supervision. This is bewildering as these

learners frequently participate in workplace activities that contribute to the delivery of care to patients. Such participative learning enables access, skills development and the formation of professional identity in the workplace (Morris, 2012:14), factors which contribute to the continuity that is necessary in supporting the safety and provision of patients' care by healthcare professionals in specific disciplines. I shall now attend to learners in the workplace to address my final question.

7.5 Undergraduate learners' recontextualisation of knowledge on placement

Sections 5.5.1 and 6.4 reveal the prevalence of the apprenticeship model in the TR workplace and reflects Evans et al.'s (2006:34) claim about supporting learners' gradual transition to full participation in workplace activities. However, section 5.3.3 shows that this transition occurs through multiple rotations that are constituted in the organisation of the placement experience whereby students move to a new placement on a regular basis. Whilst such rotations anticipate that learners will develop a breadth of experience, they also have implications for students' socialisation. For example, each placement requires relationship building with patients and other members of the team, understanding of the team's culture and the student's role and responsibility, factors that others have acknowledged (Holmboe, Ginsburg, and Bernabeo, 2011; Hyde, 2015). This insight endorses the significance of the socialisation process with each team that students have to steer before they can begin to advance their own learning.

Sections 5.5.1 and 6.4 demonstrate that the majority of learning occurs through participatory practices confirming others' research (Evans et al., 2006:18; Bishop and Waring, 2011:163). Furthermore, learning in the workplace is mostly acquired by observing the team's activities before learners begin to participate. This informal learning in communities of practice also highlights the value of developing effective communication skills that are vital to the practice of patient safety. Participation in team activities gradually develops skills that support competency. Thus my research supports Barnett's (2009) view that knowledge combined with a disposition to engage and learn and qualities of integrity, precision and thoroughness are important. In the workplace these

qualities secure the supervisor's and other team members' trust. These attributes lead to expansive learning opportunities that precipitate development of proficiencies and build learners' confidence (Evans et al., 2006:40-41).

A surprising finding was the development of tacit knowledge in students' learning at pre-registration level. As most of the literature on workplace learning appears to be directed at practising professionals (Eraut, 2000; Evans et al., 2006:71), this was an unexpected revelation. Eraut (2000) identifies characteristics that include routinisation and repetition of tasks. Section 5.6 suggests it is context dependent and personal thus concurring with Gascoigne and Thornton (2013:191) who reach a similar conclusion. I suggest the personal refers to a comprehending being who has already rationalised the situation. Consequently, their articulation is demonstrated in their actions.

7.6 Implications for professional practice

Three issues regarding curriculum design are discussed. Firstly, signposting of patient safety in the professional standards and in the curriculum content is important to develop knowledge and contextualise its significance for practice. Second, I suggest incorporation of the human factors systems approach since all healthcare students are likely to experience team-working, communication skills and situational awareness, that are critical to patients' safety, a view that is also reflected in the WHO's patient safety curriculum (2011). Thirdly, supporting novice learners' development of social skills may enhance their learning in the workplace given that socialisation is an integral feature of the workplace culture.

Turning to the workplace, supporting supervisors' mentoring skills and knowledge of educational theories may contribute to the development of a clinical curriculum that makes explicit reference to patient safety values, attributes and systems in the workplace to embed these elements for professional practice.

To address the blame culture, a review of workplace training regarding errors and root cause analysis is necessary. This should be combined with awareness regarding interpersonal relations that include students since their

position at the bottom of the hierarchy places them in a vulnerable position. Evaluation of such actions may reveal the effectiveness of the intervention. Combined with the aforementioned components of professional ethics in section 7.2, these elements also reflect the PRSBs standard regarding scope of practice.

7.7 Limitations of this research

- This research was limited to a single institution. Therefore, some practice findings are context bound, implying that other elements like the structure of the physical environment are standardised because of adherence to the workplace radiation regulations. However, consideration of macro-level systems was beyond the scope of this research.
- Knowledge of and expertise in the systems approach was not explored in depth with educators and supervisors and therefore merits further exploration to ascertain its importance to support students' learning of patient safety. This was mainly compounded by time constraints of participants' availability therefore some issues could not be explored in depth.
- As this case-study involved practitioners from two units only, this research illuminates a specific aspect of radiotherapy practice. Therefore, further research is necessary to understand workplace practices and their impact on the learners' recontextualisation of safe practice in other areas of TR practice.
- It is important to acknowledge the potential limitation that may have been unwittingly imposed due to my position at Cambourne. Whilst my insiderness provided a common ground regarding the subject, participants may have failed to fully verbalise their thoughts due to the assumption of shared knowledge and understanding (Dwyer and Buckle, 2009). My awareness of the Foucauldian notion of power relations (Lemke, 2001) also alerted me to the likelihood of participant self-censoring given my role and relationship with them as lecturer, link tutor and team-member. Nevertheless, during the analysis of the texts, the space between insider and outsider came to the fore as I began to

appreciate the complexity and multifaceted nature of patient safety in practice. Indeed, Dwyer and Buckle (2009) write that:

> '*it is restrictive to lock into a notion that emphasizes either/or, one or the other, you are in or you are out'*.

With participants' acceptance, in this space I developed a depth of understanding that would not have been possible otherwise.

7.8 Developing as a practitioner-researcher

The preparation for observation of participants was powerful in enforcing my emerging identity as a practitioner-researcher, defined here as 'anyone engaged in education who is researching their own practice' (Foreman-Peck and Winch, 2010:5). For the data collection, I was acutely aware of the importance of trust in the observer-participant relationship; physical positioning to minimise the intrusion of observer presence; and cultivating the skill of pretending not to know. With the last point, I constantly reviewed how and what I interrogated in the field as I balanced the skill of 'being strange' (Dowling and Brown, 2010:54) with my role as a TR educator. Going too far on this spectrum would have questioned my professional credibility. Consequently, in the short breaks from participants, constant comparison of events in field notes, incidents and actions with each patient inside the room enabled me to reflect on my technique.

At the same time, drawing on Gibbs' (2010) concepts of understanding events and incidents, my preliminary analysis of observations led me to review my strategy. This process reveals the iterative nature and the action research that are integral to observation in the field. In this context, the notion reflects the concept of action learning arising from reflection (Walla and Marks-Maran, 2014). For a researcher, such actions exemplify leadership skills that are essential to develop and progress the project. Occasionally, discussions with my peers and my research supervisor also informed such actions. These experiences reflected similarities with the notion of action learning sets (ibid). So in this context, 'action research' refers to a concept of learning in professional practice.

The specific interrogative skills required for the analysis drew me further into the research domain. Reflecting on my research, some aspects were intellectually challenging as I embarked into the new terrain of coding and interpretation. Others were charged with emotion as milestones of completing data collection and writing specific chapters were achieved. Frequently, these solitary tasks were accompanied by apprehension and doubt regarding the process. However, Alexander, Harris-Huemmert & McAlpine (2014) assure scholars like myself that this is a 'normal, albeit challenging part of developing academic identity'. Nevertheless, cultivating skills such as these and combining them with other attributes also contributed to my professional development and achievement of the Senior Fellowship of the Higher Education Academy.

Moving on to Guile and Evans' (2010) theoretical framework of recontextualisation, the structure assists in making transparent how the curriculum is shaped in this inductive research and illuminates how and what content is recast through pedagogic practices to support learners' development of patient safety practices. Reflecting on the utility of this framework, the broad outline of the four types of knowledge recontextualisation support its transferability to any discipline but this expansive approach is also prone to different interpretations during data collection and analysis. This provoked anxiety as I strived to apply the framework as intended. This disclosure reveals the apprehension that novice researchers may experience in doing justice to others' work. Nevertheless, the framework supports the discovery and explanation of the dispersed content of patient safety in the TR curriculum thus confirming Taylor, Evans, and Pinsent-Jones (2010) assertion that it has explanatory power. My study reveals that in patient safety practice, actions combined with knowledge are foregrounded in the prevention of harm.

Chapter 8 - Conclusion

In healthcare practice, patient safety has become a topic of significance to policymakers, practitioners and patients, who have a shared interest in enabling practices that prevent harm, and support high quality care for individual patients. A multidimensional concept of patient safety constituting values; attributes of quality of care and systems approach consisting of sub-disciplines was ascertained from the literature review. These constructs informed data collection in this inductive, empirical research of what constitutes patient safety knowledge in TR, how this is recontextualised in the curriculum by educators and how undergraduate learners recontextualise knowledge of patient safety in the workplace. Using purposive sampling, faculty, workplace supervisors and TR undergraduate students participated in semi-structured interviews. Observation was undertaken with a small group of students.

This research shows that PRSBs standards directly influence knowledge, understanding and practice development in the TR curriculum, thus patient safety values and quality of care are present, however, they are not explicit. Moreover, the systems-based approach is currently lacking. In the classroom, the fragmentation of safety constructs through modularisation possibly detracts from the holistic care that is essential to a patient-centred approach. Therefore, signposting of patient safety is essential to support novice learners' development in the classroom and its recontextualisation in the workplace.

In the implementation of curriculum statements, division of labour occurs through collaboration between the HEI and TR workplace. Undergraduate learners' placements are organised by the workplace practice educator and supported on the linac units by practitioners. Training is essential to support workplace supervisors' pedagogic development, which is critical in the absence of a placement curriculum. Consequently, informal learning supports pre-registration students' skills development and proficiency attainment in the workplace. Socratic questioning also features in the assessment of learners’ knowledge and understanding. Such interrogation facilitates learners' integration of knowledge and practice and develops awareness of patient safety issues.

Socialisation in workplace practices occurs through horizontal discourse and also contributes to practice development. Such socialisation is necessary to support learners' transition because the HE culture allows some latitude in rules of engagement, whereas the workplace culture expects conformity with respect to uniform, punctuality and adherence to protocols. This creates a tension between the two worlds where rigidity in the workplace is juxtaposed with a degree of leniency in HE that allows for personal development. For novices' agility is then necessary to adapt to the workplace practices to embody this professional culture in which modifications of the 'ideal practice' are embedded in the quest to provide safe, patient-centred TR practice. Additionally, learner agency is critical to skill development in the outcomes-based proficiency model that underpins workplace practices. Therefore, learners' dispositions and qualities are important factors contributing to workplace affordances that are necessary for skills development.

Relationship building with teams on each rotation may impede learners' development in the workplace. Here, facilitating development of social skills may support progress. However, power relations in the workplace suggest the presence of a blame culture where errors in patient identification are apportioned to novices. Learners' peripheral participation in workplace practices commonly begins with observation, allowing gradual development of skills and understanding necessary for entry level practice in the TR profession. However, some low level routinised skills contribute to the development of tacit knowledge at pre-registration level.

8.1 Contribution to knowledge

To my knowledge, this is the first qualitative study exploring how patient safety knowledge and practice occurs in TR. As far as I know, it is also the first study reporting how professional statements are recontextualised in the TR curriculum and possibly in healthcare education. This research reveals that safety-related matters begin early where the value-based concept is embedded in recruitment to the undergraduate course thereby demonstrating accountability to the regulatory body and to the public.

Additionally, this research reports on how rules of combination are applied in the classroom practices and for placement where safe practice of hand hygiene, basic life support, moving and handling and the operation of the linac equipment are recontextualised. The research contributes to the literature on supervision of pre-registration learners in healthcare, including TR. Most importantly, it contributes to the literature on patient safety in pre-registration healthcare education and to the methodological literature on Guile and Evans' theoretical framework. The development of tacit knowledge at pre-registration level is significant, adding to epistemology of this subject.

8.2 Recommendations for future research

- To better understand the role of professional and regulatory bodies in upholding patient safety, an exploration of how and what they assess in the approval of radiography programmes may improve educators' knowledge and enhance the curriculum content. At the same time, such actions may improve the public's understanding of these institutions.
- To improve knowledge of the current level of patient safety education in undergraduate radiography education, a mixed method approach may illuminate the curriculum and pedagogy. Undertaking a national study may also reveal the form of the TR placement curriculum to ascertain models of practice that can inform development for placement education.
- Also related to placement education, research to identify and assess current use of competency-based models may evince an understanding of the effectiveness of assessment models in TR courses.
- To support workplace education, exploring TR practitioners' knowledge and understanding of supervisory practices may inform training needs to enhance pre-registration students' experience.

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Appendix A

Invitation to participate in research

Dear students

I am asking you if you would help me with a study which involves interviews and observation of work practices to find out how undergraduate students on the therapeutic radiography course develop radiotherapy practice skills. You have been approached to take part as a possible participant because you are a student on the above course. This research will form my doctoral thesis. It is anticipated that results from the research may also help the course team to evaluate the current structure of the placement experience and inform future review.

I will collect data during placement in the radiotherapy department. The study will involve observation of participants on a linear accelerator in the radiotherapy department to find out how practice knowledge relating to patient safety is gained and applied during placements. Observations will normally take place on 2 separate occasions and may last the whole day.

I would also like to interview each participant after the observation to find out your views of learning in the radiotherapy environment. The interview may last up to 1 hour and will be recorded to ensure that I capture all the information. Information disclosed during the interview will be kept confidential and anonymity will be ensured. However, any information relating to practice that was previously undisclosed and may have resulted in harm to a patient or a healthcare practitioner may require further action.

The research will be arranged to minimise disruption to student's time and therefore the majority of the activities will take place during placement in the department.

You do not need to take part in this study, and you can leave it at any time without affecting your education/relationship with me (as a lecturer), the placement site, Faculty or University in any way.

All information obtained from you during the course of this study will be maintained in a strictly confidential manner. Data will be stored on a password protected computer. The only person who will have access to the information will be my research supervisor, Caroline Pelletier at the Institute of Education. After successful completion of the project all raw data that can identify individuals will be destroyed. In the reporting of this

project, no information will be released which will enable the reader to identify who the respondent was. However, with your permission I may use some anonymised quotes to illustrate my results. I would not reimburse your travel expenses as the research will be conducted during your time in the institution.

It is anticipated that participation in the study may help participants to reflect upon their learning which may help to optimise their radiotherapy practice experience. Results from this investigation may enable the quality and content of subsequent academic and clinical modules to be improved for future students.

Thank you for taking the time to read this letter. If you have any questions or problems, please contact me by email at [redacted]. Alternatively, you may phone me on [redacted]. Please let me know if you wish to be informed of the results from this research.

Warm regards
Kumud

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Dear colleagues

For some time now, I have been interested in finding out how knowledge of patient safety is incorporated in the undergraduate programme. How students transfer knowledge from the University to the placement setting and how this is applied and integrated during their placement experience is also of interest. How undergraduate students are supported in this endeavour will form part of the student's learning experience. Therefore, I am asking you if you would help me with a study which involves interviews and observation of work practices to find out how undergraduate students on the therapeutic radiography course develop radiotherapy practice skills. You have been approached to take part because you are a radiographer on the treatment unit.

This research will form my doctoral thesis. It is anticipated that results from the research may help the course team including practice providers to evaluate the current structure of the placement experience and inform future review.

I will be collecting data by observing students during their placement on this linear accelerator. This will involve observation of all aspects of their learning experience on this unit. Observations will normally take place on 2 separate occasions and may last up to one day. In addition, I would like to interview you to explore your views of how students' learn and develop their skills of radiotherapy practice in the placement environment. The interview will last no more than 1 hour and will be recorded to ensure that I capture all the information.

Data from the digital recorder will be stored on a password protected computer. Information disclosed during the interview will be kept confidential and anonymity will be ensured. However, any information relating to practice that was previously undisclosed and may have resulted in harm to a patient or a healthcare practitioner may require further action.

With your permission, annonymised quotes from the interview may be used to illustrate research findings in the written report. It is anticipated that results from this investigation will enable the quality and content of subsequent academic and clinical modules to be improved for future students.

Thank you for taking time to consider participating in this study. If you have any questions or problems, please contact me by email at [redacted]. Alternatively, you may phone me on [redacted]. Please let me know if you wish to be informed of the results of this research.

Best wishes
Kumud

Participant Information Sheet and Consent

Study Title

Transfer of learning in undergraduate radiotherapy education - An Exploration of the Recontextualisation of Patient Safety Knowledge in the Curriculum.

I would like to invite you to take part in my research study. Before you decide, I would like you to understand why this research is being done and what it would involve for you.

What is the purpose of this study?

The purpose of this educational study is to find out how patient safety is integrated and contextualised in the radiotherapy curriculum by educators in higher education and in the radiotherapy department. This will be performed by exploring how undergraduate students transfer knowledge to the placement setting to develop radiotherapy skills for safe practice.

Why have I been invited?

You have been invited because you are a registered student on the undergraduate therapeutic radiography course or you are currently involved in the undergraduate radiotherapy education as a lecturer, practice educator, supervisor / or mentor.

Do I have to take part?

It is up to you to decide if you wish to take part in this study. If you agree to take part, I will ask you to sign a consent form. You are free to withdraw at any time without giving a reason. It will not affect your learning experience as a student in the department or in the University. If you are an educator, it will not affect your relationship with the educational institution or me in any way.

What will happen if I agree to take part?

You will be invited to take part in an interview exploring your views of patient safety in the undergraduate curriculum. The interview is expected to take up to 1 hour. You will be sent a typed transcript of your interview to check if you agree with the information that was shared with me. You will only be required to attend interview on one occasion. However, it is possible that I may need to contact you to check some details - should this happen then you will not be contacted more than twice. Additionally, some participants e.g. students and supervisors may be observed in the placement setting for up to 2 days. At the end of the observation, they will be asked to take part in an interview to explore views of how safe radiotherapy practice takes place on the linear accelerator and in the radiotherapy department.

Expenses and payments

You will not receive any payment for taking part in this study.

What will I have to do?

On the linear accelerator and in the radiotherapy department you are not required to do anything that you would not normally do in routine practice. At the beginning of the study, I will arrange dates for the interview and, for some the observation. I will record the interview to make sure that I have remembered all the information that is shared with me. When I have transcribed the interview, I will email the transcript to you to check if you agree. If I do not receive a response within 7-10 days, this will imply that you are happy to continue with your participation for the study.

What are the possible benefits of taking part?

The study may not benefit you but may influence the learning experience of future undergraduate students on this course. The interview questions should not distress you, however if this happens then counselling services will be available from the University or the hospital. Counselling Services: tel: [redacted]
Email: [redacted]

How will taking part affect confidentiality?

I would like to assure you that the information you share will be kept in strict confidence. The digital recorder and any notes from observations will be kept in a locked drawer. Data will be stored on a password protected computer. The only person who will have access to the information will be my research supervisor. If the transcription is undertaken by an external person then a contract will stipulate that any transcripted information is not disclosed to other people to ensure confidentiality is maintained. Furthermore, checks will be made to ensure that the person undertaking this type of transcription has had previous experience of dealing with research data and therefore understands the need to maintain participants' anonymity and confidentiality. After successful completion of the study all raw data that can identify individuals will be destroyed. In the reporting of this study, no information will be released which will enable the reader to identify who the respondent was. However, with your permission I may use some anonymised quotes to illustrate my results. In these instances, a false name will be used to maintain your anonymity. During the interview should any information reveal potential harm to patients, students or other practitioners then I may need to disclose this to the relevant people as required of me as a member of the Society of Radiographers and the Health and Care Professions Council.

What will happen if I don't wish to continue with the study?

You are free to withdraw from the study at any time you wish. This will not affect the learning experience or your relationship with me, the faculty or the University.

What will happen to the results of the study?

The results will be reported in the thesis and published in professional healthcare or educational journals at a later stage.

Who has reviewed this research?

This research has been reviewed by the Ethics committee at the Institute of Education. It will also be reviewed by the Research and Development unit at the [redacted] and by the Ethics Committee in the [redacted].

Further information and contact details

If you have any questions or problems, please contact me.

Kumud Titmarsh Email: [redacted]

Or my supervisor, Caroline Pelletier Email: [redacted]

Thank you for taking the time to read this information sheet and for considering this invitation.

Appendix B

WRITTEN CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Statement by participant

- I confirm that I have read and understood the information sheet for this study. I have been informed of the purpose, risks, and benefits of taking part.

  Study of Transfer of learning in undergraduate radiotherapy education - An Exploration of the Recontextualisation of Patient Safety Knowledge in the Curriculum.
- I understand what my involvement will entail and any questions have been answered to my satisfaction.
- I understand that my participation is entirely voluntary, and that I can withdraw at any time without prejudice.
- I understand that all information obtained will be confidential.
- I understand that I may be observed in the radiotherapy department and information may be documented during this time.
- I agree that the interview may be recorded.
- I agree that research data gathered for the study may be published provided that I cannot be identified as a subject.
- Contact information has been provided should I a) wish to seek further information from the investigator at any time for purposes of clarification (b) wish to make a complaint.

Participant's Signature----------Date

Statement by investigator

- I have explained this project and the implications of participation in it to this participant without bias and I believe that the consent is informed and that he/she understands the implications of participation.

Name of investigator ----------

Signature of investigator ----------

Date ----------

Appendix C

Interview guide - HE course team

1. How do you decide what content to include in the curriculum to develop student's knowledge and practice of patient safety on placement?

2. What content do you believe is included on the topic of patient safety in the University's curriculum?

3. Would you give examples of the types of teaching methods that you normally use to develop student's knowledge and practice of patient safety in the radiotherapy department?

Appendix D

Interview Guide - Workplace supervisors and educators

1. In your opinion, what should be the key elements of patient safety in radiotherapy practice?

2. What do you think is the rationale for having patient safety as a topic in the undergraduate radiotherapy curriculum?

3. What knowledge of patient safety do you expect from 2nd year students?

4. What additional knowledge, if any, would you expect from 3rd year students?

5. Talk me through how you normally make decisions on whether a student is performing to a safe standard when setting up a patient for radiotherapy treatment for prostate cancer.

6. What additional knowledge of safe radiotherapy practice would you expect from a student involved in the care of a patient with prostate cancer?

7. What sort of teaching is normally put in place to assist student's development of radiotherapy practice on the linac?

8. How are undergraduate students integrated into the linac team?

Practice educator (additional questions)

1. How do you decide what content to include in clinical/practice education to develop student's knowledge and practice of patient safety on placement?
2. What content do you believe is included on the topic of patient safety in the University-based teaching curriculum?
3. Would you give examples of the types of teaching methods that you normally use to develop student's knowledge and practice of patient safety in the radiotherapy department?
4. In your experience how do students integrate theoretical knowledge with practice on the linac?

Appendix E

Interview Guide - Year Two and Three students

1. How does the University-based teaching prepare you for safe radiotherapy practice on placements?
2. Based on your experience, what does safe practice in radiotherapy involve?
3. In which modules have you learned about treating patients safely?
4. Give me an example where you have applied the University-based knowledge of patient safety to your placement experience.
5. In your experience, how is the patient's safety managed by the team on this linac [linear accelerator]?
6. Based on your experience, what role does the student normally have in the linac team to check that the patient in their care is treated safely?
7. In your opinion, how does the student contribute to the safe radiotherapy treatment of a patient with prostate cancer?
8. How you adapt to the team during placements on different linacs [linear accelerator]?
9. How do the mentors / supervisors highlight matters relating to patient safety?
10. How do you adapt to variations in individual supervisor's practice?
11. In your experience, what does a radiotherapy error on a linac consist of?
12. How have you (or might you) cope with a radiotherapy error?
13. In your experience, how does the practice educator [who coordinates your placements] support learning of patient safety in the department?
14. What does patient safety mean to you?

Appendix F

Excerpts from coding

Curriculum content

		Name	Sources	Created On	Modified On	
Teaching methods	4	74	KT	KT		
Specific subjects	4	56	KT	KT	**Curriculum content**	
Personal experience	3	31	KT	KT	Specific subjects	
Personal reflection	3	27	KT	KT	Patient specific topics	
Curriculum content	5	26	KT	KT	professional issues	
Patient safety interpretation	3	26	KT	KT		
Professional issues	3	25	KT	KT		
Patient safety topics	2	17	KT	KT	**Pedagogy**	
Active learning	3	16	KT	KT	context-laden	
Personal stories	2	16	KT	KT		personal experience
Level of knowledge	2	15	KT	KT		personal stories
context-laden	3	14	KT	KT	active learning	
human fallibility	2	13	KT	KT	Skill development	
emotional response to error	2	12	KT	KT		developing number sense
Determined by scope of practice	4	11	KT	KT		documenting errors
personal reaction to error	2	11	KT	KT	internet resources	
patient-centred care	3	10	KT	KT		
Skill development	3	10	KT	KT		
personal safety	2	9	KT	KT	**Patient safety interpretation**	
Meaning of patient safety	1	8	KT	KT	Meaning of patient safety	
Task-oriented	3	8	KT	KT	human fallibility	
impact on daily practice	3	7	KT	KT		emotional response to error
planned actions	1	7	KT	KT		personal reaction to error
embodied learning	2	6	KT	KT	patient-centred care	
identification of current gaps	1	6	KT	KT	personal safety	
prior learning and knowledge	1	6	KT	KT		
problem-solving	2	6	KT	KT	impact on daily practice	

<Internals\\RT tutors\\A [redacted] t -coding> - § 11 references coded [2.96% Coverage]

Reference 1 - 0.22% Coverage

things like linac and talk about things like the interlocks and applicators

Reference 2 - 0.07% Coverage

we've done calculations,

Reference 3 - 0.37% Coverage

talk about transcription errors and the importance of individual checking rather than checking doing the calculations together

Reference 4 - 0.20% Coverage

things like errors and reporting and near misses and quality systems

Reference 5 - 0.13% Coverage

they do have in the IFP a patient safety day

Reference 6 - 0.06% Coverage

moving and handling

Reference 7 - 0.07% Coverage

being safe with a patient

Vertical knowledge

<Internals\\Partcipant 13 transcript> - § 4 references coded [6.60% Coverage]

Reference 1 - 1.91% Coverage

University especially first year, they help us to really understand how doses we can get, that the dose badge is really important, they told us, they learn us a lot about organs at risk and unwanted radiation, and about the (sorry - recorder just fell on the floor) how radiation is

harmful, yeah like unwanted radiation, there all the tolerances , yeah is depend like yeah dunno what really ask for so

Reference 2 - 1.32% Coverage

on the first day we had radiation regulations and patient's data protection so we had to know for so I'm not sure it was PPD 1 (questioning, KT - could have been), yeah it was on the exam so we had to learn all those safety things rules and regulations which applied in the dept

Reference 3 - 1.77% Coverage

in the University they told us that we need to match but we didn't actually see it how to do it but they gave us some examples but in the dept they use different equipment and technique so we can actually see how does it work so it helps a lot as well and yeah University gives you like a background, basic, maybe not basic but background knowledge really which helps a lot

Reference 4 - 1.59% Coverage

Moves I learn on the VERT and on the lectures, also calculations. I mean each department is a bit different so you just use this knowledge when you come to the department, you use something else and you learn more practical, not theory but yeah, University gives you the knowledge about the movement and the numbers, how to add them up

Horizontal knowledge

<Internals\\Partcipant 13 transcript> - § 2 references coded [5.82% Coverage]

Reference 1 - 1.84% Coverage

Another tutorial about the safety was yes to localise the oxygen where do we keep the oxygen, how do we check the levels of the oxygen and how to use it, how to connect the mask. Also the fire extinguisher and they told us how to report if there is a fire, if there is emergencies, we need to call 2222 and then we need to state where are we, what's happened and yeah where it happens.

Reference 2 - 3.98% Coverage

emergency trolley, what is within the trolley, how to check the date, I mean expiry dates so the trolley has to update the things, also they told us we had a tutorial in terms of fire sometimes

there is an electricity breakdown, that we have different pendant, I mean different pendant to move the bed cos the patient is quite high so we need to move the bed down to take them out. So this is one of the things and when it comes to fire and alarm we also need to actually stop the treatment and take the patient down from the bed and yeah put them in a safe place. Also we need to record at which stage we stopped the treatment so, how much dose we delivered and how much dose needs to be delivered to complete the treatment so yeah we need to record those things. And I think in terms yeah, of tutorials this is the most things we had so far

<Internals\\Participant 10 transcript> - § 1 reference coded [0.94% Coverage]

Reference 1 - 0.94% Coverage

Because everything's done differently, so even in uni it might have been discussed that this is what happens, that the end of patient you have to make sure that everything's clean and hygienic and things like that, but until you see it, and you follow how your hospital does it, and how a team does it, it varies so differently. I mean obviously it's the same outcome, but everyone works differently. But I think that's something you can get straight involved in, because yeah, you don't really need to be taught that, you can just watch.