

**THE ROLE OF DISCOURSE IN THE CONSTITUTION OF
RADIOGRAPHIC KNOWLEDGE:
A CRITICAL REALIST ACCOUNT**

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Abstract

The ways in which knowledge is constituted in Higher Education in South Africa today needs to take into account the historical diversity of learners' academic and literacy competencies. The thesis begins by considering the ways in which, historically, many learners in Higher Education have been under prepared for the challenges of studying complex disciplines through the medium of English, which is often their second or third additional language. It also considers the sometimes inappropriate response of Higher Education to the plight of these learners and the present and potential role of language specialists working in collaboration with disciplinary specialists to support these learners.

In this ethnographic research, I use an ontological metatheory, critical realism, as my analytical lens. Critical realism is an appropriate analytical lens for exploring and gaining insight into the possible causal mechanisms that generate the stratified and often inscrutable nature of social reality, including the role of language and discourse in education. I employ a case study design to explore the role of discourse in lecturers and clinical radiographers' constitution of the knowledge of entry level Radiography learners at the Groote Schuur campus of Cape Peninsula University of Technology (CPUT).

Taking discourse as my unit of analysis, I develop a model of knowledge constitution based on a Hallidayan framework (1978). This model comprises two contexts of culture (Higher Education and Health Care) within which are embedded two contexts of situation (the university classroom and a clinical radiography workplace). In these contexts, I focus on how lecturers and clinical radiographers constitute radiographic knowledge through the field, tenor and mode of their discourse. My research sheds light on learners' construal of various aspects of this process of knowledge constitution, and I consider implications for Radiography teaching and learning.

I conclude that, because of the dual contexts in which the learners' knowledge is constituted, literacy requirements in the two contexts are quite different. For this reason, learners may often be unmotivated to enhance their literacies, particularly in reading and writing; yet, in the interests of the future growth of the profession, the latter will be required of them as practitioners who conduct research and publish. I argue that the real empowerment of Radiography learners thus lies in their lecturers' agency: there is a need for them to implement certain practices that will shape the learners' identity, not only as clinical

practitioners, but as researchers and writers. In doing this, they will ensure that the learners' potential is realised and they have the capacity to make meaningful contributions to the growth of the future radiography profession.

Keywords

Critical realism

Case study

Radiography education

Teaching and learning

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Chapter 1

INTRODUCTION

1.1 Aim of the thesis

The primary aim of this thesis is to explore two questions. The first is: ‘How is radiographic knowledge constituted in a university of technology classroom and in a clinical workplace?’; and the second is: ‘What is the role of discourse¹ in this process?’ In answering these questions, the thesis focuses particularly on the ways in which knowledge was constituted for entry-level Radiography learners in the context of the Radiography Division of the Cape Peninsula University of Technology (CPUT), but also in a department of Groote Schuur Hospital (GSH), in Cape Town, South Africa. In this introductory chapter, I therefore provide a brief history of these dual contexts in which the learners’ education and training occurred, as well as an account of the events that led to my particular interest in the stated research questions.

I begin with a brief description and discussion of Health Care in South Africa, as it is within this broad context that the CPUT Radiography Division of GSH is situated.

1.2 Contexts of research: Health Care and Higher Education

1.2.1 Health Care in South Africa

Basch (1990: 289) defines a Health Care system as “...an organised arrangement to provide specified promotive, preventive, curative and rehabilitative services to designated persons, using resources allocated for that purpose.” He (1990: 290) adds that “[h]ealth care is a continuously evolving process impossible to describe adequately in an instantaneous snapshot.” Health itself is not simple to define. Beaglehole and Bonita (2004: 3) explain that ‘health’ has many meanings, “...ranging from an ideal state to the absence of a medically defined and certifiable disease.”

According to Engel-Hills (2005), because of changes in technology, Health Care globally has altered so dramatically over the past few decades that all aspects of Health Care have been affected, including radiography, which originated over a century ago. Much of the training for all Health Care fields, including radiography, was originally provided by hospitals; but, as developments in knowledge-based technologies affected the day-to-day operation of service

¹ An explanation of my use of the term is provided in section 1.3 of this chapter.

providers, it became necessary to change the way in which Health Care personnel were prepared for employment within this environment. These developments necessitated changes in the way that institutions organised and managed their practices. Engel-Hills (2005: 4) notes that these developments brought about changing expectations of the desirable characteristics of employees: nowadays they are expected to be “...flexible, adaptable, and to share decision-making in flatter organisations, with less pronounced hierarchies.” Besides these changes within, Health Care facilities have also increasingly found it beneficial to work with other Health Care facilities across regions and nations.

Within South Africa, post-apartheid changes in ideology and policy have affected the Health Care system. Post 1994, the transformation agenda in Health Care targeted previously neglected Health Care sectors. Upgrading the previously neglected primary Health Care sector has, in particular, become a priority; and, inevitably, this shift in priority has meant a reduction in expenditure on tertiary Health Care, the sector in which Health Sciences learners have, in the past, been educated (Engel-Hills, 2005).

Post-apartheid social transformation has meant that patients and employees from all cultural and economic groupings have become part of the Health Care landscape, particularly in state-run teaching and research hospitals like Groote Schuur, where the research which forms the basis of this thesis was undertaken. These changes have prompted adjustments in the education and training of members of the Health Care teams that work within such institutions. In the arena of Radiography² education, Engel-Hills (2005: 2) points out that “[t]hese disciplinary, technological, professional, and social changes have had an impact on the shape and structure of radiography curricula.” Those involved in professions closely linked with radiography have also experienced changes; and all are increasingly part of an integrated and multidisciplinary team of Health Care workers.

The South African Minister of Health has recognised the role of academic institutions in developing professionals for the health science professions and has included Higher Education in plans for the transformation of Health Care (Engel-Hills, 2005).

² Unless quoting from a source, I will capitalise the initial letter of ‘radiography’ when referring to the academic discipline of Radiography, and the lecturers and learners involved (e.g., ‘Radiography lecturers’), but use a lower case initial letter when referring to ‘radiography’ and ‘radiographers’ (as I would do if referring to ‘medicine’ and ‘doctors’). Occasionally the distinction is not applicable (e.g., the future of radiography’, in which case I use a lower case ‘r’).

While changes in Health Care have improved the lot of many previously disadvantaged South African citizens, much remains to be accomplished, especially regarding access to Health Care, particularly in impoverished rural areas where Health Care workers are generally not attracted to work. Efforts are being made to address such challenges (Engel-Hills, 2005).

Since the late 1980s, Higher Education institutions like CPUT have taken responsibility for the evaluation and the issuing of state-run Health Care qualifications (such as Radiography), in the context of a medical facility such as Groote Schuur Hospital (Engel-Hills, 2005).

I shall now provide a historical backdrop to the development of Higher Education in South Africa, with a particular focus on the former Peninsula Technikon, a historically black institution (HBI). The latter merged³ with the former Cape Technikon, a historically white institution (HWI), on 1 January 2005 to form the Cape Peninsula University of Technology (CPUT), so I will also sketch a little of the development of the former Cape Technikon and briefly explain how the merger came about. However, at the time that this research was conducted (predominantly in the first half of 2006), the institutional character of the former Peninsula Technikon was as yet unchanged by the merger, and it was in that context that Radiography education was embedded.

1.2.2 Higher Education in South Africa

1.2.2.1 A brief history of apartheid education in relation to the former technikons

Cooper and Subotzky (2001) provide a comprehensive account of the development of historically white and historically black institutions of higher learning in South Africa over the past century. This historical summary serves as a necessary contextual backdrop to my research site, as it indicates the impact of historical linguistic, cultural, gender and racial trends on tertiary education dating back to the late 19th century, some of which are still

³ The merger of the former Peninsula and Cape Technikons was one of several mergers of Higher Education institutions across South Africa following an announcement by Kadar Asmal, the Minister of Education, of a 'National Plan on Higher Education' in March 2001. This set in motion changes that would permanently alter the Higher Education landscape (CPUT website, 2007). One of the purposes of such mergers was, ostensibly, economic; the other was to address equity issues by bringing together former white and black institutions which had been unequally funded under apartheid. Mergers have had enormous political and structural ramifications. For instance, in the faculty in which I am based (Health and Wellness Sciences), changes were still being made to departments (involving changes in staffing and geographical location) at the end of 2007, a full three years after the effective merger date.

evident to this day and which continue to have an impact on current teaching and learning contexts and participants in Higher Education.

As already noted, CPUT is the product of a merger between two former technikons, one of which was historically black (Peninsula Technikon) and the other historically white (Cape Technikon). Although they developed separately, their historical development was parallel in several respects, so a brief insight into the historical background of both is necessary.

White universities in South Africa date back to 1873, with the establishment of the University of the Cape of Good Hope (UCGH). Segregation in Higher Education was evident before the official 'apartheid' era began in 1948. The disenfranchised ('blacks' and 'white' women) could not belong to any colleges (that were almost exclusively white, male); however, they were allowed to write the University of the Cape of Good Hope (UCGH) examinations.

After 1948, the formal apartheid era had devastating effects on all but 'white' education. So-called rural 'tribal colleges' were established for different black 'ethnic' groups. A white technical college system that operated prior to and following World War I met the need for trained technicians for industry (Cooper and Subotsky, 2001). From 1955, leading white technical colleges began to cater for Higher Education only. They became Colleges for Advanced Technical Education (CATEs). When polytechnics emerged in Britain, the South African CATEs followed similar trends. These colleges became known as 'technikons' in 1979. Because of the apartheid government's policy of racial segregation and separate development, colleges and technikons served different racial communities. Cooper and Subotzky (2001: 10) explain that there was a "parallel process" (to that described above for historically white institutions) to cater for the education and training of other racial groups.

The Radiography division of the Faculty of Health Sciences was part of the former Peninsula Technikon, originally named 'Peninsula Technical College', which was established in 1962 as a state-subsidised, so-called 'coloured' institution to cater for the growing number of trade apprentices. By law, indigenous blacks were not allowed to study there. The main languages spoken were Afrikaans and, to a lesser extent, English.

In 1976, the Technikons Act was promulgated and, in 1979, Peninsula Technikon was formally named (CPUT website, 2007). It gained partial autonomy from the state in the early 1980s. Until 1993, when it became fully independent from the Dept of National Education, final examinations were set by that body (Kolbe, 2004). There was thus a centralised

curriculum that applied to all technikons, irrespective of their historical differences. Only after 1993 were technikons free to devise their own curricula and respond to local needs.

The Department of Education (1997: 7, 10) promoted a ‘ready for work’ philosophy for technikons. Thus, unlike traditional universities, technikons often valued experiential learning over disciplinary knowledge and their goal was therefore “...to prepare people [students] for a particular occupation or industry.” Former technikons were therefore “oriented towards the practice, promotion and transfer of technology.”

Peninsula Technikon, like other historically ‘black’ institutions of learning, was a site of the fierce nation-wide struggle against apartheid. Despite the apartheid government’s efforts to disregard, retard - even annihilate - such institutions, they did not succeed; and, in their separateness, institutions like the former Peninsula Technikon started to address issues of transformation before these became national imperatives (Kolbe, 2004). When I joined the institution in 1985, there was no official language policy. Afrikaans and English were the main languages spoken on the campus. The majority of academic staff at that time were so-called ‘white’ or ‘coloured’, usually unable to speak isiXhosa, the dominant indigenous African language of the region. (This inability of most staff to speak isiXhosa continues.)

From the mid-1980s, the cultural and language profile of the institution slowly began to change to include, increasingly, speakers of isiXhosa. From 1994, the year of liberation and democracy in South Africa, the number of formerly excluded learners escalated rapidly. The latter learners enrolled in Higher Education following what, for most, had been a period of severely disadvantaged schooling. Within a short time, almost all courses were taught through the medium of English only. Even when there was an alternative choice, particularly isiXhosa learners tended to choose to study Communication courses through the medium of English. This choice was attributed to learners (and their parents) regarding English as essential to their upward mobility, it being South Africa’s leading language of commerce and industry (Kolbe, 2004).

1.2.2.2 The learners of the former Peninsula Technikon

The needs of learners who enrolled at former black technikons like Peninsula Technikon were, generally, quite different to those of learners at former white technikons like Cape Technikon. Until 1993, owing to the Department of Education’s central administration of all technikons, no official differentiation was made to address historic imbalances. South

Africa's history of unequal school education during the apartheid regime clearly indicates the reasons for these imbalances. Black learners came from impoverished socio-economic backgrounds, where they attended under-resourced schools (termed 'gutter education' during the apartheid regime). The majority of learners in South Africa schools were also taught through the medium of English, even though it was their second or third additional language (Du Pré, 2004).

Saunders (1988) explains that, historically, the training, employment and salaries of all indigenous African teachers were under the control of the Dept of Education and Training (DET). Their pay was appalling and their prospects poor. Samuel (1990) describes the indigenous black teachers of the mid-1970s as "...hopelessly under qualified." Black and coloured schools were poorly subsidised: black schools received R12.46 per capita per annum, compared with R144.57 for white schools. As the draft White Paper on Education and Training (Republic of South Africa Government Gazette, 1994: 9) records:

...the funding of education and training has been grossly unequal across the racial and ethnic sub-systems. A century and more of discriminatory provision entrenched huge disparities in physical facilities, professional services, and teaching quality.

Similar conditions existed in so-called coloured schools, although not to the same extent, as funding and education were somewhat better. Apartheid schooling, in conclusion, failed to equip most of the learners of the former Peninsula Technikon for tertiary studies. When they were admitted to Higher Education, they were often severely under prepared (Coleman, 1993; Dizdar, 1993; Leibowitz, 1995).

Since the advent of democracy in 1994, the situation has, ironically, deteriorated in many schools, particularly those situated in historically 'coloured' or 'black' areas. Schools have been affected by an ongoing series of disruptions, including inadequate staffing, staff resignations, a deterioration in the learning culture, and an infiltration of drugs and crime. Such events have commonly been reported in the local press. Prior to South Africa's first democratic elections in 1994, a Reconstruction and Development Plan (RDP) was formulated to address social and economic transformation. However, from the end of 1996, this strategy was overshadowed by the politically formulated Growth, Employment And Redistribution strategy (GEAR). Whilst this was supposed to increase funding for education, in real terms this did not occur, as there was inadequate provision for redress of glaring inequalities in educational provision (Christie, 1999). It is only since 2005 that government funding for

education has increased. However, the crisis in schooling persists, with the social situation in many schools being antithetical to learning. A recent national teachers' strike in mid-2007 has had an as yet uncertain impact on the education of learners.

The effects of school crises continue to be felt in South African Higher Education. It is thus not surprising that many of the challenges faced by learners before 1994 remain significant today. Firstly, English is an additional language, yet this is commonly the medium of instruction. Secondly, many learners are not able to cope with the scope and pace of the curriculum for a host of reasons: they may lack self-confidence; many are plagued with financial worries; rural learners may struggle to adapt to urban life; and all have to adjust to the university environment and culture. When they struggle to cope, learners are sometimes embarrassed to reveal this to their lecturers and peers, so avoid seeking help. Because of their limited experience of other types of learning and their previous success with rote learning practices, learners often continue to cope by drawing on those practices.

1.2.2.3 Academic responses in Higher Education

At the former Peninsula Technikon, many academics have not always fully understood, nor responded appropriately to, learners' difficulties. There tends to be a gap between the academics' expectations of the learners and the reality that confronts them. Lecturers continue to expect fairly autonomous learners, who understand English medium lectures, can read academic textbooks (in English) and who can write fluent and comprehensible English, especially in academic assignments. They expect learners to show initiative and to ask for help when they do not understand concepts. The deficiency of the learners' past educational experiences – not of the learners themselves – prevents these learners from meeting their lecturers' expectations. Many learners have a knowledge deficit that requires attention if they are to cope with Higher Education.

Unfortunately, many academics have conflated the learners' difficulties with the learners themselves. Some describe learners in deficit terms. Kernick *et al.* (1993: 525), for example, report that “[a]cademics are continually dissatisfied with learners' apparent inability to ‘think’.” They speak of ‘dropping standards.’ Many academics attribute learners' difficulties solely to poor or limited English proficiency – and assert that if only ‘the language problem’ can be addressed, learners' academic difficulties will disappear (McKenna, 2003: ii). Such discourse indicates that some academics believe that these learners are inferior speakers or users of English as an additional language (Boughey, 2002). While there may well be some

validity in attributing learner difficulties to limited English proficiency, Masenya (1995) has indicated that it is South African Higher Education itself that has been (and, in many instances, still is) under prepared to meet the challenges facing today's learners. Boughey and Volbrecht (2004: 62) add that labelling learners as the source of 'the problem' is "politically expedient", enabling lecturers to avoid making real changes for the benefit of the future of these learners. Lecturers' attitudes to staff development and mainstream curriculum reform initiatives have often been negative, perceived as taking time away from more pressing academic concerns (many of which are assessment-related, imposed by requirements of the administrative system). However, pressure to produce good pass rates has also, unfortunately, caused many academics⁴ to resort to assessment practices that test learners' memory rather than their understanding, thus masking the reality of learners' academic difficulties and perpetuating learners' rote learning practices (Wright, 1997).

It is interesting, in the context of this discussion of 'standards' and 'deficits' to note certain parallels in attitude towards 'different' learners in British Higher Education during a time of educational change. According to Maton (2004), in the British Higher Education system in the 1960s, when rapid expansion was expected to take place, those who were planning anticipated unimaginable upheaval to accommodate the expected influx of 'new' learners (actually learners from working class backgrounds) into traditional Higher Education institutions. They chose, instead, to establish new universities of technology to which these 'new' learners would be better suited. Ultimately, such 'new' learners did not exist: they were merely learners who had different cultural backgrounds, with different priorities and who valued Higher Education for its functional benefits - it provided access to the kinds of qualifications that would lead to better employment (and therefore better economic prospects) for them. They did not 'fit in' with the mores of traditional universities and were not greatly motivated by the prestige of being a university insider. Extending Bernstein's notion of the 'pedagogic device', Maton (2004) argues that those in charge of the 'epistemic device' did not realise this and were not prepared to change the status quo to include the 'new' learners. In many respects, Masenya's (1995) earlier point seems relevant here: in the South African context, many in traditional Higher Education institutions (including some in the former Peninsula Technikon) continue to expect a particular kind of learner from a more privileged cultural and educational background. To varying degrees, some of these lecturers too have

⁴ I use the term 'academics' to denote teaching members of a Higher Education institution, irrespective of their area of specialisation.

resisted changing to accommodate the influx of the new kind of learner that entered Higher Education in the mid-1990s.

The situation at the former Cape Technikon (a historically 'white' institution) will now be discussed in relation to many of the aspects discussed in relation to the former Peninsula Technikon. However, as I know the latter institution much better after being employed there for twenty-three years - and it is the site of my research - my discussion of the former Cape Technikon will be brief.

The staff and learners of the former Cape Technikon were predominantly Afrikaans and English speaking and so instruction was dual medium. In some respects, the history of Cape Technikon was similar to that of Peninsula Technikon: it also began as a technical college, offering a consolidated venue for the technical courses that were being offered at various sites across Cape Town. Like Peninsula Technikon, it then became a College of Advanced Technical Education (a CATE) and was later established as a technikon in 1979. However, because of different histories under the apartheid regime, the two former institutions were understandably different, both in character and concerns. In 1987, the Cape Technikon applied to have the apartheid government's regulations lifted on the permitted quota of black learners; and from 1993, the number of black learners attending the institution began to grow quite rapidly (CPUT website, 2007). A 2001 study at the former Cape Technikon indicated that, whereas in 1993 the white learner profile was over 85.9 % of the total, by 2001 it had decreased to 43.2 % (Favish, 2005).

Various challenges emerged with this change, and the institution was not prepared for the implications of these challenges in terms of their teaching and learning policy and practices. Admission criteria and other factors meant that African learners were insufficiently represented in programmes that were geared towards major growth in the economic sector. Favish (2005: 276) argues that, to meet the challenges of change "...necessitates changes in institutional policies and the political will of senior leadership in HEIs⁵." By 2001, there were no 'black' learners enrolled for post-diploma programmes. Also, there were insufficient black learner graduates; and an increasing drop-out rate. As Favish (2005: 278) comments, "[t]hese trends reflect international experiences of the effect of massification, where opening up access was not accompanied by increased levels of support to ensure success and retention." While the changing institution adopted strategic goals of redress, equity and recognising

⁵ Higher Education Institutions

diversity, the study indicates that institutional attitudes and practices undermined black learners' chances of success (Favish, 2005). Lecturers, for example, indicated that the major factors hampering learning were learners' "impoverished" educational backgrounds and their inability to apply knowledge. For their part, black learners felt socially unequal and unrecognised. The research indicates, however, that staff members were aware that they required 'diversity' assistance to help cope with the changed learner profile (Favish, 2005).

Thus, despite their different histories, many academics in both former technikons held (and continue to hold) similar notions of learners' academic difficulties. Such notions are commonly reflected in various discourses at CPUT. Boughey (2002), for example, notes that these discourses tend to reflect a common sense approach to addressing learner difficulties that is ideologically biased. While such discourses persist, learners are unlikely to be provided with real epistemological access to the covert rules of the knowledge bases in Higher Education.

1.2.2.4 The overlapping paths of 'Communication' and Higher Education Development

Since 1993, with the Department of National Education no longer in control of technikon curricula, lecturers have been free to respond to local needs as they see fit. In the mid-1990s, the management of Peninsula Technikon, realising the need to assist learners in the context of redress and transformation following years of educational disadvantage, employed several part-time practitioners to manage the support of learners in academic programmes. This kind of support became widely known throughout South Africa as 'Academic Development' (AD)⁶. This is significant, as there are strong links between the work of lecturers of the subject that I teach, namely 'Communication', and that of AD practitioners.

Originating in former white technikons, the subject 'Communication' was originally intended to meet learners' workplace needs, although it has usually been taught by lecturers with literature and educational backgrounds rather than those with expertise in workplace communication. While Boughey (2002) argues that it is problematic to employ experts in teaching literature to teach language, many of my Communication colleagues and I were

⁶ Boughey and Volbrecht (2004) note that there has been some confusion about the term 'academic development'. It is generally used to refer to developmental work, whether for learners or staff. They (2004: 58) rather define Academic Development as "...an open set of practices concerned with improving the quality of teaching and learning in Higher Education through integrating learner, staff, curriculum, institutional and research development."

employed precisely because we had previously taught English, isiXhosa or Afrikaans in secondary school prior to being employed by Peninsula Technikon. When I was a learner teacher, a literary degree and a teacher's diploma (including English Method) were prerequisites for teaching English in secondary school.

When I started working at the former Peninsula Technikon, experienced colleagues guided me regarding what needed to be covered in the (usually entry-level) Communication curriculum offered in many programmes. (It is important to note that many Higher Education curricula did not include a subject called 'Communication', nor do they do so today. The Radiography curriculum is one such example.) Communication lecturers were expected to assist learners to use 'standard' English, as we were preparing them for the workplace which expected that form of English. I also learned that I would be teaching several generic Communication content areas such as 'communication theory', 'report writing', 'meetings' and 'correspondence'.

Initial notions of applied linguistics (AL) teaching in South Africa and elsewhere focused on the idea that one could teach (and learners could learn and apply) separate, generic academic competencies in a separate subject. It was thought that learners would make the connection between these competencies and the knowledge of their discipline and so be able to apply these competencies in that context. This model operated in the departments where I taught from the mid-1980s, with the curricula and assessments prescribed by The Department of National Education. As I recall, the focus of the Department's Communication assessments was on workplace communication (e.g., theory of communication, correspondence, report writing and telephone techniques) and grammar. From 1993, when technikons acquired autonomy from the Department of National Education, lecturers had greater freedom to respond to local needs. With the influx of large numbers of previously excluded, under prepared learners at the former Peninsula Technikon, Academic Development (AD) practitioners were employed (using 'soft funding'), in the interests of transformation and equity, to help address 'the language problem.'

At the former Peninsula Technikon, my initial contact with these AD practitioners was through a joint initiative entitled 'LEAP' (Learning in English for Academic Purposes) involving a team of AD and Communication lecturers. The purpose of the initiative was to try to address entry level learners' difficulties with academic competencies and enhance their

social confidence⁷. The LEAP curriculum was therefore different to most previous Communication curricula. It was a structured, developmental, academic programme (taught through the medium of English) that replaced the first year mainstream English programme at the School of Education.

As Boughey and Volbrecht (2004) report, AD practitioners' progress in academic development endeavours usually depended on the extent of their influence and the willingness of mainstream management and staff to cooperate and collaborate with them. Our team of AD practitioners and language lecturers worked well together and were eager to continue to collaborate. However, such work was apparently expected to be transitory and was regarded by management as an 'add-on' that they were not prepared to fund indefinitely. Attempts to permanently involve AD practitioners at the former Peninsula Technikon, as elsewhere in South African Higher Education, were unsuccessful⁸. In discussing the reason for the discontinuation of AD work in many South African institutions of higher learning, Boughey and Volbrecht (2004: 66) refer to the impact of a "stringent macro-economic framework" that constrained the education budget and that was accompanied by the establishment of new priorities that developed and manifested post-1994. Such changes severely affected historically black institutions that had expected long-term funding for redress of past imbalances. The ensuing fiscal discipline on education was evident in the freezing of posts and the cutting of anything that was considered peripheral to core business, including AD work. A simultaneous collapse of South Africa's professional organisation for

⁷ Although elsewhere an 'infusion model' (Walker and Badsha, 1993) of academic development was being advocated by researchers, so that AD practitioners could address the much needed and marginalised academic development from within the mainstream curricula (Boughey and Volbrecht, 2004: 63), at the former Peninsula Technikon, Communication was curriculated and taught as a separate subject within the context of a largely unconnected academic discipline. The notion of 'infusion' was unknown to most of the Communication lecturers of the time (and probably, too, to the content lecturers); besides, the general focus of Communication lectures at the time was not particularly academic.

⁸ This kind of academic work was marginalised elsewhere too (Boughey and Volbrecht, 2004). As at the former Peninsula Technikon, AD staff members were usually on short-term contracts, and funded from outside institutional budgets. This was not conducive to maintaining their services, so there was a high staff turnover. They usually carried heavy teaching loads, were poorly paid and had neither time nor opportunity to further their qualifications or (usually) to theorise their practice. Courses that they designed was often marked by a lack of "a collaborative sense of a community of practice in action" (Boughey and Volbrecht, 2004: 61). In traditional universities, their lack of equivalent qualifications and poor publication record caused them to be marginalised. At the former Peninsula Technikon, the latter was not the reason for their marginalisation: their qualifications were on a par with, and often better than, those of mainstream lecturers. Instead, they were marginalised precisely because their work was not permanently mainstreamed and funded by the institution.

academic development work, SAAAD, occurred in 1998 and, with the withdrawal of donor funding, this work ceased.

At the former Peninsula Technikon, when the 'soft funding' provided by outside sources ceased, and institutional funding was not provided, AD was 'phased out' and Communication lecturers were pressured to incorporate AD concerns into their curricula - because of their language teaching experience and educational qualifications. Communication lecturers responded to this 'opportunity' and pressure in diverse ways that will be discussed shortly.

1.2.2.5 Changing imperatives in a University of Technology

At the former Peninsula Technikon, in the last decade, Communication lecturers have initiated or supported various language and academic support programmes focusing on both learner support and staff development. For example, all the Communication lecturers of the former Peninsula Technikon were involved in a two-year 'content and language integration' project that began in 1999. During the time of the project, many of the Communication curricula on the Bellville campus reflected similar, or at least overlapping, understandings of the role and purpose of Communication. However, there were - and still are - disagreements about the extent to which Communication curricula should support first years' academic needs. Some Communication lecturers have embraced their role as academic development practitioners, working closely with disciplinary/content specialists in a particular faculty to integrate the 'academic literacy' emphases of Communication into learners' disciplinary curricula; others vehemently oppose this role, insisting that their work should primarily address developing learners' workplace communication competencies. During pre-merger discussions at a meeting between Communication lecturers from the two institutions, it became evident that Communication curricula of the former Cape Technikon have tended to focus on workplace communication; whereas, certainly because of its history and decades of concerns around equity, the majority of Communication curricula of the former Peninsula Technikon have been more concerned with supporting learners academically; workplace communication has thus tended to be of secondary concern. Thus, across the two former technikons comprising CPUT, one may find that Communication curricula vary quite fundamentally.

This background information is provided to explain why many, but not all, Communication lecturers identify their role with that of AD. However, it is important at this juncture to note that the position of AD has not been stationary over the past decade. It is heading in a new

direction that will certainly influence how many Communication lecturers will view their role and purpose. Boughey and Volbrecht (2004) explain that AD is being transformed and, more rightly, should be referred to as 'Higher Education Development' (or HED), as this term incorporates a wider spectrum of development than merely 'academic development'.

This shift needs to be understood in relation to other changes that have occurred in South Africa since 1994. In this period, thinking has evolved regarding the place of South Africa in relation to world market economic trends. The discourse of globalisation has been particularly strong, linked with a perceived urgent need for skills development for economic growth and development. Choosing to introduce Outcomes-Based Education (OBE) and the Nationals Qualifications Framework (NQF) were logical developments in this context (Kraak, 1999). AD practitioners have been greatly affected by these shifts. Owing to their teaching and learning experience, they have been employed by organisations in various fields to help develop new qualifications and monitor progress in various aspects of Higher Education. The latter logically includes staff development, as academic staff have been expected to incorporate OBE practices, such as criterion-based assessment, in their curricula and programmes. Thus former AD practitioners have been given a higher status, entrusted with important mainstream staff development, curriculum development and a host of other management-sanctioned and management-driven initiatives aimed at achieving the goals of transformation. However, as Boughey and Volbrecht (2004) point out, in the global context in which Higher Education is located, equity is no longer the prime driver of transformation. Instead, achieving a level of high skills and being able to compete globally have become the main motivators of staff development. Boughey and Volbrecht (2004) challenge all who manage Higher Education change to find a balance between the goals of equity (reconstruction and development) and efficiency (the goals of the global competitive market). In the meantime, they contend that it remains the task of those in AD to reconceptualise and reconfigure their role and identity in Higher Education so that the shift to Higher Education Development (HED) is recognised and marked by more explicit positioning, organising and strategising. At an institutional level, substantial shifts are required of academics in their attitude towards integrating curricula and programmes. This implies ongoing and focused capacity-building, both among the HED practitioners and academic staff and management. Boughey and Volbrecht (2004) speculate that HED practitioners may need to rely less on collegial congeniality in future and more on their understanding of organisational learning and educational management to continue to make a difference in Higher Education.

The 2005 merger of the two former technikons has provided a window of opportunity in that priorities and practices are being shared and re-examined. CPUT is attempting to understand and carve a new identity for itself. Noting that a new Higher Education landscape for South Africa has been outlined by the Council on Higher Education (CHE) (2000), Winberg (2004) has challenged the former technikon communities to understand their new role as a university of technology. She points out that there are models of universities and institutions of technology throughout the world that can be emulated, such as the Massachusetts Institute of Technology (MIT) and Chalmers University of Technology. Such institutions follow a model very different to that of traditional universities and, over time, they have become highly respected for their initiatives in the development of various technologies. While achieving a similar level of excellence will take time, Winberg (2004) suggests that CPUT should begin by articulating its knowledge and scholarly base. This implies a focus on applied scholarship in teaching and learning, research and innovation in the various specialist fields of technology. She (2004: 7) adds that the growth of CPUT will be facilitated by various “conditionalities” in this regard. These are “structural, systematic, attitudinal and dispositional.” CPUT has to understand what it means for it to be, firstly, a university and, next, a university of technology. Former technikons prided themselves on their career-focused education, with work placements in, and close links with, industry. Winberg (2004) argues that CPUT now needs to theorise how different knowledge production systems operate and interact, both within the institution, and with the evolving workplace. This requires making space for reflection and debate on pedagogic functions, practices and understandings. Drawing again on the examples of MIT and Chalmers, Winberg (2004: 9) argues for a broad, more inclusive type of education whose knowledge is socially useful, and that includes the arts, humanities and social sciences as important aspects of an education in technology. Beyond equipping learners with the necessary technological knowledge and practical base, such an education would develop learners’ social and ethical awareness such that they are self-reflective, creative and have a broad ‘criticality’ which is essential in an increasingly global world (Winberg, 2004: 16).

My research has been motivated by an awareness of global, national and institutional trends towards a more holistic form of education to prepare learners for the world of work in a globalised information society. In the past decade, South African Higher Education has been increasingly affected by these international trends and theorists like Nowotny, Scott and Gibbons (2001) urge movement towards a more robust form of education that transgresses

traditional knowledge boundaries. Kleiber (2001) and others argue that “[i]t is becoming increasingly clear that all three historical forces – the market economy, science and democracy – not only benefit from, but more importantly, require, working across disciplines.” The thrust of such arguments is that the kinds of global challenges facing the world today are of such a complex nature that the knowledge of several relevant (but traditionally segmented) producers and users of knowledge are required to address them. Many educators have begun to re-examine the relevance and usefulness of their curricula and question prior conceptions of discrete disciplines. The South African Government (1997), in its White Paper no. 3 on Higher Education and Training, identified a change in the nature of knowledge necessary in today’s workplace and society. There is a clear emphasis on the need for a skilled workforce to address complex problems by reconfiguring knowledge and work in transient, interdisciplinary teams. These abilities are also seen as essential for any country that wishes to maintain a competitive edge, both nationally and internationally. Researchers like Gibbons (1998), Gibbons *et al.* (1994) and Nowotny *et al.* (2001) have urged the development of Mode 2 knowledge, as workplace and societal needs demand “...a new mode of knowledge production ... a more ‘socially robust’ knowledge that transgresses disciplinary and institutional knowledge.” In South Africa, the need for disciplinary specialists to expand beyond their disciplinary role is evident in various policy and planning changes encouraging academic staff development. Rip (2003) has described the ideal 21st century professional as “T-shaped”: the vertical bar of the T refers to disciplinary depth, while the horizontal bar refers to transcontextual strength, indicating the value of being able to collaborate creatively with professionals from other disciplines in addressing current challenges. Supporting the drive towards a Mode 2 society does not, however, imply a rejection of disciplinarity, but the addition of interdisciplinarity or transdisciplinarity.

In line with Mode 2 understandings, Geisler (1994) asserts that, if HE is to be relevant and capable of addressing the complex challenges of the 21st century, tertiary educators need to incorporate three facets in their professional repertoire: the first of these is a solid disciplinary knowledge base (the vertical bar); in addition, educators need an explicit understanding of their individual and collaborative pedagogic role, as well as a clear understanding of the literacy issues and requirements of their disciplines (the horizontal bar). Regarding the first of these, Gee (1999) and others of the New Literacy Studies movement would argue that professionals require a critical understanding of the knowledge base of their disciplinary field because the selection of any body of disciplinary knowledge is not neutral. (The ways in

which the knowledge base of the discipline is pedagogised and conveyed to learners, as well as the role of discourse in this process, will be discussed in Chapter 2.)

Like most academic institutions, the former Peninsula Technikon has, through separate faculties, departments and divisions, supported a traditional, compartmentalised conception of knowledge and knowledge production. This has included the separation of ‘content’ disciplines from language/literacy issues, highlighting the fact that language has been - and apparently still is - understood narrowly (Geisler, 1994). This is slowly changing, although the recent merger has complicated the process and redirected focus from this as a core need.

My research is directly related to my experience as a Communication lecturer at the former Peninsula Technikon, particularly since 1994. As mentioned, in 1999, I was involved in a ‘content and language integration’ project involving ten pairs of language and content lecturers. The focus of much of the project work was on developing an understanding of how many of the Communication competencies (including academic, life skills, study skills and workplace communication competencies) could be integrated with the disciplinary content of a range of disciplines across the three faculties. This was in line with Crandall’s (1993: 256) contention that

[s]tudents cannot develop academic knowledge and skills without access to the language in which that knowledge is embedded, discussed, constructed, or evaluated. Nor can they acquire language skills in a context devoid of content.

Many of the target competencies were thus clearly outside the strictly linguistic realm. During the project, I was involved in collaborative materials development, team teaching, and promoting integration practices; I later conducted research on aspects of content and language integration practices, such as collaborative materials development (e.g., Wright, 2003, 2007). The latter research was situated within the New Literacy Studies (social practices) theory.

My experiences during this project provided the springboard for the research interest described in this thesis. One of my content partners, a Radiography lecturer on the Groote Schuur campus, has an educational and humanities background. This, combined with her radiographic background, made her ‘a rare creature’ among other content lecturers in the project. She possesses what Tinberg (1997: x-xi) would call a “blurred” identity, capable of doing a strange bilingual “dance” between one discipline and another. Through her effort and encouragement, much learning from the project was cascaded into the Groote Schuur Radiography division which has no subject called ‘Communication’.

There were three facets of the Radiography division that impressed me and provoked my curiosity and desire to understand better how the Radiography academics at GSH constituted⁹ Radiographic knowledge for the learners and, also, how and to what extent they were making language aspects of Radiographic knowledge explicit in teaching and learning situations. The first of these facets was that, at approximately the same time as the content and language integration project occurred, the Radiography lecturers developed an integrated curriculum, incorporating outcomes for Radiography education, as well as many of those of Communication. In theory, therefore, language and content integration was already a feature of the Radiography curriculum. The second factor that was unusual was that all the Radiography lecturers of CPUT have a teaching qualification. The third aspect that impressed me was that several Radiography lecturers were engaged in Masters or Doctoral degrees focusing, in several cases, on Radiography education (rather than on Radiography as a discipline). Thus, as a group, the lecturers of the Radiography division were apparently meeting all three of Geisler's (1994) prerequisites for a 21st century educator.

In all these respects, what was happening at Radiography differed from what I had experienced in many contexts elsewhere at the former Peninsula Technikon. While the need for a lecturer to have a solid disciplinary base is obviously not a cause for contention, depending on circumstances and educational background, the other aspects mentioned by Geisler (1994) have often been resisted by lecturers, though to varying degrees. One of the findings of the content and language integration project was that, consciously or unconsciously, a key hindrance to integrating content and language may revolve around the resistance of some content lecturers to move beyond, or collaborate with, Communication lecturers (i.e., those who generally have a background in language and pedagogy). Possible reasons for this resistance may include the following:

1. The medium of instruction at CPUT is English. Many content lecturers have a limited personal English proficiency. This may affect their confidence, making it difficult for

⁹ At this point, in light of my thesis title, it is relevant to provide a distinction between the terms 'knowledge constitution' and 'knowledge construction', as these terms are often conflated in social science discussions. In a general dictionary, the distinction between these terms is not generally clear: 'constitute' is defined as "the components or essence of; make up, form" (Tulloch, 1993: 307); while 'construct' is defined as "make by fitting parts together; build, form" (Tulloch, 1993: 307). In this thesis, I will use the expression 'knowledge constitution' to refer to the ways in which academics and clinical staff - consciously or unconsciously - select, organise and present knowledge to learners, while 'knowledge construction' will refer to the way in which learners organise and develop their knowledge.

them to conceive of themselves as language specialists. There is also a commonly held notion, reflected in the discourse of many content lecturers, that their English grammar is 'not good enough' to assist learners with their language difficulties, i.e., they believe that they need to be able to use "the 'best' and 'proper' structures ...in a language" (Yule, 1996: 87) or be educated in the 'Received Tradition of English Teaching' (Boughey, 2002) if they are to be of any help. For their part, while Communication lecturers tend to have a language background, this language is not always English, so they face similar challenges. However, they face the additional challenge of trying to induct learners into the discourse of a discipline which they have (usually) not acquired.

2. Despite a strong disciplinary/professional/industrial background, content lecturers often have limited (or no) teaching qualification and may lack confidence to assume the role and tasks of sound pedagogy. Communication lecturers, by contrast, generally have a strong teaching background.
3. A third reason may be the relatively low status of Communication compared to the high status of many content disciplines. Communication is frequently termed a 'service' or 'soft skills' subject, and is often facilitated by women. While Communication has always been mainstreamed, content lecturers may anticipate little personal or professional benefit in adopting the role of Communication specialist, and so, logically, it may be difficult to convince them to adopt the concerns of the role. As Trowler (2005) observes, disciplines are 'cultural regimes' whose members may resist change for a host of reasons.
4. Only in approximately the past decade have the staff of the former Peninsula Technikon been encouraged by management to improve their academic and teaching qualifications and to view themselves in the roles of researchers and lifelong learners. The fact that many academics are now moving in that direction indicates the importance of the management of an institution in providing its academic staff with leadership and focus. Henkel (2000) contends that, because individuals are embedded within communities and institutions, the latter constitute "the bounded space" that frames the academic's role and self-concept.

Especially in the context of transformation to address South Africa's historically unequal development, I believe that it is vital that we - both content and language lecturers - develop a critical understanding of how knowledge is constituted in Higher Education and the role of

discourse in that process. To this end, the research focuses on one disciplinary area, Radiography, which straddles both the academy and the workplace. In the context of CPUT's new status as a new university of technology and Winberg's (2004) challenge for these institutions to understand themselves and develop a new identity (noted earlier), the focus in this research on a disciplinary area which straddles both the academy and the world of work appears appropriate. To develop this critical understanding, the two research questions mentioned at the beginning of this chapter are addressed in this thesis, namely:

1. How is Radiographic knowledge constituted in a university of technology classroom and in a clinical workplace?; and
2. What is the role of discourse in this process?

1.3 Explanation of terms

1.3.1 'Language' lecturer

Communication lecturers are synonymously termed 'language lecturers', 'literacy specialists' and, sometimes (not quite accurately) 'academic literacy specialists'. These differing terms often create confusion; however, as yet, no commonly accepted term has been recognised. The term 'language' lecturer or 'language specialist' is usually used to denote a lecturer who is not a 'content lecturer' or a 'disciplinary specialist' (such as a Radiography lecturer). 'Language lecturers' commonly have an educational background and some experience in teaching a language/s, often at secondary school level. In Higher Education, they are often involved in some form of academic support and development, particularly for entry level learners. I thus generally use the term 'language' both in Gee's (1990) lexico-grammatical sense (i.e., to refer to a stretch of language) as well as to refer to aspects of the work of Communication lecturers/ 'language specialists', namely to teach academic competencies.

Regarding the term 'academic literacy', McKenna (2003) asserts that, "[g]enerally, educators do not have a clear understanding of academic literacy." The term 'academic literacy' is usually understood in one of two ways among lecturers, at least among those of the former Peninsula Technikon. The most common understanding seems to be that learners who are

‘academically literate’ are able to cope¹⁰ with the academic demands of their studies. The second sense of the term ‘academic literacy’ is less widely understood, namely the sense of knowing and sharing explicitly with learners how and for what purposes the academy structures knowledge in particular academic disciplines (Geisler, 1994). This corresponds with Gee’s (1990) notion of ‘teaching for learning’, that is, analysing material and developing learners’ meta-knowledge of how it is organised and for what purpose. A greater awareness of this second, less discussed meaning seems necessary. As will be discussed in Chapter 2, Geisler (1994: xiii) problematises the notion of ‘academic literacy’, as it has created a false notion of expertise by separating ‘rhetorical process’ and ‘domain content’.

1.3.2 ‘Content and language integration’

This is the term used to indicate efforts by collaborating content and language specialists to support learners’ academic development by integrating academic and language/literacy competencies in the teaching and learning curriculum.

1.3.3 Discourse

Because this thesis is concerned with the constitution of Radiographic knowledge and the role of discourse in this process, I need to explain my use of the term ‘discourse’. Here I am influenced by Gee’s (1990) and Kress’s (1989) explanations. According to Gee (1990), one acquires a ‘primary’ discourse in the context of the home and social group (with social and cultural practices embedded in the language for a particular context); one then acquires a ‘secondary’ discourse during one’s schooling (commonly meaning that one is able to use language meaningfully to read and write relevant texts). However, when one becomes a member of a community of practice (Lave and Wenger, 1991), one signals one’s membership by one’s acquisition of that group’s ‘Discourse’ (with a capital ‘D’); in other words, one is able to function as a member of that group, and signals one’s membership both through one’s appropriate use of the group’s language as well as through one’s actions in historically and socially defined contexts with their underpinning values. Acquiring a Discourse often occurs according to unspoken ‘rules’ and ‘norms’ and is learned gradually. Discourse refers to “...a

¹⁰ This ‘coping’ includes being able to access information from various sources (‘information literacy’), to use computer technology (‘computer literacy’) and to apply this information competently to achieve particular academic purposes, such as for performance tasks (e.g., assignment writing and oral presentations) and processing of information in various ways (e.g., note-taking, organising and studying). Developing some or all of these competencies has been the intention of Communication lecturers, hence the term ‘academic literacy specialists’.

particular social group's way of being in the world, their 'form of life', their very identity..." (Gee, 1990: 3). This Discourse is to be found in academic disciplines. Each Discourse embodies a tacit message of what that group considers is the right or normal way to be, behave, think and so on, in a particular context. Gee (1990: 6) terms these notions 'ideologies'. Thus when I refer to 'discourse', I am implying Gee's (1990) 'Discourse'. I do not use it with a capital 'D', however, because I combine Gee's 'Discourse' with Kress's use of the term 'discourse'.

Kress's (1989) definition of 'discourses' incorporates Gee's (1990) ideological aspect, but focuses more specifically on the expression and enactment of culturally generated meanings within institutions. Kress (1989) states that discourses are:

...systematically-organised sets of statements which give expression to the meanings and values of an institution. Beyond this, they define, describe and delimit what is possible to say (and, by extension, what is possible to do or not to do) with respect to the area of concern of that institution, whether marginally or centrally. A discourse provides a set of possible statements about a given area, and organises and gives structure to the manner in which a particular topic, object, process is to be talked about. In that it provides descriptions, rules, permissions and prohibitions of social and individual actions.

In Kress's definition, therefore, discourses prescribe (and constrain) the limits of (individual and social) discussion and action within an institution. This, of course, suggests that discourse is utterly constraining. However, I contend that, once an individual has acquired a target discourse, she is then empowered, permitted - and even expected - to add her voice to the group conversation. Through this 'internal' form of engagement, an individual is in a position to enact her agency to influence nuances of meaning (and even the values of an institution) in directions that she supports.

1.3.4 'Knowledge' and 'information'

I use the term 'information' to refer to 'facts' given. These facts are often provided in relation to rules, regulations and other requisite details in a particular context that learners needed to know. This information was usually provided by lecturers and hospital authorities. However, I also use the term 'information' in the sense of facts provided during a lecture, while 'knowledge' indicates learners' understanding of, and an engagement with, those facts.

1.4 The structure of the thesis

This thesis has the following structure:

Chapter 2 includes a comprehensive literature review in which various theories are overviewed and their relevance to the research question outlined.

Chapter 3 discusses the methodology of this research. As the metatheoretical framework of this study is critical realism, this will be set out in some detail, including the implications of this framework for the ways in which data are gathered and treated.

Chapter 4 introduces a model of knowledge constitution based on Halliday's (1978) framework of, firstly, the 'context of culture' and, embedded within that, the 'context of situation'. Drawing on critical realism, I provide preliminary descriptions of aspects of the two contexts of situation in which the research was conducted, namely the Radiography division of CPUT and a hospital department of GSH. In relation to these contexts, I also outline Halliday's notions of three forms of discourse, namely field, tenor and mode, and their associated meanings.

Chapter 5 focuses on the 'field of discourse', and draws conclusions regarding the knowledge base and emphases of the Radiography curriculum. Data here and in the next two chapters are related to the two research questions; and links between findings and the literature in Chapter 2 are highlighted.

Chapter 6 explores the 'tenor of discourse' in relation to teaching and learning practices.

Chapter 7 discusses the 'mode of discourse' and its influence on the constitution and construction of Radiographic knowledge.

Chapter 8, the concluding chapter, reviews the previous chapters and draws together my findings and conclusions in relation to future knowledge constitution practices in Radiography education.

Chapter 2

THEORETICAL FRAMING

The theoretical framework of the research underpinning this thesis is broadly critical. Critical theorists share a value orientation that is directed towards uncovering social injustice, promoting transformation and, generally, pressing towards “positive social change” (Carspecken, 1996). I have chosen as the foundation of my research a particular metatheory, a philosophy of science, known as ‘critical realism’. Like other critical research, critical realism is concerned with social inequalities, vested interests and the transformative potential of the individual (Archer, 1995). It endorses a “social science which is critical of the social practices it studies” (Sayer, 2000: 10). The early work of its founder, Roy Bhaskar, focused on his concerns around world poverty and the relevance of economic theory to this (Norris, 1999).

Following my discussion of critical realism, I shall also draw upon various interrelated theories that are relevant to aspects of knowledge constitution and the role of discourse, namely the theories of the New Literacy Studies theorists (e.g., Gee, 1999; Street, 1984, 1993, 1996); Systemic Functional Linguistics (Halliday, 1978; Halliday and Martin, 1993); communities of practice (e.g., Wenger, 1998); boundary theory (e.g., Tinberg, 1997; Gans, 1992; Cotterill and Ife, 2001); content and language integration theory (e.g., Mohan, 1979, 1986; Jacobs, 1989; Klein and Doty, 1994; Klein, 1996); rhetorical studies (e.g., Norgaard, 1999; Geisler, 1994; Bazerman and Prior, 2004); identity theory (e.g., Henkel, 2000, 2002; Taylor, 1989); Bernstein’s model of knowledge and associated discourses (Bernstein, 1996, 1999); and various theories of knowledge in relation to curriculum development, such as those advocated by Gamble (2003^{a,b}), Barnett (2006) and Luckett (2001). Although I will discuss these theories individually in this chapter, I will indicate areas of overlap where these are pertinent; and, from Chapter 4, in my discussion of the data that I gathered, these theories will be discussed within a model of knowledge constitution and the role of discourse which my analysis of the data allows me to build.

I shall now discuss each of these theories and its relevance to my research, beginning with critical realism which, as a metatheory, will underpin my discussion of the other theories.

2.1 Critical Realism

The implications of critical realism for my research methodology are set out in detail in Chapter 3. Here, I will discuss the key tenets of critical realism as a philosophical framework for my research.

Critical realism has implications for empirical science and for theorising (Sayer, 1992). Founded by Roy Bhaskar, critical realism has emerged as a philosophy of science, not as a substantive social theory, although it has more in common with some social theories than others (Sayer, 1992:5). Danermark *et al.* (2002: 1) explain that critical realism as a metatheory is not a homogenous social science movement, but includes a variety of perspectives and developments that relate to social science research practices. It draws on all traditional paradigms, but also rejects each at a fairly fundamental level. Nonetheless, Danermark *et al.* (2002) advocate a ‘both-and’ rather than an ‘either-or’ approach, as critical realist research can draw on knowledge and insights from other positions while offering an alternative perspective. I will therefore discuss the key tenets of critical realism and its alternative response to various popularly held positions in today’s natural and social sciences, including its response to the dualisms evident in claims between the natural and social sciences.

2.1.1 Dualisms and relationism in social science research

In *The Possibility of Naturalism: A Philosophical Critique of the Contemporary Human Sciences*, Bhaskar (1979) explores the human sciences and the importance of the human role and social context. Here he merges his general philosophy of science with his human science philosophy called ‘Critical Naturalism’. In this work, Bhaskar (1979) criticises the dualism of natural and social sciences, arguing that this has split the world into polar opposites. This has, in turn, led to time-wasting disputes, with one side trying to prove the superiority of its position - indicating domination by an empiricist philosophy of science (Norris, 1999). The dualism between materialism/positivism (the world exists only in matter) and idealism/hermeneutics (the world exists only in ideas) is unhelpful. In an interview with Norris (1999), Bhaskar claims that a more important goal for sociology is an understanding of the relation between opposing dualities, i.e., relationism. Critical realism therefore advocates a dialectical and critical position between extremes. This would apply to all dualisms, such as subject versus object, the individual versus the collective, and facts versus values. As Caldwell (2003) asserts, through critical realism “there is a single world again”.

In *Scientific Realism and Human Emancipation*, Bhaskar (1986) contends that, through ‘immanent critique’, one can reveal the axiological inconsistencies of a theory and its practices. Thus, for example, in line with his rejection of dualisms, Bhaskar (1979) rejects the opposing stereotypes created by the theories of Durkheim and Weber and argues, instead, for a more general, relational position. Durkheim’s position was that society (structure) creates man (agency); Weber’s was that agency creates structure. While acknowledging that structure and agency are mutually influential, neither is deterministic; nor do Durkheim and Weber’s positions give credence to the role of human choice. Furthermore, according to Bhaskar (1979), people do not create society, as society always pre-exists people; however, people have the choice and capacity to reproduce and transform aspects of society because, according to Bhaskar (1979), mental processes and actions have causal power.

It is clear that striving for such a position is relevant to my research, concerning as it does the role of discourse (social science) in the constitution of Radiographic knowledge (including some social science but primarily concerned with natural sciences). Through sharing the insights gained through this research, I hope to set up a dialectic involving the ‘relationism’ of these two worlds that, in Higher Education, are generally regarded as separate.

Critical realism’s emphasis on dialectic is extremely helpful in social theorising. Harvey (2002) describes dialectic as an opposing force that prompts change. It involves flux, flow and process building up against ‘permanencies’. The latter are structures in society, such as institutions and their practices, some of which may be hegemonic. Only through flux and flow against these permanencies may the latter shift and new permanencies arise. In relation to theorising and knowledge development, Barnes (2006) explains the relevance of this: through dialectic, a new theory creates a tension with existing, stable concepts until there is a shift towards an as yet unformed new world. The notion of the dialectical turn is developed in Bhaskar’s (1993) *Dialectic, The Pulse of Freedom*. Here, he considers the mutual influence and transformative power of structure (systems of organisation involving social relations), and agency (the emergent power of ‘individuals’).

In the context of my research, the mutual influences of structure and agency will obviously be relevant, as I will be exploring how structures (the university and the hospital) influence the practices of agents (the clinical radiography staff, the academic lecturers and the learners); and the potential influence that these agents may have on the structures in which they are situated.

Structure and agency will be discussed in more detail further on in this chapter, as well as in Chapter 3 in relation to methodology.

I will now review the most pertinent ontological emphases of critical realism to provide a broad foundation for discussing the social theories reviewed thereafter.

2.1.2 Critical realist ontology: the three domains of reality

In *A Realist Theory of Science*, Bhaskar (1975) sets out his general philosophy of science called ‘Transcendental Realism’. Here he claims that science constitutes a paradox: we are surrounded by a transitive social reality and, at the same time, an intransitive, transcendental reality. Bhaskar and Lawson (1998: 5) affirm that Bhaskar’s original account of transcendental realism includes “the theory of being, as distinct from (ultimately containing) epistemology, the theory of knowledge.” I will be exploring how structures (the university and the hospital) influence the practices of agents (the clinical radiography staff, the academic lecturers and the learners); and the influence that these agents may have on the structures in which they are situated.

To say that one can conflate the two is, in Bhaskar’s view, an ‘epistemic fallacy’ (Bhaskar and Lawson, 1998: 5). Bearing this in mind, Sayer (2000: 11) reminds us that it is therefore misleading to speak of the ‘empirical’ world as if that is the only reality. Because we cannot be sure of the unassailable truth of our reality, Sayer (2000:2) remarks that “Realism is...necessarily a fallibilist philosophy and one which must be wary of simple correspondence concepts of truth...the world can only be known under particular descriptions, in terms of available discourses, though it does not follow from this that no description or explanation is better than others.”

Distinctions in reality arise because, according to Bhaskar (1975), the world is stratified, differentiated and changing. While, in some respects, it is constituted by humans, in others it is beyond human influence. Bhaskar (1978: 13) uses the following table to illustrate a three-layer conceptualisation of reality comprising the real, the actual, and the empirical in relation to the extent to which we can observe their presence in the world:

	Domain of the Real	Domain of the Actual	Domain of the Empirical
Mechanisms	X		
Events	X	X	
Experiences	X	X	X

Figure 2.1 Bhaskar's (1978: 13) three-layer conceptualisation of reality

Bhaskar (1978: 12) makes an ontological distinction between these three levels of reality. He postulates the existence of certain generative mechanisms in nature that are real structures which have built-in tendencies originating in the real domain. However, we cannot observe the mechanisms themselves, only (sometimes) what they generate in the actual domain when they are activated. This is because, as Bhaskar (1978: 13) notes, "...these natural mechanisms endure and act outside the conditions that enable us to identify them." When events are experienced or perceived, they are said to be in the empirical domain.

The laws of nature that generate events and experiences are not determined. Rather, they are tendencies that exist by virtue of the nature of the structure of the mechanism. As Bhaskar (1978: 14) explains, "[t]endencies may be regarded as powers or liabilities of a thing which may be exercised without being manifest in any particular outcome."

Kaboub (2001), commenting on Bhaskar's (1978) distinctions between these three dimensions, notes the central importance of the 'real': it generates the phenomena that humans attempt to understand (i.e., it is causally generative); but because our understanding usually starts with the empirical layer - that which the self and others can observe - an understanding of the 'real' is very difficult to attain. Sayer (2000: 11) describes this real layer as "whatever exists, be it natural or social, regardless of whether it is an empirical object for us, and whether we happen to have an adequate understanding of its nature." The empirical domain is theory-laden and is therefore potentially misleading, since we only understand reality through our concepts of it (Danermark *et al.*, 2002: 21). Because this is the domain in which we conduct research, we have to be wary, as we cannot be sure of the 'truth' of our claims.

To understand the social practices of individuals in this reality, we first have to understand the material context and cultural significance of social practices, because these are all that is accessible to us. For this reason, the concrete and people's understandings of concrete aspects is the starting point for exploring the real (Carter and New, 2004: 6). Danermark *et al.* (2002:

109) similarly argue that the stages of explanatory critical realist research should begin with a description of the concrete. (This will be discussed more fully in Chapter 3.)

In summary, because of the stratified nature of reality, the implication of these three dimensions for critical realists is that social theory can only ever be an examined conceptualisation of reality or some object. According to Bhaskar (1975), while science ever strives to capture deeper levels or layers of intransitive reality, some may not ever be known to humans, nor reduced or changed by any mental activity or human notions about them. Scientific knowledge therefore has to conform to the unchanging world that exists prior to it and that generates it (Norris, 1999). There will thus always be an ontological gap between science and the intransitive object studied (Danermark *et al.*, 2002).

2.1.3 Emergence and the objects of social science

A further understanding is necessary as a backdrop to this research. Not only is reality stratified, critical realism argues that strata are distinguished by the principle of emergence, within both the intransitive and transitive layers of reality. Each stratum, with its own unique potential, is distinct and irreducible to others. This potential is inherent in the causal properties and powers (or ‘mechanisms’) of that stratum (Archer, 1995: 9, 106; Harvey, 2002: 165). A particular stratum is capable of generating another stratum; and the new stratum becomes unique and irreducible to the stratum that generated it. Examples of generative mechanisms include cultural, political and economic conditions and the structures involved in their functioning (Danermark *et al.*, 2002).

In my research, the above implies that culture, structure and agency each has its own causal mechanisms. The activation of mechanisms is not generally observable or predictable; and, once activated, these mechanisms may generate new strata that become self-sufficient and not necessarily connected to the stratum of origin in any tangible way. Therefore, the hospital and university culture may exert influences on individuals and their relations that are intangible and so unnoticed; the same applies in the event that agents’ mechanisms are activated, as their influence on the hospital and university practices may not be noticed.

Next, three facets of reality that have already been touched on, will be discussed. These facets are culture, structure and agency. Each belongs to its own stratum; and it is their properties and emergent powers - and their interrelations with other strata - that comprise further discussion of critical realism in this chapter.

2.1.4 Culture, structure and agency

Culture, structure and agency each occupies its own stratum, with its own causal or generative powers and potentials. Each of these will now be briefly described.

‘Culture’ is an extremely wide-ranging concept, including “all things capable of being grasped, deciphered, understood or known by someone” (Archer, 1998: 504). The term generally refers to ideas, beliefs and ideologies held by individuals and groups of people. Culture will receive less attention in this research, although it will be discussed where appropriate in the context of the Higher Education and Health Care cultures in which the CPUT Radiography division and the clinical department of Groote Schuur Hospital are embedded.

‘Structure’ refers to forms of social organisation, as well as the social relations that comprise them. Structures include systems at a macro level, and social relations at a micro level (Archer, 1995: 11). It is important to note that the terms ‘macro’ or ‘micro’ refer to relation and time (some pre-exist others), not size (Archer, 1995: 8).

The properties and powers of a stratum emerge through the relations between structures, influencing and impacting upon each other and other strata (Archer, 1995: 12-13). Sayer (2000: 12) notes that “...some structures may not be observable.”

An education system is an example of a structure comprising systems and social relations. All social structures have powers and mechanisms that operate independently of agents’ intentions in the present. Danermark *et al.* (2002: 36) point out that, in this respect, social structures are real, or intransitive: even though they are socially produced, they become almost self-sufficient, perpetuating themselves through entrenched, habitual practices of agents who, themselves, inherited those practices.

Systems comprise the macro environment in which the micro social interactions occur (Archer, 1995: 11-12); and it is always through social interaction that systems are reproduced or changed (Archer, 1995: 10-11). However, while everything has the potential to be changed, the changes that do occur do not usually occur as desired or intended (Archer, 1995: 2).

The term ‘agency’ refers to the power of people acting within and upon their world. Agency, like structure and social interaction, occupies its own stratum (Archer, 1995: 12). Carter and

New (2004) point out that agents have certain properties and powers, some of which they share with other organisms. For example, they are self-conscious, intentional, emotional, cognitive and reflexive (capable of sophisticated, symbolic communication, able to plan, pursue and envisage). People can influence by the power of their numbers – what Carter and New (2004: 10) term “demographic agency”. In other words, people can and do make history.

Archer (2000: 11) focuses on the critical importance of the agent acting in relation to what she or he cares about in the world. Caring is vital, because emotions convey the significance of different situations to us; they indicate our commitments which are “...constitutive of who we are, and an expression of our identities. Who we are is a matter of what we care about most.... It is only in the light of our ‘ultimate concerns’ that our actions are ultimately intelligible.”

Archer (1995: 15, 88) stresses that structure and agency are not Janus-faced - not two faces of the same entity - but instead are utterly different in kind. As Carter and New (2004) point out, structure and agency are irreducible to each other and it is their interplay that is important. (For this reason, it will be noted in Chapter 3 that the methodology of this thesis is based on analytical dualism: structure and agency are analysed separately before their interrelation is considered.) The outcomes of this interplay should, however, be regarded as contingent (i.e., not necessary/internal) and explicable (not predictable). Bhaskar (1979) and Archer (1995) criticise one-dimensional theorising evident in various forms of conflation typical of past and current social theorising. Archer (1995) explains the significance of this: what society and humans are believed to be - and their interrelation - affects how they are studied. As already mentioned, downward conflation is implicit in theories that depict people as determined by society; upward conflation, by contrast, is implicit in theories that depict people as the sole determiners of society. Central conflation, too, is inadequate, as the tight mutual constitution described by theorists such as Giddens (1976) does not make allowance for the separate analysis of culture, structure and agency, nor does it consider their interplay over time.

Realist philosophy holds that social relations (and social objects) are multi-dimensional and have causal powers (Sayer, 1992: 3). Such relations evolve over time. For this reason, social relations pre-date the occupants of positions and exert an enabling and/or constraining influence on the actions of occupants of such positions (Sayer, 1992: 38). Danermark *et al.* (2002: 26) add that occupants of positions have varying access to power and resources.

Differences in culture and ideology¹¹ can lead to different knowledge needs, resulting in conflict or poor cooperation. Thus, through ideology, certain kinds of knowledge are valued more and so become more important in some workplaces, while others become irrelevant. In comparing common attitudes to ‘hard’ (pure or applied) and ‘soft’ (social/human) sciences in our institution, for instance, the former usually enjoys a far higher profile and popularity than the latter. This comparison is relevant for my research, because, according to Engel-Hills (2005: 35), the essential workplace knowledge base of Radiography derives primarily from the ‘hard-applied’ quadrant of Biglan’s (1973) taxonomy of the disciplines, although it also draws on the ‘pure-hard’ (Physics), the ‘pure-soft’ (Psychology) and ‘soft-applied’ (Communication) quadrants. Language and literacy issues - although regarded as important by the academics in the Radiography division because of their relevance to practitioner-patient communication - enjoy relatively little prominence in the curriculum. As Danermark *et al.* (2002: 33) note, social practices and ways of doing only exist because they are socially valued and sanctioned, otherwise they disappear. These critical issues of social valuing and sanction will be raised again in discussions of discourse, semiotic domains and communities of practice.

In the following section, I will discuss knowledge from a critical realist standpoint. In critical realism, questions of knowledge and language are pivotal in discussions of reality, as it is only through our theories or concepts of reality that we can hope to gain deeper insights into that reality.

2.1.5 A critical realist view of knowledge

Knowledge can be understood as a map or recipe for doing things in the world (Sayer, 1992: 17). It develops erratically and is used in the context of other kinds of knowledge (including everyday knowledge) and of practice. Sayer (1992) argues that knowledge is not a finished product but a process, always in a state of becoming and growing. By contrast, Danermark *et al.* (2002: 31) refer to knowledge as “always a social product” because our theories are socially produced and socially defined. However, their use of the term ‘product’ here seems to suggest knowledge as an effect rather than knowledge as static.

¹¹ I use ‘ideology’ in Johnson’s (2000: 151) sense, as “...a set cultural beliefs, values and attitudes that underlie and thereby to some degree justify and legitimate either the status quo or movements to change it.” While Johnson (*ibid*) points out that, in Marxist literature, ideology is used by dominant groups to perpetuate their privilege, he adds that social changes that result from ideology may also be positive.

Knowledge is conceptually formed and we think with and about concepts; even common concepts often constitute the social objects under investigation (Archer, 1995; Sayer, 1992; Danermark *et al.*, 2002). The ‘reality’ of the world around us comprises people, events, objects, and structures with their social relations, systems of operation and meaning (including actions and texts); and our notions of all these phenomena are concept-dependent. Sayer (2000) noting this, emphasises the link between our concepts and the language we use. He claims that the only way that we know the world around us is through particular descriptions and in keeping with available discourses. Archer (2000: 10), however, cites Piaget (1967) who demonstrated that “...the fundamental bases of thought are practice-based and not language-based. And this means that language use itself, since it depends on the logical canon to communicate thought, is activity dependent and not vice versa.” In other words, while language is important, it is not a prerequisite for practice; instead, its existence is dependent on practice. This is not to state that there is no linguistic access to reality, merely that there is also a non-linguistic access to it that occurs prior to linguistic access. Archer (2000) claims that this assertion complements the general realist understanding of reality. Indeed, in Sayer’s (1992: 6) earlier work, he states that “Knowledge is also largely – though not exclusively – linguistic.” He (1992: 14) adds that knowledge is gained through activity while we labour, and through interaction, using language as a common resource. This is obviously highly relevant to my research, as I am interested in the role of discourse in the constitution of radiographic knowledge, both in the university classroom and in the clinical workplace.

Danermark *et al.* (2002: 30) also draw our attention to the role of language in the human world and in the development of concepts. The human world comprises concepts couched largely in language, irrespective of the context. Danermark *et al.* (2002: 15; 27-28) emphasise the critical importance of the concept-language relationship in knowledge development. Because language encapsulates concepts, it is a vital instrument for scientific research, although many researchers seldom consider its use as a tool in the search for knowledge.

A consequence of this is that, in the context of my research methodology in Chapter 3, I will have to be aware of the core function of conceptualisation in my analysis of structure. This will be more thoroughly discussed in Chapter 3, but here it may be important to note that, in relation to this discussion of concepts and knowledge, abstraction in critical realist research is vital. Although abstraction is often misunderstood in everyday contexts as connected to

thinking that is somehow vague and amorphous, in social science, abstractions are not intended to conceal but to deal with and clarify aspects of great complexity. To abstract in social science means to isolate and distance a particular aspect from others so as to perceive it more clearly and to understand the causal mechanisms that may be at play. Examples of what one might wish to abstract are gender, role, class, and norm (Danermark *et al.*, 2002: 43).

Social science knowledge does not exist in isolation, but is situated in relation to other kinds of knowledge and practice (Sayer, 1992: 12-13). This point is relevant to my research interest in the role of discourse in knowledge constitution, indicating another reason that critical realism is an appropriate framework for my research. In the first instance, the knowledge of Radiography learners is constituted in the dual contexts of the university classroom and the hospital. These environments influence the conceptual development of learners, both in terms of their experience, as well as the (explicit and implicit) conceptual teaching provided by members of the university and medical teams (lecturers, clinical radiographers, doctors, nurses, etc.). My research therefore had to consider the influence of both complex contexts.

The critical links between language, teaching and learning are often overlooked. As Sayer (1992: 6) points out, knowledge and language are inextricably connected: "...the nature of language and the way we communicate are not incidental to what is known and communicated." Knowledge expressed in words only has meaning because of an existing frame of reference that has grown and exists through what has previously been experienced, conceptualised and communicated. Also, because language is a convention, it has its own effects and meanings beyond those intended. Sayer (1992: 20) discusses this:

We are accustomed to thinking of language as something which we, as users, speak with and through. But there is a sense in which the reverse applies too; I am not the sole author of this book: the structure of language and narrative forms, such as those of academic texts, of which I am only partially aware, speak through me...the effects of language are not fixed like those of bricks and steel. New interpretations are always possible; they can never be foreclosed.

These issues of language, teaching and learning resonate strongly with the concerns of my research. As discussed previously in Chapter 1, many content lecturers regard language functionally, as a neutral carrier of meaning, separate from 'facts', and the province of language specialists only (because language is equated with 'grammar'). However, the meaning that language conveys is never definite or unchanging. Being largely unaware of its rhetorical aspects, and its integral role in the way in which learners grasp the meaning of new

concepts and link them to previous ones, content lecturers tend to ignore language in the context of teaching and learning. Without an explicit awareness of these rhetorical functions of language, and a deliberate intention to communicate some of these language features as they arise in teaching and learning contexts, many content lecturers omit the opportunities presented by these features to facilitate learners' understanding. While I am not suggesting that this is a deliberate omission, if content lecturers were more aware of the rhetorical and semantic features of language, this would certainly improve teaching and learning. For example, guiding learners would be particularly helpful where learners have not previously learned how to structure their knowledge for an essay.

Sayer (1992: 14-16), in discussing knowledge, language and research, makes several claims related to common misconceptions:

The first misconception is that knowledge is (mainly) gained by observing and contemplating. Instead, Sayer (1992: 13-21) makes these claims:

Firstly, knowledge is gained mainly through activity/ work/ labour and interpersonal/ communicative interaction: "...work is the most transformative relationship between people and nature" (Sayer, 1992: 18). It is a conscious, intentional, material process. By 'work', Sayer means consciously performed, purposive human activity, such as transforming, modifying, moving or manipulating for human purposes. Knowing occurs when one checks results against the intended goal of an activity. Work is therefore the 'missing link' between knowledge and the world and is consequently central to transformation. When one works, one uses shared resources, especially language; indeed, the development of human labour requires a parallel growth of communicative interaction. This interaction involves sharing or transmitting meaning, verbally and non-verbally. New knowledge therefore requires new language.

Secondly, Sayer (1992: 51) cautions against reliance on the conceptual mediation of perception: we have a commonsense trust in perception and its neutrality, yet research indicates its complexity. Our sensations are conceptualized, making it possible for us to identify objects, but these perceptions are "conceptually-saturated". Carspecken (1996: 11ff.) similarly cautions against trusting solely in what he terms 'visual perception', as this is a fallible form of knowledge.

The second misconception is that knowledge is reducible to what we can say and write about it. A central difference between realism and many other social theories regarding language is that, from a realist point of view, one does not have to be able to name concepts in order to have them. As mentioned earlier, Sayer (1992: 6) stresses that “Language is largely – though not exclusively – linguistic....” Instead of claiming that one can reduce knowledge to that which is verbal (the written or spoken word), Sayer (1992) argues that much social activity is mediated practically. In addition, Sayer (1992: 20) reminds us that verbal language has unintended effects - such as those conveyed by the form of texts (for example, academic texts) - of which the language producer is unaware. The effects of language are thus never complete or fixed.

The third misconception is that knowledge is a product. Whereas it is often claimed that knowledge is a static product external to oneself that can be obtained and assessed independently of its context, Sayer (1992) argues that knowing is personal, in an active state of developing and becoming, as part of the development of our state of being (rather than a product which we have). It should therefore be regarded as a social activity and process within the context of work and communicative interaction.

The fourth misconception is that science is the highest form of knowledge. In contrast to this common assumption, Sayer (1992) claims that different types of knowledge are appropriate, depending on purposes, functions and contexts.

Language is also relevant in Sayer’s (1992) expressed concerns around subject and object misconceptions. He (1992: 22-23) explores dualisms in this regard in the social sciences, arguing that our typically dualistic conceptual framework is deeply embedded in our culture, our thinking and therefore our language. Precisely for this reason, it is often overlooked. This conceptual framework exhibits ‘vertical leakage’ and ‘conflation’. The term ‘subject’ includes understandings of other related terms, including people, knowledge, mind and the expressive function of language; the term ‘object’ includes other aspects, such as nature, society, practice and the referential/ propositional function of language. Sayer argues that these dualisms cause people to be separated from society and their own activity. The relational aspects that are missing are aspects essential to our human life, namely work, activity, social relations, intersubjectivity, and the social functions of language necessary for the development of knowledge. The latter are neither subject nor object, but all involve communicative interaction – and thus are too often neglected in educational contexts.

Thus subject-object dualities look harmless, but each generates problems in how we see ourselves and the world; they also mutually reinforce each other. In research, they convey the notion that the subject of research, the investigator, and his/her knowledge, beliefs, thoughts and perceptions are divided from nature, society, objects, actions, practices and facts. Instead, the subject should be regarded as “a creative agent who brings about change” (Sayer, 1992: 22). In other words, the researcher is not a passive contemplator of events, but can be actively involved in developing and sharing insights regarding, for example, educational activities, social relations, the social and educational functions of language, communicative interaction and intersubjective meanings that are negotiated in educational context.

To conclude this discussion of knowledge, concepts and the role of language in critical realism, Sayer (1992: 19) comments that the linguistic character of social scientists’ knowledge has often been taken for granted, as if language does not exist, nor has any effect. He (1992: 19) argues that this needs to change: “Language... needs to be put in its place, elevated from its present position of neglect, though not abstracted from its context.” Because of the passive voice in the above sentence, it is not clear who it is that should put language ‘in its place’ while preserving its contextual features. In this thesis, I will be suggesting that this may be achieved, not by language practitioners alone, but through an ongoing dialectic between language and content lecturers that focuses on the *relation* between content knowledge and the rhetorical functions of language in particular contexts, not on their differences.

In the following pages, I will discuss relevant aspects of various social theories that have a bearing on my research. Realism has a particular standpoint on views prevalent in current social theory. Sayer (2000: 32) explains that critical realism has “...a relatively open or permissive stance towards epistemology...” Despite this, the first issue arising from a critical ontology concerns what Bhaskar (1975) terms the “epistemic fallacy” (previously discussed) in social science theory, i.e., the tendency to conflate the reality of the world with our knowledge of it. Another realist concern is the notion that reality - and so knowledge - is ‘socially constructed’. The difference between knowledge constitution and knowledge construction has been touched on in Chapter 1. The reader will find that, in this thesis, the term ‘knowledge constitution’ is preferred, as it indicates a more active role for lecturers as agents. In the context of my research site, Radiography specialists select and configure components of knowledge in a particular way to constitute the accepted knowledge base for learners. From a critical realist perspective, the actions of selecting, configuring and

transmitting this knowledge are generated by certain notions. The latter are therefore causal mechanisms as they generate effects, although these effects are not necessarily those anticipated or desired. Educational structures, with their forms of organisation and social relations, also influence the way in which this knowledge selection, configuration and transmission occurs. Learners then *construct* this knowledge in their own way, transforming it so that it is meaningful to them. Learners are therefore not passive receptacles of knowledge, but active agents.

Another concern of critical realism regarding current social theorising is the relationship between social practices and concepts held by individuals. While people's concepts certainly influence their practices, Sayer (2000) is critical of their conflation, arguing that just because practices are concept-dependent does not mean that the practices are equal to the concepts. There may be other mechanisms at play. In addition, critical realism is a non-deterministic philosophy, preferring to regard concepts as having the capacity to generate tendencies rather than determine particular effects (Sayer, 1992).

To conclude this discussion of critical realism, the implication of a critical realist stance in research is its strong ontological emphasis. As Danermark *et al.* (2002: 5) assert, being a critical realist involves switching from a common social science emphasis on epistemology to an emphasis on ontology (because one's epistemology is inherently ontological); and from a common focus on events (the observable, empirical aspects) to a focus on the possible mechanisms that generate those events.

In the rest of this chapter, I will discuss a number of social theories that I will be drawing on in my attempts to understand the constitution of radiographic knowledge and the role of discourse in this process. I am aware that several of the postmodernist theories that I will discuss do not sit particularly comfortably with critical realism. Nevertheless, I believe that these theories provide useful tools for discussing academic disciplines and their practices, particularly as these relate to academics' understanding of themselves and their literacy practices. The reality that social theorists attempt to describe in their theories is enriched by multiple perspectives, even if ontologically they have different understandings of aspects of the same issues. As Sayer (2000: 5) points out, "[r]ealists *expect* concrete open systems and discourses to be much more messy and ambiguous than our theories of them and do not consider that differentiation poses a threat to social science." He (2000: 30) adds that, "[although] postmodernism tends to be anti-realist and realists tend to be

modernists,...critical realism should not necessarily reject postmodernism but acknowledge that some elements of it may be valid....”

As stated earlier in this chapter, the interrelations of these theories will be represented in Chapter 4 in a model illustrating the constitution of radiographic knowledge and the role of discourse in that process.

2.2 The New Literacy Studies (NLS)

The NLS movement did not evolve as a separate entity: other movements developed simultaneously and some of these overlapped with, or were incorporated into it (Gee, 1999). The NLS movement itself was part of a “social turn” away from a focus on individuals and their private thoughts to a focus on social practice and interaction. Proponents of this movement (e.g., Gee, 1999; Street, 1984, 1993, 1996; Baynham, 1995) thus strongly emphasise the notion of literacy as a social practice with these premises: notions of literacy have developed over time; literacy has social purposes (e.g., to create and share meaning); like all social practices, literacy is best understood within a particular cultural and situational context (Lave and Wenger, 1991); literacy is (implicitly or explicitly) ideological; and it has social power (Baynham, 1995).

NLS theorists have been particularly intent on addressing social injustices resulting from elitist notions of literacy. In particular, they regard as problematic the customary ‘deficit thinking’ about literacy. Common understandings of literacy - the ability to read and write in a particular way, for example - are recognised as situated social and cultural practices that have evolved for particular purposes.

As discussed within the context of critical realism, language embodies concepts and thus influences how knowledge is constituted. The world, people’s beliefs about that world and the words chosen to represent that world are often mutually reflective and, sometimes, influential. From a critical realist perspective, it is important to understand that the words expressing concepts about reality within any context cannot be conflated with reality itself. Sayer (2000) argues, however, that one may accept both the existence of a world independent of our thoughts, as well as the fact that we can know more about that world through discourse.

Gee's (1990) seminal contribution is to discussions of language, literacy and discourse in Higher Education. He (1990) challenges the notion of an independent, skills-based form of literacy, arguing that this view indicates a lack of understanding of the distinctions between (broadly-speaking) the grammatical, textual and social uses of language.

Critical Discourse Analysis (CDA) is an approach that incorporates several perspectives and methods for studying the relationship between language and social practices. As it regards language as a social practice, it fits into the NLS movement (Fairclough and Wodak, 1997); furthermore, it emphasises the importance of language use within a specific situated context (and the latter within a broader context of culture), and so resonates with Halliday's (1978) 'Context of situation' and 'Context of culture' in Systemic Functional Linguistics (to be discussed in greater detail later in this chapter). In discussing CDA, Fairclough and Wodak (1997) note that discourse is inextricably connected with culture in society: within the broader society, each culture has its own discourse; and every time language is used, in some way it reproduces or transforms culture (along with aspects of its history and ideology).

Of relevance for my research is the fact that the discourse of entry level learners in Higher Education is often vastly different to that of the disciplinary discourse. Yet mastery of the disciplinary discourse is the much sought-after mark of an accepted insider. Those who control powerful discourses often exclude - even if unintentionally - those who have not demonstrated acquisition. They may do this in ways that are perhaps harmful and hurtful (Gee, 1990). Groups that control the discourse are what Wenger, McDermot and Snyder (2002: 4) refer to as "Communities of practice". The latter and the related identity and boundary theory will be discussed shortly.

Disciplinary subject areas have their own individual discourses, although there are often overlaps in related fields. In the case of Radiography, for example, Engel-Hills (2005) points out that Radiography comprises several overlapping sub-disciplines. Becoming a Radiography expert requires learners to develop knowledge of all these sub-disciplines, as well as expertise in a particular specialist area. In the process, acquire the language, literacy and social practices comprising the discourse of Radiography generally, as well as that of the particular specialist area.

Acquiring a disciplinary discourse also includes knowing, at a conscious or an unconscious level, what Gee (2003) terms the 'design grammars' of that community. An 'internal' design

grammar refers to knowing how knowledge for a disciplinary domain is selected and organised; an 'external' design grammar refers to the ways in which that specialist community decides how it will communicate this meaning. These 'design grammars' call to mind Bernstein's (1996) 'recognition' and 'realisation' rules related to the pedagogic device (the means through which the 'grammar' of pedagogic discourse is conveyed). The pedagogic device is mediated through three interrelated sets of rules, one of which he terms distributive rules. Distributive rules (the means by which a culture is propagated) are realised through learners possessing the recognition and realisation rules of a target culture. A learner would need to 'recognise' what is appropriate in relation to texts and practices in a culture, as well as have the ability to 'realise' this understanding in practice, such that what knowledge - and how they communicate it - is acceptable and understandable. Possessing recognition and realisation rules is thus critical to a learner's educational progress.

This issue of design grammars (as well as the link with explicit and implicit teaching and learning) is touched upon by Gee (1990) in his earlier work in a discussion of 'teaching for acquisition' and 'teaching for learning'. Gee (1990: 1) states that there are two kinds of teaching (and thus learning) that must occur, and in the following sequence: first, teach for acquisition; then teach for learning. A discussion of this process follows here.

One first acquires the disciplinary discourse through observing what experts do, by listening, and by being included with other members of that group in various activities. Gee (2003) adds that novices need to be exposed to contexts in which experts are engaged in "dialogic talk", expressing situated meanings. Following this exposure, the novices can 'try on' the discourse by simulating the experts' actions and words (spoken and written) in an experimental manner. Gee (2003) stresses that the learner needs the opportunity, in a non-threatening environment, to explore combinations of meaning, images, and so forth to test how they are progressing. While learners are trying on the discourse, an expert's response is necessary to guide them when they are wrong, but experimentation should be encouraged. This is what Gee (1990) terms 'teaching for acquisition'. This has implications for teaching and learning contexts: to acquire the disciplinary discourse, novices need to be engaged in an empowering learning (fairly time-consuming) process in rich, meaningful contexts so that learning is authentic.

Following 'teaching for acquisition', the disciplinary specialist explains explicitly how the disciplinary content is structured and how new knowledge fits into the total knowledge

structure of the discipline. This is what Gee (1990) terms ‘teaching for learning’. This stage provides learners with a meta-insight into this usually unexplained area of a discipline. Learners who have experienced this kind of learning would be ‘academically literate’. When one is ‘academically literate’ in this sense, one is empowered to make meaningful, innovative contributions to the knowledge of the disciplinary domain.

Gee (1990) and Morgan (1997) advocate critical literacy practices in the classroom as a vital step towards creating a more just, equitable society. Gee (1990) argues that teachers need to be aware that, along with ‘teaching for learning,’ (i.e., teaching learners about knowledge selection and the structure of the discipline), the learners need to understand that the traditional school-/university-based discourse is not ‘natural’, ‘right’ or ‘superior’ to any other discourse, but has been chosen by human agency and developed over time as a particular way of expressing understandings in that context. Gee (1990: 5) explains: “The point is that there is no one correct reading, just different ones relative to different attitudes, values and ways of thinking, each of them enshrined in some home-based or public Discourse....” For teachers to be able to teach this, they themselves need to hold this understanding in conscious awareness, as well as learn to identify features of texts and their purposes (i.e., they must be able to critique the texts of their discipline if they are to guide learners to do the same). As Gee (1990: 4) contends, “[t]he conditions of good teaching and learning in schools are...not trivial. Teachers must have a full commitment to social justice, ...a commitment to allowing every child to acquire (and to critique) the school’s and society’s Discourses.”

Morgan (1997) expresses concern about the separation between theory and practice: critical theorists advocate critical literacy, but unchanged practices in many schools suggest that this theory is not being implemented. Like Gee (1990), she advocates critical practices in the classroom: teachers need to enlighten learners about how knowledge is created through texts and understood by readers. Allowing learners to critique written and spoken texts so that they understand its power and purposes would, in turn, empower them. In other words, they need access to what Geisler (1994) terms the rhetorical processes of knowledge (to be discussed in greater detail further on in this chapter).

Thus, if learners are to be empowered to contribute to the discipline in innovative ways, they need to become academically literate in the sense of having meta-knowledge of the design grammar, the structure, and the uses of texts in the discipline.

Developing the disciplinary discourse requires time and, especially at first, immersion in the context of use, so that text has concrete referents. Geisler (1994: 10) notes, for example, that during the early stages of acquiring a disciplinary discourse, there is high reference to a specific context; then, as confidence increases, language is less dependent on context. Instead, the language becomes more descriptive and abstracted as the user internalises meanings associated with that language. Once the discourse is acquired and the learner has become an 'expert', much of this knowledge becomes implicit. Few experts can explain what they do, how they do it, or why, even if they are able to demonstrate what they do. Discussing how radiologists graduate from novice to expert, Geisler (1994: 62), for example, explains that, to find solutions to problems, radiology learners gradually increase the amount of processing during reasoning (involving elaborate, symbolic representations). They move beyond the general and abstract (theoretical, disciplinary knowledge) and relate it to a concrete and specific case. Even in unfamiliar domains, experts are able to adapt their knowledge to specific cases. Geisler (1994: 66) notes that these adaptations have a "rhetorical flavour", as the expert has to find ways to communicate his/her judgement convincingly (through reasoned arguments) in relation to the contextual characteristics (the case, and the audience to whom the expert has to explain this abstract knowledge).

Polanyi (1967), the first to use the term 'tacit' knowledge, explains that this is knowledge that users cannot explain. Sometimes it is because the user has the knowledge but is not aware of it. However, some argue that tacit knowledge can become explicit. Perkins (1992), for example, describes four developmental/progressive levels of metacognition, with tacit knowledge being the first of these levels. Those that follow are awareness, strategic thinking and reflective thinking.

In their discussion of tacit knowledge, Wenger, McDermot and Snyder (2002: 9) similarly argue that tacit knowledge can be made explicit. They argue that it is important that this occurs, as it is often the tacit aspects of our knowledge that are the most valuable, because they represent "embodied expertise", a depthful, complex understanding of the structure and dynamics of an issue or system that is very difficult to replicate. They (2002: 9) suggest that, to make tacit knowledge explicit, there should be sharing through interaction and "informal learning processes such as storytelling, conversations, coaching and apprenticeship of the kind that communities of practice provide." It is through the informal, where learners are empowered to question, that greater insight into tacit knowledge is enabled. Sayer's (1992)

claim that knowledge is constituted through labour and communicative interaction is, once again, echoed here.

Jacobs (2006: 242) would agree that tacit knowledge can become explicit. She argues that, in educational settings, language specialists, who have a comparably equal status with content lecturers, are best placed to help disciplinary specialists bring their tacit knowledge to an explicit level. This they are able to do through the language specialist requesting explanation and clarification of concepts. (Learners, because of their lower status in relation to lecturers, might not have the confidence to do this.) Language specialists, unlike many of their content colleagues, also have the advantage over learners in that they have a heightened awareness of the rhetorical processes through which content knowledge is organised and expressed. Generally, language specialists do not, of course, have access to the disciplinary discourse, so are unable to model the discourse for learners, nor single-handedly make the language features of a discipline sufficiently explicit.

Other theorists of tacit knowledge (for example, Eraut, 1994) insist that tacit knowledge cannot be made explicit - for the very reason that it is tacit. Geisler (1994: 19), too, argues that, for example, scientists can't be expected to match text and practice exactly, because their knowledge of laboratory procedures is tacit. She refers to several theorists in this regard: firstly, to Vygotsky's (1962) work on the change required if there is to be movement along a continuum from 'inner speech', through oral speech, to written speech (Geisler, 1994: 6). This transition is extremely challenging, as personal meanings require radical restructuring to become explicit. Secondly, Geisler (1994: 20) draws on earlier work by Polanyi (1958) who claims that knowledge of instrumentation is in "subsidiary" awareness, that it is only "...known at the fingertips" and thus cannot be articulated. In my view, she means that this knowledge is a non-verbal, tactile form of knowledge that can be observed and simulated but not adequately expressed in words. Thirdly, Geisler (1994: 20) refers to Collins's (1985) work in which he concludes that tacit knowledge can only be learned firsthand and through continuous contact with other experienced practitioners.

The issue of tacit knowledge will be discussed again in relation to Bernstein's model of vertical and horizontal discourse.

As will be seen in Chapter 4, this theory is relevant to my focus on the ways in which knowledge is constituted for Radiography learners. Because the learners are exposed to

authentic workplace contexts, they are able to observe and listen to experts firsthand, and be involved in various activities with them. They can ‘try on’ the radiographic discourse in an authentic workplace context and be guided by the response of experts. Thereafter, in the academic classroom, the academic lecturer (who is also an expert radiographer) can explain how new knowledge relates to other knowledge structures of the discipline. The question that arises in relation to my research site is whether, in light of the tacit nature of much Radiography knowledge, there is sufficient overt/ explicit teaching of the disciplinary discourse at the second ‘teaching for learning’ stage that, according to Gee (2003), should occur after ‘learning for acquisition’ (the more hands on learning, such as that which occurs in the clinical setting). It is at this stage that the learners should acquire an explicit meta-understanding of how the knowledge of the discipline is structured and where new knowledge fits into that structure. This ‘knowledge’ would require learners to understand the goals and values underpinning the Radiography profession and the academic discipline. It would also lay a foundation for Radiography learners to become researchers at a later stage of their development, as their understanding of Radiography’s knowledge base, purpose and aspirations would then be a clear ‘map’.

In conclusion, developing the learners’ disciplinary discourse is essential to their being accepted and respected as experts in their field. While disciplinary specialists are best placed to help learners to do this, the role of discourse and communicative interaction in the learning process should not be overlooked. This may mean that, in line with Jacobs’s (2006) thinking, those with language and discourse insights may be able to help content specialists make the tacit aspects of their discipline sufficiently explicit for their learners.

2.3 Systemic Functional Linguistics

In his detailed functional grammar of modern English, Halliday (1978: 2) indicates that several meanings exist simultaneously in language, because our world comprises “a whole complex ideology of language attitudes and values.” Language is an active metaphorical system that symbolises our social system and all its variations. It serves three meta-functions, namely ‘ideational’, as it is a way of representing the world; ‘interpersonal’, as it functions to conduct social relations; and ‘textual’, as it organises messages and their meaning. These meta-functions will be elaborated upon in the next few pages.

Halliday (1978) explains the functions that language must fulfil in any culture:

1. Language must interpret our experiences. In doing this, it reduces all knowledge to a manageable quantity through types, classes, collections, etc.
2. Language must convey logical relations through words such as 'like', 'but', 'if', as well as through language-specific words such as 'namely', 'says' and 'means'.
3. Language must express our involvement in a situation, i.e., our roles are identified and our views, desires, emotions and judgements are conveyed.
4. Language must do all the above simultaneously and appropriately in a 'situation of context' (to be explained shortly); that is, it must be organised as relevant discourse, not just as grammatical sentences.

There are two contexts within which literacy practices should be understood (Halliday, 1978). The first of these is the 'context of culture'. Clark and Ivanic (1997: 67) describe this context as the "...whole historical and socio-political context in which language is used" and the provider of a range of competing possibilities within that culture of knowledge. The context of culture is socially produced and reproduced, and comprises systematic attitudes, values and beliefs. (These affect purposes and relations in a particular context of situation.) Some of these values, beliefs and attitudes may be more dominant than others at a particular time, and their adoption tends to be influenced by various social pressures, such as accepted conventions. The context of culture may have several levels, some of which are more remote than others (e.g., global, national, regional or institutional culture). Each of these sets in place, or privileges, certain values, influences and practices. The context of culture helps people to know precisely what is acceptable and expected of them. As discourse is the outward expression of cultural values, beliefs and attitudes, this resonates with Kress's (1989) explanation of discourse as expressive of ideology, defining and delimiting what is acceptable to think, be and do within a culture. This discourse is in the empirical domain but provides insights into the hidden domains of reality.

In line with his functional approach, Halliday (1978) also refers to the 'situation of context' of language use which is embedded in the situation of culture. Clark and Ivanic (1979) comment that the context of culture and the context of situation are difficult to separate, in some respects: what occurs in a specific situation is possible only a result of the broader context of culture which influences the process and outcomes in a context of situation. The context of culture shapes what a person, in a particular situation of context, will bring to, for

example, a literacy act or task in terms of attitude to that task, beliefs about its purpose, awareness of available genres and discourses, and power relations between persons involved. Thus Halliday (1978) insists that language/ literacy acts are never insulated - they are always about something else. In turn, the referent of language should also be understood in relation to the language used. In some fields, the links are more obvious (e.g., language and literature), but they always exist. The context of situation will shortly be discussed in more depth in relation to meaning and register. However, for the moment, it is pertinent to relate the site of this research to the above: CPUT's Radiography division at GSH is situated within two broader contexts of culture, namely Higher Education and Health Care, each with its traditions and discourses. Within these two broader contexts of culture, teaching and learning occurs largely through language within two particular contexts of situation, namely the university classroom and the clinical workplace. Language cannot be insulated from the contexts of culture, nor from the contexts of situation; thus observed situations should not be understood separately from the language used in those situations.

It is clear from the above that Halliday (1978) regards language as a branch of sociology and is concerned with the social context of linguistic acts. The individual expressing meaning through language should thus also be seen from a social perspective, destined to become part of, and participate in the activities of, a group or community of practice. This process of participation occurs partly through language. One becomes a person (not merely a biological entity), through the medium of language and through fulfilling one's social roles as a member of society. According to this perspective, linguistic processes should be viewed from beyond or 'outside' the individual. Language from 'outside' is concerned with language as behaviour; by contrast, language from 'inside' is concerned with language as knowledge. To study language as knowledge means that one tries to discover what occurs in the brain, and what mental mechanisms enable speaking. This is not Halliday's (1978) concern, although he points out that the two orientations are complementary.

Although language is but one of the means by which we exchange meanings, it is the most significant one. Halliday (1978) emphasises that language is a semiotic system; and 'literacy' is the use of that system for particular purposes and in particular forms. We exercise choice rhetorically rather than logically: we make choices that will convey the meaning that we believe will fulfil our intended purpose. The implication of this is that language should be studied from a functional perspective.

Halliday (1978) prefers the term 'language development' to 'language acquisition', as the latter implies that language is a commodity that you need to get and have enough of. This thinking argues that, if you have enough language, you will succeed; if you don't, you will fail. If you don't have enough, the implication is that there is a gap to be filled, that you should acquire more. He (1978) postulates that this kind of thinking is responsible for the deficit approach to language and that many of the approaches to 'fix' the 'language problem' originate with this kind of thinking. In his discussion of educational failure, Halliday (1978: 23) points out that such failure is "usually associated with the working class."

Halliday (1978: 23) refers to another commonly held theory, namely one of 'difference' in language form. The underlying assumption is that there is one received, standard norm. Deviating from this norm results in social stigma, and in being labelled 'inferior' in some way by those who are prejudiced. Drawing on Bernstein (1971), Halliday argues that it is language function associated with a particular culture, rather than the language form, which is significant: ways of speaking are a function of the social-cultural relations that give rise to specific linguistic forms or codes. The latter transmit the culture and affect behaviour. This is so because cultures vary in the emphases that they place on different language functions; and in the process, these functions come to represent different meanings from one culture to another. Within a culture, children learn patterns of language during socialisation. These patterns are restricting only when they orient a child's thinking away from the patterns that are the norm in schools. Schools typically require children to be able to use language in certain ways if they are to succeed.

Halliday (1978: 27-28) goes on to speak of language as 'meaning potential': "...it is what the speaker can do"; and what the speaker can do linguistically is equivalent to what she can mean and become. Choices of meaning are available to speakers. As mentioned, each person learns language uniquely, as a particular variety in a socio-regional subculture, because different cultural and social structures generate different levels of semantic properties. Halliday (1978) compares each element of a sentence available to a speaker to a musical chord that contributes to the overall melody. How does this insight help us to understand the role of discourse in knowledge constitution? Because of this individual, unique language development, different children see different potential in the same situation type. Difficulties and difference in educability arise when there is discontinuity in symbolic ordering between the child's home and school. A child whose symbolic meanings differ from those of the

school is then ‘not at home’, because the system of meaning potential offered by the school has an expectation of a particular interpretation in relation to a situation – and the child’s interpretation of what is required does not resonate with that of the school. Halliday (1978: 26) comments that “...certain ways of organising experience through language, and of participating and interacting with people and things, are necessary to success in school.” Halliday (1978: 24) therefore notes that “educational failure is really a social problem, not a linguistic one” as failure is related to linguistic aspects involved in growing up in a particular ‘context of culture’ (1978: 68).

One can see the link between the cultural and situational contexts of my research site outlined in Chapter 1 and these two points on ‘deficit’ and ‘difference’: many university lecturers attribute learners’ academic difficulties to ‘language problems’ (deficits) and the discourse of some indicates that they think the solution to this ‘language problem’ is to ‘top up’ this shortfall. Their discourse may also indicate that the learners’ form of language ‘differs’ to their notion of a ‘standard’ form, implying that it should be corrected. In both cases, the learners are stigmatised by these comparisons. The rationale commonly given for these arguments is that the workplace requires such standards.

Kress (1993: 254) describes ‘text’ as “...a unit of meaning which is coherent and appropriate for its context.” As already noted, SFL argues that any text simultaneously creates three categories of meaning. These ‘meta-functions’ of text are ideational (the meaning of language represents the world and our experiences, what we do); interpersonal (the meaning of language expresses interpersonal or social relationships); and textual (the meaning of language is conveyed through lexical choices, combinations and organisation) (Halliday, 1978).

To understand fully the context of situation in which texts are used (and the above meanings are conveyed), one needs to examine the ‘register’ of a text. Halliday (1978: 32) describes register as “a form of prediction.” In a familiar social context, it is usually possible to predict fairly accurately the kind of language that will be necessary and that will be used. A reader or listener attributes significance to written or spoken language according to a comparison with a notion of what it could be, or ‘should be’, in that particular context (Halliday, 1978). In the absence of direct experience, insight into the following three aspects of register in the context of situation is helpful: the ‘field of discourse’, the ‘tenor of discourse’ and the ‘mode of

discourse'. (Each of these is further affected by the degree of formality in the context of use.) These dimensions of register are briefly described here:

The 'field' of discourse refers to what is occurring, the subject or discipline, the institutional setting for the language used and the social practices.

The 'tenor' of discourse refers to aspects of the 'who' – the individuals involved in a situation, their status, their roles, their relationship, and the formality and duration of this relationship. In addition, Eggins (1994: 64), drawing on studies of language variation and role relationship by Brown and Gilman (1960) and Poynton (1985), explains that tenor can be further divided into three continua: power, affective involvement, and contact. The power continuum indicates one's role in relation to the dynamic of power: some have greater power than others (e.g., employer versus employee). The affective involvement continuum indicates the extent of emotional involvement between role players in situations (e.g., affective relationship with one's child compared with that between oneself and a shop teller). On the contact continuum, one's role is positioned according to the frequency of contact with other role players (e.g., contact with one's spouse as opposed to contact with one's dentist for a biannual dental check-up). Tenor is thus a direct indicator of the link between language, context, role and relationship.

The 'mode' of discourse refers to the symbolic organisation of text, the rhetorical role of language and whether the channel used is written, spoken or graphic.

To relate the above to the context of my research, ideational meanings are constituted for Radiography learners in two fields, namely the university classroom and the hospital's clinical departments. Tenor is involved in each of these fields: interpersonal meaning is involved in the academic classroom as lecturers guide the learners' construction of knowledge; likewise in the clinical workplace, as learners are guided by clinical radiographers. The mode of discourse (the role and forms of language) differs somewhat in the university classroom and in the clinical workplace: whereas university academics make extensive use of written, spoken and visual text as they convey and inter-relate concepts, and describe academic conventions, etc., practising radiographers in the clinical departments make limited use of written text in guiding learners. They may explain orally what they are doing, often in immediate contexts where a patient is present or nearby; they may discuss a particular radiograph in relation to its required quality; and they will usually demonstrate

radiography practices, for example they operate equipment and position patients. Although there is limited requirement for radiographers to write texts in Diagnostic Radiography, they need to be able to decode information provided in various hospital documents, such as Request Forms from radiologists and other information provided in patient folders.

In the above interpersonal interactions with lecturers and clinical radiographers, learners are not entirely passive: they have the potential to negotiate interpersonal meanings in the context of tenor with lecturers who are the audience for their (mainly) academic work, and with clinical radiographers who are the audience for their (mainly) practical work. In each of these two contexts (the university and the workplace), the textual meanings that learners encounter and to which they respond depend on the intended purposes and relevance of those texts in the particular context of situation.

In my research, I will be exploring the meta-functions of text (ideational, interpersonal and textual meanings) in relation to the field, tenor and mode of discourse as academics and clinical radiographers constitute first year learners' knowledge of radiography in two contexts of culture and situation.

Halliday's (1978) SFL and the work of the NLS theorists resonate regarding the interrelationship between culture and language: both contend that language is a social practice, and that language acts cannot be seen in isolation from the particular culture in which they are embedded; and, because language embodies concepts, it influences how knowledge is constituted. Halliday (1978) also reminds us that the context of culture in which the context of situation is embedded delimits the possible ways in which texts may be produced and interpreted.

To conclude, language is an active system of symbols that conveys meaning in the world. Humans use language rhetorically, to achieve purposed meanings and to predict the meanings of others and situations. The possibilities of the language that can be used in various contexts are influenced and constrained by the contexts of culture and situation. Studying language use in these contexts implies taking a functional approach to language use.

Critical realists would agree that taking the broader contexts and functions of language use into consideration is important; however, they would also caution that, as reality is stratified, one ought not to equate words representing reality with the reality itself. Also, while they would agree that language and social relations are important in social science, each comprises

an individual stratum and so each has unique causal mechanisms that may produce various intended and unintended results. Thus, at best, one can endeavour to develop theory that is practically adequate, though probably not fully reflective of reality.

2.4 Communities of practice

Inseparable from any discussion of disciplines is the notion of a ‘community of practice.’ According to Wenger, McDermott and Snyder (2002: 4), these communities are “...groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis.” Over time, they “...may develop a tacit understanding that they share.” They (2002: 24-25) add that there are many kinds (and sizes) of community of practice, some of which are homogeneous, such as people from the same discipline or function; others comprise people from different backgrounds whose functions differ, but who share a common problem or context: “They are as diverse as the situations that bring them into existence and the people who populate them.” What distinguishes them is “...the existence of a shared practice” (2002: 25).

Wenger (2007) explains that the decision about whether or not to join a community of practice is linked to personal identity. Once one chooses to join a particular community, one also becomes part of that community’s group identity. (Identity theory will be discussed in greater depth further on in this chapter.) Drawing on Lave and Wenger (1991), Engel-Hills (2005: 37) explains that, although participation in a community of practice is initially ‘legitimately peripheral’, participation increases over time, along with commitment. Lave and Wenger’s (1991) model is applicable to the shared knowledge, identities and commitments of the radiography community of practice, “...where there is a shared way of doing and approaching practice.”

Wenger, McDermott and Snyder (2002: 27-29) indicate that all communities of practice share a basic knowledge structure that uniquely combines three constituents: a knowledge domain; a group of people who care about the domain; and an evolving, shared practice to improve efficiency in that domain. A well-defined domain creates a sense of shared identity. The community provides a social milieu that encourages sharing; and the practice indicates the particular knowledge that the community shares, develops and maintains.

Each community has distinct activities, ideologies, meaning structures, power structures and purposes (Dias *et al.*, 1999). Communities grow and are transformed by inducting initiates

into that community. Learning to speak, read and write relevant texts (the literacy practices of a discipline), as well as adopting the identity of a group (knowing how to act and enact the values of the group) is a necessary and critical part of socialisation into, and acceptance by, that (or any) community of practice. Acquiring a community's discourse successfully is thus the path to prestige, acceptance and empowerment in that field. One is recognised by a community through one's knowing and enacting a particular set of ways of being in the world. Once one has been recognised and accepted by a community, one is held accountable by that community. By implication, what would then exclude one from such a community of practice, marking one as an outsider, is an inability to engage with the powerful discourse of that community.

From a critical realist perspective, it is important to understand the causal mechanisms operating in the creation and maintenance of various disciplines. An academic/ disciplinary community typically pre-exists its members who, as they enter the community, are then obliged to adopt its practices, values and concerns. While the latter have historical origins, they are causal mechanisms, as they pervade, influence and perpetuate current practices of a community. However, it is also important to note that the action, or potential action, of individuals is not determined by these historical influences. The latter merely generate tendencies that may or may not be activated; and the agent has some choice in this. This would account for individuals' differing degrees of commitment to the values, mores and identity of organisations to which they belong. Further on in this chapter, in the section on identity theory, factors that may affect the degree of an individuals' identification with community goals will be discussed.

Wenger (2007) claims that the 21st century will be the century of identity, and that identity will become increasingly important in discussions of learning. He argues against the notion that 'learning occurs in institutions, while experience occurs in the rest of life'. Instead, he claims that experience is available everywhere. This calls into question the assumptions of the role of educational institutions. The latter's premises may not be very useful to learners who have access to the whole world. Wenger argues that productive citizens are needed - those who can engage creatively with ideas and solve problems in real world contexts. To become such citizens, learners need to create a coherent trajectory of learning in which their identity as a member of a real community of practice is their deepest resource. Taking a critical realist perspective, an individual's options may be somewhat constrained by the

structures in which they find themselves; but creativity and choice can be exercised if there are opportunities to develop a distinct identity and learn through experience in a real world of work community of practice, as is the case in Radiography education.

In disciplines in Higher Education, use of a disciplinary discourse is a more or less ‘territorial’ signal used by members to distinguish themselves from others outside, and to signal their valuing of and adherence to, a certain set of practices. These signals demarcate boundaries disciplinary boundaries.

It thus seems that, once one is a member of a community of practice, such as Radiography, one is accountable to that community’s code of practice; but there are different degrees to which individuals adopt the identity of the group. This suggests that being a member of a community of practice is constraining – and so it is, to some extent. However, being a member of a community of practice like Radiography provides a level of liberation within the bounds of that group because, as an accepted member, the individual then has the potential to become a creative problem-solver in response to real life problems, drawing on real work experience.

The links between discourse (e.g., Gee, 1990; Kress, 1989), communities of practice (e.g., Wenger, 1998, 2007), identity theory (e.g., Taylor, 1989; Henkel, 2000) and disciplinary boundaries and power (e.g., Klein, 1996) should thus clearly not be overlooked in discussions of knowledge constitution.

Boundary theory and issues of power within and across disciplines in Higher Education will now be briefly discussed. Thereafter, I will draw on the work of the rhetorical studies, showing how all these issues are interlinked and their significance for my research.

2.5 Boundary theory

Klein (1996: 1) explains the link between boundaries and knowledge domains as follows:

Definitions of a boundary differ, ranging from demarcations of science from non-science to divisions of geographical land and political power. Nevertheless, over time and specialist domains, ‘boundary’ has become a new keyword in discussions of knowledge.

Klein (1996: 1) adds that “Boundary work is the composite sets of claims, activities, and institutional structures that define and protect knowledge practices.”

Gans (1992) regards the concept of boundaries as useful as it may shed light on groups that are bound. Experts tend to demarcate their field of expertise (or community of practice) through linguistic and activity cues (Rifkin and Martin, 1997). This demarcation may be prompted by some groups having a higher status than others. Boundary issues are therefore frequently linked to power relations. As Lamont and Fournier (1992) remind us, groups of different status have to compete for the monopolisation of resources, so status (and therefore power) is critical to success.

Lamont and Fournier (1992: 1) claim that "...one of the most important challenges that we face today is understanding how we create boundaries and what the social consequences of such action are." They (1992: 4) argue that "...only a permanent questioning of acquired positions can lead to genuine advances." However, it is not always possible to discern boundaries, which complicates the task of interacting across them, understanding the motives and predicting the strategic moves of role players. In drawing a distinction between visible and invisible boundaries, Gans (1992: xiv) notes that "the latter are often more difficult to cross than visible ones." These invisible boundaries exist because it would be unseemly if, in an age of democracy, they were seen to exist. Like Lamont and Fournier (1992), Gans (1992) relates boundary issues to those of territory, power (and prestige), as well as gender, culture and class (all related to economic and related inequalities). These theorists remind us that boundary issues are never neutral, although they may appear so (and are often perceived to be so). For example, radiographers, like Communication lecturers, have traditionally been female, and almost all academic lecturers at CPUT are female. This contrasts with the demographics of many of the other sciences at the university which are male-dominated.

In Higher Education, the notion of separate disciplines with strict boundaries has traditionally been considered 'normal', with such divisions generally unchallenged. Academic institutions have thus supported this conception of separate groups of knowledge and knowledge production. Distinct boundaries have tended to separate 'content' disciplines from language/literacy issues, highlighting the fact that language has been - and apparently still is - understood narrowly, as 'grammar' and as an instrument of communication. The role of language, literacy and discourse as inextricable from any discipline is frequently not appreciated (Street, 1984, 1993, 1996).

Critical realists need to understand the causal mechanisms underlying phenomena that are researched. I therefore needed to identify causal mechanisms that influenced how

radiographers and Radiography lecturers organised and regarded themselves as communities of practice (and to what extent they formed one community). Community boundaries are constituted through discourse, with the latter generating and perpetuating tendencies peculiar to radiographers. Radiographers' discourse itself is thus a causal mechanism. Even though Radiography lecturers are specialists in different categories of Radiography (e.g., Nuclear Medicine, Radiotherapy), they work together as an academic team in the university. The lecturers are all professionally qualified, both as radiographers and as educators. In recent years, the many Radiography lecturers have been involved in furthering their educational qualifications to Masters and Doctoral level, and this has contributed to the growth of their academic status in the university, as well as to the professional status of radiographers. Thus, in the university and hospital setting, the Radiography division as a community of practice has created a distinct - but not impermeable - boundary around itself: it has its own central set of academic practices, but it has also extended itself across its own disciplinary boundary in several respects.

Most of the sub-disciplines comprising the knowledge base of Radiography fall within the category of hard, pure or applied sciences: Maths, Physics, Anatomy, Pathology, Physiology and Radiation science. All the lecturers have qualified in those subjects, though they might have more experience of teaching some of them than others. As a team, they collaborate and cross sub-disciplinary boundaries in constituting the learners' knowledge. Also, because of their own experience as clinical radiographers, they are able to cross boundaries and collaborate with clinical radiographers in the hospital in the course of their work.

To conclude this discussion of boundaries, from a critical realist perspective, boundaries represent divisions between structures and so demarcate different forms of social organisation, each with particular systems and social relations. As these structures have causal mechanisms, they influence practices and potential practices. This discussion of boundaries is therefore an extension of my discussion of radiography communities of practice.

2.6 Interweaving language with disciplines

While there is no official subject called 'Communication' in the Radiographic curriculum at Groote Schuur, the lecturers have included some outcomes in the curriculum. Several of the lecturers have intentionally attempted to integrate language/literacy practices into the

curriculum at different levels of study. Many of their current practices are a direct result of the influence and initiative of my partner in the 1999 content and language integration project (see Chapter 1). To better understand the ways in which Radiography lecturers have attempted to integrate content and language in their curriculum, I will summarise Winberg's (2000) useful discussion of four 'generations' of content and language integration over the past few decades. Winberg (2000) terms these four approaches the Skills Approach, the Cognitive Approach, the Genre Approach and the Critical Approach.

2.6.1 Skills Approach

Mohan (1979, 1986) veered away from the practice of using any content to teach language (the so-called 'content-based' language teaching). Instead, he advocated an English (L1 and L2¹²) teaching and learning approach in which language, as the major medium of learning, is integrated with content, thereby providing learners with better access to that content.

Mohan's focus was therefore on English for learning, English for academic purposes, as opposed to learning English for its own sake. His work therefore falls within the realm of English for Special Purposes (ESP). He viewed integration as necessary to support limited English proficiency (LEP) learners. Study skills were also advocated to achieve academic success.

2.6.2 Cognitive Approach

Theorists such as Cummins (1984) and Saville-Troike (1984) claimed that there is a need to incorporate more complex elements of cognitive-academic language proficiency in teaching and learning. Cummins's approach emphasises the importance of using the learner's home language, as this underlying proficiency contributes to the development of proficiency in another language. He also identified two types of language proficiency: BICS (Basic Interpersonal Communicative Skills) and CALP (Cognitive Academic Language Proficiency). The former is context dependent, uses concrete language and is cognitively undemanding; by contrast, the latter is less context-dependent (or even context-free), uses abstractions and is cognitively demanding. This distinction is significant in Higher Education, as CALP can take years to develop, yet it is this ability that is most frequently expected and required.

¹² L1 and L2 will sometimes be used to denote learners' language, as these are less clumsy than the more appropriate 'home language speaker' and 'speaker of English as an additional language.'

Mohan and others of the Skills Approach generation criticised Cummins's approach because of the notion of a common underlying language proficiency. They claimed that literacy skills are inextricably linked to a specific cultural community and questioned their transferability. Nevertheless, Cummins's work is valuable as it highlights the need to go beyond second language perspectives to include research into home language development.

2.6.3 Genre approach

Later, genre theorists built on Cummins's (1984) notion of home language proficiency by including the notion of building on learners' prior personal, educational and cultural experience during their academic development. This approach derives from a social science paradigm, one that explores how people construct meaning in their social world. Learners are empowered when they have access to the powerful discourse of a discipline; and this access occurs through socialisation into that discipline, during which, ideally, the conventions and values of the discipline are made explicit. Learning may involve, for example, textual analysis of the distinctive genres of a discipline.

This notion of developing academic discourse as a socio-cultural activity resonates with the work of Vygotsky (1962) who emphasised the role of language in cognitive development, and Bruner (1983) who researched novice-expert learning interactions. Language socialisation, not acquisition, is the key difference between this and prior approaches. Noteworthy theorists in this field include Ballard and Clanchy (1988), Swales (1990) and Cope and Kalantziz (1993). Their special interest is in how individuals become competent in a community of practice and the role of language and discourse in the process. The term 'academic literacy' (discussed previously as a much misused term) tends to mean targeted language development within a particular academic and social context. Both language and content teachers play an essential collaborative role in supporting this process of socialisation, so it cannot occur through a language programme alone. Carrell's (1988) reading research also indicated that content specialists and their facilitation of particularly limited English proficiency (LEP) learning is essential if learners are to develop the disciplinary discourse. Similarly, writing research (McCutchen, 1986) revealed that content domain knowledge leads to greater cohesion in writing. There is clearly significance for the academy, where writing is often a major means of assessment.

Important for its implications for content and language integration and interdisciplinary collaboration, is Hammond's (1987) finding that content specialists have little conscious

awareness of the genres that they require of their learners. Consequently, they are not able to support learner development meaningfully in this regard. Language lecturers could perhaps play a role in assisting content lecturers to develop an explicit understanding of their disciplinary discourse so that the latter may more consciously and explicitly facilitate learners' learning of these genres (Jacobs, 2003).

2.6.4 Critical Approach

The Critical approach, the fourth generation of content and language integration, clearly shows the relevance of various other theories discussed previously in this chapter: Halliday's (1978) work on functional linguistics; boundary theory (e.g., Klein, 1996); communities of practice (e.g., Wenger, 1998); and the NLS theorists' work (e.g., Gee 1990, 2003) in relation to the role of discourse in the constitution of knowledge. The focus of the critical approach is how the academy uses and organises academic discourse in academic disciplines and the boundaries that distinguish these disciplines as communities of practice.

The ability to read and write is recognised as a social and cultural practice. Street (1996) explains that literacy should not be regarded simply as "a set of technical skills learnt in formal education, but as social practices embedded in specific contexts, discourses and positions." Theorists in this field have been particularly intent on addressing social injustices resulting from elitist hierarchies. As Baynham (1995) comments: "[c]ritical literacy doesn't accept the natural status of dominant institutions and discourses but calls them into question." In particular, the customary 'deficit thinking' regarding literacy requires careful scrutiny. Baynham (1995) argues for a 'critical functional' approach to literacy: 'functional' literacy refers to considering the social purposes of literacy as it is used in contexts; and 'critical', because there needs to be a "meta-level of critical awareness, both linguistic and social." Street (1996) also cautions that, because literacy practices are always rooted in power relations, apparently neutral norms disguise how power is maintained through popular conceptions of literacy.

While disciplinary boundaries are permeable to initiates, they appear to be less so to others – and the boundaries may be less permeable when the statuses of disciplines are not equal. For example, as mentioned in Chapter 1, language lecturers perceive that they tend to have a lower status than many content lecturers, particularly those in science and technology. Nonetheless, both content and language lecturers erect boundaries that exclude others through their particular discourses. Tinberg (1997: ix) argues that a change of attitude on the part of

both content and language specialists seems necessary, so that integration of content and language can occur, because “[t]he old walls, the old borders between one field and another, simply have lost their usefulness.”

The critical realist perspective on content and language integration would suggest that, while structures exist (in the form of individual disciplines) and pre-exist agency, agents have the capacity for relationship and learning across disciplinary boundaries. Structures generate tendencies: they do not determine outcomes. Structures, indeed, depend on repeated actions of agents for their continuing existence. If educational structures are to be transformed, change is only possible through agents who are convinced of the value of that change and who are capable of adopting new priorities and practices.

In the next section, in an effort to further elucidate the academic scenario that I will be analysing from Chapter 4 onwards, I will be discussing notions of expertise in relation to the preceding theories and the research site, indicating how these notions have arisen, and their relation to the discrete disciplines that continue to characterise Higher Education.

2.7 Rhetorical Studies

Bazerman and Prior (2004: 2) note that, while rhetoric was initially “a productive discipline” with the purpose of creating powerfully persuasive texts that would influence others’ thinking and action, it “...also fostered a critical reading practice.” This means that the examination of texts involved questions, not only about what texts meant, but how they meant what they did.

More recently, rhetorical studies by certain theorists (e.g., Norgaard, 1999; Geisler, 1994) have focused in particular on how notions of expertise have been created and how, in the process, domain content and rhetorical processes have become separated. Geisler (1996: 4-6) suggests that the myth of the autonomous text is responsible for creating this divide. Learners at school are typically taught that learning to read entails finding meaning in a written text. The text is decontextualised and therefore ‘autonomous’. She (1994: 32) notes that textbooks, as embodiments of autonomous text, comprise archives of accumulated knowledge and information, and are regarded as the authoritative versions of society’s knowledge. Learners are taught that their job is to master this knowledge. Because the writers of the text are separated from the reader in space and time, the writers seem to readers to be beyond criticism. Geisler (1994: 51) explains that it is therefore not surprising that learners do not develop their critical faculties at school – they are expected to stay close to the source texts,

retrieving and reproducing facts. Being able to adopt an alternative stance in relation to the written text is therefore difficult. This is usually accompanied by an inability of learners to produce original work, as they only repeat what has been handed to them.

At the level of Higher Education, Geisler (1994: xii) discusses how the apparently accessible literacy practices of Higher Education are actually 'arcane', restricting access and power to a few through various cultural practices under the banner of "professionalisation". She (1994: xiii) argues that professionalisation, as a cultural movement, has used "...the technology of literacy to give weight to claims to professional privilege...." This has resulted in "a great divide between expert and layperson". The effect of 'academic literacy' has been to split expertise into hidden 'rhetorical process' and explicit 'domain content'. In many cases, both in schools and Higher Education, content is presented as decontextualised, neutral facts. Geisler (1994: 89) explains that the hidden domain is actually what is required to produce professional experts. Thus, while the present educational system purports to produce expertise, it really mostly provides students with only a naïve understanding of expertise, because the crucial rhetorical component is neglected. This has created a huge divide, not between orality and literacy, as literacy scholars have suggested, but between experts and laypersons.

It seems logical to assume, then, that learners will not value the rhetorical aspects of their discipline if their lecturers do not (either by neglect or by directly dismissing their value); and, in response, learners may disregard or compartmentalise the rhetorical aspects apart from the 'real' concerns of their learning.

Yet it is only those who are already part of a discipline and its conventions have access to the discipline's arguments and assumptions. Geisler (1994: xiii-xiv), like Gee (1990), argues that Higher Education (and secondary schools, presumably) needs to reform to make the literacy practices of its disciplines explicit.

Most professionals in Higher Education are probably unaware of most of the above. They have been inducted into a disciplinary discourse and, in many cases, follow its dictates fairly unquestioningly. As Norgaard (1999) suggests, as disciplinary specialists in Higher Education, we "...accommodate ourselves to a particular conception of expertise, and organise our curricular and pedagogical efforts around it". This is especially so "...when we equate expertise with the mastery of content." In other words, if we think that mastery of

content is the epitome of expertise, getting our learners to achieve such mastery will be the primary goal in our teaching – our notions and discourse act as causal mechanisms that generate these tendencies. Tradition has lent legitimacy to this conception, so it may be invisible or appear inconsequential – and so be unquestioned. Under these circumstances, the rhetorical dimension of expertise is overlooked.

To address this divide between rhetorical processes and domain content, Geisler (1994) emphasises the importance of making both aspects explicit for learners. Rhetorical expertise develops over time and is marked by increasing abstraction and a growing awareness of the rhetorical features of the text. For this reason, readers at different levels of development are likely to read/attend to text differently. The role of the teacher is crucial for the development of rhetorical awareness: learners need guidance to realise that there is a writer behind a text. Geisler (1994: 23), for example, refers to Haas (1994) whose research indicates that graduate learners notice rhetorical features of text more readily than undergraduates: they try to assess gender, profession, and the motive of the writer. In other words, graduate learners tend to be more critical as readers, as they try to reconstruct contextual information that is not obvious in the text itself. However, with explicit guidance and through critical reading activities, all learners can develop a greater awareness of the writer's purpose and techniques in a text (Bazerman and Prior, 2004).

In my research, the explicit and implicit ways in which Radiography experts constituted the domain content and rhetorical processes of their discipline for their learners, and the ways in which learners construed this knowledge, were critically important, especially in light of Geisler's (1994: 82) contention that, in an undesirable way, the separation of expertise and literacy "...has transformed...the shape of expert thinking itself." Critical realism would also regard the separation of content and literacy as an action that has affected the natural, holistic structure of knowledge. This action of separation constitutes a causal mechanism that has resulted in a tendency for learners (and, often, their lecturers) not to understand the human role in textual production and, therefore, in an unquestioning stance towards learning.

2.8 Identity theory

Closely allied to the preceding theories is identity theory. According to Henkel (2000), the traditional academy rewarded individualism cultivated within a distinct community of practice/of peers. Today, social practice theorists see learning as more than an individual,

cognitive enterprise: it involves the whole identity of the learner within a social context. In this section, I will first discuss the identity concept generally, before going on to discussions of academic identity.

In the formation of the identity concept, communitarian philosophers stress the relational aspects of identity, the “dynamic between individual and collective” (Henkel, 2000: 14), with the former embedded in the latter. The group only survives because the individual aspires to become part of the group identity that is couched in certain terms. For example, to attract learners to study a particular course, websites and brochures typically make the course seem attractive and important: they might include descriptive words such as ‘exciting’, ‘interesting’, ‘challenging’, or appeal to philanthropic values such as ‘making a contribution to society’. When learners are specially selected from among many applicants, this adds to the prize, as joining an exclusive group adds status for the individual. As Clark (1972: 178) notes, the group identity is an “organisational saga”, which is “...a collective understanding of a unique accomplishment in a formally established group.” Referring to the ancient use of the term “saga”, he notes that a saga was not merely a story, but a story that had a large following of believers. Their belief was crucial; without it, the story would merely become history.

Taylor (1989), too, notes the role of an individual’s social and cultural community in providing the language and systems of meaning involved in the identity formation of that individual. The community’s conversation occurs among members whose roles and statuses co-exist in complex interrelationships. Learning the language of that community therefore involves entering the existing conversation along with other members of the group. As the community and the language pre-exist the individual, learning the community language means taking on the group’s historical meanings, ideas, experiences and values and, in time, adding one’s own expressive voice. Henkel (2000: 16) adds that each individual has a “unique narrative history” that develops within this community framework; and, although the individual’s identity is not fixed, there are limits to which that identity will shift because of the relative stability of the community identity. This again resonates with Halliday’s (1978) discussion of the ‘context of culture’, as well as Kress’s (1989) definition of ‘discourses’.

Regarding professional and moral identity, Gamble (2003^a) criticises the way education has bowed to the marketisation of education and training, resulting in individuals who are not personally motivated nor disciplined by a value system that they have adopted. She argues

that Higher Education tends to prepare learners for the workplace through an excessive codification of knowledge; in the process, professional values are often underplayed. Then, because of the way the social base of society has shifted, with the ancient notion of a moral/religious vocation changing to that of a work vocation, the workplace identity has also changed. As a result, corporate goals and ideology prescribe the values for the good employee, who is pressured to comply to achieve productivity.

Drawing on Durkheim (1995) and Bernstein's (1996) work on moral education, Gamble (2003^a) concludes that, in a master-apprenticeship relationship, moral transmission was multi-dimensional; and that the individual self-identity that was rooted in a group occupational identity had a strong 'anchoring' role, able to accommodate both individual and managerial goals. In this way, a strong vocational work ethic was sustained. However, in today's world of work, this kind of moral identity has often been lost and replaced by a transient, consumer identity. Gamble (2003^a: 14-15) argues that the NQF, with its competency-based modular approach, results in "fragmented occupational identities." The new occupational qualifications perpetuate this kind of identity; and Higher Education institutions often become flat in character, capable of neither building nor sustaining the kinds of workplace identities needed in contemporary workplaces. To counteract this trend, it is necessary for teachers to adopt the role of moral transmitter of values and professional identities. Referring to Bernstein's (1996) 'instructional' and 'regulative' discourse, Gamble (2003^a) states that instructional discourse regulates the selection, sequence and pace of any communication, and is always embedded in the (dominant) regulative discourse. The latter, the moral discourse, creates the criteria for conduct, character and how messages are communicated and received. If values can be imparted, people can rule themselves, and this is how secular morality is transmitted. Gamble (2003^a) also describes three facets of morality that result from the right kind of moral education: discipline; attachment to a social group; and autonomy or self-determination, implying the exercise of rational morality or reason. In a similar vein, in his discussions of identity, Taylor (1989) uses the notion of "spatial metaphors" to denote bounded spaces within the individual that constitute a unique conceptual, moral framework for identity development. This moral framework comprises three dimensions, namely one's duty to others, fulfilment (through achieved goals), and a number of other moral aspects, such as dignity, respect and self-worth.

Gee (2000: 100) provides another framework for understanding individual and social identity. He explains that identity refers to being recognised as a particular 'kind of person' in a given context. There are four interrelated ways of understanding identity, namely Nature-Identity (N-Identity, a state of identity in which the source of power is nature); Institutional-Identity (I-Identity, a position of identity authorised by an institution); Discourse-Identity (D-Identity, an individual characteristic that is recognised in dialogue/discourse by 'rational' persons); and Affinity-Identity (A-Identity, where shared experiences identify one with others who undertake similar practices). One identity may dominate, depending on the context.

Gee (2000) argues that identities are only meaningful if they are recognised by others as such. One does not acquire an identity by oneself alone, as individuals are socialised into combinations of ways of being and doing that are recognised and affirmed by 'rational' others as constitutive of a particular identity. This recognition is a complex process.

Individuals choose to adopt or reject this attributed identity. For example, if an I-Identity is attributed to a person, this may or may not be welcomed by that person. If she accepts that identity, it may be internalised and termed a 'calling'; otherwise, it may be regarded as an 'imposition'.

In the case of a D-identity, others' discourse and dialogue are needed because others have to recognise certain characteristics that, for them, are indicators of one being a certain 'kind of person'. Such an identity is therefore constructed by others; and their discourse and dialogue are also necessary if that identity is to be sustained. If an institution then affirms and promotes a particular D-Identity, it can become an I-Identity.

The fourth perspective on identity is the Affinity-perspective (A-Identity). The source of power is an affinity group (recognised by various other names in the literature, including a 'community of practice'). Such a group's power resides in participation in its particular set of practices. Members' allegiance lies in sharing certain practices that provide them with required experiences. One actively chooses to become a member of such an affinity group.

The relevance of this to my research is that, as Gee (2000) points out, some institutions engineer certain practices and encourage employees to regard themselves and others in particular ways. If the institution can succeed in achieving this, they can conceal their authority over employees, as the latter become self-regulating. The institution continues to exert its power in other, more obvious ways. Then the A-Identities that evolve are

“institutionally sanctioned”. This resonates with Gamble (2003^a) and Taylor’s (1989) discussion of the need for moral education and the engendering of self-regulating individuals through embedding the instructional discourse within the dominant moral regulative discourse. In the context of Radiography education and training, the notion of ‘professionalism’ encapsulates all the values and practices that both the university and the hospital require of employees; thus, if the learners can be encouraged to adopt this kind of identity, they become self-regulating.

Henkel (2000), Gamble (2003^a), Taylor (1989) and Gee’s (2000) discussions of identity are relevant to my research, because, as will be discussed in Chapter 5, in their interactions with Radiography learners, the lecturing and clinical staff constantly emphasised the importance of radiographers acting professionally, that is, in ways that are consistent with high moral values and ethics. From a critical realist perspective, this discourse comprised a causal mechanism that had the potential to influence the identity of Radiography learners.

I will now focus on the role of the development of academic identity. This is important in my research, because those experts who constitute Radiographic knowledge for learners are primarily academics, although they work quite closely with the clinical radiographers in the hospital departments, where they also conduct tutorials with learners. (As Henkel (2000) notes, the profession plays a significant role in forming the academic identity.) The influence of the lecturers’ identity on the constitution of learners’ knowledge is therefore significant.

Henkel (2000: 16) explains that the notion of academic identity has developed within an idealist notion of the self-regulation of academia and the transmission of exclusive knowledge. Membership and, therefore, accessibility is usually limited to an intellectual elite, strictly controlled by self-regulating academic disciplines.

Moore (2003: 38-41) discusses the four main influences on enculturation into the academic identity: the discipline; the institution; the Higher Education system; and the broader academic profession. Of these, the academic discipline is most influential. Disciplines tend to be autonomous and individualistic, as they are “cognitive divisions” that “...give rise to differing orientations to the world” (Moore, 2003: 39). The daily force of knowledge creation, reconfiguration and transmission is the root of the identity of individual disciplines, “...shaping the consciousness and priorities of individual academics...” (Moore, 2003: 39). Disciplines are thus more than epistemological distinctions (Henkel, 2000).

In spite of the unity of purpose within a discipline, Henkel (2000) points out that, through the subdivision or multiplication of disciplines, the force of the original whole discipline is weakened. Members may struggle to find sufficient common connections, much less cross disciplinary divides. In addition, as Moore (2003: 39) notes, individual identities are not homogenous, as individuals adopt the disciplinary culture in unique ways. This may result in tensions among individuals within a group. Usually, specialisation tends to prevent confrontation and allows individuals to claim their own intellectual space.

Moore (2003: 41), in discussing the relationship between institutions and their departments, notes that departments, like their individual members, have a somewhat more autonomous orientation than the larger institutional entity that is orientated to integrate all entities comprising it. This can give rise to oppositional stances between departments and the institution. Maassen's (1996) study indicates that there are disciplinary differences in the way academics respond to top-down imperatives to change: academics in the natural sciences and humanities tend to value autonomy and decentralisation more highly than those in other fields, especially the professions. Moore's (2003: 5) research indicates that those that comply with requirements to adopt policy and institutional imperatives do so because of their individual academic "cognitive commitments" that (usually) pre-date the policy. Furthermore, Moore (2003: 210-211) notes the link between the personal cognitive identity of these academics and the cross-disciplinary character of their discipline and its practices: "...the cross-border inclinations of these cognitive-adaptives are related to the inherent hybridity of their disciplinary specialization or to contemporary interdisciplinary developments in their field." Thus the kinds of academics who are more amenable to interdisciplinary work tend to be found in hybrid disciplines. This is relevant for my research for several reasons: the Radiography curriculum has a multidisciplinary knowledge base that is focused on preparing learners for the radiography profession; and the lecturers have pursued a variety of specialisations within Radiography. It is perhaps for this reason that the lecturers have been able to collaborate to integrate their disciplines and have had a more open attitude to incorporating language and literacy aspects into their curricula than is sometimes the case elsewhere in the former Peninsula Technikon. Also, perhaps because of its geographical distance from the central campuses of the university, the Radiography division, like other satellite campuses, has established its own identity which incorporates a medically-orientated code of conduct and practice which, in some respects, is more typical of the medical profession in the hospital workplace than in the university. Another factor may well

be that Radiography learners are strongly encouraged to think of themselves as members of a Health Care team of professionals whose prime concern is the well-being of patients.

To consider the lecturers and learners' academic and medical identity in relation to critical realism, it would seem that the generative mechanisms of the university and workplace structures influence the kinds of identities which Radiography academics (and, in time, their learners) adopt and that then influence their agency. Archer (1995) reminds us, though, that agents are not passive contemplators of reality: they actively develop insights, share these, and negotiate meaning in their work contexts.

2.9 Pedagogic discourse and curriculum choices

Theory on pedagogic discourse is important in my research, as it provides a framework to explain how particular knowledge is constituted for entry level Radiography learners. I will begin by describing Bernstein's (1999) theory of pedagogic discourse and Gamble (2003^b) and Barnett's (2006) extension of this, before tying these theories into those discussed earlier.

As a backdrop to his essay on horizontal and vertical discourse, Bernstein (1999) provides an overview of his earlier work: pre-1980, his work focused on code modalities, i.e., on how content was taught and learnt in particular social contexts; from 1980, the focus was on what was constructed by pedagogic discourse, and an analysis thereof. From 1990 onwards, Bernstein's work focused on pedagogic discourse itself. He was concerned with how knowledge is produced, distributed and reproduced, and the relationship between this knowledge and power relations implicit in structures. He considered assumptions of pedagogy and practice in terms of a macro social class, and the influence of power relations on micro educational processes. In the process, he discussed visible and invisible pedagogy as these relate to social class, privilege and domination (Sadovnik, 2001).

Three terms are hallmarks of Bernstein's theory of pedagogic discourse and practice, namely 'classification', 'framing' and 'evaluation' (Sadovnik, 2001). Each of these will now be briefly summarised.

'Classification' refers to the "organisation of knowledge into curriculum" (Sadovnik, 1995: 9). It also indicates the extent to which content areas are insulated from others and the way boundaries are maintained around a particular content area (Sadovnik, 2001). The term 'classification' refers to the relations between categories, not to qualities of any category

itself. Thus, as Bernstein (1996: 19-20) explains, "...the crucial space which creates the specialisation... is not internal to that discourse...[it] is the space between that discourse and another." It is through this space that a discourse is uniquely identified. When, as an 'outsider', one encounters such a discourse, "[it] is the dislocation in the potential flow of discourse which is critical to the specialization of any category." In other words, the outsider experiences a gap between her own discourse and that of the other. Bernstein (1996: 21) asserts that it is power that maintains the space between categories; and that "[a]ttempts to change the degrees of insulation [between one category of knowledge and another] reveal the power relations on which the classification is based and which it reproduces."

'Strong' classification indicates that boundaries between subjects are distinct; 'weak' classification would indicate that boundaries are fragile and therefore more permeable, more amenable to integration of content areas.

'Framing' refers to pedagogic practices involved in the transmission of knowledge, and the choice and form of the message. Teachers and learners' degree of control over choice and organisation of content, and the pace and timing of delivery, are also part of framing. When there is strong framing, there is a limited degree of choice; the converse applies with weak framing.

According to Bernstein (1996: 27), "[c]lassification refers to *what*, framing is concerned with *how* meanings are put together, the forms by which they are to be made public, and the nature of the social relationships that go with it." 'Evaluation' is the system that specifies what level of learner knowledge is valid. Entwistle (1993) cautions that assessment indicates to learners what their lecturers value. Thus, if assessment requires learners to demonstrate reproduction rather than understanding of facts, learners will adopt a superficial or 'surface' approach to learning. In Chapter 5, although I will discuss assessment in relation to its influence on knowledge constitution, I will focus mainly on the impact of classification and framing on knowledge constitution, as I was not present during any of the formal learner assessments.

In his essay on vertical and horizontal discourse, Bernstein (1999) presents a model of discourse and associated knowledge structures, including a language to identify and describe these discourses, their relation to practice in the field, and associated issues of discourse acquisition and identity (touched on previously in this chapter).

Bernstein (1999: 157) describes modalities of discourse that are “...generally seen as oppositional rather than complementary.” He (1999: 158) refers to Bourdieu’s (1990) functional distinction, with “...one form creating symbolic and the other practical mastery.” Sometimes the symbolic form is regarded as schooled knowledge, whereas the other is generally considered everyday knowledge. Power relations and ideological stereotypes are relevant considerations here, as a more powerful group could dominate and silence another group, resulting in unfulfilled potential. Bernstein (1999) expresses his concern that much of the past discussion of these modalities has focused on the stereotypical character of implicit dualities: in discussions of epistemology, there has been a tendency to separate subjective and objective. (This echoes critical realism’s concern with dualisms, including Sayer’s (1992) concerns about the subject-object divide.) Bernstein (1999) has, instead, attempted to describe and differentiate two discourse forms, providing a new language for this purpose. He terms the two discourse forms ‘horizontal’ and ‘vertical’ discourse. Within each, he further distinguishes different forms of knowledge/knowledge systems.

Horizontal discourse is “a set of strategies” intended to maximise everyday encounters between people in various contexts (Bernstein, 1999: 159). Each member of a community has a different ‘repertoire’ of strategies that is activated in different contexts. This discourse is therefore context-dependent/local and specific. Strategies may be contradictory across contexts, but not within. The discourse is often oral, tacit, multi-layered and segmentally differentiated. Some of this discourse is more or less useful or important, depending on where it manifests.

Certain rules regulate the distribution or circulation of horizontal discourse, and these are knowledge, behaviour and expectations. The relations between the individual repertoire and the community reservoir are important as they regulate the practices of the individual: the more isolated an individual is, the lower the dynamic potential and effectiveness of that member. With restricted circulation, there is an increase in specialisation and privatisation, and a decline in effectiveness. The exchange or circulation of strategies is also limited by isolation. The converse too applies: the lower the isolation, the greater the potential for exchange and circulation of strategies and procedures; then both the individual repertoire and the community reservoir expand. Thus there is a difference between the actual and the potential practice of a member, depending on social relations between that member and the community (Bernstein, 1999).

The way in which horizontal discourse is acquired and shared depends on the kind of knowledge involved. Acquisition is segmentally organised and knowledge circulation depends on status/position. Pedagogy occurs in face-to-face situations, may be strongly affective and context-dependent, and may involve tacit modelling, showing and some explicit modes. Repetition may occur until the learner is competent. If there is a goal of competency among a group, this may give rise to competitive relations. This description corresponds with the knowledge form evident in clinical departments of the hospital.

By contrast with horizontal discourse, vertical discourse, typically associated with sites of knowledge production and institutional pedagogy, comprises “specialised symbolic structures of explicit knowledge” (Bernstein, 1999: 161). Vertical discourse is influenced by “strong distributive rules regulating access, regulating transmission and regulating evaluations”. Knowledge is usually circulated through “explicit forms of recontextualising” (*ibid*: 159). Recontextualising involves transforming and relocating knowledge for the purposes of pedagogy (Bernstein, 1996: 47). Units involved in pedagogy are constructed, evaluated and distributed to groups and individuals (in time and space) by ‘recontextualising’ principles (Bernstein, 1999). Integration of vertical knowledge occurs at the level of meaning, not the relations between segments or contexts, as in the case of horizontal discourse. Procedures are also linked hierarchically; and pedagogy is an ongoing process. Performance is graded on an individual basis (Bernstein, 1999). This description closely matches the knowledge form evident in the academy.

Bernstein (1999: 159) explains that vertical discourse has two distinct forms. The first he terms ‘hierarchical knowledge structures’. This form is typically coherent, such as is found in the sciences. By contrast, ‘horizontal knowledge structures’ have specialised languages and principles of interrogation. The latter have specific criteria that govern the way text is produced and circulated (as in the humanities and social sciences).

Hierarchical knowledge structures (e.g., the sciences) are characterised by attempts to arrive at general theories and find uniformities across a range of different phenomena. There is thus a strong integrating motivation, with increasing abstraction from lower to higher levels of the hierarchy. By contrast, because of the specialised languages of horizontal knowledge structures (e.g., the social sciences and humanities), each with its unique mode of interrogation and accepted ways of constructing and circulating texts, integrating principles cannot apply: it is difficult to translate the language of one structure so that it relates to that of

another. Bernstein (1999), in considering these difficulties, distinguishes between those horizontal knowledge structures that have weak and those that have (relatively) strong grammars. Strong grammars are seen in fields such as Maths and Logic. Maths, for example, has a strong grammar: it has sets of distinct languages, each for addressing particular problems. Empirical referents are unnecessary, so the subject can be studied in a purely abstract way. The knowledge structure tends to be rigorously restricted and is therefore 'neat'. By contrast, horizontal knowledge structures that have weak grammars, such those of Sociology or Philosophy, Social Anthropology and Cultural Studies, are much less tidy. Acquiring a weak grammar is consequently far more complex than acquiring a strong grammar. While hierarchical knowledge structures have unmistakable grammar and vocabulary, horizontal knowledge structures with weak grammar borrow from one another. Thus, when one is speaking or writing Sociology, one is not sure whether one is consistently using the correct grammar and vocabulary. For this reason, learning to recontextualise terms correctly is critical to acquisition and transmission of horizontal knowledge structures with weak grammars.

In acquiring a horizontal knowledge structure, Bernstein (1999: 165) notes that one's goal is to acquire the expert 'gaze' that will enable one to read, evaluate and create relevant texts. This learning occurs through tacit transmission, and through being with those who have 'the gaze' in a "social interactional relationship." This corresponds with Sayer's (1992) contention that knowledge is acquired through labour and social interaction.

This distinction between horizontal discourse and horizontal knowledge structures is relevant to the way in which knowledge is constituted in my research site. Bernstein's description of acquiring horizontal discourse corresponds with the way Radiography learners learn in the clinical setting: their learning is context-dependent and occurs in an authentic workplace setting. Clinical radiographers guide learners orally, and model practices for them. Much of the learning is tacit, involving observation and manual practice (e.g., operating equipment, lining up the patient in relation to the radiation source and processing films). The learners acquire real-world radiographic discourse in the clinical setting of the hospital. Because radiographic practice is shared, there is a great potential for exchange and circulation of strategies and procedures; both the individual repertoire and the community reservoir expand. Before Radiography education was under the auspices of the university, learners did all their training under the guidance of various hospital departments. As Engel-Hills (2005: 3) notes,

“Hospital-based training met the needs of the [radiography] vocation for years.” Thus the hospital workplace had a greater influence on the education of radiographers than is the case now that the university recontextualises workplace knowledge and frames pedagogy. Also, because the Radiography lecturers tend to teach more explicitly than clinical radiographers, learners may grasp the principles of procedural knowledge more readily through their lecturers’ teaching than through the tuition of clinical radiographers.

Bernstein (1999: 165) points out that there are similarities between horizontal discourse and the horizontal knowledge structures of vertical discourse, albeit at a fairly abstract level. This is especially so with areas of weak grammar, where transmission may be both explicit and tacit (Bernstein, 1999: 168). As will be discussed in Chapter 5, the first year learners study certain subjects (e.g., Radiation Science) comprising aspects of disciplines with strong grammars (e.g., Maths, Physics, Chemistry); Psychodynamics is another subject, one with a weak grammar, borrowing, as it does, from other human sciences, namely Psychology and Communication. Depending on the site of instruction, transmission may be tacit and/or explicit. As mentioned, transmission by clinical radiographers in the clinical setting is often tacit: “A ‘tacit’ transmission is one where showing or modelling precedes ‘doing’” (Bernstein, 1999: 168). By contrast, in the university classroom, and when lecturers conduct clinical tutorials in the workplace, transmission tends to be explicit: “Explicit transmission refers to a pedagogy which makes explicit...the principles, procedures and texts to be acquired” (*ibid*: 168).

The concepts of ‘Singulars’ and ‘Region’ are also relevant in discussions of Bernstein’s knowledge systems. Bernstein (1996: 65) describes a singular as a “knowledge structure” with a “specialised discourse” – what we would commonly call a ‘discipline’ in Higher Education, such as Physics, Chemistry or Economics. Bernstein notes that these singulars have strict rules of entry and examination, and are “orientated to their own development, protected by strong boundaries and hierarchies.” Regions, he (1990: 156) describes as “...a recontextualising of disciplines into larger units which operate both in the intellectual field of disciplines and in the field of practice.” Engineering, Medicine and Management, amongst others, are examples of regions because they represent the interface between individual disciplines and the resultant technologies that develop. With increasing regionalisation, discourse classification diminishes, while less specialised identities emerge through

associated technology. Radiography is a region, in that it draws on aspects of several singulars, such as Physics, Maths, Anatomy and Physiology.

In his discussion of regions, Bernstein (1996: 68) notes that regions “...face inwards towards singulars and outwards towards external fields of practice.” This aptly describes the dual context in which Radiography learners study: their ‘inward’ academic study comprises the study of aspects of various overlapping singulars in the university discipline of Radiography; their ‘outward’ learning of real world radiographic practice occurs in the ‘hands-on’ clinical setting of the hospital. However, in many ways, the learners study in a field of professional practice that is so closely interwoven with the academy that it can scarcely be described as ‘external’ to it. Bernstein (1996: 68-69) rightly points out that regions facing towards practice and its requirements “...will regulate the identity” of these practitioners.

In the next few pages, I will consider the work of a few other theorists who have debated vocational education and pedagogy in relation to Bernstein, namely Gamble (2003^b), Barnett (2006), Luckett (2001) and Wheelahan (2006).

Drawing strongly on Bernstein’s (1999) model of discourses and knowledge structures, Gamble (2003^b) discusses career-focused vocational education within a knowledge framework. Gamble (2003^b: 78-79) takes an historical perspective on “principled” and “procedural” knowledge. First she considers Sohn-Rethel’s (1978) discussion of the historical division between intellectual and manual labour, and then Zilsel’s (2000) study of the development of science, with its original social class divisions of upper class rationality (thinking) and lower class experimentation (doing). In her discussion, she indicates the long-held division between the intellectual, mathematical and non-empirical (‘General’ knowledge) and the kind of knowledge required for manual work (‘Particular’ knowledge). Gamble (2003^b: 79) notes that science was born and the social prejudice regarding manual labour was “eventually overcome” when the gap between the two was closed through technological advancement. At that time, a collateral relationship developed between the two former oppositions, with rationalists doing experiments. Gamble (2003^b: 79) coined the terms ‘principled’ and ‘procedural’ to describe two closely linked, complementary knowledge forms involved in these collateral relations. Thus General Knowledge can be seen in terms of principled (abstract) and procedural (manual) knowledge; the same applies to Particular Knowledge (Gamble, 2003^b). To explain how abstraction (principled knowledge) applies to manual (procedural knowledge) work, Gamble (2003^b: 83) describes principled knowledge as

abstract and holistic, involving the visualisation of an ideal so that, in relation to this ideal type, the practitioner observes both what is there and what is not. As principled knowledge is held in tacit form, it can only be modelled through showing right and wrong examples. Skilled manual work entails one grasping the abstract principles that underpin the particular aspects; the abstract knowing then directs the concrete procedure, the tactical knowing ‘how to’. Procedural knowledge is therefore derived from principled knowledge. For this reason, Gamble (2003^b: 85) describes principled knowledge as abstract in relation to a concrete particular.

Gamble (2003^b: 80) criticises the development of educational institutions which have separated principled and procedural knowledge. General theoretical training has been introduced to compensate for the limited opportunities for gaining the kind of procedural knowledge that characterised the former relationship between master and apprentice. At approximately the turn of the 20th century, technical education adopted in South Africa, as in Britain, solidified the distinction between theory and practice, and this persists to this day, in many instances.

In a similar vein, Barnett (2006) discusses vocational education, pedagogy and academic disciplines, noting the current emphasis on ‘education for the workplace’ that is often accompanied by a neglect of pedagogy. In this ‘generic’ trend, he notes the danger of thinking that if someone is trained as a teacher, he or she can teach any subject. Providing a sociological perspective, Barnett (2006) extends Bernstein’s work regarding vocational education, referring specifically to Bernstein’s concepts of classification, recontextualisation and framing. While agreeing that some non-occupation specific knowledge is perhaps important, Barnett discusses the difficulties of translating what happens in the workplace into disciplinary knowledge. Situated knowledge (i.e., knowledge transmitted in the workplace) is taught largely tacitly, by modelling and emulation (involving trial and error); it is also fragmented, heterogeneous, and difficult to codify. By contrast, academic knowledge is explicit, sequenced and, as abstract knowledge tends to be, relatively portable. However, because the relevant academic knowledge may also be vital for a particular occupation, Barnett (2006) explains why it is so important to conceptualise the links between the two. When disciplinary knowledge of the academy is recontextualised in relation to the workplace context, the result is a ‘toolbox’ of knowledge that can be applied in various workplace contexts. Strategies used to arrive at this toolbox are workplace-regulated, rather than

pedagogically. This contrasts with the usual one-step recontextualisation required to transform disciplinary knowledge in the academy into academic pedagogy. This means that a double translation or recontextualisation has to occur if workplace knowledge is to be taught adequately. Barnett (2006) therefore argues that workplace education requires a particular vocational pedagogy.

Barnett discusses how vocational knowledge is framed for pedagogy, noting that the criteria used to frame knowledge reflect perceptions about that subject and its position in relation to other subjects. He also notes that the structuring of the knowledge of a discipline is not arbitrary, nor is the way the knowledge units are taught. Pedagogic framing has to link issues such as the situated knowledge of, for example, bed-sores, with the discipline of Biology. Barnett argues that, because of this need for both disciplinary knowledge and situated knowledge, vocational courses need to incorporate both in their curricula. He also raises the question of whether a third dimension shouldn't also be incorporated, namely the values and ethics of workplace practice (echoing Gamble (2003^a) and Taylor (1989) earlier in this section).

Achieving an effective vocational pedagogy requires boundary crossing and it involves inevitable challenges (Barnett, 2006: 154). To cross a boundary in the vocational field, a teacher requires a reasonable amount of insight into the knowledge base of each discipline, an understanding of their interconnections, as well as a reasonable amount of knowledge of the workplace realities. The boundaries are not merely between bodies of knowledge, however, but “between languages, people and identities,” or between discourses. In addition, because there is a constant change in the knowledge base and occupational status of various subjects and their practitioners, Barnett (2006: 155) notes that trying to bridge boundaries is like trying to construct a bridge “between two unstable land masses.” There are also particular difficulties in regions comprising several disciplines, such as Nursing (and, of course, Radiography), because limited attention is paid to each sub-discipline. Decisions about framing these areas while maintaining relevance are therefore difficult. As Barnett concludes, achieving effective vocational pedagogy is a much more complex situation than that which faces the general subject teacher.

Wheelahan (2006: 19) defends the theoretical knowledge base of vocational knowledge, arguing that it is both socially and epistemically important. Drawing on Bernstein and critical realism, she finds they agree on certain understandings of knowledge: both acknowledge the

existence of distinct forms of knowledge structures; both acknowledge the uniqueness of knowledge forms; both agree that knowledge is independent of the context of knowledge production as well as of those who produce it; and both agree that one cannot rely on sensory data alone to understand the real. In addition, they both agree that knowledge is concept-dependent. Wheelahan (2006) also emphasises that both stress the importance of making knowledge structures and the boundaries between knowledge types explicit for learners – and enabling learners to “traverse” them. She (2006) strongly criticises the Australian model of vocational education and training (VET) that is underpinned by competency-based education (CBT), as well as constructivist alternatives. CBT dominates funding; and both CBT and the offered constructivist alternatives sacrifice complexity and depth of vocational knowledge for ‘authentic’ workplace learning. She argues for retaining Bernstein’s ‘esoteric’ knowledge: it is only this form of knowledge that is truly powerful, as it is the site of transformation and possibility, from which one can challenge the social uses of power. She (2006: 34) points out that content is the product of disciplinary knowledge, and reproducing that content alone does not have the generative mechanisms that enables learners to produce such content.

Disciplinary knowledge has epistemic value, as, firstly, it provides representations of causal mechanisms that are not usually directly observable (e.g., in my research site, radiation); secondly, disciplinary knowledge provides relational connections within and between fields; and thirdly, disciplinary knowledge provides access to the particular ways of reasoning in that discipline. Ultimately, it is disciplinary knowledge that “mediates social access to the ‘unthinkable’” (Wheelahan, 2006: 35). In other words, while experience is important, knowledge cannot be reduced to experience alone. Besides, as Barnett (2006) has pointed out, whereas situated knowledge is most valuable initially, when one advances to more senior levels in the workplace, a more balanced blend of situated and disciplinary knowledge is required.

In the South African context, Luckett (2001) expresses concerns that, because of various threats to Higher Education, curriculum reform has become a means of meeting market demands – what she terms ‘marketisation and instrumentalisation’. As an alternative, she promotes the notion of curriculum as an experience, with teachers and learners the key agents enacting the curriculum. Luckett (2001) argues that it is almost only in universities that non-instrumental and non-commercial values are highlighted and developed. She (2001: 52-53) therefore promotes the notion that, through a “...quality HE curriculum”, learners should learn to “...integrate theory with practice (praxis), to be aware of how they do so (meta-

awareness) and of the ethical implications of their choices.” Luckett advocates particular ways of learning and knowing that would characterise an “epistemically diverse curriculum” in Higher Education. These ‘ways’ represent a balance between Nowotny, Scott and Gibbons’s (2001) Mode 1 and Mode 2 learning. In discussing the importance of Mode 2 knowledge, Luckett (2001: 51) stresses that she does not advocate the replacement of Mode 1 knowledge with Mode 2 knowledge, as Mode 1 knowledge is an essential aspect of undergraduate learning through which learners are inducted into the discourse of particular disciplines. However, she (2001: 51) points out that, especially in the light of the majority of South African learners having undergone poor schooling, it is “...vital to include in the HE curriculum an opportunity for learners to think about their own values, ethics and social responsibility and to develop high levels of reflexivity... so that they can work responsibly in Mode 2 teams.” Drawing on Barnett and Griffin (1997), Luckett (2001: 54) argues that Higher Education institutions ought to be “democratic discursive spaces” where there is specialisation in meta-knowing and engagement with multiple knowledge frameworks and their discourses.

She sets out four ‘ways’ of knowing, suggesting how each should be implemented in teaching and learning. These ways are presented in a framework (see Appendix A) based on a horizontal practice-theory axis (from left to right) and a vertical subjective/ contextual-objective/ reductionist axis (from top to bottom). Each resulting quadrant represents a particular kind of knowledge with its associated competence. Thus Quadrant 1 (in the intersection of theory and objective/reductionist) is propositional knowledge, the traditional Mode 1 foundational, cognitive competence. Quadrant 2 (between practice and objective/reductionist on the intersecting axes) refers to practical knowledge, i.e., knowing how to apply the knowledge of Quadrant 1, in a hands-on manner, through apprenticeship. Quadrant 3 knowledge (situated in the intersection between subjective/contextual and practice), refers to experiential knowledge that is relevant to personal (as opposed to practical) competence. This entails important aspects of learning through personal engagement and reflection. Quadrant 4 (in the intersection between subjective/contextual and theory) represents epistemic knowledge: reflexive competence, enabling the learner to use metacognition and think in terms of systems and contexts.

Luckett (2001: 56) argues that traditional technikons have been active in forming industry partnerships to provide learners with “real-world practical placements” (Quadrant 2).

Universities have not always done this, however; and, even where there have been opportunities for work-simulated learning, this has often been in contexts intended to get learners to apply disciplinary theory to rather well-structured problems. Garraway (2007) argues that, in the process of designing simulated workplace problems for academic study, academics design a new academic product that attempts to integrate the workplace and academic knowledge; but, because the real world of work knowledge has been recontextualised, the result is a skewed, asymmetrical hybrid object that it is no longer really meaningful in the workplace. Luckett (2001) argues that, in real world of work contexts, employees have to solve problems in unfamiliar situations where certain solutions have not been tried before – requiring a reformulation of propositional knowledge (Quadrant1) through the application of Mode 2 knowledge.

To view issues of pedagogic discourse and curriculum through the lens of critical realism, one needs to identify what structures, agents and causal mechanisms are at play, their interrelation and their influences or effects. Social relations inherent in structures occupy their own stratum and thus they have their own unique causal mechanisms. Structures, such as education systems, pre-exist occupants of positions and influence their efforts, although not always in ways anticipated or chosen. Agents acting in relation to other agents within those structures may also have individual ambitions and motives, independent of those of other role players in the same context. Bernstein's model of horizontal and vertical discourse provides a structure and a language for identifying the causal mechanisms that generate these two kinds of discourse and the social relations involved in each. Gamble (2003^b), through her conception of principled and procedural knowledge has extended this model; and Barnett (2006), Wheelahan (2006), Luckett (2001) and Garraway (2007), in their discussions of curriculum design and vocational education, have considered the relation between the workplace and the academy in influencing curriculum, and the role of agency and discourse in knowledge constitution in these contexts.

In the conclusion that follows, I will highlight aspects of various social theories that I have discussed in this chapter that are relevant to my research. The inter-relevance of these theories will be summarised, and related to my research questions and critical realism.

2.10 Conclusion

As critical realism is a metatheory, all other theories are viewed through the critical realist lens. Critical realism argues that reality is stratified. For this reason, human knowledge is only ever partial, and it is thus a fallacy to believe that reality is equal to what we can discern or say about it. In any context, it is always possible that unseen causal mechanisms are influencing events or generating tendencies, so an observer's impressions may be mistaken.

As discourse was my unit of analysis, and the language used in various lectures, discussions and interviews pre-existed users, it was also important to bear in mind critical realists' contention that language conveys intended and unintended effects, as it is produced and reproduced by users. Discourse, while an apparent outcome of other generative mechanisms, is itself a generative mechanism: it is socially produced, and users have motives; it also is capable of generating influences and tendencies as it conveys and reproduces attitudes, beliefs, and ideologies.

My research is concerned with how radiographic knowledge is constituted (and construed) and the role of discourse in this process. Because of the central role of discourse in conveying and shaping knowledge, it is vital to understand its role in discussions of knowledge. Each of the theories that I have discussed in this chapter has helped to shape my understanding of the knowledge-language relationship that is central to my research.

As language is always used in a particular context of culture and, embedded within that, a particular context of situation (Halliday, 1978), I drew on Halliday's (1978) framework: I explored knowledge constitution and the role of discourse in two contexts of situation (a university division and a hospital department) embedded within two contexts of culture in South Africa (namely Higher Education and Health Care). Each of these contexts has an associated discourse, although there are overlaps because both contexts are involved in the education of the Radiography learners.

Halliday's (1978) Systemic Functional Linguistics emphasises the roles that language must play in human existence. Language use is always rhetorical, so language should be studied from a functional perspective. In addition to the two contexts mentioned above, three elements of register (the field, tenor and mode of discourse) are realised in any context of situation through three simultaneously produced meanings (ideational, interpersonal and textual).

A context of culture helps people to know precisely what is expected and possible in a context of situation. This understanding is conveyed through discourse that is the outward expression of cultural values, beliefs and attitudes (Kress, 1989). What occurs in a specific context of situation is only possible because of the influence of the broader context of culture. Thus, literacy acts in a context of situation are never insulated: they are always about something else within a broader context of culture.

Discourse plays a central role in the constitution of knowledge. Its use by a community of practice is always situated and functional. Through discourse, the identities of agents are constituted, and their values, interests and aspirations conveyed. For this reason, in the field of discourse, the selection (classification), sequencing, pacing and emphases (framing) and assessment of knowledge (evaluation) conveys to learners what experts (their lecturers and their clinical supervisors) value. The tenor and mode of discourse add layers of meaning in situations. In the process, discourse reproduces and so perpetuates attitudes and power relations among users of that discourse.

The NLS theorists (e.g., Gee, 1999) claim that literacy is a situated, social practice embedded in a particular culture. NLS theorists also stress the importance of sound pedagogy: Gee (1990) argues that both ‘teaching for acquisition’ (largely tacit) and ‘teaching for learning’ (explicit) are vital. Thus the role of experts in a community of practice is not only to model the disciplinary discourse, but to guide novices explicitly in its structure and use. As novices become experts, their knowledge base becomes increasingly abstract, tacit and therefore inaccessible (Geisler, 1994), particularly where practical procedures are involved. However, some like Wenger, McDermot and Snyder (2002) and Jacobs (2006) believe that some aspects of tacit knowledge can become explicit and that it is in the interests of teaching and learning that this should occur.

Communities of Practice theory focuses of the social, cultural group who share common values, goals and practices (e.g., Lave and Wenger, 1981). A community of practice’s knowledge is equated with experience (not a list of competencies), so a community of practice comprises an array of experiences. Members of a community of practice share a common ideology and identity, and sanction what they consider worthwhile knowledge. (A group of lecturers with a distinct knowledge base and discourse therefore comprises a community of practice.) Discourse is central to the group identity: novices are inducted into the competent use of discourse (including language and practices) that conveys certain core

values, identifying users as members. Inability to use the required discourse constitutes a boundary to meaningful membership.

Bernstein (1999) links power relations (dominance of one group by another) with two kinds of knowledge that are identified by particular types of discourse. As this discourse is historically constituted, it is difficult to change. Vertical discourse tends to be associated with schooled, symbolic (abstract) knowledge, while horizontal discourse is often associated with practical, everyday work (concrete). Bernstein further distinguishes two kinds of knowledge structures within vertical discourse. These are hierarchical and horizontal knowledge structures. The former is associated with pure sciences, with tendencies to find general theories, and uniformities. Thus there is a strong integrating motive and boundaries are strongly insulated. Knowledge is increasingly abstract. Within horizontal knowledge structures, by contrast, there are many specialised languages, each with particular modes of interrogation and identifiable text which is treated in distinct ways. Because of this diversity, integration is difficult. Some subjects have strong grammars, such as Maths and Logic, and so their grammar is distinct and recognisable; however, those with weak grammars such as Sociology are less distinct and so more difficult to acquire, as they borrow language from other fields.

In vertical discourse, issues of pedagogy are relevant to the way in which knowledge is constituted, as knowledge is never mediated in its original form: it is recontextualised and so changed. There are levels of achievement, with performance individually graded.

The academic identity affects the way the curriculum is operationalised. Boundaries are also evident between individual departments. Boundaries may not always be visible, but are often conveyed through linguistic and activity signals. For example, 'Civil Engineers' have a different knowledge base and do different work to 'Mechanical Engineers'. Academic departments tend to be autonomous and protect their knowledge base and practices. While interdisciplinary and transdisciplinary Mode 2 projects (Gibbons, 1998) are increasingly making the boundaries between disciplines less distinct, the original boundaries remain to preserve the internal integrity of each discipline. A discipline in Higher Education, as elsewhere, has a community history and an inherited knowledge base that has been classified and so the disciplinary knowledge is distinguished from other bodies of knowledge. Personal characteristics of individuals and the nature of their discipline may, however, make cross-disciplinary connections easier. For example, some disciplines (like Radiography) comprise

several categories or sub-disciplines, so the individuals involved are accustomed to straddling different discourses. They may therefore be less resistant to working beyond the boundaries of their discipline than those who are in pure disciplines, such as Physics. Bernstein's (1999) work on vertical and horizontal discourses is relevant here: the knowledge of some disciplines is strongly classified whereas the knowledge of others is weakly classified. Strongly classified knowledge areas are thus more strongly insulated against outside influences; the converse applies.

The theory on how 'content' and 'language' (using these terms broadly) are interwoven in teaching and learning practices in Higher Education is also relevant to my research. Discourse is always about something, so language is never separate from a context. Theorists working in this area (of content and language integration) are concerned with how to facilitate learners' access to disciplinary knowledge through various literacy practices in the curriculum. Content specialists are seldom aware of the rhetorical features of their disciplinary discourse and so do not make these features explicit for their learners; and because language experts are not experts in the disciplinary discourse, they are not able to do this either. Language specialists also have concerns around the issues of explicit and tacit knowledge: as content specialists often have only a tacit awareness of the ways in which language operates in their discipline (cf. Jacobs, 2006). Content specialists also do not always understand the nature of learner difficulties (as discussed in Chapter 1), so they may label learners' knowledge or competencies in deficit terms, which are also often language-related (e.g., 'the language problem'). Halliday (1978), like the NLS theorists, stresses that the individual is a member of a group, so meaning is social/cultural. He is concerned that learners fail when the cultural patterns of their language use are different to those sanctioned by experts (a community of practice) in a learning institution. He thus regards failure as a social, not an individual, problem.

Geisler's (1994) work on the autonomous text explains how content domain and rhetorical processes have become separated, so that even the nature of expert knowledge has changed. Learners at school level are not encouraged to use their critical faculties in response to (particularly) written text, and this persists in Higher Education, resulting in learners who are unable to 'think' (cf. Chapter 1). Geisler blames the cultural movement of excessive professionalisation for the divide, arguing that content is now presented as neutral and decontextualised, almost without human origin. She, like Gee (1990) stresses the need for the

structure of knowledge to be made explicit for learners; and for the rhetorical role of language to become part of the curriculum so that learners have access to the empowering disciplinary discourse. Wheelahan (2006) argues for retention of esoteric knowledge as it is the only form of knowledge that is powerful, enabling learners to challenge hegemonic practices. Content alone cannot provide learners with the kinds of generative mechanisms to produce more content knowledge.

Theorists such as Taylor (1989), Luckett (2001) and Gamble (2003^a) argue for the reintroduction of moral values and a strong group occupational identity with a vocational work ethic. Like Geisler (1994), they criticise the excessive bending of education to marketisation forces, where productivity is more important than professional values. In the process, knowledge is excessively codified and pedagogy neglected.

In closing, only with full access to the powerful disciplinary discourse and an understanding of the structure of the discipline can learners engage with powerful hegemonies that might need to change if visions of a different world are to be realised. Critical realism advocates a dialectical position between all dualities: between theory and practice, content and language, the tacit and the explicit, teaching and learning, and the expert and the novice. The language specialist may have a particularly valuable role to play in helping content specialists develop their understanding of the role of the rhetorical in their subjects, and by helping them to support the development of their learners by incorporating valuable language competencies in their curricula (e.g., critical reading, and the structure and presentation of text in different genres that are employed by specialists in the discipline). Providing learners with these insights will possibly activate several generative mechanisms, each giving rise to new possibilities in the future.

In the next chapter, I will explain how critical realism relates to methodology, including my analysis of the data gathered.

Chapter 3

RESEARCH METHODOLOGY

As already noted, the following research questions are addressed through my research:

1. How is Radiographic knowledge constituted in a university of technology classroom and a clinical workplace?; and
2. What is the role of discourse in this process?

As also noted, the overall research approach was guided primarily by critical realist ontology. This had important implications for various aspects of the methodology, including the orientation and stance that I adopted. While I have set out and discussed critical realism in more general terms in Chapter 2, here I will discuss various aspects of critical realism solely in relation to their relevance to methodology.

Sayer (1992: 3) contends that method should include the following:

1. Modes of explanation and understanding;
2. The nature and role of abstraction;
3. Research design; and
4. Methods of analysis.

I will use these points as a guide in this chapter. In the first section, I will consider how critical realism provides modes of explanation for my research methodology and the practical implications of these for my research. I will then go on to discuss the nature and role of abstraction in my analysis. Next, I will describe the research design and the methods of analysis that I used to make sense of my data. Lastly, I will touch on ethical considerations.

3.1 Modes of explanation and understanding

Using an ontological explanatory framework for research requires that all aspects of the research process are interpreted within it. These aspects are, firstly, a critical orientation; secondly, an understanding of ontology and its relationship with epistemology and methodology; and thirdly, an acknowledgement of the stratification of reality and the

implications of this for theorising and knowledge claims. Each of these will now be discussed in relation to their implications for my methodology.

3.1.1 A critical orientation

As discussed in Chapter 2, critical realism is critical of understandings of both natural and social reality reflected in much current social theory. Critical realism represents an alternative way of conceptualising reality that has implications for how that reality is researched.

Sayer (1992: 40) contends that method must be critical of its object, both of “practical contexts and associated practices and material structures they produce, which in turn sustain those practices.” He (1992: 41) also argues that “...social science must stand in a critical as well as an explanatory and interpretive relation to its object and to common-sense knowledge...” Method must therefore not just describe, but evaluate. However, as realism is a fallibilist philosophy (Sayer, 1992: 67; 2000: 2), the researcher must be cautious about knowledge claims. The implication of this critical orientation for my research was that, while gathering and analysing my research data, I had to be alert to contexts and practices that indicated power relations among agents in their habitual roles in the research sites (university and hospital), particularly as these might impact on knowledge constitution. I also had to be alert to the ways in which language and literacy aspects were discussed and accorded attention, both in teaching and learning situations and in interviews and group discussions. However, it was also necessary for me to bear in mind that my impressions could be mistaken. I therefore planned to acquire confirmation of my impressions through as many sources as possible.

3.1.2 Relationship among ontology, epistemology and methodology

As mentioned, critical realism has a strong ontological emphasis. Archer (1995) has made a special contribution to realist theory through her emphasis on the importance of consistency among the tripartite connections of ontology, methodology and practical social theorising. Methodology is the central link, and needs to be anchored by ontology and practical social theorising if there is to be internal consistency. As Archer (1995: 22-23) asserts, ontology acts as a “gatekeeper and bouncer” for methodology and the two are mutually regulative. She (1995: 28) adds that “[a]n ontology without a methodology is deaf and dumb; a methodology without an ontology is blind.”

Terreblance and Durrheim (1999) also discuss the need to consider three inextricably linked essentials in research: ontology, epistemology, and methodology. Wedekind (2005) provides a useful explanation of how these three aspects manifest in a research project: at a macro level, the researcher's ontology influences the researcher to ask questions like, 'What is the nature of truth and being?' At the epistemological level, the researcher asks questions like, 'What can we know and how can we come to know something?'; and at the micro level, the researcher asks practical questions like, 'How do I deal with the data?' Critical realism would argue that the answer to part of the second question, what we can know, is inherent in the answer to the first. The question is therefore ontological, not epistemological: what one can know depends on the nature of reality, as there are some levels of reality that we can never know (Bhaskar, 1979).

Danermark *et al.* (2002: 5) emphasise that critical realism, as a metatheory, implies a switch from epistemology to ontology; and from a focus on events, to the mechanisms generating those events. The implication of this for my research was that ontology had to be central to my thinking and theorising about knowledge constitution. This meant that, during the practical research process, during analysis of data and the subsequent drawing of conclusions, I had to be guided by critical realist ontology. The other theories on which I drew to make sense of my data and subsequent conclusions had to be re-interpreted, to some extent, within realist ontology. Most importantly, it meant that I could not rely purely on the empirical; rather, I had to attempt to identify causal mechanisms that generated observable events.

3.1.3 The three domains of reality and knowledge claims

The three domains of reality (the real, the actual and the empirical) have been discussed in Chapter 2. There it was elucidated that the 'real' comprises the intransitive; the 'actual' may or may not be intransitive (because events are generated, even if one does not experience them); and the 'empirical' is of the transitive realm. Bhaskar (1989) remarks that, in critical realism, there is an understanding and acknowledgment that human knowledge claims in social science explanations are part of the empirical, transitive realm and are therefore subject to many historical and temporal influences. They are thus liable to change. He (1975) therefore asserts that we can never fully know the greater intransitive, transcendental reality; moreover, in an interview with Norris (1999), Bhaskar calls it an 'epistemic fallacy' to believe that reality depends on us and on our knowledge of it.

To relate this to my research, knowledge constitution and my theorising about it occurs within the transitive, empirical (and therefore fallible) dimension. Acquiring insight into the mechanisms underlying knowledge constitution in the real dimension is difficult as these mechanisms are not visible or observable; only their effects (such as events) may be observed or experienced when they manifest at indeterminate times following the activation of a generative mechanism. Even then, one invisible mechanism may be operating in conjunction with another equally invisible mechanism; besides, mechanisms merely provide tendencies and influences that are not necessarily activated, so attributing causes is highly fallible. It is for this reason that knowledge claims that I (and other) researchers make about the world must be considered tentative.

Another reason that knowledge claims are fallible relates to ‘open’ and ‘closed’ systems. In an ‘open’ system, such as the world of nature and social science, there is no attempt by the researcher to control variables, as this would create an artificial environment. Structures and agents have their own emergent properties which cannot be contained. Change sometimes produces small, negligible - and often, unintended - results. For this reason, conducting research in an open system implies a humility and realisation of the tentativeness of human knowledge. By contrast, in the natural sciences, closed systems are required if extrinsic and intrinsic conditions are to be met, so precautions must be taken that no uncontrolled properties emerge inside or outside the system (Archer, 1995: 70).

Although our knowledge is fallible, there are degrees of fallibility. Danermark *et al.* (2002: 25) argue that knowledge may have ‘practical adequacy’, even if it is not ‘the truth’; and its usefulness will depend on “how well our concepts capture the generative mechanisms in the objects we study.” Variations in practical adequacy exist because of a stratified and structured reality, where different levels and kinds of practice exist.

To attempt to achieve maximum practical adequacy in my research, I had to include as many sources of information as possible. Observable aspects in the empirical realm included teaching and learning materials (e.g., handouts, overhead transparencies, posters, anatomical models); documents (e.g., the first year Learner Guide, hospital regulations); actions (e.g., explanations and descriptions of content by lecturers and clinical staff); learner activities (e.g., learner projects, tasks and duties); and lecturer activities (planning meetings). I also considered aspects in the actual realm; that is, aspects that were not directly observable but that I experienced as a non-participant observer with the first year learners.

To check my understandings and impressions against those of others involved in situations, I balanced what I had observed, experienced and gleaned from documentation (e.g., Learner Guide, lecturer handouts, log books and learners' clinical notebooks) with what I learned during interviews with lecturers and learners, group discussions and informal talks with lecturers, learners, and clinical radiographers in a hospital department. Regarding Sayer's (1992) contention that knowledge is gained through work and communicative interaction, I reflected on my observations of Radiography learners in the clinical workplace and balanced my observations with views expressed by lecturers, clinical staff and learners on that experience to consider how such practical knowledge complements the (mostly) theoretical knowledge acquired in the CPUT context. I then theorised what underlying mechanisms could reasonably have generated the actual and empirical aspects.

All of the above led me to draw certain conclusions about, for example, academics' notions of practice, and about issues and implications of position and power held by various agents in the academic and clinical contexts. These notions, perhaps tacitly held, constituted generative mechanisms in the real dimension of reality. Finally, I considered the dialectical interplay between the real, actual and empirical phenomena. However, throughout this process, I had to remain aware that, because of the real domain, there were aspects that I would be unable to discern, irrespective of the duration of my observations and the number of interviews and discussions that I held.

There are thus limits to what we can learn, either solely through observing the practices of others, or through analysing the discourse of others, as we cannot be sure that we are gaining true insights into the real dimension of reality. We can, however, aim for a degree of practical adequacy.

3.1.4 Stratification and emergence

Because of the stratification of the world, my research also had to consider the complexities and interplay of culture, structure and agency. Each occupies its own stratum and has its own generative mechanisms that are irreducible to those of the other strata. Generative mechanisms do not act alone, so emergent properties could have been caused by the interplay of generative mechanisms. Understanding this unseen complexity of reality is an important feature of critical realism.

According to Archer (1995: 12), each of the strata - culture, structure and agency - has links with and influences other strata, but is qualitatively different. She (1995) discusses the differentiation of strata by emergence, pointing out that the properties and powers of one stratum emerge before those of another, with the powers and properties of the real emerging before those of the actual and empirical. Once a property/power has emerged, that stratum becomes relatively autonomous from others and then each autonomous property exerts its own power (Archer, 1995: 13-14). Emergence occurs in cycles over long periods of time.

Emergent properties delineate each stratum (Archer, 1995: 9). For example, forms of social organisation occur within the empirical dimension of reality. A particular social structure, such as an educational institution, with its forms of social organisation and relations, has mechanisms that generate events in particular configurations. Then the relations between two structures (like a university and a hospital in this research) may combine to generate further emergent features which may or may not be observable. The implication of this for my research is that influences that emerge from the generative mechanisms of the various strata (of culture, structure and agency) and their relations occur unpredictably over time and affect social relations in subtle ways. These influences may not be observable to me or to other agents, but their effect may be discerned in, for example, observable practices and stated attitudes.

I shall now examine more closely these three strata.

3.1.4.1 Culture

Cultural aspects (comprising ideas, beliefs and ideologies) are historically derived. They may manifest as a strong identity associated with that history. This identity is often noticeable in various texts issued by an organisation (such as a university or hospital). Halliday (1978) would describe such texts as being embedded in a 'context of situation' which, in turn, is embedded within a greater 'context of culture.' As mentioned in Chapter 2 in my discussion of Halliday's (1978) Systemic Functional Linguistics, Halliday (1978) regards language as a branch of Sociology. He emphasises the notion of language as purposive behaviour that conveys social meaning. Because language is a metaphorical system, it is capable of constituting several meanings simultaneously (it is ideological, attitudinal, and value-laden), so it can be examined to gain insights into notions held by agents in social systems. Because we use language functionally, rather than logically (i.e., to achieve various purposes, depending on the macro culture), Halliday (1978) advocates a functional approach to studying language.

As mentioned in Chapter 2, language is used in specific ways by different cultures. A hospital, for example, is part of a greater ‘context of culture’, the Health Care culture. Halliday (1978) considers the importance of taking into account both this broader ‘context of culture’ as well as the ‘context of situation’ (such as the hospital and its departments) in relation to texts produced. With insight into a particular context of culture, one is better able to interpret the context/s of situation embedded within it. In the latter, a particular ‘register’ guides one in predicting or anticipating what text or discourse will be used by others, or what text is appropriate to use in that particular context. Three aspects constitute this predictive role, namely ‘field’, ‘tenor’ and ‘mode’. These have been discussed in depth in Chapter 2.

To relate the above to my analysis of data, I had to examine various texts (both oral and written texts, including transcriptions of spoken text) to discern if they conveyed significant cultural and situational messages relevant to my research. I therefore had to consider within the broad Health Care and Higher Education cultures aspects of the contexts of situation and associated meanings: the field (Radiography within the greater academic and medical context); tenor (who wrote or spoke the texts, in terms of their roles, status and relationships); and mode (the role being played by language). I was particularly interested in spoken and written texts that entry level Radiography learners encountered as they were being socialised into particular practices in what was, for them, a novel context.

3.1.4.2 Structure

As discussed in Chapter 2, structure refers to forms of social organisation and the social relations within these. Each structure occupies its own stratum; and, according to Archer (1995: 9), the relationship of one stratum to another may be described as “Macro” and “Micro” by virtue of temporal aspects and the emergent properties of each, not by virtue of their relative size. The macro systemic features of a structure (for example, various aspects of an educational institution) are either reproduced or transformed through micro features (the interpersonal social activities and relations of agents within that organisation). Micro and macro are thus qualitatively different. Structure, the macro context, refers to forms of social organisation; social relations are always micro to that macro context.

Non-conflation in critical realist research held two implications for my research: firstly, in my analysis of data, these two aspects (structure and agency), had to be analysed separately (“analytical dualism”) and only then their interplay examined; secondly, the social relations and interactions of people in the Radiography division of CPUT would always have to be

considered micro to the macro university structure with its particular systems and underlying generative mechanisms. Likewise, the clinical teaching context in the hospital with its social relations always had to be understood as micro to the hospital's macro structure with its own particular systems and underlying generative mechanisms.

Because the Radiography learners were being educated within both the university and hospital contexts, I had to consider the curriculum of each structure separately and then the interrelationship between the two structures in relation to the constitution of Radiography learners' knowledge. Within the teaching and learning contexts of CPUT Radiography and the clinical teaching environment in the hospital, there was a curriculum which influenced practices by providing a template for the education and training of Radiography learners. The clinical hospital curriculum was not explicitly documented, but served the same purpose.

As mentioned in Chapter 2, analytical dualism is of critical importance in critical realism. I therefore planned to analyse separately the structures of the CPUT Radiography division and a GSH hospital department before exploring their interplay. Each structure had a particular cultural and historical context, with systems that predated current users and properties that would affect the constitution of knowledge. The occupational position of participants and their understandings of their interrelations, including the relative power relations between them, were all aspects of structure that needed to be considered. The historical contexts of each structure also had established traditions that influenced the nature of the social relations that occurred within each structure and influenced relations between structures.

3.1.4.3 Agency

Agents are people acting in and on their worlds in relation to other agents within a particular cultural and structural milieu. Agents included the lecturing staff, the clinical staff, the learners and, to some extent, me as a researcher. Each agent has an educational and experiential history that influences perceptions, aspirations and attitudes to his or her role. Within an open system, agents have the potential for causal efficacy (Archer, 2000). For example, they have the capacity for initiating or continuing transformation through the power of reflection, action and social interaction in a social context (Archer, 1995).

The implication of the above for my research was that I regarded agents as capable of making choices and initiating change in their social context, making an alternative world possible, despite uncontrollable variables typically found in open systems (such as the intentions of other

agents, or the ways in which culture, structure and entrenched systems tend to pre-ordain what occurs in certain settings). In my data analysis, the role of individual agents, as well as their interplay, was explored; I also considered the interplay between agents and structure. For example, I considered notions of agents about Radiographic knowledge and practice, the way in which agents acted individually (the role of individual choice and initiative - or lack thereof - in relation to current teaching and learning practices); the way they interacted (e.g., their planning and collaboration); and the way their intentions and interactions were enabled or constrained by structure and other variables in teaching and learning situations.

As a researcher, I also needed to consider my own historical and professional influences and how these might affect my interpretation of findings. For example, my language and teaching/learning background provided a sound basis for exploring teaching and learning practices. However, I am not a radiographer, and thus, while I was observing practices and interviewing lecturers and learners, I was aware that my background was a fallible base from which to explain and understand practices and issues. I could draw conclusions, but my intention was to describe, explore and discuss, not make irrefutable claims to 'the truth' in this realm as, over time and with more knowledge, it was possible that such insights might prove incorrect. I needed to discuss with participants my understandings and impressions to ensure that they had a reasonable basis.

On the positive side (although it would probably be impossible to ascertain), I wondered whether, through my presence in our multiple interactions (e.g., in the staffroom, during meetings, in teaching venues, and during interviews and discussions), participants (lecturers, radiographers and learners) might have reflected on their practice and, where appropriate, these reflections might have generated change. Before and during the period of data gathering, I was invited by lecturers to discuss preliminary findings of my research and to make suggestions for improvement at a future date. These discussions were informal and held with individuals rather than the full group of Radiography lecturers as, until I had had a chance to view my data holistically - and in the light of the theories set out in Chapter 2 - I was unwilling to make comments that were based on incomplete reflection. Through such interactions, involving (as they tend to do) dialogue and reflection on teaching and learning, what Harvey (2002) calls a 'dialectic' - a dynamic force flowing against permanencies - possibly came into play. Through my interactions with lecturers especially, I was therefore

possibly an agent of potential change, in accordance with my concern for continued reflection on, and striving for transformation in, educational practices in Higher Education.

It was also important to consider my relationship with other agents, because, as Sayer (1992) reminds us, knowledge develops through work and communicative interaction (such as sharing experience and negotiating meaning in the CPUT Radiography context). My relationship with these colleagues was three-fold: I was (and remain) a colleague of many years (and thus I am a 'collegial friend'); I was (and remain) the Faculty Language Coordinator (and in that capacity I am consulted regarding - and am expected to influence - language and literacy notions and practices in teaching and learning); and, more particularly during my visits to the CPUT Radiography division, I was (and remain) a researcher which, during the data gathering period of my research in 2006, situated me in a somewhat different - and perhaps difficult - relationship to my colleagues. They were aware that I was there to scrutinise and evaluate as many aspects of their teaching and learning practices as possible in a given period.

As mentioned, when conceptualising a social structure as an open system involving various agents, it is relevant to consider that social interaction is micro to the macro structure (Archer, 1995), because then one bears in mind the total context when assessing how any desired transformation may be possible. In an open system, social interaction may influence, but not determine, change. Nor, as mentioned earlier, does change necessarily occur in an anticipated or desired direction. The implication of this for my research was that I had to be aware that, despite appearances and efforts, historical and current influences in the macro structure would continuously influence intentions, perhaps beyond the control of any agent. It was also important to note, in this regard, that because of the role of agency (Archer, 1995: 12) and because structure and agency each has unique potential emergent properties and powers (Archer, 1995: 106), I had to be careful not to mistake the influence of either as determinism.

Regarding the prospect of changes in practice by agents such as staff and learners alike, critical realism reminds us that change does not occur through human choice alone, as the context within which change may be envisaged is a given, with pre-existing conditioning from the past (Sayer, 1992: 10). Such conditioning will necessarily impact on the extent and nature of any elaboration that occurs – or, indeed, inhibit it altogether. The implication of this for my research was that, because the emergent properties of culture, structure and agency are themselves a

consequence of past conditioning and cycles of social action, interaction and elaboration, I needed to consider the impact on agency of the interplay between the pre-existing culture, structure and agency of the hospital and the CPUT Radiography division, each with its history, systems and practices.

3.2 Abstraction, language and concepts in structural analysis

In Chapter 2, I discussed in some detail the centrality of language, concepts and conceptualisation in knowledge constitution. Here, I consider these aspects further, particularly the role of abstraction as expressed through language, in relation to theorising about the constitution of knowledge.

3.2.1 The nature and role of abstraction

In this discussion, it is necessary to differentiate ‘concrete’ from ‘abstract’. Although one tends to consider the abstract as non-observable, and the concrete as observable, this is not always the case (Danermark *et al.*, 2002: 43). Sayer (1992: 87) explains that concrete refers to something that is more than empirical; it refers not only to what exists but to its constitution through “a combination of diverse elements or forces.” Understanding the concrete always involves a double movement from concrete to abstract and then back to concrete. Until this is done, our initial understandings of the concrete may be “superficial or chaotic”. This resonates with Gamble’s (2003^b) discussion of principled and procedural knowledge: these are complementary as, whether in theory or practice, one needs both an abstract/theoretical understanding and a visualisation of the concrete/practical dimension.

Abstraction is used in a particular sense in critical research methodology: an abstract concept includes only part of an object. To abstract means to isolate each element (although, in reality, such elements could not normally exist in isolation). Through isolation, we create a distance between the object of study and other objects. The purpose of this process is to clarify the essence or core of a phenomenon (Danermark *et al.*, 2002: 48), not to conceal its complexity. Many abstractions, such as gender, role, and norm, are only perceptible through their effects, so their generative mechanisms are not observable (Danermark *et al.*, 2002: 43). Abstraction therefore functions to illuminate what is observed and helps to theorise possible underlying generative mechanisms (Danermark *et al.*, 2002: 50). The purpose of abstraction should be mainly to determine the constitutive properties and the nature of objects. This is achieved by structural analysis first; then causal analysis (Danermark *et al.*, 2002: 70).

Structural analysis is an advanced form of abstraction, involving what Danermark *et al.* (2002: 45) describe as going through a process of structuring, restructuring and adjusting abstractions so as to avoid irrelevance in the research process. The implication of this has been discussed in the previous section: separate structures must first be analysed closely in abstract terms, then their interplay. In this way, one may achieve insight into the causal mechanisms that could be generating observable events.

In light of the above, during my research, in descriptions of the research site and the routine activities that occurred there, it was important to distinguish various abstract aspects (such as conceptions of knowledge, professionalism and hierarchy) from concrete aspects (like teaching and learning interactions, documents and teaching aids). The intention was to discern or uncover possible generative mechanisms giving rise to emergent properties.

Danermark *et al.* (2002: 45-47) discuss the importance of distinguishing between the nature of relations in structural analysis. The relations between two objects or social phenomena may be ‘formal’ – also termed ‘contingent’/‘external’ (Sayer, 1992: 89) or ‘substantial’ – also termed ‘necessary’/‘internal’ relations (Sayer, 1992: 89). For purposes of clarity, I will use the terms ‘necessary’ and ‘contingent’ as I find that they better explicate the nature of the relations. The term ‘contingent relations’ refers to the relationship between objects that lack real connection, where interaction is lacking. The objects may merely have shared characteristics, such as two towns linked by a road, or the age of two people. By contrast, ‘substantial’ relations are real relationships involving interaction between people or objects. The relationship between a parent and child would be described as ‘necessary’: one can only be a parent by virtue of having a child; and one can only be a child if one has a parent. Necessary relations involve mutual conditioning; and the one cannot exist and be what it is without the other, although the relationship may not be harmonious or equally balanced.

Objects, both social and natural, are characterised by necessity; that is, they necessarily have causal powers (that enable) and liabilities (that inhibit), as well as mechanisms (ways of acting). As notions of all phenomena (including actions, texts and institutions) are concept-dependent, a researcher needs to interpret and explain phenomena. However, this may prove difficult, because unobservable mental processes, social relations and structures have causal power, so they can cause change (Bhaskar, 1979; Sayer, 1992: 2). For this reason, Sayer (1992: 2) asserts that their qualitative nature needs to be conceptualised and this involves the use of abstraction.

Danermark *et al.* (2002: 47, 97) reason that several forms of inference can be used to uncover and understand the nature of an object. Deduction, induction, abduction and retroduction are four such forms of inference, with the latter two being particularly useful in social science. These modes of inference are thought operations that move one in one's thinking from one point to another (Danermark *et al.*, 2002: 79). Each has strengths and limitations. I shall briefly discuss abduction and retroduction here as these two forms of inference that I used are less well known.

Abduction involves reconceptualising or recontextualising something within a conceptual framework which provides the known with fresh meaning (Danermark *et al.*, 2002: 91). Redescriptions do not necessarily provide truths; however, they may provide a deeper understanding of a concrete event. In my research, I used abduction to recontextualise knowledge constitution practices in the university classroom in terms of the requirements of the clinical workplace environment and the Radiography lecturers' vision for the emerging radiography profession. In the process, new light was shed on the relevance of the university's teaching and learning practices to the world of work.

Retroduction is a mode of inference used to discern the essence of objects, e.g., the constituents of structures (Danermark *et al.*, 2002: 96). The process involves asking a simple question, such as one or more of these: "What does the existence of this object presuppose?"; "What is it about this object that caused it to do such and such?"; or "What can one not remove from this object before it ceases to be what it is?" In the process, the researcher must distinguish between concrete and abstract to clarify the nature of underlying generative mechanisms (Danermark *et al.*, 2002: 47). This also involves separating the necessary from the contingent, which may be difficult as relations are combined in complex ways in any concrete situation. Sayer (1992: 87) explains that, if we are to get answers to questions like those posed here, a double process is needed: a move from the concrete to the abstract; then back from the abstract to the concrete. The concrete concepts will probably be "superficial or chaotic" at first, but once they are abstracted and combined with other abstractions, the concepts may grasp the concrete objects in such a way that greater clarity and depth of understanding is achieved.

Abstractions "freeze" a moment of a process, so they only indirectly indicate processes and movement. This 'movement' from concrete to abstract and back to concrete continues throughout research, ending only when analysis ends (Danermark *et al.*, 2002: 51-52).

To conclude, abstractions have the advantage of bringing into clearer focus those aspects of a research situation that one needs to understand (as best as possible) to gain insight into underlying causal mechanisms at play.

3.2.2 The role of language in concept development

Previously, it was mentioned that, as the observable belongs in the empirical domain of reality while causal mechanisms are part of the real domain, we cannot observe causal mechanisms in action in the empirical domain. We therefore have to be cautious about drawing conclusions about reality from what we observe. There is another reason for caution, however: we cannot separate our concepts of what we are observing from the objects of observation themselves, because we think with and about concepts (Sayer, 1992; Carspecken, 1996; Danermark *et al.*, 2002; Archer, 1995). For this reason, personal concepts may limit and influence explanation. As Sayer (1992: 5) explains, “Our knowledge of the world is fallible and theory-laden.”

Turning to a consideration of the role of language in conceptualization, according to Sayer (2000), we only know the world around us through particular descriptions and in keeping with available discourses. To access the causal properties of social objects, the qualitative nature of social objects and the relations among them need to be conceptualised, interpreted and explained through language (Sayer, 1992: 2, 6). Freeman (1996: 367) reminds us that language is always used to express and represent thought: “Language provides the pivotal link in data collection between the unseen mental world of the participants and the public world of the research process.” However, it must be remembered that language is also a causal mechanism: in their discussion of causal mechanisms and texts, Fairclough, Jessop and Sayer (2001: 7) argue that “...if a cause is whatever produces any change, then semiosis and texts must be causal.” (It is worth noting that these authors prefer the term ‘semiosis’ to ‘language’ and ‘discourse’ as they regard it as less confusing).

In critical realism, the role of language is regarded as crucial. For example, Sayer (1992) argues that knowledge cannot be reduced to what we can say or write about it, as this ignores non-verbal aspects. Rather, knowledge is gained through both work/labour and communicative interaction. Like the language that represents it, knowledge is constantly evolving; it is not a fixed product but a process.

As discussed in Chapter 2 and earlier in this chapter, language encapsulates our concepts, and is the means by which we communicate our understandings to others. In Higher Education, it is largely through spoken and written language that humans express concepts and pass on shared and valued knowledge, culture and notions of social reality (although much may also be passed on and acquired tacitly). Acquiring the appropriate discourse of a discipline is a signal of a learner's readiness for inclusion in a community of practice. In most educational contexts, much assessment of competency is through the medium of the spoken and/or written word.

Because of the strong links between knowledge, communicative interaction and language (Sayer, 1992: 6), the challenges of the educational and language background of some of the learners, as well as my interest in the role of discourse in the constitution of radiographic knowledge, I paid particular attention to the ways in which lecturing and clinical staff used language (both verbal and non-verbal) to constitute radiographic knowledge for first year learners.

All text has unintended effects – messages are not only sent intentionally; and they are not necessarily understood as intended (Danermark *et al.*, 2002). Thus, in the analysis of my data I had to consider that I – and others in a situation – might have misunderstood what was observed and heard; and, so, when I interviewed and discussed events with staff and learners, I tried to remember that my questions and their answers could be misunderstood. For this reason, in interviews and discussions, I tried to compare my conceptualisations and conclusions with those of others.

3.3 Research design

This research was intended to provide a window on the world of educational practices in the teaching and learning context of the university and the clinical environment of the hospital. The focus was on the ways in which knowledge was constituted in those two contexts and the role of discourse in that process.

A basic case study research design was used (Yin, 2003). In a case study, an in-depth investigation of a single context occurs employing “thick” description and “multiple perspectives” (Babbie and Mouton, 2001: 281). In other words, the intention was not to gather data from a wide variety of separate contexts, but to examine in rich depth the interplay of culture, structure and agency in the context of a single educational programme. The Radiography programme was conducted in two sites of learning, namely the university

and the clinical department. According to Merriam (1988), case studies should have four traits: be particularistic (focusing on a specific phenomenon); descriptive (detailed, ‘thick’ description, including as many aspects as possible over as long a period as possible); heuristic (resulting in a more profound understanding of the situation); and inductive (the findings can lead to conclusions that may generate theory). Interpretation and understanding are not the key purposes, however: explanation is. A case study design is therefore also appropriate in critical realist research, involving as it does an in-depth exploration and attempted explanation of the causal mechanisms underlying the transitive, every-changing world experienced by individuals within a multi-layered social context.

Danermark *et al.* (2002: 151) lay a systematic foundation for the choice of method. They advocate ‘critical methodological pluralism’. Instead of using the traditional terms ‘qualitative’ and ‘quantitative’, they prefer the terms ‘extensive’ and ‘intensive’ research design, and regard both as constantly involved in practical research work. In my research, I used only intensive design.

‘Intensive’ design refers to questions related to processes in a particular or small number of cases. Agents and their actions are the focus; and necessary relations are of interest. Causal contexts and activities are involved. However, it is understood that patterns of concrete relations discerned may not be causally related although, superficially, they may appear to be. These patterns and relations may also not be ‘usual’ or ‘generalisable’.

Danermark *et al.* (2002: 151-152) discuss the reason for the break with the traditional qualitative/quantitative dichotomy. According to them, this dichotomy, as often presented, obscures the nature of reality as presented in critical realist ontology. Nor does the dichotomy truly represent the realities of the research process which often includes aspects of both approaches. Excluding any method in advance is not possible; combining methods from both may be beneficial. This is not to say, however, that all methods are suitable. This has to be decided by considering the relationship between the metatheory (the ontology), the method and the practical theorising.

In line with descriptive and explanatory research, I employed strategies that are sensitive to complex and fluctuating contexts. As a researcher, I adopted an ethnographic approach, using thick description (Carspecken, 1996). Babbie and Mouton (2001: 279) explain that original descriptions of ethnography included a cultural perspective: it incorporated “...data of cultural

anthropology that is derived from the direct observation of behaviour in a particular society. The making, reporting and evaluation of these observations are tasks of the ethnographer.” They (*ibid*) report that the original anthropological links have been lost over time, as the term ‘ethnography’ has since been used for a myriad studies in multiple research sites. They note, however, that many now argue for a more cultural perspective on ethnography, so as to understand activity from an insider’s point of view and so learn from people (e.g., Spradley, 1979). I endorse the latter sense of ethnography as a cultural activity in which the researcher endeavours to learn from those in the research site. It is in this sense that I use the term ‘ethnography’ in my research.

Freeman (1996: 371-373) notes that, in data analysis and interpretation, three aspects must be considered, namely stance, process and categories. Stance refers to the attitude of the researcher to the participants in relation to gathering and analysing the data (to be discussed below); process denotes the unfolding of data analysis throughout the research process (this may be linear or iterative); and the researcher’s choice of categories shapes the first two.

The analytical stance of the researcher is important (Freeman, 1996: 368-369), as it explains the breadth and depth of insights gained. In relation to gathering the data, my stance was sometimes ‘participatory’: I was personally able to generate data by experiencing the same lectures, practicals and tours that the first year learners did during the first term, as I observed, listened, read handouts and took notes. I did not participate in assessments and activities, such as group work, during lectures except once, when I helped a group of learners to find terms in a dictionary; nor did I ask, nor respond to, questions in class. At times, my stance was ‘collaborative’: as I had shared certain experiences with the first year learners, we sometimes shared our views on an experience (e.g., during a practical, a hospital tour, or after a lecture). At yet other times, my stance was ‘declarative’: after the end of the first term of 2006, I documented participants’ thinking during group discussions and interviews, and described the learners’ actions and comments during my visits to a clinical department. My stance could therefore be described as having spread along a continuum between ‘researcher as insider’ and ‘researcher as outsider’. During analysis of the data, I tried to include and balance all the perspectives and insights that I had gained in relation to my research questions.

The case study included an exploration of several sub-contexts involving interactions among the various cultures, structures and agents in the research site: the university classroom; the

clinical workplace of the hospital; Radiography planning meetings; interactions among lecturers; interactions among radiographers; and lecturer-learner, radiographer-learner, and learner-patient interactions (although the latter was not the focus of my research). As a result, I needed to use various kinds of data production and gathering. Documents (e.g., the Vision and Mission of the institution in relation to the specific discipline; the Radiography website; and the first year curriculum) were reviewed to gain an understanding of the chosen emphases of the discipline. Observations of teaching and learning events provided insight into the daily knowledge development and language practices in that context. These were followed by individual interviews and group discussions so that I could reflect on, then probe to confirm or revise understandings and impressions gained as an observer. This was especially important as I was in a 'new' culture. In-depth details of these sources and methods will be listed shortly.

For the purpose of easy reference, I will now summarise details of the selection of data sources, and how data were collected and analysed.

3.3.1 Site selection

The Groote Schuur Radiography division of CPUT was chosen as it offered several features that distinguished it from many other academic divisions that I had experienced:

1. As mentioned in Chapter 2, the subject Communication is not formally part of the Radiography curriculum, yet Communication outcomes are integrated into the division's outcomes-based curriculum. Radiography lecturers therefore ostensibly integrated these into their content curricula. In theory, therefore, boundary crossing occurred and could be observed; and
2. The workplace (the hospital) and academy are closely interwoven in Radiography education, so the real needs of the workplace are continuously considered by the academy and the relevance and usefulness of their curricula are constantly reviewed.

3.3.2 Event selection

Events included:

1. Planning meetings of the Radiography lecturers. Three planning meetings were observed. One of these was in 2005 and included a discussion with two first year learners regarding

their views on the first year programme which they had just completed; the other two meetings were observed in 2006.

2. All classroom teaching and learning events involving first years in the first term of teaching (from 1 February to 20 March 2006); and
3. Three clinical department visits (21 April, 5 May and 19 May) to observe first years working alongside clinical radiographers in the workplace.

3.3.3 Participant selection: 2006

1. Lecturers: These were all the Radiography lecturers who were teaching the first year learners in the first term of 2006.
2. Learners:
 - There were 31 first year Radiography learners. I selected thirteen of these learners for group discussions and interviews on the basis that they alone were in their first tertiary year, whereas the other learners had either worked or studied for a year or more after leaving secondary school.
 - Three third year learners were selected by the senior lecturer for a group discussion with me. They were selected because they were considered articulate in English, though English was an additional language for them.
3. Clinical staff: informal discussions were held with radiographers and the head of radiography in a particular department, as these radiographers were involved in the clinical supervision of CPUT Radiography learners.

3.3.4 Data collection

Freeman (1996: 365) notes that "...how one observes and collects data shapes what one sees; ...this caveat is particularly apt in research on teacher knowledge...because it deals with a cognitive world that is unseen, unheard, and only indirectly observable."

Data collected were of two types: observational data and verbal data (gathering and production):

1. Observational and verbal data gathered in the natural settings of a university teaching venue and a clinical department in the hospital;
2. Verbal data gathered from a variety of documentation issued to learners. These documents were issued both by the hospital and the university, covering aspects such as hospital policy and procedure, and the first year Radiography Learner Guide;
3. Verbal data gathered during meetings of the university teaching staff; and
4. Verbal data produced in the artificial setting of planned interviews, group discussions and unplanned, informal conversations.

I will now discuss each of these in detail.

3.3.4.1 Observational (non-verbal) data and field notes

According to Silverman (2000: 37), “[e]thnographies are based on observational work in particular settings.” Observation is what Freeman (1996: 366-367) terms ‘first order’ research, as the researcher makes statements/field notes about what is directly observed in the world; by contrast, in ‘second order’ research, the researcher focuses on participants’/people’s experiences of the events and views on topics. Silverman (2000: 126) explains the value of field notes: “...making field notes is not simply recording data but also analysing them. The categories you use will inevitably be theoretically saturated – whether or not you realise it.” This was certainly so in the case of my field notes: towards the end of the first term, I began to read through my notes and reflections. As I did so, I identified categories or themes. I used a system of colour coding in the margins alongside my notes and thereby grouped these themes (see Appendix B).

As discussed in the context of critical realism, observation alone is insufficient, as it merely sheds light on the empirical level of reality. Nevertheless, observation was an important starting point for establishing familiarity with the teaching and learning contexts typically experienced by first year Radiography learners. I took detailed notes on what I was seeing and hearing during subject lectures, leaving the opposite page open for reflections, comments, cross-references among different subject lectures, and to note questions that I might have. When I visited a clinical department, I similarly took notes on what I saw and heard, although this was often difficult as I was ‘on my feet’ and frequently in an examination room where a patient was being positioned for an X-ray. It was not always

possible to observe clearly what was being done, as radiographers and Radiography learners (who had to be able to observe) usually obscured my view.

3.3.4.2 Verbal data (spoken and written text)

Freeman (1996: 367) stresses that ‘second order’ research (i.e., people’s experiences of events/topics) must be explicit at two levels: firstly, data must be defined (what the data are and how they relate to the purpose of the research); and secondly, data must be explained (how and by whom they are gathered, analysed, and interpreted). This section describes the gathering of verbal data from lectures, documents and various events involving, or related to, research participants.

1. *Gathered in university and hospital venues:* As mentioned, I accompanied the first year class throughout the first term of 2006. I took lecture notes so as to experience as closely as possible what learners were experiencing. I noted phrases used by lecturers and teaching staff in the university classroom, during hospital tours, and in a clinical department. I also noted learner questions and responses in these contexts.
2. *Gathered from various documents:* I examined certain documents (some of which were given to learners) so as to glean their possible influence on the constitution of knowledge by lecturers and on learners’ understanding of Radiography. Documents included the 2006 first year Learner Guide, hospital policy and procedures, and a rules and regulations document. During their first clinical practice, I asked the small group of learners to respond to various questions in the notebook that I had prepared for them (see Appendix C).
3. *Gathered from interviews and group discussions:*
 - Two sets of interviews were held with individual lecturing staff: the first set focused on the constitution of Radiographic knowledge; the second set focused on the role of discourse in the constitution of that knowledge (see Appendices D and E).
 - One set of individual interviews was held with first year learners regarding their perceived English proficiency and their role in coping with learning about Radiography through the medium of English (see Appendix F).

- Three group discussions were held with the first years at different stages of the year. The first was held at the beginning of March, a month since their first day of orientation and after their first week of lectures (but before their first clinical practice block). This discussion focused on their understanding of Radiographic knowledge and their personal experience of constructing that knowledge (see Appendix G). The second group discussion was held at the end of March, in the last week of term, after their first clinical practice experience, focusing on their experiences and learning in the clinical workplace environment (see Appendix H). The final group discussion was held in September and concentrated on their retrospective views on the course and their role and responsibility as learners (see Appendix I).
- A group discussion was also held with a group of three third year learners, the purpose of which was to get their retrospective views on their radiographic learning, and the role of language in that learning over the past three years (see Appendix J.)

All interviews were conducted in English, were audio-taped and then transcribed.

As I was/am not a highly experienced interviewer, I tried to conduct interviews and discussions in accordance with the following advice from literature on the subject:

Silverman (2000: 36) reminds us that it is questionable if interview responses can possibly give us direct access to the experiences of others: an interview may merely elicit one narrative from a number of other possible ones, as the interviewee might have assigned multiple meanings or interpretations to a situation.

Kvale (1996) conceives of the qualitative researcher as a traveller. This metaphor is helpful, as it describes the role of the researcher-interviewer building understandings through dialectic with those involved along the way. In a similar vein, Remenyi (2005) encourages researchers to regard the interview as an Inter View, involving the participation of both interviewer and interviewee. He (2005) cautions that it is a mistake to view interviewees as passive agents and suggests that “reflexive intelligence” be employed in negotiating the meaning of questions and answers together. Because of my common experience as a lecturer (in the lecturer interviews) and as a quasi learner (in the case of interviews and discussions with learners), I regarded our interviews as a sharing of views and experience. Carspecken (1996:

155) too notes that research participants should have a voice in the research process and so the researcher's initial role should be more that of a facilitator, in a supportive environment. In this role, s/he is able to help participants to explore issues in their own words, using their own metaphors and ideas. I disagree to some extent with Carspecken's advice that the interviewer should not share his/her ideas with interviewees as this might influence their openness with him/her. My experience was that, when learners, lecturers and I had had a common experience, our discussion was open and the data that was produced was rich. I do agree with Remenyi (2005), though, that there is realistically a limited degree of symmetry or equality in the interviews, as the knowledge base of the two parties is unequal. This is not to say that either is superior in all knowledge to the other – if that were the case, the interview would not be necessary! Nevertheless, the interviewer should strive to establish rapport with the interviewee/s. Thus, especially with learner interviewees, I kept language simple and clear, with referents as concrete as possible; and when potentially difficult or complex terms were used, I first explained these and gave examples (as suggested by Foddy, 1993: 41). Of course, one does not always anticipate terms that will not be understood.

Interviewing as a means of gathering data is strewn with complications. Remenyi (2005) points out that more control on the part of the interviewer is assumed than is actually the case: the researcher plans the questions, but this itself affects the information that is going to be generated. Foddy (1993) and Remenyi (2005) also indicate that interviewees don't always give appropriate replies to questions. This may be because they misinterpret questions. I sometimes noticed this with first years whose responses indicated that they did not understand a term used in a question. This in itself, though, gave me some insight into the learner's level of English proficiency and how they were likely to be coping with the sometimes highly technical terms used in Radiography lectures.

The interviewer is not always very experienced and therefore, not being at ease, may not set the interviewee at ease, which would affect the latter's openness in response to questions (Foddy, 1993). Interviewees may also have their own unknown agendas and therefore not provide a comprehensive picture. Foddy (1993: 18) concludes that it is probably unrealistic to expect perfect control in the expression and interpretation of questions, given the complex nature of human communication.

Foddy (1993) advises the interviewer to pay attention to the context in which questions are asked as the cultural context may influence the interpretation of, and response to, a question

(Foddy, 1993). Increasing the number of people interviewed can provide a better chance of improving the clarity of information.

Foddy (1993: 35) advises the interviewer not to rush the interview as interviewees need time to answer questions fully. For this reason, I usually requested an hour for interviews with lecturers and for group discussions with learners (we ran over this time in some cases) and 30 minutes for interviews with learners (learners that I interviewed on their own tended to elaborate less than when they were in groups).

At the end of each question or issue discussed, it may be important for the interviewer to summarise for the interviewee what she has learned before going on to the question because, as Foddy (1993: 40) points out, “[e]ven when words are understood as intended, unintended nuances can interfere with communication.” I tended to paraphrase my understanding of what the respondent had said to confirm that I had understood the respondent.

Various authors offer advice about preparing for an interview to ensure the best outcomes. Kvale (1996), for example, emphasises the importance of choosing a theme or focus for an interview. Once this is decided, other considerations can follow. Foddy (1993) suggests that, in an interview schedule, it may be helpful to write the purpose of each question alongside, as this helps to ensure that questions are in line with one’s research questions. I did this (see Appendix E and I), but found it more useful to list the focus areas of the interview above relevant questions so that I could check that my discussions remained relevant to those focus areas (see Appendix D).

Carspecken (1996: 154) suggests that one should interview or hold group discussions only after a thick record of observations has been compiled. I conducted the first interviews with learners in early March, after three weeks of orientation and a week of lectures. Interviews with lecturers were held in the last ten days of the first term. The three group discussions with first year learners were also held after a significant amount of time (on 23 February, after three weeks of orientation; on 28 March, after their first clinical practice; and on 12 September, shortly before the final tests at the end of the third term of 2006). The group discussion with the three third year learners was also held on 12 September.

Qualitative interviews should ideally be semi-structured and be designed for flexibility. Carspecken (1996: 156-158) suggests a particular protocol: formulate two to five lead-off questions to open up the broad topic for discussion. I planned more than that, but often found

that, in discussion, respondents provided information that later questions had been designed to elicit.

Carspecken says that the focus of initial questions should be concrete, not abstract. I did not always consider this when compiling interview questions. For example, the question that I asked both learners and lecturers in the first interviews was probably too abstract and phrased too academically for learners (“How would you describe your general English proficiency?”). However, I generally paraphrased a question if it seemed that there was any uncertainty about its meaning. For example, I would re-phrase along the lines of, “Do you think your English is okay?” and then probe further for clarity.

Carspecken (1996) suggests that, as an interviewer, one should draw on what one has personally observed (e.g., in a teaching venue, or during an examination of a core document), as one can then compare one’s record with that of the interviewee/s. This was the starting point for one of my group discussions (see Appendix G).

During the course of the interview, Carspecken (1996) advises that the interviewer should strive to guide the direction of the interview on the basis of what the respondent says, using follow-up questions per topic domain on the basis of possible conversation directions. I did this and sometimes an unplanned, fairly long discussion ensued and provided rich insight into the contexts of teaching and learning, though the information was not always totally relevant to my research questions.

Remenyi (2005) advises that, at the end of an interview, it may be valuable to ask interviewees if they have anything to add that is relevant to what has been discussed. I did this in the case of learner interviews that were fairly short, but the pressure of completing the lecturer interviews usually did not allow for this.

It is suggested that interviews be audio-taped and listened to in conjunction, if possible, with copious notes (Remenyi, 2005). I did not listen to audiotapes with notes; I transcribed interviews/discussions in full and printed these. Remenyi (2005) also suggests that, to facilitate analysis, transcripts be coded to identify themes/foci. I colour coded the transcripts thematically, underlined significant text and made summary notes in the margins.

Remenyi (2005) notes that case study information may be presented in several ways: as a chronology (using a time line for structure); as a play (indicating both a time line and

multiple people and their different accounts); a biography (tracking a group's or an individual's story); and as voices (allowing quoted words to stand alone). As Remenyi (2005) notes, story-telling is an intrinsic part of social science research. I chose to use a combination of these: I used chronology (in that I sequenced some data in order of time); biography (in that the group discussions related the stories of some of the learners); and voices (I quoted an individual's statement if it struck me as powerful). However, to provide a meta- structure for my data that would incorporate all these configurations, I used a model of knowledge constitution based on Halliday's (1978) contexts of culture and situation (see Appendix L).

3.4 Methods of analysis

3.4.1 Unit of analysis

The chosen unit of analysis was participants' discourse regarding:

1. Radiography as a field of knowledge;
2. Knowledge constitution practices (as revealed during observations, interviews and group discussions); and
3. The role of discourse in the constitution of Radiographic knowledge (as revealed during observations, interviews and group discussions).

I also examined the transcripts of interviews with learners to gain insight into how they construed the constitution of their knowledge.

3.4.2 Analysis of data

Silverman (2000: 39) notes that we all code what we observe, whether or not we are aware of it. Coding in research is part of the object of inquiry, as it helps the researcher to make sense of the great amount of data typically gathered. Data analysis should be shaped by the choice of categories used by the researcher. I chose to use Guided Analysis (see continuum of categories, Freeman, 1996: 372). In this form of data analysis, categories or themes are shaped by ongoing interaction with the data. These categories are originally *a priori*, derived from previous knowledge and experience about the topic and preliminary consideration of the research context and focus. Further development of knowledge during the research process can change these categories, depending on what the researcher actually finds in the data. As previously mentioned, I originally colour coded my field notes by using colour in the margins

alongside text (see Appendix B). These notes were gathered in a journal as I observed teaching and learning situations in the first term of 2006. There were initially approximately ten categories. I colour coded all interview and group discussion transcriptions to match this initial colour coding. Through this system, the links in meaning across pages of data could easily be located. For example, a purple stripe in the left hand margin indicated that the focus of the notes was Pedagogy, while a yellow stripe indicated Assessment.

Subsequently, in line with Guided Analysis, I used only three colour categories (see Appendix K) to correspond with the three main categories of the working model of knowledge constitution that I developed (see Appendix L). These categories were derived from Halliday's (1978) notions of 'field', 'tenor' and 'mode' of discourse, the categories against which I would analyse the data from my theoretical chapter.

Although I reduced the number of categories, the original colour categories were useful in further analysis: for example, if I was looking for sections of a transcript related to working in integrated teams (as part of the 'field' of discourse, for example), I scanned for brown coding on the transcripts, even though I was using red to indicate 'field'.

3.4.3 Truth claims

In the empirical domain, the term 'conclusions' remains at the empirical level, whereas in critical realism, one's conclusions – other than that tendencies exist - are made without certainty: as Danermark *et al.* (2002: 57) comment, "Statements about tendencies are transfactual, as mechanisms of objects may be doing other than what appears to be the case."

For this reason, critical realists (e.g., Danermark *et al.*, 2002: 76) remind us that, in social sciences, as elsewhere, unfounded generalisations should be avoided. While explaining that critical realism does not have a particular method - a method is chosen according to the object being studied - they (2002: 73) argue that methodology should involve generalising claims. However, as it is important to note how the terms 'generalisation', 'prediction' and 'causes' are used in critical realism, I shall now explain this.

In general, scientific generalisations are used in an empiricist sense. Thus they denote, for example, the size of a population to which one can generalise an observation. In critical realism, there are two senses in which something can be general: it can either occur generally (i.e., it is commonly observed or is recurrent); or it may be general regarding its constituent

properties: ‘transfactual conditions’ are the fundamental constituent properties or structures of something that one can try to access by retroductive inference (Danermark *et al.*, 2002: 77-78). Thus, in my research context, it was essential that I tried to identify the essential properties of various objects; that is, what made those objects what they were and not something else (e.g., radiographers, lecturers, the knowledge base of radiography, teaching and learning practices, and the language of radiography).

Regarding the notion of ‘prediction’, in social science it makes sense, then, that Danermark *et al.* (2002: 69) caution researchers regarding prediction: the relation between an object of study (e.g., knowledge) and its properties (e.g., a process) is necessary; the nature of the relations between unseen mechanisms underlying the constitution of that knowledge, and the effects of knowledge constitution, are contingent. Several mechanisms which we cannot perceive may be producing the effects that we observe, so we can only refer to ‘tendencies’, not ‘laws’ of prediction. Danermark *et al.* (2002) therefore argue that explanation, not ‘prediction’, is what makes claims practically relevant. In everyday life, we can usually predict to some extent what will happen if we act to try to change a negative situation. However, in social science, unless we know precisely what causal mechanisms are at play (which is unlikely), and understand the fundamental constituents of structures involved (which is also doubtful), predictions are risky.

Regarding ‘cause’ in critical realism, ‘cause’ similarly does not refer to the relation between separate events. Real causes in social science are not observable (Danermark *et al.*, 2002: 54). In the natural arena, the relation between a natural object and its causal powers is one of necessity. However, the relation between a causal power and its effects in social science is not necessary but contingent. We can thus only say that a social object ‘tends’ to operate in a particular way when it seems that certain generative mechanisms are triggered (e.g., by the actions of people); and, even then, while actions may be conditioned, they are not determined by mechanisms, as alternatives and unseen circumstances affect how they function (e.g., actions may not be prompted by choice but by imposition).

3.4.4 Validation

Regarding validation of analysis and conclusions, the term ‘triangulate’ has traditionally been used in qualitative research (Mathison, 1988). According to Silverman, (2000: 98), triangulation is intended to provide a cumulative view on data derived from different contexts. Because discourse (as the unit of analysis) involved several contexts which framed

and lent weight to the interpretation of data, such contexts were taken into account when analysing the data (for example, documents were analysed in their context of use, namely the university classroom or hospital department). This offered the benefit of providing an examination of the interplay of data. However, Silverman (2000: 99) argues that one cannot assume that simply ‘aggregating’ data will lead to a cumulative ‘truth’. Denzin and Lincoln (2005: 5) note that triangulation is really an alternative to validation, and that multiple methods should rather be viewed as a “...strategy that adds rigor, breadth, complexity, richness and depth to any inquiry.”

Richardson and St Pierre (2005: 963) express concern regarding the term ‘triangulation’, as the term suggests that there is a fixed point or truth that can be triangulated. Instead, they prefer the term ‘crystallisation’, as it indicates the complex, multi-faceted nature of a topic. Implicit in the metaphor of a crystal is a paradox: many facets of the topic may be visible, but some are not, so it is doubtful whether we can really understand all existing facets. The notion of a crystal, with its various planes, patterns, reflections and internal and external colours accurately conveys the multiple perspectives, dimensions and reflections of reality in social science research contexts. This image also resonates with the critical realist description of reality having varying strata or dimensions, some of which will never be understood clearly.

3.4.5 Theory development

Babbie and Mouton (2001) claim that case study findings are tested for their fit with previous knowledge (“analytic generalisation”) and that they have “great potential for theory development.” Yin (2003) too discusses these aspects and points out that, while a case study cannot be generalised to other populations or other case studies, it can be generalised back to theory. I am a member of an NRF-funded research niche, WILRU (Work Integrated Learning Research Unit). Over the past three years, the research base developed by WILRU has provided a rich theoretical foundation on the relationships among Higher Education, the world of work and knowledge development in both contexts. Findings from this case study will therefore ‘speak back’ to this body of knowledge.

3.5 Conclusion

Critical realism is an ontological metatheory that regards reality as stratified. All strata of reality, both observable and unobservable, have causal powers. Critical realism is built on an understanding of natural necessity in life: there is a natural necessity between an object and its causal powers. The object of critical realist research is to attempt to uncover the probable causal mechanisms that generate particular tendencies and patterns in the empirical domain of reality.

Critical realist research examines aspects of culture, structure and agency and the relations between these. To understand relations, abstraction through structural, then causal, analysis is necessary. Structural analysis, an advanced form of abstraction, requires the researcher to isolate particular parts of the object of research to see each more clearly, to see how forms of social organisation, systems and embedded social relations are configured and the processes involved in their functioning. Throughout the research, as a researcher, one must be aware of the role of language in one's conceptualisations. Abduction (recontextualisation or redescription that offers new insights into a known phenomenon) and retrodution (a thought operation that allows us to approximate the essence of a phenomenon) are two forms of inference that are particularly useful as, through these mental processes, one is able to gain a clearer understanding of the research object.

Throughout the research, one's objects of study, methods of data collection and subsequent analysis should be understood in relation to the ontological framework of reality that critical realism outlines for researchers. Thus generalisation, conclusions, prediction, causation and validation all have particular meanings when used in critical realist research.

The ethnographic approach used in this case study was enriching, as it provided me with an opportunity to learn through close engagement with research participants and their situations in multi-faceted situations embedded within the cultural contexts of Higher Education and Health Care. In the process, I had to remain aware of my stance as a non-participant observer in teaching and learning situations.

3.6 Ethics permission

To conduct research in the academic context of the former Peninsula Technikon, ethics permission was obtained from the Chairperson of the CPUT Health Sciences Research Ethics Committee (see Appendix M). Ethics permission was also obtained to go into the clinical

departments of Groote Schuur where patients were present. This was obtained from the University of Cape Town Ethics committee who are responsible for granting or refusing ethics permission for researchers to conduct research in the clinical ambit of Groote Schuur Hospital (see Appendix N). Unfortunately, I was unable to accompany the first year learners into the clinical environment during their first clinical practice, as there had been some confusion regarding whether or not I would require ethics permission at that stage. By the time I found out that I needed it, it was too late. However, I was then able to visit the learners in a clinical department on three other occasions during the first half of 2006.

Ethics permission was obtained from all first year Radiography learners on the first day of orientation when I explained the purpose of my research and what I envisaged I would be doing there. In addition, I obtained individual informed consent from all Radiography lecturers, as well as from the learners who comprised the two smaller discussion groups (of first and third years).

In the following chapters, I will refer to individual lecturers and learners by pseudonyms. All participants have been given female names. I have randomly assigned English, Xhosa and Afrikaans names. I allocated pseudonyms to the lecturers; learners allocated their own pseudonyms initially (to facilitate my identification of them in audio-taped group discussions); I then changed these again so as to ensure the confidentiality of individuals.

Chapter 4

A MODEL OF THE CONSTITUTION OF RADIOGRAPHIC KNOWLEDGE

In this chapter, I describe a language-based model of knowledge constitution to frame the analysis of my data. This model is socially embedded and contextually driven and is derived from a working model (see Appendix L). It was against this working model that I analysed data in relation to the theory in Chapter 2. In the working model, I have configured relevant modes of explanation regarding my research questions in relation to critical realist theory and the two contexts of culture and context described by Halliday (1978) and also discussed in Chapter 2. I will begin by describing the broad features of this working model in some detail; thereafter, I will sketch a simpler diagrammatic model (see Fig. 1) adapted from Eggins (2004: 111) that reflects the basics of the working model.

4.1 Description of a working model

The model is based on Halliday's (1978) notion of language as an active metaphorical system comprising several levels of meaning. Language is always situated in a 'context of situation' which is embedded within a foundational 'context of culture' that prescribes and delimits what language can possibly be used and what it can possibly mean for that culture (Kress, 1989). The horizontal sections of the model are therefore organised to reflect these contexts, beginning with the context of culture.

Within the context of situation, the first column of the model is divided vertically into three aspects of register, namely 'field', 'tenor' and 'mode' of discourse. Within that first column, under those appellations, are summaries of modes of explanation presented in Chapter 2, i.e., theories relevant to knowledge constitution and the role of discourse.

The next column to the right of this provides a critical realist perspective on these theories because critical realism is the ontological lens for interpreting all other theories.

The third column is subdivided into the two contexts of culture (Higher Education and Health Care) with the corresponding two contexts of situation embedded within each (CPUT and GSH).

4.2 A simple model of knowledge constitution from a critical realist perspective

This diagrammatic model indicates the context of situation, including three aspects of register (field, tenor and mode of discourse) embedded within a context of culture; and all are conceptualised through the lens of critical realism. Although the model is derived from a linguistic framework (Systemic Functional Linguistics), it also provides a suitable framework for conceptualising knowledge constitution, as knowledge is constituted through discourse.

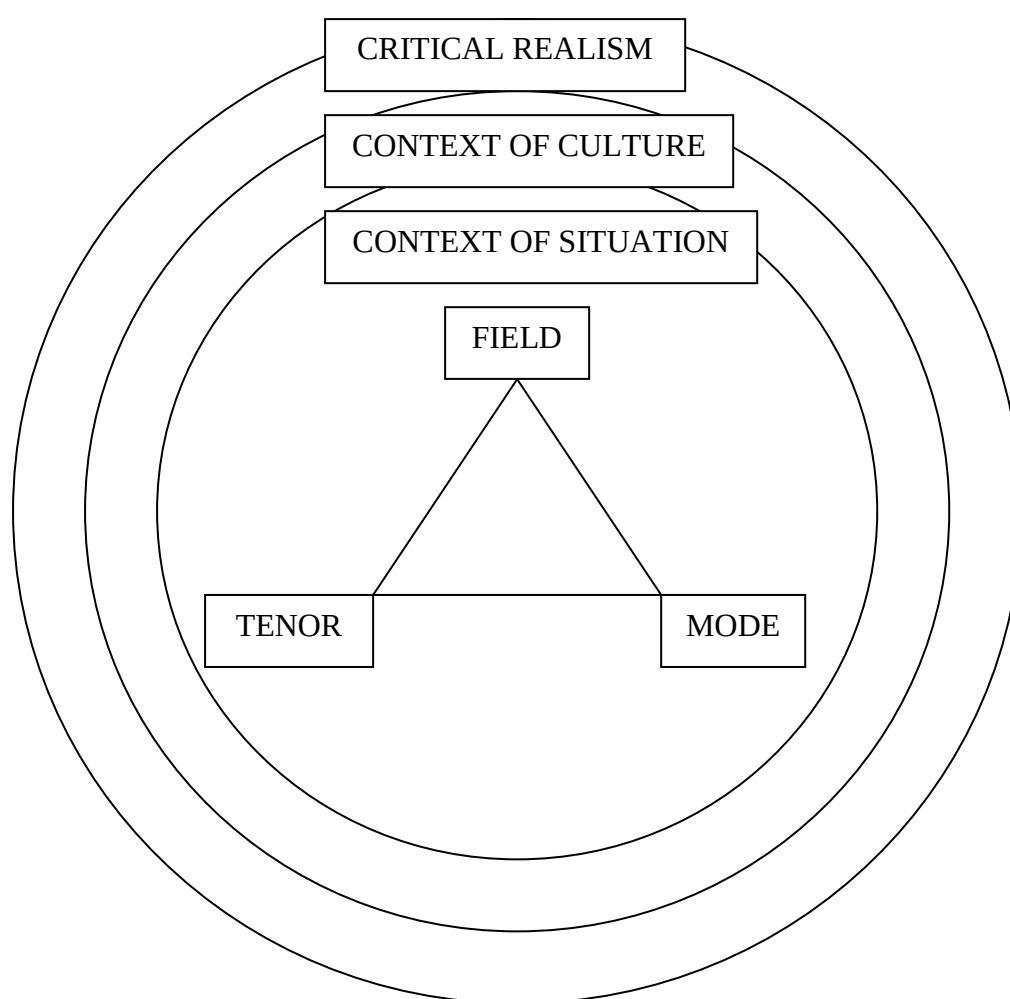


Figure 4.1 Model adapted from Eggins (2004: 111)

Discourse was the unit of analysis in my research (see Chapter 3). I remind the reader that I use the term ‘Discourse’ in both senses that Gee (1990: 3) does, i.e., both as a stretch of language and as “...a particular social group’s way of being in the world, their ‘form of life’, their very identity...” (Gee, 1990: 3). I also use discourse in the sense that Kress (1989) indicates, namely as organised statements that express meanings, values and ideology of an

institution, and that delimit what may be said and done (and how it may be said and done) in a culture.

4.3 Description: the contexts of culture and situation

As description should precede explanation, and the concrete should precede abstraction, in this chapter, I shall briefly describe concrete aspects of the research site: the university classroom situated within the Higher Education culture, and the clinical department situated within the Health Care culture (Halliday, 1978).

In the following chapters, information and insights from my daily journal are indicated by a bracketed date, e.g. (10 Feb.); interview information is indicated by a bracketed date in bold text, e.g., (**14 Mar.**); and group discussions are indicated by GD, plus the relevant date (e.g., GD 3, 12 Sep.).

4.3.1 ‘Contexts of culture’: Higher Education and Health Care

According to Halliday (1978), any ‘context of situation’ needs to be understood within its broader ‘context of culture’. The two significant cultural contexts in this research were Higher Education and Health Care. I have provided some background on both these contexts in Chapter 1. As Higher Education was my key interest, however, I concentrated on that context: I referred to global influences on curriculum priorities and changes in South African Higher Education; I then outlined the history of institutions of higher learning in South Africa, particularly the former Colleges of Education and their transformation into technikons (and more recently into Universities of Technology); finally, I described some of the history and evolution of the Academic Development movement in South African Higher Education, particularly as it affected academic activities at the former Peninsula Technikon. I shall not repeat those details here. Rather, I will describe the two contexts of situation that are embedded in those contexts of culture, namely the Radiography division of CPUT and the clinical department of GSH that I chose to visit.

4.3.2 Two intertwined ‘contexts of situation’: CPUT and GSH

As mentioned previously, the Radiography learners’ education and training was provided by both CPUT Radiography lecturers and the clinical radiographers in various departments of GSH. From early in their first year (2006), learners experienced a mixture of theory and practice, spending approximately equal time in the academy and clinical departments. During

this time, their knowledge of Radiography was constituted through various means: there was the official documentation such as the Learner Guide; there was some exposure to the hospital context during guided tours of various departments; and several members of staff of CPUT and GSH addressed learners about a variety of topics related to being a radiographer and working in a hospital as part of a Health Care team. Notions about the cultures of Health Care and Higher Education, with their respective ideals, beliefs, traditions and values, were conveyed explicitly and/or tacitly through these means. In both university and clinical contexts, learners encountered the knowledge and discourse of Radiography, both in its more formal academic form (largely context-independent knowledge in the university classroom) and in its more practical form (context-dependent knowledge in clinical departments). How this knowledge was constituted, and the role of discourse in the process, will become apparent in the next few chapters.

My discussion will be organised around field, tenor and mode of discourse, the three facets of register in any social context of situation in which all literacy acts are embedded (Halliday, 1978).

In line with critical realist methodology, I will begin by describing concrete aspects of the CPUT Radiography division and a GSH clinical department. (As I spent much less time in the latter context than in the university context, my descriptions will be less detailed). I will then describe how especially Radiography lecturers and, to a lesser extent, clinical radiographers construed radiographic knowledge and the radiography profession, as I believe that these notions were causal mechanisms that would have influenced how they classified, framed and evaluated radiographic knowledge.

I begin with a description of the site of my study (namely the university Radiography division based at Groote Schuur Hospital), as well as the Radiography lecturers and learners.

4.3.2.1 The CPUT Radiography division

The Radiography division at Groote Schuur Hospital (GSH) in Observatory, Cape Town, is part of CPUT's Department of Radiography and Nursing which, in turn, is a department of the Faculty of Health and Wellness Sciences based on the Bellville campus, some 30 km distant. The Radiography division occupies a wing of the Old Main Building at the hospital. Space is limited in the division, so all venues are small: there is one small classroom with an adjacent darkroom, a secretarial office, a staffroom, a library, a meeting room and a computer

centre. The rest of the area comprises mainly lecturers' offices. There is a second, large classroom upstairs, a short walk away.

In 2006, learners could enrol for a three-year National Diploma course in Radiography. Those who had aspirations to study further (and who qualified to do so) could do a fourth year BTech degree. Thus there were four year levels of learners studying in the division. Time-tabling ensured that the division was able to accommodate all four groups: at any one time, the first and the third year groups were in academic block while the second and fourth years were on clinical practice (and vice versa).

The roster indicated that weekdays were divided into three 2-hour lectures. Sometimes each lecture was further subdivided. The roster was compiled on a weekly basis in consultation with all lecturers, allowing for up-to-date flexibility and creativity in planning and prioritising.

The Radiography lecturers

The Radiography lecturers of CPUT comprise a community of practice. To paraphrase Wenger, McDermot and Snyder's (2002: 4) description, communities of practice are groups who, because of a shared concern, problem, and/or passion, pursue relevant knowledge and expertise and interact regularly. This aptly describes the Radiography lecturers at Groote Schuur Hospital. On the first day of orientation (1 Feb.), when the lecturers were introduced to the first years, the Senior Lecturer described the lecturers as a team whose members were "very much connected". She said, "We work together so much as a team that divisions are not always so easy to see."

At the time of my ethnographic study, there were eight lecturers and one senior lecturer. Seven of the nine lecturers taught the first years during the first term of 2006. (One lecturer retired mid-year, so I did not conduct a second interview with her). All lecturers had been working in the CPUT Radiography division at GSH for a number of years. All but one was female. Most of these lecturers had extensive previous radiographic workplace experience; and all had a teaching qualification.

The lecturers supported growth – their learners', each other's and that of their profession. At the time of my research, most members of the division were engaged in, or had recently completed, further studies.

Linda (24 Mar.) described Radiography lecturers as “multi-disciplinary professionals.” Their identities varied slightly because of their chosen specialisations, although many had specialised in at least two fields. Linda (24 Mar.) commented: “If you look at our group you’ll find each of us has got a speciality, a hobby, almost.”

The lecturers held weekly meetings (conducted in round table formation). During these meetings, the staff discussed a wide range of issues, tackled challenges and planned the week’s lecture schedule. During one of the meetings that I attended, I noticed that, when a lecture coordinator asked lecturers to fill ‘skills development’ slots on the roster for the following week, individuals volunteered to present particular lectures. On 14 February, I wrote in my notebook that everyone seemed to talk/contribute to the discussion with great earnestness – often at the same time! In my notebook, I reflected: “They also discuss at length (sometimes tediously long for me) all issues affecting processes, fairness to learners, part-time lecturers, professional bodies, log books, etc.” (17 Mar.). The lecturers also spoke about aspects of radiography during tea and lunch breaks. I always found them willing to be drawn into discussion on educational and language issues.

Seminars were sometimes included in weekly meetings (one was planned per month). Lecturers took turns to do presentations; and discussion followed. Seminars focused on aspects such as a staff member’s research interest, curriculum development, and assessment; or the forum served as a rehearsal for (or a re-presentation of) a conference presentation. Lecturers expressed keen interest in each other’s work and discussions were lively.

The Radiography learners

Aspiring radiographers undergo a selection process. In the second half of 2005, promising candidates from among the approximately 300 applicants were selected to attend a panel interview where they were assessed against various criteria (see Appendix O) and a final selection was made. In 2006, the class size was 31 (i.e., about 10 % of the initial number of applicants).

In the first year class in 2006, there were 25 female and 6 male learners (i.e., 31 learners). Their dominant languages were as follows: 14 English, 11 isiXhosa, 2 Afrikaans, 2 North Sotho, 1 South Sotho, and 1 Swazi. Eighteen of this group had completed Grade 12 (matriculation) some time before 2005. Learners indicated that they had either worked or studied elsewhere for between one and four years since then. Only 13 of the class group had

been in Grade 12 in 2005. I chose to conduct in-depth discussions and interviews with this small group, as they shared a relative inexperience of the world of work and Higher Education.

Ten of the 13 learners had chosen to specialise in Diagnostic Radiography; the other three had chosen Radiotherapy. The group comprised 11 females and 2 males. Their ages varied between 17 and 23 years (their average age was 19 years). Their dominant languages were: English (7); isiXhosa (4); North Sotho (1) and Afrikaans (1).

Pre-requisite subjects for studying Radiography included Grade 12 Maths, and a science subject (Physical Science/Physics, Biology, or Physiology), plus languages. The first year curriculum draws on and builds upon knowledge from all these areas. In 2006, three learners were admitted without Grade 12 Biology or Physiology. It was challenging for them to compensate for the gaps in their school knowledge while simultaneously staying abreast of new work. (By the end of their second year, one of them had left the course). During Clinical Radiography Practice (12 Feb.), learners were told they would be expected to revise Grade 12 work independently because there was limited time for revision of this work during lectures.

As the medium of instruction of CPUT is English, I recorded the research group's Grade 12 English scores, as well as their university English proficiency scores (although I was aware that neither of these was likely to provide a precise indication of the learners' English proficiency levels). With one exception, the group's Grade 12 English scores were all C's and D's; only one learner had scored an E, an isiXhosa-speaking learner who had chosen to register for English First Language, Higher Grade (usually only English first language speakers choose to register for Higher Grade).

The university English proficiency scores were noticeably higher than the Grade 12 marks, with 9 of the 13 learners scoring a grade higher than their Grade 12 scores. One of the learners had scored comparably poorly in her mid-year Grade 12 exams (44 %). She passed the final Grade 12 English examination with 53 %. However, she also scored very poorly in the university English proficiency test, with an average score of 33 % for the equally weighted multiple choice and writing sections. Her results were thus much lower than those of her classmates. Only one other learner failed the university proficiency test, and her result was not a true reflection of her ability, as she did not do the writing (i.e., the composing)

section of the test. Her multiple choice score of 56 % was thus halved, resulting in a total score of 28 %.

When asked about their level of English proficiency in individual interviews (**6 to 9 Mar.**), the learners' views varied little: most were reasonably confident about studying, and being assessed, through the medium of English. As they had all been taught and assessed through the medium of English during their schooling, this was perhaps not surprising. Only two of the learners regarded their English as inadequate: Angela (**9 Mar.**) said: "...I'm not so good in English, I don't know it properly"; and Sharon (**9 Mar.**) said: "I don't think it's fine because sometimes I don't understand what the lecturers are saying." When asked whether this was because of medical terminology or more general language, she said that both were difficult.

Lecturers regarded learner's English proficiency as highly significant to their coping with the programme and with their success. Katy (**15 Nov.**) said that learners' English proficiency affected their understanding of lectures and textbooks. Cindy (**15 Nov.**), for example, said: "English first language students tend to grasp things much better...they understand the terms much better than the English second language students." She added that many L2 English learners' English proficiency affected their ability to understand what they were reading, particularly certain journal articles, as these were written for medical doctors, so the language was medical. For this reason, the lecturers concentrated on building up the learners' medical terminology from the first day of their studies. (The ways in which this was done will be discussed in the next chapters.)

Because many learners' writing competencies were poorly developed, along with their limited English proficiency, they did not express themselves clearly in tests and, if the lecturer could not follow their argument, they were then liable to lose marks (Cindy, **15 Nov.**).

Fiona (**15 Nov.**) believed that learners' limited English proficiency affected their confidence: "The ones who are not English first language tend not to want to speak in class...I think if English is not your home language, it's difficult, it's very difficult."

Katy (**15 Nov.**) explained that, since the time when she had trained as a radiographer, the literacy demands of radiography had increased - reading, writing, speaking - and learners therefore had to have a reasonable level of English. She recalled: "We simply came to class,

took notes, wrote tests, that was the only form of evaluation, the written test, so people could learn rote fashion without even understanding the work, but nowadays we also expect them to produce written assignments and so on, ...so nowadays we actually expect more of the learners.”

I will now provide some insight into the learners’ reasons for having chosen to study Radiography; and, after three weeks of orientation, their insights into some of the challenges involved, even before they attended their first clinical practice block. Critical realism would argue that the learners’ motivations and understandings of what was involved in studying Radiography were causal mechanisms that would influence their responses to the challenges facing them.

The learners’ views on their new environment, their experiences of orientation (including lectures) and their comments about their lecturers, suggested that they had a positive attitude towards their role as learners, the profession and the day-to-day work that lay ahead. After three weeks of orientation (GD 1, 23 Feb.), learners said that they had been motivated to study Radiography for several reasons. These included the following: “I feel that I like helping people”; “I love the fact that I am in the chain of saving lives in some way”; “I wanted to be part of a medical team”; “Radiography... it’s more exciting for me, you see different people and you experience different things”; “It was something different and interesting”; “...you see how important the radiographer actually is”; “It’s not a job where you’re in the office all day,... there’s lots of variety,... you’re busy all the time”; and “...it’s really, really exciting.”

The learners were aware of the personal qualities required for, and the challenges involved in, the work of a radiographer. A learner noted that the work was difficult, “...especially if you’re not used to being around people who are ill.” She added: “...if you’re a radiographer you can’t be scared of blood and things.” Another learner said that working with cancer patients required maturity: “...you must be responsible, just act calmly, because you can’t let them see (that you are shocked).” Because radiographers had to care for patients, they needed to be emotionally stable. A learner said: “You must know how to work with people and empathise with them... you have to be emotionally strong not to cry with them.” The importance of effective communication with patients was also recognised: “You should be able to ask them (questions) and explain to a person what is happening....” When a learner was asked to select the personal quality that was most important, she replied: “I think they’re

all important because they're all interconnected... you need all the aspects to be an excellent radiographer.”

4.3.2.2 A clinical department at Groote Schuur Hospital

Groote Schuur is a large, state-subsidised, provincial hospital situated in Observatory, Cape Town. It is world-renowned as the site of the world's first human heart transplant performed by Professor Christian Barnard in 1967. Like many large state hospitals, GSH is a teaching hospital. For this reason, the practical training course components for several professions and institutions, including CPUT Radiography, occur there.

Although I visited several hospital departments during the orientation tour, I chose to visit the same department during my three visits, because that department focused on Diagnostic Radiography, the largest radiography discipline and the chosen specialisation of 10 of the group of 13 learners.

Situated in the new GSH building, the department housed clinical radiographers and radiologists in offices lining one side of a passage. On the opposite side of the passage was a series of examination rooms where radiographs (X-rays) were taken. The dark room, the supply store, and the daylight processor (the modern equipment that efficiently processes radiographic images) were also in the central passage, or in rooms leading from it.

In this central passage, various tasks were performed: radiographs were examined on viewing boxes; folders and radiographs were labelled and annotated; new patient folders were received from reception; and radiographers consulted one another. Unused film cartridges were also stored in this area.

From this passage, each examination room was entered through a door (while patients entered through another door from the waiting room beyond). An illuminated red light above the door to each examination room indicated to outsiders that a radiograph was being taken, and warned that entering would expose them to radiation.

Radiographs of patients were taken according to specifications provided by the doctor or radiologist on a Request Form (see Appendix P).

There was a large notice board with notices related to the first years' presence in the clinical department. On this were pinned duty rosters and a clinical roster, providing dates, times and names of learners who would be attending tutorials in various departments.

In the next three chapters, I will draw on the ethnographic data that I gathered to describe how knowledge was constituted in these two contexts of situation (CPUT and GSH). My discussion will be situated within Halliday's (1978) framework comprising three components of discourse (field, tenor and mode) and thus the three chapters are named according to these components.

Where there are overlaps with the three hallmarks of Bernstein's (1996) theory of pedagogic discourse and practice (namely classification, framing and evaluation), I will note these. In each section, I will also provide a critical realist perspective on the issues discussed. Generally, the two contexts will be discussed separately; however, because of the close relationship of the two, there will be overlaps at times.

Chapter 5

THE FIELD OF DISCOURSE

Literacy acts are always situated, i.e., they have a context and thus are best understood within that context (Lave and Wenger, 1991). Embedded within the cultural contexts of Higher Education and Health Care, the field of discourse was Radiography education and training in both the university and the hospital contexts. The ‘field of discourse’ refers to what is spoken about, what is occurring, the subject or discipline, the institutional setting for the language used and the social practices, including interaction. In analysing the field, I will first discuss the university context.

5.1 The ‘field of discourse’ at CPUT

The Radiography lecturers, authorities in the Radiography discipline, constituted the Radiography curriculum for the first year Radiography learners. It is important to gain some insight into, firstly, how the lecturers conceptualised the essential knowledge base of Radiography; secondly, how they identified themselves both as radiography professionals and as academics; and, thirdly, their vision for the future of radiography. Critical realism would regard these concepts as causal mechanisms that influenced their discourse and the ways in which, in Bernsteinian (1978) terms, they classified, framed and evaluated Radiographic knowledge.

When interviewed, CPUT Radiography lecturers described Radiography in several ways. The full version, indicating individual contributions, can be found in Appendix Q. I have summarised these views here. It is noticeable that all the descriptions link theory and practice:

1. The purpose of Radiography is to use radiation (or other means) to diagnose and treat illness;
2. Its knowledge base is “more than paper knowledge”, it’s “the whole profession”;
3. It has several knowledge bases (core sciences, “a whole lot of other disciplines”);
4. It involves a close link between theory and practice, as indicated by these descriptions:

- It is “very clinically based, it’s absolutely driven by clinical practice and very Radiographic-specific...”;
- It is “...the professional knowledge that you need to undertake your job,” involving “increasingly applied” theory;
- It involves learning the practical radiographic procedures in relation to theory (learners have to “marry” the theory and practical).
- In the practical process, learning becomes “increasingly applied and tacit”.
- It includes some “management” knowledge; “technical” knowledge (including more “general knowledge of equipment”); knowledge of “imaging”; “medical” knowledge; and aspects of nursing. It also includes a focus on human sciences because radiographers deal closely with patients.
- It has a specific ‘language’, so working as a radiographer involves knowing and using the radiographic and medical terminology appropriately in the workplace.

All the Radiography lecturers had previously practised as radiographers, and said that they regarded themselves as radiographers who had become Radiography lecturers. I understood the lecturers’ dual identities (as radiographers and lecturers), including their attitude to these two professions, to be causal mechanisms that would influence their curriculum choices and teaching and learning practices.

The Radiography profession was described by Linda (**24 Mar.**) as a ‘caring’ profession. She explained: “...patient care is just as important, whatever discipline you do and whether you are seeing someone for ten or fifteen minutes. There’s a standard of professional care and communication.”

Lecturers expressed different reasons for identifying with the profession. Nadine (**17 Mar.**), for example, said that radiography was special because it involved “dealing with patients.” Patsy (**23 Mar.**) said she found the work endlessly fascinating because the human body was “...an interesting, difficult area to work with... you can never become an expert on everything, not in your lifetime.” Helen (**22 Mar.**) said that, for her, radiography was “...a profession, working in a hospital.” She added: “...the people and machines I loved; and I found diseases fascinating and even trauma units quite exciting.”

The lecturers explained that radiographers identify with a broader medical team. Nadine (**17 Mar.**) expressed this as follows: "...it's [radiography] not something you can go and practise exclusively; you are part of that medical team."

All the lecturers had acquired teachers' diplomas while practising as radiographers. They said that, even though education had not initially been their chosen field, they enjoyed their current role as Radiography lecturers. Cindy (**28 Mar.**) commented: "I don't think initially when I started Radiography I thought I would like to teach"; however, she added, "I now have a keen interest in teaching." Helen (**22 Mar.**) explained that going into teaching seemed "a natural step to take". Patsy (**23 Mar.**) expressed her enjoyment of teaching Radiography as follows: "I'm very passionate about it [radiography]. I love to introduce the passion that I have for it. I want to share that."

The lecturers shared their perceptions about the links between their role as lecturers and the radiography profession. Because the Radiography division was based at the hospital, the lecturers, to different degrees, were able to work in both contexts: even though their base was usually the university classroom, they also conducted clinical tutorials in clinical departments. They said that they enjoyed lecturing Radiography because it is a highly applied science and, with their experience, they could meaningfully relate for learners the relevance of the academic theory to workplace practices. Fiona (**23 Mar.**) explained: "I think that, for me, the best part of Radiography teaching is that ability to teach now in class and then take your learners and go and do... I'd hate to lose that". Nadine (**17 Mar.**) similarly said:

I can do teaching and radiography as well...the learners link up the theory with what's happening in the practical. This allows me to teach but I still go down to the department and I do clinicals [tutorials] with the patients, and with the learners... so it's the best of both worlds.

The lecturers regarded radiography as a 'calling'; and on several occasions I heard them talk about radiography as an 'emerging profession' with which they strongly identified. They were enthusiastic about contributing to the growth of the profession in various ways. For some, this involved studying further to get formal qualifications; for others, it meant pursuing an interest and initiating new courses; for yet others, it meant sharing their knowledge with radiographers in other parts of South Africa and the continent. Within the past few years, for example, three of the lecturers had completed a Masters degree and one a Doctorate; one of the lecturers had previously initiated an Ultrasound course at the hospital (**23 Mar.**); another was offering, for the first time in South Africa, a part-time short course in a specialist area of

Radiography (CT scanning). Yet another lecturer (22 Mar.) explained that, although Radiography was already considered a profession, she envisaged developing it further. To contribute to its development, she and others in the division had travelled to parts of Africa to deliver papers, share experience, and help guide the growth of the various radiography specialisations/disciplines on the continent. This lecturer believed that the way to achieve the growth of radiography was through research and publication in the field. Research and publication had not traditionally been part of the radiographer's role: "Writing articles and things before was not part of our profession...when we first qualified we had a radiography journal, but all the publications were by doctors. We got doctors to write the articles for our journal." Radiography had developed internationally, with radiographers now actively contributing publications to Radiography journals. She said of the local context:

There's so much in radiography that's not researched because it is clearly radiography. It's not medicine or physics, and so it's not as if we are researching something that others are researching. We can actually research things that are now not being researched. And it's that recognition that if we don't do it, it won't be done. So there's plenty for us to do and we just have to get people through with the skills and the competencies so that they can go ahead and do it...it takes time.

In this, Radiography lecturers expressed their aspiration to a new professional identity. This identity shift had occurred over time because their work ambit had changed: previously, as practising radiographers, they had been taught and then, in turn, taught others in clinical workplaces like hospital radiography departments. Thereafter, they had started to teach in Higher Education (e.g., in the former Peninsula Technikon, later CPUT). While they continued to run some clinical tutorials, their responsibility had become more academic/theoretical. To some extent, responsibility for much of the practical teaching had become the province of clinical radiographers.

Along with this shift in practice, and along with increasing pressures for lecturers at former technikons to improve their academic qualifications and conduct research, Radiography lecturers had developed a new identity as academics (that conduct and publish research). The implication was that they needed to increase their research capabilities. From a critical realist perspective, this shift in identity - from their being (primarily) professional 'hands-on knowledge' radiographers to (primarily) intellectual 'head knowledge' academics - constitutes a causal mechanism, as it influenced how lecturers orientated themselves towards the achievement of new goals. There will be further discussion on the growth of the radiography profession later in this chapter.

When I visited a clinical department (5 May), the head of department expressed concern that Radiography learners were not getting enough practical experience in the departments in their first year. She pointed out that radiography is “a very practical job” and that the learners’ limited hands-on experience showed up in their second year, when they did not yet know the basics. She claimed that, while the academic aspects of radiography were important, there was a problem if the learners couldn’t do the practical work. She said she had quite openly told the CPUT lecturers as much.

The senior lecturer, however, believed that the balance of theory in the academy and practice in the departments was correct. She said (**22 Mar.**): “I think the strength of learners immediately having exposure to what the profession is and what you’re going to do - I don’t think you can replace that with any amount of classroom teaching.” However, she said that, in her view, the clinical staff were, perhaps understandably, not much concerned about the learners’ academic knowledge: “They never talk depth of knowledge and information, they just want the learners in the department more... so that they can do [work].” She added that, while more workplace hours did equate to a better radiographer, she believed in balanced theory and practice:

But I want that balance, because I don’t want them to only to be able to do the job. I want them to grow the profession, and by them spending lots of time working in the department, doing lots of the same, the staff eventually like them there because they can do a certain amount of stuff without supervision and then the staff doesn’t have to do it, you know? Well, lots of that, lots of the same doesn’t eventually grow the profession. Then we end up with a lot of people who can do the job, but how can they develop it, how can they move it forward? And for that they need academic depth, academic strength, an academic course.

She added that, once they were in a workplace, learners could refine techniques; however, there were academic aspects that they needed to learn that would make a difference to their future growth and that of the profession. While conceding that learners’ individual initiative certainly played a role in the development of quality radiographers, she added:

How much do you get the person absolutely competent to do what people think is the entry requirement for that profession, and how much do you get them to have some understanding of where they can go beyond that? And I think it’s so important.

It therefore seems that, in line with their vision for the profession, lecturers were aware that a greater emphasis on the academic knowledge base of Radiography was required if the profession was to grow, as the past practice-based radiography training alone was unlikely to

carry the profession forward. A critical realist position on this would be that the need to grow the profession was a causal mechanism that generated an awareness of the need for a different kind of knowledge to that required in the past.

Having provided some background on the Radiography lecturers' notions of Radiographic knowledge and notions of the current and future radiography profession, I will now describe and discuss the constitution of Radiographic knowledge in relation to Bernstein's (1996) 'classification', 'framing' and 'evaluation' of knowledge.

5.1.1 The classification of knowledge

As discussed in Chapter 2, 'classification' of knowledge refers to the nature of the relations between categories of knowledge, not to the nature of the category itself. It refers to the degree to which one category of knowledge is insulated from others. In educational institutions, disciplinary divisions and sub-divisions are typical signs of the traditional division of categories.

The classification of knowledge by members of a community of practice is not neutral: it is a careful process based on notions of what knowledge will best serve the future interests of the group concerned (Bernstein, 1996). At some time during the development of Radiography as an academic discipline, lecturers selected knowledge areas considered relevant to the work of a radiographer and distinguished these knowledge areas from others; they would also have considered the interrelation of these categories in constituting a holistic form of Radiographic knowledge for learners. Over time, particular specialisations emerged and learners were then given the choice of studying one these areas: Diagnostic Radiography, Radiotherapy/ Radiation Oncology, Nuclear medicine or Ultrasound.

A critical realist viewpoint on this process would be that the community's selection and organisation of knowledge into categories, and their attributing the links between these categories (i.e., mutual relevance), constitute causal mechanisms, as these events would have generated tendencies for knowledge to be understood in particular ways, both by lecturers and learners.

The theoretical knowledge base of the CPUT Radiography course could be described as vertical discourse comprising mostly hierarchical knowledge structures (Bernstein, 1999).

As discussed in Chapter 2, Radiography is a 'region' comprising several 'singulars' (Bernstein, 1996). Its knowledge is predominantly derived from several core sciences, namely Physics, Maths, Anatomy, Physiology and Chemistry. Anatomy and Physiology were formal subjects; other subjects were Radiographic Practice I, Clinical Radiographic Practice I, Radiation Science, and Psychodynamics of Patient Management. Some subjects involved the study of other subjects, e.g., Radiation Science included the study of Maths and Physics. The only subject that had a horizontal knowledge structure, making it somewhat of an 'outsider', was Psychodynamics, as this subject has weak boundaries and a weak grammar, having borrowed its grammar from other subjects like Psychology and Sociology. For this reason, it does not integrate neatly with core science subjects lectured in Radiography, such as Radiation Science or Anatomy.

As discussed in Chapter 2, the workplace knowledge base of Radiography fits primarily into the 'hard-applied' quadrant of Biglan's (1973) taxonomy of the disciplines, although it also draws on the 'pure-hard' (Physics), the 'pure-soft' (Psychology) and 'soft-applied' (Communication) quadrants (Engel-Hills, 2005).

Bernstein (1999) indicates that, within hierarchical knowledge structures, there is a strong integrating motivation, and that there are attempts to unify across diversity. Although Radiography involves the study of knowledge from core disciplines like Physics and Chemistry (knowledge areas that traditionally have strong boundaries), the distinctions between different content areas of Radiography tended to be fairly blurred because of the division's deliberate integration of Radiography outcomes (to be discussed shortly in more depth).

5.1.2 The framing of knowledge

In this section, I will explore several facets of the framing of Radiographic knowledge in the university context. These are:

- The transformation of workplace knowledge for pedagogy
- The emphases of the curriculum
- The integrated curriculum
- Formal subjects taught (i.e., those that are in the curriculum)
- Topics emphasised

5.1.3 The transformation of workplace knowledge for pedagogy

As mentioned in Chapter 2, ‘framing’ refers to pedagogic practices involved in the transmission of knowledge. Bernstein (1996: 27) notes that “[c]lassification refers to *what*, framing is concerned with *how* meanings are put together, the forms by which they are to be made public, and the nature of the social relationships that go with it.” Framing provides the visible form of the discourse, and thus conveys the intended message. When there is strong framing, there is a limited degree of choice; the converse applies with weak framing. The framing of Radiographic knowledge was moderately weak; that is, individual lecturers had some freedom to choose how to configure, sequence and discuss chosen knowledge during lectures and tutorials. Constraints on framing included the administrative requirements of the university (e.g., test dates and due dates for submission of results); the weekly academic roster (in relation to available time in a term, for instance); and the clinical tutorial roster (because particular theory had to be covered in academic lectures before tutorials could be held).

To teach learners about the realities of workplace practices and discourse in a truly meaningful, workplace-relevant way requires a transformation of the workplace knowledge. In Chapter 2, I cited Barnett (2006) who argues that, to achieve this, lecturers are required to perform a double translation or recontextualisation of workplace knowledge (chiefly procedural knowledge) into disciplinary knowledge (chiefly principled knowledge); and then again into a form suitable for academic pedagogy. In that process, the original form of the knowledge is changed (Bernstein, 1996); and, as Garraway (2007) points out, this change may be quite drastic. The reason is that there are great contrasts between workplace and academic knowledge. As Barnett (2006) explains, the latter tends to be explicit, sequenced and abstract; by contrast, workplace knowledge tends to be difficult to codify because its characteristics are so different: it tends to be taught tacitly, in concrete situations, with much modelling by an expert and emulation by the learner; and it is fragmented, with no particular sequence (the sequence of learning in the radiographic workplace depends on the nature of the patient’s problem and the immediate requirements of the situation). The academy usually requires only one recontextualisation – from disciplinary knowledge to a pedagogic form of that knowledge. To suit the academy and ensure that pedagogy is not neglected, workplace knowledge has to undergo a double recontextualisation: it has to be transformed into portable, abstract, explicit, sequenced knowledge; and then further transformed for successful pedagogy (Bernstein, 1996). Critical realism would see these transformations as causal

mechanisms capable of generating tendencies to change the way in which particular knowledge is likely to be understood.

In the context of the Radiography division, once Radiography lecturers, as a macro structure (a community of practice as a form of social organisation, with micro social relations), had recontextualised workplace knowledge as disciplinary knowledge (and set it out as outcomes in Learner Guides for each year level programme), they then also had to transform that knowledge for pedagogy. Through framing (the process of sequencing selected knowledge, and deciding when, in what depth, at what pace, and how, to discuss it) as well as through assessment practices (to be discussed further on in this chapter), lecturers communicated to learners - sometimes tacitly - which knowledge they valued. For example, learners would have gained the impression that radiation protection was very important because, within the first two weeks of orientation, several lecturers spoke about it and organised for learners to visit clinical departments where they were taught about various aspects of radiation protection. Thus, firstly (2 Feb.), learners went on a tour of all departments where radiation is used so as to get a general sense of the use of radiation in GSH departments; then (10 Feb.), to give the learners a sense of the global use of radiation, one of the lecturers showed them a video on the science of radiation which dealt with aspects such as international radiation regulators (bodies that regulate the use of radiation); radiation dose levels; safe dose levels in relation to various human organs; and the monitoring of radiation levels. Two days later (12 Feb.), yet another lecturer distributed radiation badges/dosimeters to learners and explained at length the reasons for radiation monitoring and emphasised the consequences of irresponsible dosimeter use. Learners were also informed about the use and significance of red and green lights outside dark rooms where radiographs are processed, and the meaning of various kinds of trefoils (signs used in the clinical departments warning of different levels of radiation danger). Two days later (14 Feb.), learners then visited a Diagnostic Radiography department where they were introduced to radiographic imaging equipment and protective measures used in the workplace, such as lead glass and lead aprons. During the following two days (15 and 16 Feb.), the learners also learned about the use of radiation and radiation protection in their visits to Radiotherapy and Nuclear Medicine departments. These tours were not rushed so, although learners were exposed to an enormous amount of new knowledge, there was sufficient time for them to absorb much of the knowledge; there was also some repetition across the various contexts, such as the ways in which radiographers implemented radiation protection measures. This emphasis on radiation protection in both theoretical and practical

contexts would have conveyed to learners that this knowledge was central to their understanding of being a radiographer.

5.1.3.1 The emphases of the curriculum

The design for the Radiography Education programme was based on Outcomes-Based Education (OBE). OBE was introduced to all facets of South African education in 1996. It replaced apartheid education and rests on an educational philosophy that all learners can succeed if the conditions for quality educational experiences are provided by educators. Curriculum design is the key to success (Naidoo and Cooke, 2001).

This new form of education represented what Naidoo and Cooke (2001: 116) term “a major paradigm shift.” Prior to that, education and training had been content-based, focusing on subjects and syllabi, with minor attention paid to the knowledge that learners were able to demonstrate, i.e., the competencies they had achieved. OBE assesses learners’ competencies against pre-set criteria. Applied competence is achieved when there is an integration of “...knowledge, skills and attitudes relevant to the field of study and ...[that are] responsive to local, national and global societal and economic needs.”

The National Qualifications Framework (NQF) was promulgated by the South African Government to organise kinds of knowledge and structure qualifications around learner outcomes. These were expressed as levels (e.g., NQF Level 6 represented the first degree level in Higher Education). Institutions had to register their qualifications with the South African Qualifications Authority (SAQA).

Qualifications for a learning programme such as Radiography comprised three kinds of outcomes. Critical Outcomes, also known as Critical Cross-Field Outcomes or CCFOs are, as the name suggests, relevant across all subjects of a programme. They include what are regarded as essential competencies, such as being able to work effectively in groups, solve problems using creative and critical thinking, and use science and technology effectively and critically, showing responsibility towards others and the environment.

Specified Outcomes (SOs) refer to contextually demonstrated knowledge, values and competencies. Together, these lead the learner to achieve certain Exit Level Outcomes (ELOs) that are assessed at exit level (hence the name), leading to qualifications.

In the first year Learner Guide, a page of information on the various ELOs (entitled “The schedule and relevance of the learning programme”) preceded details of the ELOs and the relevant SOs (see Appendix R). There were also tables relevant to academic and information literacy. These tables comprised three columns entitled ‘Topic’, ‘Learning Task’ and ‘Assessment Criteria’ (see example, Appendix S).

Framing was evident in the relative sequencing of information and the amount of emphasis placed on ELOs in the Learner Guide (and, obviously, in the classroom). For example, ELO 1, in first position, stressed collaborative patient care with other members of the Health Care team, and the value of excellent interpersonal communication.

However, it was ELO 2 that was accorded the greatest emphasis during the first term of 2006. In other words, being a radiation scientist was foregrounded. This was to be expected, given the close interweaving of the theoretical and practical contexts of radiography: certainly, in Diagnostic Radiography, learners almost immediately began to practise as radiographers, albeit under close supervision and with much guidance.

Regarding ELO 3, the document stated: “The main focus of ELO 3 is information literacy.” The sentence that followed was: “The emphasis here is to equip you with skills, such as computer literacy, sourcing information, academic writing and presentation skills.” The phrasing of this ELO 3 suggests that competencies such as writing can be taught separately from radiography practice. Research (e.g., Boughey, 1998) has indicated that trying to teach such skills separately tends to encourage learners not to value learning the competencies that their lecturers aspire to, as they are not able to appreciate the relevance of these competencies in practice. This is not to say that the lecturers actually taught such competencies separately; but the learners’ reading of the paragraph on ELO 3 would probably have suggested this.

On locating ELO 3 in the tabled section that followed (see Appendix S), the stated focus (i.e., on information literacy) was not immediately obvious, as it was introduced as follows: “Apply self-management and basic administrative tasks to ensure a quality service, and access and utilise information applicable to radiation medicine and imaging services.” Also, during a lecture (13 Feb.), ELO 3 was barely mentioned by the lecturer. It was merely indicated that this ELO meant that they would be learning about computer literacy and telephone skills. In other words, two examples of channels of communication (computers and

e-mails) were mentioned rather than the purpose/s of communication (accessing and using information to communicate, both as learners and as radiographers).

Thus, while competencies related to ELO 3 were not spoken of negatively, omission could be seen as a causal mechanism that had the potential to lead learners to understand that those aspects were not particularly important in their studies (i.e., their value is lost). In light of the lecturers' expressed concerns to grow the Radiography profession, I consider that a reformulation of ELO 3 could indicate that acquiring academic competencies and developing their target language/s (for academic purposes and for the workplace) could empower speakers of all languages to develop their knowledge and their workplace (i.e., career) potential.

ELO 4 emphasised the accomplishment of effective radiographic imaging in relation to the human body. This was also stressed during the term although, as learners did not practise taking images until the end of the first term, this was probably emphasised in greater detail thereafter.

5.1.3.2 The integrated curriculum

In 2000, the Radiography lecturers decided to integrate their subject curricula. This choice generated certain tendencies among agents to conceive of their previous knowledge bases in new ways. As mentioned above, a summary of the Exit Level Outcomes (ELOs) and Specified Outcomes (SOs) for this curriculum appears in Appendix R. These integrated outcomes were explained in some detail in the 2006 first year Learner Guide, providing insight into the concerns and emphases of Radiography education for that level.

In the written introduction to the first year Learner Guide, learners were informed that the Radiography curriculum was based on an Outcomes Based Education (OBE) system, so that "...the learning environment has an integrated design, which allows the learner opportunities to achieve the outcomes for radiography through formal teaching, group activities and individual learning."

While knowledge categories for the first year curriculum did not change when the integrated curriculum was introduced, how lecturers framed this knowledge was critical, as this would constitute a casual mechanism that influenced the development of learners' understanding. The integrated curriculum that is set out in the first year Learner Guide reflects the

knowledge that Radiography lecturers value. The holistic integrated curriculum is an attempt to prepare Radiography learners adequately for the workplace.

I will now describe and discuss lecturers' views on the integrated curriculum, as their notions of this also constituted causal mechanisms, influencing the ways in which they constituted knowledge. I will also indicate some of the challenges experienced by learners in the process.

The lecturers had certain views on the integrated curriculum, both as it affected teaching and learning, and as it affected them. Helen (**22 Mar.**) said that the multi-faceted nature of radiography made it suitable for teaching through an integrated curriculum. She added: "The integrated curriculum is a natural sort of curriculum for professional education"; Linda (**24 Mar.**) commented that Radiography education was ideal because it involved learners "in the workplace and carrying out what they've learned in the classroom; and Nadine (**17 Mar.**) discussed the integrated curriculum as follows:

The advantage for students is that they don't see subjects in compartments...they get to see that there is a link...and it also... enhances their practical ability in the hospital, because then if they're doing an examination they must think about the end product, the anatomy, how they are actually... the technique, equipment, what equipment did I use, what film...so they bring the science and all that in, so I think it teaches them a sort of holistic approach to radiography....that's what we would hope.

All the lecturers were in favour of the integrated curriculum. Cindy (**28 Mar.**), for example, said:

Why I like the integration is that it gives you the freedom to move between subjects, between concepts. I mean, you can describe Anatomy now, then you can ask them Pathology, or you can jump to Patient Care in between that. That makes it sort of nice for me, because you can really move between different concepts and different subjects, so to say, without being restricted, because you know, like in the past, you had an Anatomy lecture and you only had to cover that and now I can move from Anatomy, I can do some Clinical, I can do a bit of Psychodynamics....You can even jump to things like medical and legal ethics.

On the downside, integration requires lecturers to have a very clear understanding of what each of them is doing and when. This requires ongoing communication, involving time and effort. Nadine (**17 Mar.**) said that the lecturers needed to give this planning "the proper priority... it's a critical part of integration." A future challenge was to improve this by working more closely with programme coordinators at each year level:

If you don't communicate properly with that coordinating lecturer, then you can find that chunks have been missed out, you haven't been called to do that specific thing – you know, that part, maybe physiology of the bone, or the anatomy of the bone or... you haven't been called to come and do the practice of it....The disadvantage is, if you don't communicate, the students will suffer in the end. And when you plan, you can't plan individually, you've always got to plan as part of a group... and the disadvantage for the student is that they don't really know what fits where, and I know for myself, I always like to have a bigger picture of something before I go down into detail....It is time consuming.

Several lecturers, e.g., Patsy (**23 Mar.**), Linda (**24 Mar.**) and Fiona (**23 Mar.**), were of the opinion that, on the whole, integration worked best from second year onwards, because at first year level, learners had not yet acquired the core radiographic knowledge that they needed to integrate knowledge. As Patsy said: "In the first year it's difficult to integrate if you don't know Anatomy, if you don't know Physiology, if you don't know science, all these concepts...." Linda said: "You can't just go problem-based and pick up the little bit that you need, you actually need to take the full academic theory of the physical science, going to the organic chemistry.... all that theory builds into radiographic knowledge... you have to have a curriculum that's going to give you the competency to carry out the job."

Helen (**22 Mar.**) said that they had changed their approach somewhat since the integrated approach was adopted: "We've probably tempered what we integrate...the first course we presented in 2002 ...we really tried to go more comprehensively integrated, and I think we've become a little less... set on that,...we are focusing on some things which just are taught separately, need to be taught separately...."

Another concern of some of the lecturers was that, because of the integrated curriculum, the depth of some of the core sciences was being diluted at first year level. Linda (**24 Mar.**) said that she and other lecturers had debated whether they should not, perhaps, bring in some specialists to teach aspects of the core disciplines which, she described as "jolly difficult specialities." Fiona (**23 Mar.**) said that perhaps the current form of their first year integration should be modified so that, initially, more core subjects were taught separately; otherwise, it would be best if, for example, one person taught both Anatomy and Physiology. She believed that integration would best begin fully either from the end of the first year, or from the second year onwards. However, she said that perhaps the lecturers "are reluctant to go back." Linda's (**24 Mar.**) opinion was that having one lecturer teach the theory and the practical (i.e., related clinical tutorials) was ideal because one could then continuously relate theory to practice.

First year learners experienced some difficulties in matching knowledge areas with particular subjects. Nadine (17 Mar.) confirmed that first years found integration difficult: “I think all that information is quite overwhelming already and then ...students will often say, ‘Now what subject are we doing?’ because they want to take out things, they want to start [taking] notes....” Personally, I also found that I was sometimes confused about this as, on the weekly roster, lectures were often titled according to their focus, not the subject, e.g., ‘Radiography of the hand and wrist.’ Learners said that they sometimes only understood what subject they were about to be lectured because of who the lecturer was - and even then that was confusing at times, as some lecturers taught more than one subject. Integrated assessment also presented challenges. These will be discussed further on in this chapter under ‘Evaluation’.

In practice, learners were told about the integrated programme during orientation (13 Feb.). They were informed that they would be learning about Radiography through a particular process: knowledge would be built up in an integrated way using a systems approach (focusing mainly on the respiratory and the locomotor systems). A system is a dynamic, complex whole comprising subs-systems that operate together to fulfil a function or functions. Systems thinking indicates that components of a system act differently when they are no longer in relationship with other systems and viewed in isolation (Capra, 1996). Thus one needs to understand parts in relation to the whole. Learners would thus learn about various aspects of Radiography in relation to these anatomical systems. In the first year, the emphasis was on the respiratory system and thus focused on the chest (i.e., Anatomy, Physiology, and Radiation Science were discussed in relation to the chest). By contextualising the respiratory system in each of these sub-disciplines, the lecturers communicated the importance of holistic knowledge in the workplace, where radiographers needed to draw conclusions about a radiographic image by drawing on several knowledge bases simultaneously. Thus learners would have to be able to recognise anatomical features of the chest (e.g., the sternum, ribs and vertebrae) and simultaneously draw on their understanding of associated normal and abnormal anatomy and physiology in relation to Radiation Science.

Because the lecturers shared an in-depth knowledge of the sub-disciplines and their intersections, they were able to integrate this knowledge at the level of meaning. In practice, I noticed that each lecturer spoke of what she would be teaching and that more than one lecturer was responsible for teaching different aspects of the same subject. During lectures,

some lecturers referred to the work that another lecturer had recently done with learners and the relationship between that knowledge and the current lecture. For example, when Fiona (**6 Mar.**) discussed her subject with learners, she commented that Helen had done some work on the same area in a previous lecture and thus her lecture would follow on from that. Learners would then write an essay on a shared topic at the end of the term, following their first clinical practice. Katy (**6 Mar.**) was particularly diligent about explaining to learners the interconnectedness of the work that they were doing: in discussing the historical development of models of atoms, she mentioned that first years would be returning to a discussion of atoms during their Chemistry lectures.

The relevance of classroom subjects to the clinical workplace was not overlooked. For example, the Psychodynamics lecturer (**6 Mar.**) stressed the relevance of aspects of her subject in the clinical context: patient care, communication, and an understanding of human development – and she mentioned that these would be assessed in an integrated way in the clinical context; the Radiation Science lecturer (**8 Mar.**) told learners the significance of what they were learning for the workplace context: when they were learning about measurement in Radiation Science, she explained: “When people set exposures, they will set kilovolts and milliamperes.” Nadine (**9 Mar.**) commented that, at first year level, everyone did “a bit of everything”, so, for example, Diagnostic lecturers taught Radiotherapy. This was possible because, as explained during orientation (Helen, **1 Feb.**), many lecturers had dual qualifications (e.g., Diagnostic and Radiotherapy) so they could “bridge gaps” between subject areas. Indicating overlaps between knowledge areas and between theory and practice was helpful, as it made learners aware of the interconnectedness of knowledge in the various subjects taught and the relevance of that theory to the workplace practice. It also reflected the multi-faceted nature of radiography. However, at the time I reflected that links could have been made more explicit by explaining the structure of the discipline, perhaps using a diagram that showed sub-disciplines, sub-sections of these and other intersections. The first year roster could also have specified subjects involved (even if there were two or more), not only the lecture topic. While it could be argued that learners would eventually discern these overlaps if they attended classes and did the academic work involved, I think that an explicit overview of the discipline early in orientation would have helped learners enormously to locate the development of their knowledge in relation to the total structure of knowledge to be developed. Only one of the lecturers went through some parts of the Learner Guide (including the ELOs and SOs) with the learners (**13 Feb.**). She told learners which lecturer

was responsible for each section of the plan. However, the pace at which this new information was presented was rapid, the learners did not yet have copies of the Learner Guide to refer to for themselves, the overhead text was illegible from a distance, and the number of details rather overwhelming.

5.1.3.3 Formal subjects taught

While the ELOs in the Learner Guide represented the officially documented curriculum, the subjects that were lectured represent the manifestation of that curriculum – what Harden (2001) refers to as the ‘taught’ curriculum. I will now summarise the basics of this taught curriculum by sharing some details of what I learned about Radiography subjects during lectures in the first term of 2006, as well as about some of the topics that were emphasised across all subjects. I believe that this is necessary so as to provide the reader with an ‘insider’ perspective on the kinds of knowledge that lecturers emphasised in their teaching, as well as the insights that Radiography learners began to develop about Radiography and what knowledge was valued by the lecturers. As Babbie and Mouton (2001) remind us, an ethnographic account is intended to show what the researcher has learned.

Anatomy I and Physiology I

These are separate subjects, but are closely integrated in practice and so were also closely integrated in the university classroom. Anatomy for Radiography is about naming parts of the human body – organs, bones, holes, roundings, etc. Closely aligned, Physiology involves understanding the functioning of parts of the anatomy (27 Feb.). Logically, these subjects are always integrated in Radiography studies. For example, when learners were shown a radiograph of the chest, they were asked to identify distinguishing anatomical landmarks, such as the ribs, or the diaphragm and were shown indications of pathology evident on the radiograph to help them with future identification of these. Learners were also expected to explain the function of the diaphragm and the action of the ribs during respiration (13 Feb.).

As learners were expected to have covered a certain level of Biology/Physiology during secondary schooling, this work was rapidly summarised in lectures. Anatomy included much new knowledge, though, so was covered in detail (13 Feb.). Learners were assisted to visualise what they were learning through the use of various kinds of visual support, such as radiographs, diagrams, skeletal and other three-dimensional models. These will be discussed in more detail under ‘mode of discourse’ in Chapter 7.

On 7 Mar., a lecture on Human Biology focused on biochemistry of the human body, such as types and synthesis of proteins, exchange reactions, kinds of bonds in the body (covalent, ionic, and hydrogen), the chemistry of pH scales, lipids and steroids.

By the end of the first term, first year Radiography learners had begun to identify, on a radiograph, evidence of health problems that they had learned about in theory. For example, they had to identify the indicators of a haemothorax (blood in the pleura of the thoracic cavity).

Radiation Science I

Radiation medicine involves several areas of application. At GSH, it is practised in three departments, namely Radiology, Nuclear Medicine and Radiation Oncology/ Radiotherapy. On 9 Mar., learners attended an introductory lecture on Radiotherapy because, although few were going to specialise in it, all first years learn a little about all the specialisations of radiography. Much of the lecture focused on new terms related to cancer and kinds of therapy, such as ‘oncology’, ‘carcinogen’, and ‘cytotoxic therapy’.

During orientation, when learners were introduced to Diagnostic Radiography, they were told about and shown various radiation protection measures: standing behind lead glass windows, wearing lead aprons, and using lead strips to protect various areas of a patient’s anatomy. Like all radiographers, Radiography learners were exposed to radiation, so they had to wear dosimeters to measure the cumulative dose of radiation to which they had been exposed. These dosimeters had to be submitted regularly for monitoring (12 Feb.).

During orientation (10 Feb.), learners viewed a video through which they learned about standards for radiation protection. The role of radiation protection is to prevent the administering of harmful radiation doses. Radiographers/radiologists are informed about exposure rates in relation to particular areas of a building (e.g., ‘unrestricted’, ‘high’, and ‘very high’ radiation areas). The video also focused attention on radiation contamination of packaging, and the handling and safe storage of radioactive materials.

During a tour of the Nuclear Medicine department (16 Feb.), learners were repeatedly informed about radiation and radiation safety. They learned about different kinds of radiation and its characteristics in relation to time, distance and shielding (senior learner, Nuclear Medicine Dept, 16 Feb.). Radiation travels in straight lines, and loses energy over distance.

This has implications for the layout of areas in which radiation is used: in Nuclear Medicine, the 'hot lab' and the scanning rooms are well separated from the waiting room for patients; and, as an extra precaution (because uncontrolled doses of radiation can be deadly), there tend to be many right angles/turns in passages in the area. Regarding distance, the further away a person is from the source of radiation, the less strong and therefore the less damaging the radiation. Time is also relevant: the shorter the time spent with radiation, the better. For this reason, in Nuclear Medicine, radiographers work as quickly as possible when preparing radioactive pharmaceuticals, because they cannot be shielded from the radioactivity. (There are decontamination showers in the vicinity, in case of accidental spillage.)

In Radiation Science lectures (e.g., 3 Mar.), the learners were taught about units of measurement that radiographers are required to know. These included base (length, mass and time), derived (volume, density and velocity) and special quantities (e.g., units of dose, dose equivalent, exposure and radioactivity). They also had to learn the abbreviations of such terms, commonly expressed in the Greek alphabet. Knowledge of basic Mechanics (a branch of Physics dealing with the motion of objects), as well as related terms (such as 'acceleration', 'momentum', 'power' and 'energy'), was required.

Learners were also required to know the exposure factors for the X-ray tube, and the terms used to refer to the mean energy of a radiation beam, such as 'Kiloelectron voltage' (KeV) and 'filtration'.

The science of Nuclear Medicine was obviously important. The introductory lecture focused on the history of atoms and the science involved in radioactive materials (6 Mar.). For example (and expressed simply here), the lecturer explained that when an atom becomes radioactive, it has excessive energy and its nucleus is therefore unstable. To regain stability, it emits rays (alpha, beta or gamma radiation, depending on the kind of atom). In the process, the atom 'decays' or 'disintegrates'.

Learners were instructed that they needed to know about the different types of radiation that are used in particular radiography sub-disciplines. In Nuclear Medicine, for instance, gamma rays, rather than X-rays, are used. While X-rays have 60 Kiloelectron volts (KeV), in Nuclear Medicine, gamma rays emit energy measuring 140 KeV. When a radionuclide decays, it emits gamma rays and this energy can be observed in scans. Gamma rays pose the greatest safety threat: they are very light (in mass) and therefore travel fast. This level of energy is

able to penetrate lead aprons that typically protect radiographers from X-rays. Learners were given a handout (6 Mar.) about radiopharmaceuticals and the mechanisms of their uptake by organs and systems of the body.

In Nuclear Medicine (also known in Britain as Radionuclide Imaging, or RNI), learners had to understand the use of radioactive materials used to record and diagnose various diseases. While Diagnostic Radiography focuses more on structure (anatomy), Nuclear Medicine is more concerned with physiology and dynamics. Nuclear Medicine may be needed, for example, in the case of certain soft tissue disease that is not easily visible on an X-ray image, such as a suspected embolism (obstruction in an artery by a blood clot or air bubble) in the lung. In Nuclear Medicine, radiopharmaceuticals may be injected into patients, or patients may inhale radioactive gases before being scanned. Images may be static, or dynamic. In the latter case, as the patient is injected, scanning begins so that the blood flow to a specific area of the body can be observed. Various pharmaceuticals target specific organs, so an increased flow to one area, or any other unusual or abnormal pattern, could indicate an injury or abnormality.

The radiation emitted by an isotope can be used to treat malignancy. This is the province of Radiotherapy. Many patients go from Radiotherapy to Nuclear Medicine as the chemotherapy administered in Radiotherapy has the potential to damage a patient's blood flow, and this can be checked using a scan (senior learner, Nuclear Medicine, 16 Feb.).

I will now discuss Radiographic Imaging. I have chosen to discuss this topic as part of Radiation Science, although, because of the integrated curriculum, it is also part of Radiographic Practice I (theory) and Clinical Radiographic Practice I.

On 8 March, a lecturer taught the first years about the importance of basic aspects of Physics: learners had to understand the visible and invisible light spectrum and know about waves, wavelengths, their speeds, energy and effects on the human body. The lecturer (8 Mar.) also pointed out the relevance of fluorescence in the electromagnetic spectrum, as the white surfaces inside a film cartridge contain microscopic phosphors which emit light in response to any other light, such as X-rays or gamma rays.

Understanding the properties of materials involved in imaging is also important in radiography. For example, in the Nuclear Medicine department, learners were told that a particular bed in a scanning room was radiolucent (rays could go through it).

I gained limited additional insight into the science of imaging, as it was not covered in much detail in the first term. However, I learned from a textbook that Radiography learners need to understand the physics of light to set an X-ray machine correctly before taking an image. Because body tissues have different atomic numbers, when the X-ray beam passes through these tissues, the rays are absorbed differently; and the radiation that emerges beyond the body illustrates these differences on the film, and thus in the image produced (Chesney and Chesney, 1981: 3).

On a practical level, after only two weeks of orientation, a few first year learners gained preliminary hands-on experience of the use of imaging equipment in a clinical department (14 Feb.). Learners were given the opportunity to line up the X-ray Source Image Tube (SID) with the cartridge on which the image would be recorded. Further technical details included how to move the tube in different directions and how to adjust the position and height of the bed. To understand imaging, first years learned about film cartridges in relation to the principles of photography. For example, they were shown X-ray cassettes (black on one side, orange on the other) and given reasons for the colour (black) of the inner cassette casing, and the material (aluminium) of the cassette casing. They also learned the reason for placing cassettes in a certain position relative to the X-ray tube. They discussed the different size films and were informed that films may have different 'speeds': the higher the speed, the less the exposure time needed. They also learned about the physical 'camera', light-sensitive photographic materials, photographic emulsions, and various kinds of photographic film, their properties and their uses.

Step-by-step procedures were demonstrated for producing images: how to place a cassette in relation to a patient and an X-ray beam, with the black (outer) side of the cartridge facing the beam; and the beam had to be centred on the red arrow in the centre of the cassette as it lay in the Potter bucky (the cartridge holder that slides into a slot beneath the table/bed). Once this placement was accurately completed, the bucky was closed. Then the patient, with the entire table/bed, was moved until the correct anatomical markers were located on the patient's body to ensure that the required body areas were included in the radiographic image. Learners also had to know how to move the tube itself, using switches on the overhead collimator; and how to collimate (adjust the field of the beam) in relation to the patient's body to produce accurate images.

A significant portion of the radiographer's work is hands-on, physical work. When they have to position a patient correctly for a radiograph, they need physical strength and dexterity. Sometimes positioning involves lifting a patient, a procedure that has to be done correctly and safely. It is therefore understandable that it was a pre-requisite that learners be physically fit (see Appendix O). During orientation, learners practised lifting an immobile, helpless 'patient' (a fellow learner) from a wheelchair onto the table/bed and from a gurney onto the table/bed. This was easier said than done, as learners found out! (14 Feb.). During their first clinical practice a month later, learners would have to position and move real patients. Much of the learning (and assessment of their competency) would therefore occur in the hospital itself, with real patients.

On 14 February, first years were shown how to manage the administrative aspects of radiography: for example, they were shown how to label each film with the patient's name, the view (e.g., Anterior-Posterior, or AP) and the date. Learners were also shown how the more technically modern processing equipment worked (the daylight processor) and its advantages and disadvantages were explained. However, the emphasis was on the manual techniques of imaging, because clinical radiographers working in rural areas (where equipment and resources are usually scarce) had to know all the stages of processing images (including how to mix chemicals correctly).

Although Maths was touched upon quite infrequently during the first term, Patsy (23 Mar.) said that it was an important aspect of imaging. Learners need to know, for example, ratios, logarithms, scientific notation (power-of-ten notation), rounding off of decimal points, drawing simple graphs and calculating logs.

Radiographic Practice I and Clinical Radiographic Practice I

Only one introductory lecture for these linked subjects appears to have been offered during the first term. (I might have been mistaken, because the titles of lectures on the lecture roster did not indicate subjects.) The theoretical subject is Radiographic Practice. It is taught over three years in conjunction with Clinical Radiographic Practice which, as the name suggests, focuses on the clinical practices of radiography. In the first year, 'Radprac' focused mainly on two systems, namely the respiratory system and the locomotor system (13 Feb.).

Radiographic Practice involved learning about both routine (in Year 1) and, increasingly, non-routine, specialised practices as learners progressed in their studies (13 Feb.). It also

involved learning about X-ray protocols, the procedures and processes to be followed in dealing with a patient to be radiographed.

Psychodynamics of Patient Management I

Patient care and communication were first raised during a lecture on professionalism and ethics (6 Feb.); then, in the context of positioning the patient during an Imaging lecture (14 Feb.); and later by second year learners who guided first years on a tour of various departments. There it was stressed that radiography is patient and people-oriented. 'Psychodynamics' appeared on the learners' roster a few times during the first term. The subject involved learning how to apply knowledge of nursing care and human development as part of a Health Care team. It focused on developing effective communication competencies; and acting within the bounds of professional ethics at all times. During an introductory lecture, the lecturer explicitly emphasised the importance of effective communication, not only with other Health Care professionals, but with patients (6 Mar.). For example, as radiographers, learners were told that it would be their responsibility to take the initiative to reassure patients and clearly explain procedures to them (and their family). If necessary, this might involve translation of a message into another language/s. They were therefore reminded that it was insufficient to know about Radiation Science and all the procedures/ practices if their focus was not on patients.

5.1.3.4 Topics emphasised

Although they were not subjects, several 'topics' were the focus of discussion during Psychodynamics and other subject lectures. The most noticeably emphasised topic was professionalism, particularly as it pertained to the clinical workplace.

Professionalism and ethics

The abstract notion of 'professional practice' was strongly emphasised. Although the learners' level of professional practice was not formally/directly assessed by weighted marks, learners were assessed on their professional conduct in their Clinical Work Record books/logbooks (see Appendix T). Here, radiography supervisors were required to assess learners by ticking alongside, amongst others, certain criteria for behaviour/ attitude/ interpersonal communication. While expected communication competencies were not explicitly described, the criteria indicate that supervisors expected learners to communicate

“well” with patients and their colleagues. They were to “use language appropriately” and “respond to constructive help” in ways deemed appropriate in the workplace.

By the end of orientation, the learners would have had a fairly clear notion of what these criteria meant (see examples to follow below). The topic of professionalism was raised frequently and was reflected in radiographers’ discourse about ‘what radiographers do (or don’t do)’ and ‘how they do it (or should do it)’. The strong emphasis on rules and regulations, both orally and in writing, suggested that being professional involved a close compliance with standards of practice, ethics, values and principles laid down by the broad Health Care profession. Learners were informed that complying with these rules and regulations was in the best interests of the patients. As discussed in Chapter 2, certain theorists have called on Higher Education to include in their curricula the ethical and moral aspects of education that they believe will eventuate in self-regulating, self-disciplined individuals in society (Henkel, 2000; Gamble, 2003^a; Taylor, 1989; and Gee, 2000). Critical realism would regard the notion of professionalism, and notions of how to achieve appropriate levels of professionalism, as causal mechanisms, capable of influencing lecturers to emphasise these aspects, and so shape learners’ notions of appropriate values and practices in the radiography profession. A few examples of how this emphasis on professionalism was achieved are discussed here:

1. A week into orientation, a lecture was held on the topic of professionalism (6 Feb.). The lecturer explained that being professional meant that, as a radiographer, one had to be able to take independent, responsible decisions, exercise responsible judgment and not follow anyone blindly. During the lecture, groups of learners first discussed then cited these characteristics of professionals: punctual, assertive, neat, respectful, good communicators, responsible, empathetic, non-judgmental, respectful (of authority), compassionate, a team worker, accurate/precise, confident, knowledgeable, moral, and service-oriented. When asked to describe the radiography profession, they listed these points: it has a skilled knowledge-base; involves working with sophisticated equipment; has high standards of training; is a public service; requires registered workers who are bound by rules; and involves working within a Health Care team. The lecturer then discussed issues of conduct, performance and ethics in relation to professionalism. In the process, she raised issues of selflessness, confidentiality, responsibility to oneself and others; keeping one’s knowledge up-to-date; developing the necessary (which she termed

‘critical’) communication skills for the workplace; responding to supervision and delegation; and the importance of asking if unsure. ‘Ethics’, the third aspect of professionalism, was described as being honest, acting with integrity, and included much of what had been discussed under professionalism.

2. The hospital’s Radiographic Head spoke to the first years about the importance of professional appearance, using the words “smart, neat, tidy” (1 Feb.). Health Care members were required to wear white coats and badges and, thus, so were the learners. On 13 Feb., in a lecture, the subject of uniforms arose during a discussion of rules and regulations. Learners indicated that a uniform looked neat and professional; the lecturer added that a uniform also informed patients that they were Health Care workers and that they could be trusted.
3. On 8 Feb., Helen alluded to learner responsibility during a lecture on the value of reflection. Learners were encouraged to reflect on being more responsible, punctual, etc., especially if they had come there directly from secondary schooling, as there was a new set of responsibilities that they would have to accept as they were “growing up, growing older, more mature.”
4. During a Psychodynamics lecture (6 Mar.), there was a discussion on values, professionalism and ethics shortly before the Radiography learners went into the clinical environment for the first time. Groups examined various documents, e.g., ‘Professionalism and Ethics’, ‘Patient records’; and ‘A Radiographer’s Code of Conduct’. In each document, professionalism was implied in issues such as responsibility, equity, confidentiality, respect for all cultures, all languages, all religions, ages and genders. The lecturer gave clinical examples: in some cultures, men objected to females touching them (the majority of radiographers are female); women often preferred a female radiographer to perform mammograms; and it was disrespectful to call an older woman ‘Mama’ (depending on age and cultural background). The Radiographers’ Code of Conduct set out a list of principles, including openness, transparency and equity. Learners discussed what these meant in practice. Learners agreed that they had to treat everyone equally, irrespective of how a patient was dressed or how they behaved. As the lecturer pointed out, when one was tired and facing traumatic situations, this would be “...easier said than done, that will test you.”

Personal responsibility, disease and danger

Although closely tied to professionalism, responsibility was stressed in relation to learners' academic work. Learners were encouraged to take responsibility for their progress in both academic and practical arenas. On the first day of orientation (1 Feb.), the Radiographic Head of Radiation Oncology told learners to put in "a lot of work and effort". The Head of Radiography at Groote Schuur told them: "This is a time to learn, put in as much as possible, not just studying but learning how to deal with patients."

During lectures, learners were told to study diligently after lectures. Homework was either geared towards the next lecture, a class test, or a future assignment. Their Learner Guide also stressed the importance of learner involvement: "...your success depends on your being actively involved as a learner". Learners were told that they would be expected to do much work on their own: they had to read, take notes and study, even if certain aspects were not going to be formally assessed. In my journal, I reflected (Jan.): "Makes it difficult for learners to 'cop out' of the system, even temporarily, without penalty; and makes it tough for them to make up for missed work."

On 1 Feb., a lecturer went through rules and requirements in the Learner Guide before running quickly through the ELOs. This sequence (i.e., discussing rules before ELOs) suggested the extreme importance attached to rules and regulations in that environment. Learners were told that they had been given the rules in writing, so that CPUT and GSH staff were legally covered against learner error. At registration, learners had to sign acceptance of these rules and regulations. Rules covered suitable dress (uniform), obeying "professional instructions" (given by academics and clinical radiographers), and attendance of clinical practice. Warnings and details of disciplinary procedures were provided. Lecturers also emphasised rules that would affect learners in the workplace. For example, learners were expected to work under the supervision of a clinical radiographer, as only with full technical knowledge would they be permitted to operate radiation units (3 Mar.).

Learners were told that their professional lives were also subject to the rules of outside bodies. The lecturer (3 Mar.) indicated that four bodies monitored and enforced radiation rules at the hospital, in industry, etc., three of which were international, and one national. The rules applied to all radiation workers. Many of the rules of the profession were thus closely linked to radiation hazards and related safety measures. Radiation hazards were discussed explicitly, with various other dangers sometimes implicitly communicated. While it is

unlikely that any person intentionally tried to scare learners, as a quasi first year, I reflected that there were several potential physical risks in the daily work environment of a radiographer. The first and most obvious was potentially lethal radiation. During a tour of radiation sites in the hospital (2 Feb.), the senior guide related how, when a cobalt machine had malfunctioned, he and a colleague had had to rush into a treatment room and expose themselves to highly dangerous cobalt rays to save a patient from lethal exposure. The second indication was that, in the radiation areas of departments, trefoils (symbols of radiation danger) on doors and walls indicated the level of radiation danger present (12 Feb.). Thirdly, learners were repeatedly instructed regarding the three measures of radiation protection: time, distance and shielding, and were told, “You must remember this for the rest of your life” (senior learner, Nuclear Medicine, 16 Feb.). On 14 Feb., learners were told that, during the taking of radiographs, they had to stand behind protective lead ‘glass’; and, if they had to be exposed (such as if they had to support a patient while the image was being taken), they had to wear lead protection (e.g., a lead apron and/or a protective strip). In Nuclear Medicine, because radiographers cannot use much shielding, staff working in the ‘hot lab’ with radioactive materials had to work quickly but carefully: they had to “walk briskly, get to the patient, inject the radiopharmaceutical into the vein and dispose of the syringe as soon as possible.” The shorter the time they spent with radiation, the better (senior learner, Nuclear Medicine, 16 Feb.).

Learners were also informed of possible legal threats (Cindy, 1 Feb.). They could be prosecuted if found negligent (hence compulsory membership of the HPCSA so that that body could defend them). The numerous mistakes that they could make and the consequences of these were stressed. For example, learners were told about patients having the wrong limb amputated, or the wrong body part exposed to radiation through incorrect placing of identification markers - Left (L) and Right (R) - by radiographers (Cindy, 13 Feb.).

Learners were told that, as Radiography learners, “fair and safe conduct” was vital for oneself and others. They were informed that Radiography is not for the faint-hearted – lecturers and radiography staff tried to prepare them for what they would encounter in the clinical environment, such as patient blood, odour, death and anti-social behaviour. On their first day of orientation, the Head of Radiography at the hospital referred to the “shocking” things they would see during patient care, but assured them: “You’ll get used to that in time” (1 Feb.). Learners were constantly informed about their responsibility in response to the daily

encounters that they could expect with human illness, mortality, infections and diseases (e.g., HIV/AIDS and Hepatitis B could be contracted through contact with ill patients and through needle stick injuries) (1 and 6 Feb.). For this reason, learners' responsibility for taking hygienic measures in hospitals, such as using disinfectants and cleaning, was emphasised.

Finally, because of the age of the hospital and much of its equipment, learners were warned to be cautious of touching any perished insulation around electrical wiring (8 Mar.). The voltage of general electricity was 220 V, but that of some radiation equipment carried as much as 125,000 V.

Information literacy and the framing of language

I have left this topic until last because, although 'Information literacy' was not an official subject, formally titled lectures were held on the subject. Also, it was relevant to all other subjects.

The focus of lectures entitled 'Information literacy', as well as aspects of other lectures that I observed, reflected the concerns that I address in Communication programmes. In other words, the purpose of these lectures was to assist learners to cope with the academic demands of Higher Education, such as locating information sources, gathering information, organising it logically, acknowledging sources, and presenting information professionally.

In my journal (12 Apr.), I reflected that lecturers in the Radiography division were generally positive about the role and importance of language. My impression was confirmed when Helen (25 Oct.) said about the lecturers of the Radiography division: "As a lecturing team, there is a lot of sensitivity and awareness of language and so all the lecturers contribute to building that...." These attitudes were important causal mechanisms, as lecturers had the agency to influence learners' notions of valued knowledge.

During several weeks of observing orientation, lectures and some practicals, I noted many practices that illustrated lecturers' efforts to support their learners' development of language and academic competencies along with their understanding of Radiographic knowledge. These are the most notable examples:

1. Learners were asked to read paragraphs aloud; the lecturer would then ask a learner to paraphrase the paragraph; or she asked questions to probe a learner's understanding of the meaning of the paragraph. Thereafter, she elaborated on the issue concerned (1 Feb.).

2. When using new terms, most lecturers tended to write these up on the whiteboard and divide the words into parts. Learners were thus guided about the important role of knowing the meaning of the root of a word, prefixes and suffixes, as this would help them understand most medical terms used in the workplace. The lecturer told learners (28 Feb.): “It’s so easy. If you take the word parts separately, you can work it out.” She illustrated, using the word ‘hypogastric’: ‘hypo’ means below, and ‘gastric’ refers to the stomach, so the term means ‘below the stomach’. In my journal (13 Feb.), I reflected:

It is very difficult to separate effective language teaching from effective teaching in general: the one almost seems unattainable without the other. If teaching is effective, it is inevitably language-sensitive, drawing attention to new terms and the way they tend to be used in the work domain. This means that highlighting language is part of an explanation, in the same way that highlighting a new concept is.

3. Learners were given guidance on group work and member roles, then given a group task which required them to use library resources: they had to find a radiographic journal, select an article (on any topic of interest), take notes and then do a short (1½ to 2 minute) group presentation on the topic. Source references had to be included. Learners were reminded to use these techniques when their groups did their oral presentations at the end of orientation (14 Feb.).
4. Lecturers sometimes drew on learners’ work to illustrate a point: work on note-taking, for example, was especially helpful, as the lecturer used the learners’ own presentation transparencies to illustrate the effective use of spacing, colour, key words, numbered points, subheadings, etc. (14 Feb.).
5. Lecturers encouraged reading: in the classroom, learners were inevitably encouraged to read further on a topic, or to read in preparation for a future lecture (e.g., 15 Feb.). They were also encouraged to page through books to see if there was something that “captures your interest and draws you out” (8 Mar.).
6. Learners were encouraged to use dictionaries, both general and medical, as a general dictionary would often be insufficient to help them (e.g., 27 Feb.; 8 Mar.). There was a cupboard at the back of the classroom in which a set of dictionaries was kept. The dictionaries were accessed by learners on several occasions, especially when there was a group task.

7. When advising learners about note-taking in class during an information literacy class, the lecturer referred learners to an example of effective notes in their Communication workbook (by Wyrley-Birch and Wright, 2003), the features of which were annotated in the margins. They were encouraged to model their notes on that example (15 Feb.).
8. Learners were given tasks in class to practise note-taking. For example, after brainstorming a topic, learner groups were given newsprint and marker pens and asked to present the most important points of the topic in one or another note form (linear or mind map). These posters were subsequently displayed on the pin boards in the classroom (14 Feb.).
9. Learners were frequently asked to participate in class, e.g., to provide an answer to a question, or to demonstrate their understanding of a certain term (e.g., a needle-stick injury). Learners were encouraged to express their understanding, not only by pointing (e.g., at an anatomical features on a skeleton), but by explaining orally as well (27 Feb.). The lecturer discussed the importance of learners explaining in words, not merely pointing, because during written tests they would have to write their explanations, using the correct terms.
10. Lecturers helped prepare learners for the language of the workplace: before learners went on their first clinical practice visit, several lecturers mentioned workplace-specific terms that they might encounter in the hospital. Lecturers generally showed sensitivity to nuances of meaning in words and advised learners about taking care when using potentially hurtful or insulting terms, especially in the workplace. They provided examples, e.g., if radiographers were discussing the KeV setting for a 'large' patient, they should preferably say that the patient had 'an increased BMI' rather than call the patient 'large' or 'obese' in their presence (6 Mar.).
11. Learners were told to try to distinguish between the lay term (e.g., 'water on the brain') and the medical one (cerebrospinal fluid) (8 Mar.).
12. Relevant workplace phrases in isiXhosa and Afrikaans were noted on a poster at the back of the classroom; and from 2007, a lecturer organised a ten-week programme for first years, an introduction to isiXhosa/Afrikaans, aimed at helping learners to use these target languages in the radiography workplace.

A few more detailed instances are worthy of mention, as they illustrate the kind of approach that several content lecturers adopted. I observed some of these practices personally. Where lecturers discussed their practices during interviews, the date is in bold typeface.

Certain lecturers raised learners' awareness of textual variety and purpose, the importance of effective communication for radiographers, and a host of language issues relevant to the learners' studies. For example, on the first day of lectures (1 Feb.), a lecturer came to class with various written texts (magazines, books, journals and documents). In groups, learners examined these and then they discussed what they thought these journals/documents told readers about radiography. (This was the learners' first exposure to journals. They were to use journals again two weeks later in an information literacy session that required them to go to the library and find articles or topics of interest, then present these to the class.) The lecturer used this opportunity to encourage learners to use the library. In a lecture a few days later (6 Feb.), this lecturer stressed and discussed with learners the importance of positive communication with patients. Two days later (8 Feb.), she encouraged learners to take notes, to reflect on their personal development and what they were learning.

In Psychodynamics, the lecturer dealt with aspects of communication within her subject, as it is relevant in patient care. She constantly discussed and emphasised topics such as communication in relation to professionalism and ethics, human development, nursing care, and community healthcare. In her teaching, she prepared learners for, and used, group methods to engage learners with areas of the subject that needed attention.

This lecturer also required learners to write academic essays. She always explained in detail what she was, or would be, doing, and why. For example, when she discussed with learners that they were going to write a short essay on professionalism and ethics, she explained the steps and rationale of a process approach to the writing of essays that she would use (6 Mar.). Learners were told that non credit-bearing formative work would help her to know if any of them needed additional assistance to develop their writing ability; it would also assist them to do well in a summative essay later.

One of the lecturers (**15 Nov.**) said that, to encourage learners to express themselves orally, from first year, they did oral presentations. By third year, learners tended to be confident to present in English. In her particular (more senior) programme, she also focused enormously on reading journals and critically analysing articles. She added: "I think they need to be able

to do that and we don't do enough of it at first year level." They were trying to do more reading at second year level: "We try a kind of academic development programme where at the beginning of the year we take students through a few sessions of introducing them to journal articles." These were held as separate sessions (like the first year Information Literacy ones); that is, they were not integrated with a Radiography subject. After they had learned the basics of how to read articles and summarise the main points, however, learners were then grouped according to their separate specialisations (Nuclear Medicine, Ultrasound, etc.). Their lecturers were then supposed to "...do an article hour with them, on a regular basis." The lecturer added that the value of reading was not merely for language development: "...reading journals and articles show what research has been done, and then they think differently, when they approach a case, they think differently."

Another lecturer (7 Dec.) explained that developing learners' understanding of concepts and terms used in the workplace was vital for the development of their reading competency. The following is an extract from our interview:

- L: I think they [lecturers] need to help them [learners] to understand all the concepts and make sure that they know what they're reading ... it's very off-putting if a term is used and the person doesn't have the foggiest idea what that 'cassette' or that 'bucky' or that 'whatever' is; ... personally I use a lot of illustration, a huge amount of illustration, particularly if I'm starting something new and, where possible, link it up to what they're seeing clinically.
- J: When you say 'illustration', are you talking about diagrams, photographs?
- L: Mmm, yes, I've even got a sample of the thing to bring to class.
- J: Like a sample of what?
- L: First year, introducing them to the hospital folder.
- J: Oh, okay, so all of those kinds of things that would help them to understand.
- L: Where you can point and say, 'Okay, now that's where the patient has been'
- J: Bringing context into the situation.
- L: Ja, putting it into context and contextualising as much as you possibly can.... And, if possible, you keep having the written words up.

There were three lectures entitled 'Information Literacy'. (A fourth was scheduled, but did not occur, owing to a roster clash). These lectures, facilitated by the same lecturer, were titled

“Intro to Workbook and Library”; “Note taking, Referencing and Assignment Writing” (on 14 and 15 Feb.), and Reading Skills (on 28 Feb.). During these lectures, learners were exposed to the library (they had to find a topic of interest in any journal article or section of a chapter); group work and vocabulary development were emphasised, e.g., during the learners’ oral presentations, the lecturer noted on the whiteboard several terms used in their presentations, and encouraged learners to note those some that they would encounter in the clinical departments during their first clinical practice later that term. Learners were also encouraged to make their own glossary to note new terms encountered while reading.

As the first two of these three lectures were held on consecutive days in February, and only one was held late in February, I was concerned that the learners would disregard what they had learned. On 17 March, at the end of the academic block, I commented in my notebook: “Flow, continuity of information literacy very interrupted through long breaks between sessions.” Apart from these three lectures, information literacy aspects were not structured into the course, and were addressed in an individual, ad hoc way, when and if someone could manage it. Some lecturers managed this more than others.

Later in the year, the learners expressed their opinion about Information Literacy and their perception of its relevance to their learning (GD 3, 12 Sep.):

- J: Has anyone been doing anything with you on Information Literacy, or did they just tell you, ‘Here’s the book, do it?’
- C: That’s the book, do it, ja.
- J: Is there anybody else other than the Information Literacy lecturer that’s done any of that kind of work with you?
- Chorus: No.
- C: They’d just say ‘Check the book for the referencing’, or ‘Check the book for that.’
- J: Do you think that you need more, I want to use the word ‘explicit’, I’m not sure if you understand the word ‘explicit’... do you think that you need more instruction on writing assignments and referencing and oral presentations and that sort of thing, or do you think you can cope on your own?
- C: We need more, but that book actually helps.
- J: The book helps, but do you think that you need more instruction on those kinds of things? Zinzi, you’re nodding you head. I haven’t heard from you so far. Tell me what you think.
- Z: Ja, I think that we are needing more.

Most lecturers were most concerned about the need for learners to develop their academic writing competencies. However, most lecturers did not think it wise to offer a separate Communication/ Information Literacy programme. Fiona (**15 Nov.**) said: “I think it must be integrated in everything... because...when you have a subject...the students just, they switch off it...it’s got to be incorporated in something interesting that they are busy dealing with.” Helen (**25 Oct.**) similarly said that, if there was a separate subject, learners would see it separately instead of as part of all subjects:

I also think that students, then, are much more inclined to box Communication as something which is a subject, and which doesn’t belong to Radiography...it would be sad to see that, because it belongs, it is so integrated... and you can’t assess it on its own...it’s communication for something. So we have to be assessing it as written communication in all of the things, as spoken communication together with our Radiographic Practice in the department, with their group projects in the classroom. You know that’s where we need to be seeing if the communication is working or not, not in a subject.

Linda (**7 Dec.**) was of the opinion that Communication competencies “definitely shouldn’t be in a module, ...where it’s just done in the first quarter of the first semester...it’s got to be ongoing and building, if we’re truly going to be building good academic [and] literacy skills.” She said: “...what I do regret is that we have started a lot of ad hoc stuff and it’s very difficult to carry it through unless you’ve got a couple of people driving it with you.” One of the difficulties in developing coherence was better communication among staff so that they all worked towards the same goals:

People aren’t always aware of what other people are doing, ... [the way] to get rid of the sort of ad hoc [approach] is to have a much more definitive programme and also to make sure that all the lecturers at different levels are working on the same page, so that we’ve got something consistent going on, in terms of what we expect of the students’ standard of writing.... It does need to be part of the integrated curriculum, and it’s got to be... have an added value, so that students aren’t just seeing this as a development session in the afternoon and bunking it... it’s got to have a value that’s attached to their assignments so that they know it’s worthwhile...If we were all following it through in our outcomes, towards an eventual outcome, I think then the students might find it is something that’s integrated within, and that it’s a standard to work towards, so I’m worried about taking it too separate.

During the first term, I noticed a few missed opportunities to assist learners to develop language and academic competencies. These indicate that, understandably, such competencies were not uppermost in lecturers’ minds. These were:

1. Generally, I did not hear lecturers encouraging learners to take notes in class; and, although many learners told me that they did take notes, this was not my impression from where I was sitting. Although I obviously could not see everyone's desk clearly, I could see whether they were looking up and down (as one tends to do while taking notes during a lecture). This suggested that many learners were not getting sufficient note-taking practice and so the essential academic competency of discerning key and supporting points was not developing.
2. On 24 February, groups of learners (6 to 8 per group) were required to prepare a poster presentation on a topic of interest that had to be related to Health Care and related social concerns. Many learners, even those who were shy, made a sincere effort to do the task professionally: they spoke well, made good eye contact, used cue cards and covered the topic in impressive depth. When asked questions afterwards, they generally responded appropriately. Some of the posters were creative. One of the groups used overhead transparencies particularly well; and an imaginative short drama was enacted in one of the later presentations. I thought it a pity, then, that, while the lecturers present did compliment the learners generally on the presentations, they did not comment on specific aspects. I also reflected that some prior coaching would have benefited several of the learners. They could then have considered aspects of effective verbal communication (choice of appropriate vocabulary for the audience); and non-verbal communication (volume, pitch, clarity and pace of speech; appropriate dress; eye contact; and posture, gestures and other movements that can enhance, or mar, a presentation). Before the presentations, learners could also have critiqued posters from previous presentations to establish the characteristics of effective posters; a plenary after the presentations could have been used to reflect on the details of their poster design. While most posters had clearly been prepared with care, the details were often illegible from a distance; colour was sometimes used ineffectively (e.g., too many colours, or luminous colours that were not visible from a distance); and some learners did not once refer to their poster during their presentation.
3. On 6 March, a lecturer asked learners to summarise information, write this on overhead transparencies, then present the key points to the class; but no advice was given on the display of information on the transparency. Text was generally illegible – there was too much information per transparency, and it was written in cramped, untidy writing.

Learners would have benefited from simple advice on details such as font size, type and colour, as well as approximately how many lines of text to try to fit onto one transparency. Developing an awareness of these aspects would have served the learners well, both as learners and, potentially, as researchers.

4. Learners needed ongoing guidance so that they could engage more actively with their Communication workbook. They were told to read sections of the book on their own, even though the book includes many activities designed to be used interactively in appropriate content classes, e.g., the information on the Dewey Classification System is illustrated by showing how sub-sections of Anatomy are represented in the Dewey System; this is followed by an activity designed to familiarise learners with that system. Without being tasked to do this kind of work followed by a plenary session, most learners would have been unlikely to integrate these competencies on their own. I discovered by chance that, after six weeks, some learners did not yet know how to access information in the library. Being able to do so was essential, as many of the learners had financial difficulties and, during the first term at least, had not yet purchased prescribed textbooks. During orientation, a tour of the library was included, but, during the session that I attended, the librarian focused on rules rather than on a practical demonstration of how to find particular sources of information. I am sure that, in time, most of the learners did learn how to locate needed sources (the areas of the library were clearly marked; and learners were allocated a weekly two-hour slot for library/research time). However, not all learners had the necessary confidence to ask for assistance, nor previous experience of finding information in libraries. A first year L2 English learner, Angela, whose English proficiency was particularly limited, shocked me when she told me how she had searched for information (**9 Mar.**). It made me aware of how much precious time may be lost by such learners when they do not know how to find information. This was our dialogue:

J: If you go to the library, do you know where to find the books?

A: No, I don't get them.

J: How do you find them then?

A: I look through all the shelves.

J: You look through all the shelves?

A: Ja, and then I will look for the main...

- J: Do you ask for help?
- A: No, I don't ask.
- J: So, you haven't even asked the librarians to help you?
- A: No.

Angela said that, the day before, she had finally found out about the index at the back of textbooks; before that, she had used the list of contents and, if she couldn't find what she was looking for, she simply paged through books to find it.

While information about library use and book previewing was included in the Communication workbook, learners did not pay attention to it; nor had all the learners purchased the book by the end of the first term. Perhaps they thought the book and its contents were of limited importance, because, with a few exceptions, the details therein were not regularly referred to by lecturers; and, because academic development/language issues were addressed on a rather ad hoc basis, some learners also perhaps did not think it necessary to pay attention to assigned Information Literacy homework. On 9 March, for example, learners were supposed to submit a summary of a textbook article. Two-thirds of the learners had not done the work. This was unlike their response to other homework assigned during the first term.

Fiona (**15 Nov.**) indicated that, in her view, university lecturers were not always confident about how to incorporate academic and language competencies with their curricula, so they needed help: "I think there is a weakness... but I think one should educate...the academic staff at universities on how to integrate all those things."

In practice, therefore, opportunities to guide learners regarding language and information literacy issues were sometimes overlooked - perhaps because the lecturers lacked confidence in this respect; or perhaps simply because the opportunities were not recognised. Beyond the excellent work done by individuals in their lectures, there was little structured, developmental guidance for learners to assist them to cope with academic tasks. Although the learners were sometimes referred to the workbook, which included sections on how to develop many academic competencies relevant to their academic tasks (e.g., note taking in lectures), developing these competencies meaningfully required ongoing facilitated engagement by lecturers with the material and activities in the book. Interaction and discussion, in groups or in plenary, followed by various reading and writing tasks, would have helped learners to

consolidate their understanding of the academic competencies required of them. Solitary reading, while providing some theoretical insights, was unlikely to lead to achieve the same end.

Regarding the first year Learner Guide, as mentioned earlier, when I first examined it (before orientation/ lectures began), it suggested to me that language issues were somewhat under emphasised. None of the various tabled ELOs and SOs was particularly detailed, so I gathered that these sections were intended merely as a broad guide to learners. SO 3.3 of ELO 3 (see Appendix S), for example, listed five topics: “Library Skills”, “Reading Skills”, “Note-taking Skills”, “Assignment Skills” and “Presentation Skills”. Alongside each of these were related ‘Learning Tasks’ and, alongside these, relevant ‘Assessment Criteria’ that would be used to establish whether or not the outcomes had been met. In my journal, on 13 Feb., I reflected that, at some time, lecturers had agreed that these competencies were important enough for inclusion; yet learners were often expected to gain insight into them, or recognise where they, personally, should improve, even though these competencies could not be learned by memorisation, only by guided application.

While reflecting on the place of Information Literacy in the Learner Guide, I wondered what potential benefits - for the learners and the radiography profession - could be achieved if a greater emphasis were placed on developing these competencies. Lecturers clearly supported the growth of the Radiography profession. When asked what it meant to ‘grow’ their profession, Nadine (**21 Nov.**) said that, in her opinion, a profession earned respect by it professionals having self-respect: “You know, I’ve got this diploma, I’ve got this degree, I’ve earned it and I’ve been accountable for everything that I’ve done.” In other words, earning a qualification was one goal that the individual professional needed to aspire to, and take responsibility for. As Helen (**22 Mar.**) said (cited earlier): “I don’t want them (learners) to only to be able to do the job. I want them to grow the profession.”

How did lecturers believe learners were to achieve this? Helen (**22 Mar.**) commented: “You ultimately want to develop the students into competent writers, because you would hope a certain percentage of them will go on and do further studies ... and do some research and take management positions in departments, and they will have to be able to write....” In other words, learners needed to learn how to write for the future purposes of management and/or further academic study. When asked what contributes to the growth of a profession, Helen

didn't explicitly include language and academic competencies (e.g., reading and writing), although these were certainly implied in her mention of research:

- J: What, in your view, contributes to the growth of the profession?
- H: I think identifying that we have a body of knowledge that belongs to us and that body of knowledge is developing and growing...because we, who are part of the profession, are developing it through research and through reflective practice; through not only formal research, but - so I use 'research' in a sense there a bit loosely, I don't mean doctorates, masters, necessarily - but reflective practice and applied and action research in the clinical areas. I think that, that's really what it is, I think taking more responsibility and knowing that we want responsibility, we don't just want to be under...
- J: It's about taking responsibility?
- H: Yes, it's taking responsibility and wanting it, and not wanting to be the technician, who's told what to do, but wanting to make decisions for ourselves. So I think that is kind of where we're at. I think radiography people are - there's the opportunity now for qualifications, and that's happened, and that has been a great step; there's the opportunity for research and we are starting to take responsibility.
- J: And do you think, not wanting to just be a technician anymore, it's obviously to do with some sense of striving for a particular goal in terms of professional status?
- H: Yes, I think that... perhaps not even so much in professional status - some people would have years ago considered we were a profession, because professions perhaps had a different definition - my definition of a profession is very much linked to the knowledge base and that developing; so I wouldn't say that one and all of the radiographers out there see this and want it, but I think there is now sufficient, across the world, a sufficient momentum, and there are enough people driving it, that the profession is developing. And we are becoming more assertive, and we are taking our place and saying, 'We are not just going to be told what to do, we are actually going to make a place for ourselves, we are going to make some decisions; we are going to take some responsibility and we are going to take the consequences'. Because if you take more responsibility, also you take some of the knocks; you make some bad decisions and it's your decision, it's not somebody else's. And I think that was part of radiography, it was comfortable to have the doctor take all the responsibility and we were just there, doing our bit really well, but we did not have the ultimate responsibility. And now that's changing.

Helen did not see this shift implying that radiographers would replace radiologists but, as both professions were developing their knowledge and expertise, radiographers were learning to do some of the work that radiologists had previously done. Changes were being driven by

“some big drivers”, with universities and clinical practices the sites of change. Increased radiography research publications reflected the changes: “Twenty years ago, across the world, there were three radiography journals. And now there must be a hundred and three.”

In other words, the profile of radiographers was changing as they were ‘taking more responsibility’ for new aspects of radiography practice. This change involved increasing their research capacity and capabilities; and the implication of the latter was that Radiography learners would need to be prepared adequately so that, if there were opportunities and if they were so inclined, they would have the competencies to contribute to a growing body of radiography research; and they would also need the competencies to communicate with other scientists about the science of radiography.

While conceding that developing learners’ academic and language competencies was relevant, and would be increasingly important in the radiography curriculum, Helen (**22 Mar.**) did not believe that “everything” had to be done at undergraduate level. She said that, ultimately, the strength of the profession lay in their being “...jolly good practitioners and we are competent. So we want to do something additional to that, but not, not lose that.”

Like Helen, Cindy’s (**15 Nov.**) reply to the question of what contributed to the growth of the profession indicated a clear link with research and publication:

I think by developing the academic level of radiographers, whether it’s further studies, whether it’s research,... whether it’s writing journal articles, I think that is more... I think, it’s crucial to the development of radiography. It is the actual development of the qualified radiographers that needs to develop, and I think, in our profession, I think that’s where research is so important, and publications...

Linda’s (**7 Dec.**) response to the same question was similar:

Ongoing study ...yes, lifelong learning in the form of being prepared to present at seminars, going to conferences and presenting, doing research, writing for publication, going on to further qualifications, very definitely that will push the status of the profession up. But it must be ongoing learning in some form or another, either informal or formal.

Nadine (**21 Nov.**) thought that there needed to be more discussion among clinical radiographers, lecturers and learners around radiography research. She said: “Lunch times the radiologists have journal clubs. Why don’t we have journal clubs?” She believed that a change in attitude was needed for the profession to grow – and it had to come from within,

from the radiographers. She saw a link between the growth of the profession and academic and, particularly, writing development:

Scientific writing, developing scientific writing skills, modelling the work at undergraduate level... I want to be able to develop someone that can write a scientific article and a good academic, scholarly article that can be published in a journal.

Several lecturers were concerned to begin this process of developing the learners' academic and language competencies earlier than BTech level. This early beginning was regarded as important, both for learners' academic success and for the future growth of the profession. Fiona (**15 Nov.**) said that she believed that research preparation required learners to be reading and writing about research from Year 1. While reading journal articles at that stage would usually be too complex for them (because such articles were complex with dense, technical terminology), they could read summaries of the issues, discuss them, and write about them. Developing the learners' academic and language competencies would be directly involved in this process. When asked, "What is the role of the student's academic (and) literacy instruction in the future of the profession?", Cindy (**15 Nov.**) replied:

I think it's very important, because without that they will first of all... they will be hesitant to follow further studies, because if they struggle in Radiography, scrape through the course, they are unlikely to go and do a masters or a doctorate, so, yes, I think we are actually shooting ourselves in the foot by not nurturing the academic [competencies]...from undergrad level already, in order to give them that solid base so that they can feel comfortable to pursue a masters or a doctorate...I think we should build that in, even knowing that they don't know that they are going to need it in future, we should, I think, from first up to third year level.

Linda's (**7 Dec.**) response to the same question was:

L: Ah, very easy, I want them to be able to write properly. Well, it's not that easy, but my feeling is that we need to be able to ground them from first year onwards so that by the time they get to BTech they are writing scientifically, or they're capable of writing academically and scientifically, and process complex texts, you know, not just getting the minimum done to pass their subjects, but they're actually able to go a step above that.

J: Okay, and then orals, you were saying they should also be able to go and present at conferences, seminars, etc.?

L: Mmm, and to be able to discuss your topic effectively.

Nadine (**21 Nov.**) agreed that, along with the research and writing competencies, radiographers and Radiography learners would need to develop the competency to deliver professional oral presentations so that they could present their research in appropriate forums.

She, like Linda and Cindy, was of the opinion that they should not wait until BTech level to try to achieve this vision. She said that, with structured outcomes in place, the lecturers could implement the necessary changes.

Several lecturers said that an ongoing emphasis was needed on language and academic competencies to ensure that they were integrated into the curriculum. More structure was required to ensure that lecturers kept these competencies in focus so that maximum benefits were gained (e.g., Cindy, **15 Nov.**; Linda, **7 Dec.**). As Cindy (**15 Nov.**) said:

We speak about it in a very haphazard way. There's not a structured form...you know, someone taking charge...Everybody does a little bit...and then we forget about it and then we expect students to produce perfect assignments and perfect essays.... Even though one lecturer might have spent one period discussing referencing, it wasn't reinforced.... You can't qualify them and they go and do BTech and they still struggle with that.... The level of their writing is not up to standard in terms of their training. You know, you expect a qualified person to be able to write a beautiful report.

Of all the competencies that needed attention, Linda (**7 Dec.**) believed that the greatest challenge lay in developing learners' academic writing:

If you're looking at pure writing assignments and that sort of thing, then it's obviously in the theory subjects, and ...I'd say from first year that's probably their biggest challenge....

Nadine (**21 Nov.**) similarly noted that the learners' poor writing competencies became a thorny issue at senior levels when learners were required to write research articles:

You can see there hasn't been enough practice in writing. They haven't developed academic writing skills...if they progress to Masters, the majority of them, there would be a lot of bridging work that needs doing.

However, there was a dilemma: although Nadine (**21 Nov.**) and others were concerned about the learners' poor writing competencies, Nadine believed that the reason for some learners' neglect of their writing was that, in the case of Diagnostic Radiography at least, writing was currently required mostly for the academic classroom, not in the workplace. The only workplace writing in Diagnostic departments tended to be appointment cards and registers, neither of which required composed writing. Nadine said: "We know in the workplace they're not going to be required to write. You see, I think that's the big thing." She added: "The writing aspect is very much contained within what happens in the classroom environment." When asked how much writing of reports and summaries occurred in the

Diagnostic workplace (as these were genres that radiographers wrote in Ultrasound and Radiotherapy), Nadine said that, in their careers, if they were on duty and there was an incident, they would have to write an incident report, but that would be more like a news report. Would not being able to write affect the learners' future success as radiographers? Nadine admitted that it probably would not, at present.

The dilemma about the value of academic writing is not unique to Radiography education. Competent essay writing is often only really required in the academy. However, much research has indicated the value of writing, as the process of formulating one's ideas, building one's arguments and communicating them logically are important cognitive competencies of great value for learning (e.g., Corson, 1990; Cannon, 2000).

Fiona (**15 Nov.**) commented on the motivational role of the clinical departments, saying that learners would be motivated to learn how to do something if it was needed for their work in the clinical department. Nadine (**21 Nov.**) confirmed that, if learners were to value writing, it would have to be because it was required in the workplace. This implied that workplace writing practices would need to develop: "...and I think if we try, we need to force somehow a workplace writing, we need to develop workplace writing." She concluded:

Either we have got to say, we've got to accept that it's actually not a priority... or we've got to be stricter, and we've got to say, 'No, it's got to be like that, and if it's wrong, it's wrong. I'm not giving you those marks'; and assessment is what drives learning, and students are mark-orientated....

I was not sure that one could 'force' workplace writing. Nevertheless, Cindy (**28 Mar.**) informed me that practices in the Diagnostic workplace were rapidly changing, with radiographers increasingly being required to write reports for pattern recognition. The kind of language expected in these reports was highly descriptive and precise. She said that the lecturers would begin working on teaching such competencies to learners later in the year:

There's a new concept in radiography, pattern recognition, which requires a certain amount of ... we want them to describe abnormalities by using specific radiographic terminology. They will see a mass on the radiograph and they've got to say 'That's a rounded mass and shadow visible in the right apex', you know, try to get them up to that level where they can communicate with other professionals, describing abnormalities that they can see. And we are starting with that in 1st year and obviously going up in 2nd and 3rd year. But that's also very difficult for students, because sometimes they struggle to express themselves and, they generally don't do well in describing abnormalities or knowing what they are looking at and actually giving expression to the meaning of that.

Although pattern recognition reports would not necessarily prepare writers for the kind of extended research publications that they might write in the future, this was more than they had previously been required to write. I reflected that if such writing practices became commonplace, workplace notions of the place of writing would change; and learners would have to improve their writing competencies to write appropriately.

Nadine (21 Nov.) also informed me that a new “480 professional degree” (awaiting approval from SAQA, the South African Qualifications Authority¹³) could change notions of the value of writing. It was an opportunity to include some form of report writing in the curriculum. She added, though, that workplace drivers were necessary for changes in attitude to become established: writing would have to be taken seriously by the radiographers as part of their potential career pathing. She concluded: “It’s very much...going to come from the side of, from the body of radiographers, whether they want to take their career forward into that pattern recognition and report writing.” Critical realism would regard a decision by radiographers to adopt particular literacy practices within their profession as a causal mechanism that has the potential to generate new career possibilities for radiography.

Another influence that would potentially play a role in encouraging the development of reading (and, ultimately, writing) competencies was Continuous Professional Development (CPD). Nadine (21 Nov.) explained that clinical radiographers were increasingly being required to read beyond the minimal amount that they encountered in the workplace (appointment forms and request forms): from 2007, the HPCSA (Health Professionals’ Council of South Africa) required practising radiographers (and other Health Care workers) to show evidence of CPD by earning a minimum of thirty points over a two-year period. Complying with this requirement was compulsory for continued registration with the HPCSA (with whom they had to be registered to practise as radiographers). Nadine believed that CPD

¹³ The “480 professional degree” referred to here indicates the total number of credits allocated to a qualification (in this case, a degree). A credit is the value assigned by SAQA to 10 notional hours of learning (a notional hour being the time that it is believed most learners will need to meet the requirements for an outcome). A 480 degree would thus be a four-year qualification, with each year level having 120 credits and taking approximately 1,200 notional hours to accomplish. SAQA is the body that was established in 1995 by an Act of Parliament to manage the development and implementation of the National Qualifications Framework. This it achieves through policy formulation and laying down criteria to guide the registration of standards and qualifications bodies, as well as the accreditation of bodies that monitor and audit achievement of such standards and qualifications (SAQA website, 2008). The National Qualifications Framework (NQF) established the philosophy and structure (through principles and guidelines) of a qualification system within which development and implementation of qualifications occurs.

would be a “big driver” to get radiographers (and others) to take seriously the need to participate in knowledge development activities. Points could be earned through initiating CPD programmes within departments, by presentations at seminars and conferences, and through peer teaching. In the process, practitioners would have to read others’ research and apply it to their own practice. Academic reading - and writing - would therefore be encouraged.

Conclusion

The expression and configuration of knowledge (i.e., framing) affects how various kinds of knowledge are perceived (and valued) by learners. The Radiography lecturers, as a community of practice, evinced great enthusiasm and dedication to their pedagogic role. This was evident in many of their teaching and learning practices and through their integration of various language, academic, professional, moral and workplace communication outcomes into their curricula. Though some opportunities were overlooked, these could be addressed through guidance, as suggested by Fiona (**15 Nov.**) when she said that academic lecturers need to be informed about how to integrate competencies into their curricula. Lecturers’ expressed concerns that the language and associated academic development facets of the programme were not sufficiently structured to address perceived shortcomings in (particularly) the learners’ writing and reading competencies. This indicates that they were aware of the competencies that learners needed to develop. The anticipated new curriculum - as well as changes in workplace practices in response to CPD programme requirements - would hopefully address some of these issues.

In spite of their positive efforts, however, it seems that the Radiography lecturers have choices to make. In the following three respects, at least, the lecturers could make improvements:

1. Lecturers need to begin by sharing with learners their vision for the future of the profession and the implications of that vision for their (lecturers and learners’) teaching and learning practices.
2. They need to ensure that their learners are ‘academically literate’ (in the correct sense of the expression), by explaining the structure of the discipline, i.e., its internal and external design grammars, as only then will the learners be empowered, in due course, to make the

kinds of meaningful, innovative contributions to the knowledge base of the discipline that are necessary for its development (Gee, 2003); and

3. They should ensure that learners gradually gain insight into the literacy practices of their discipline. They need to be aware that there is authorship (and therefore purpose and technique) in the expression of any content knowledge – that is, there are rhetorical processes involved. A greater emphasis on critical reading from first year (including critical reading of the Communication workbook) would be important. This, coupled with journal reading practices advocated by Fiona (15 Nov.), would assist learners to understand the rhetorical nature of written materials in their field. These insights are important, because only when one understands the arcane knowledge practices of a discipline is one empowered to engage meaningfully with the discourse of other experts (Geisler, 1994).

With a better understanding of the lecturers' vision for the radiography profession (of which they are a part), along with an explicit understanding of the academic Radiography discipline, learners might be more motivated to strive for the same 'information literacy' goals that their lecturers do. The critical realist point of view on the above would be that the transparent sharing of such critical knowledge with learners could be regarded as a causal mechanism with the potential to generate new understandings and practices among learners.

I have not included learners' response to the framing of knowledge here, as it seemed to belong more appropriately under 'tenor of discourse' in Chapter 6.

5.1.4 The evaluation of knowledge

The 'evaluation' of knowledge is the process whereby lecturers decide what level of learner knowledge is valid/required (Bernstein, 1996). As explained earlier, I will not discuss assessment in much detail, as I did not personally participate in any assessments. The learners' first tests were written at the end of the first term (after their first clinical practice) and at the beginning of the second term, when I was no longer present.

Through prior experience, learners in Higher Education probably expect to be assessed in ways similar to those experienced in secondary school. (Some of the assessments in Radiography education would be quite different, though, e.g., learners would be assessed as they worked with patients and radiation equipment).

In the Introduction to the 2006 Learner Guide, the senior lecturer explained that “...assessment is part of the learning and not merely for testing.” Assessment information (e.g., the Policy and Criteria) filled several pages of the Learner Guide, emphasising for learners its importance to their lecturers.

Besides the information in the Learner Guide, assessment information was provided during lectures. For example, within the first two weeks of orientation (13 Feb.), Nadine commented that, in her subject, assessment would be mainly through written tests and assignments. One of the final, heavily weighted examinations was discussed and learners were given details of what to expect at that time. Because Radiography is about practical doing/ relating theory to practice, clinical assessments by lecturers would take place with real and simulated patients.

In the case of OSCEs (Objective Structured Clinical Evaluations), learners would progress through ten stations to demonstrate various competencies, e.g., setting up patients for radiographs, administering oxygen therapy, and handling the emergency trolley. The OSCE was intended to draw simultaneously on all knowledge (theoretical and practical) learned to that point.

Learners were also informed that 80 % of clinical assessments would cover common areas of knowledge; and 20 % would cover discipline-specific practices (e.g., Radiotherapy). Radiographic assessments would involve a critique of images, and a judgment on whether or not a radiograph was of an acceptable standard to pass on to a radiologist (who had to write a report and plan patient care management on the basis of the radiograph). If a radiograph was inadequate, the radiographer had to know how to redo it, taking corrective measures to prevent repeating errors.

During the first official lecture after orientation, assessment dates for the year were announced, and the textbook chapters to study for the first test were named (27 Feb.). During a subsequent lecture (6 Mar.), the lecturer explicitly emphasised the focus areas and methods of assessment. Learners were also informed that some subjects would be assessed in an integrated way (to be explained shortly).

A distinction was made between formative assessment (that facilitates learning and is not necessarily mark-related) and summative assessment. Other assessment methods would include written tests, assignments, projects (group and individual) and oral presentations.

Cindy (**28 Mar.**) explained that radiographers generally “...don’t diagnose per se”; however, as mentioned earlier, they had to be able to describe the appearance of anatomical features on radiographic images. It was this ability (pattern recognition) that was typically assessed; and it was an area where a learner’s language proficiency was critical, as marks were lost if learners did not express themselves clearly and use the correct terminology. Cindy (**15 Nov.**) discussed the same issue later in the year: “If the explanations are not clear, that’s where the English second language students are often...particularly those who did not go to English medium schools...they often score lower marks because they are not expressing themselves clearly....” Nadine (**17 Mar.**) too explained that, as the language requirements of Radiography were highly specific, learners typically struggled to use this language correctly:

Then also I find the actual terminology and descriptive terms to describe the radiographic practice... there are set protocols...language, how you describe the position of the patient, the relation of patients to the cassette and to the tube and anatomical terminology and radiographic terminology.... Students can maybe tell you, they can explain to you... show you... but to actually write it in good scientific, academic...especially last year - because I haven’t experienced this group much - but it’s kind of the same, because they can’t express themselves.

Regarding integrated assessments, Cindy (**28 Mar.**) expressed two of the negatives of this practice as follows:

We’ve got a very disorganised system where we’ve got to assign marks to certain subjects, because it’s still subject based, because the hospital get their funding depending on subjects that students are registered for. And the other thing, I think, because it’s integrated ...sometimes we assess them in an integrated fashion, they cannot do well in certain aspects and they still pass the assessment because sometimes we’ve got a bit of Physiology, we’ve got Pathology....

Katy (**23 Mar.**) agreed that integrated assessment was problematic, but her concern was more that learners sometimes failed subjects that they otherwise would pass if they were assessed separately: “When they assign marks, most of the integrated ones [marks] will go to at least 3 tests, and they will get the same marks for each so, whereas someone could have passed Anatomy, they end up failing...” Linda (**24 Mar.**) likewise observed that integrated assessments were not “...reflective of certain strengths in certain areas.”

Nadine (**17 Mar.**) said that integrated assessment was a challenge: “...it is confusing for the students and especially if you’re a weaker student – now you’ve got to deal with that as well. And then when it comes to the type of assessment as well, you’re (the learner is) thinking ‘Now, which part, what is going to be included in this assessment, because I wasn’t even sure

what subject it was,' kind of thing." Katy (**23 Mar.**) similarly commented: "Honestly, I think it's good to have integration, but in first year I think students struggle with the integrated test... it's got Anatomy and Physiology and Radiographic practice combined... and some Pathology, so it's like setting up a four in one test, basically....It's a lot of work."

Nadine (**17 Mar.**) agreed that the amount of work to be studied for integrated assessments was very challenging, as learners had to study all the theory plus the clinical applications for that subject. In 2006, they had changed the schedule to include more subject-specific assessments with only a few integrated assessments later in the year.

Linda (**24 Mar.**) supported separate subject assessment at first year level: "...we've gone more with discipline subjects at first level because there's certain core stuff that you can only check by, literally, a test." She said that the integrated assessment that worked well was for clinical subjects and radiographic practice subjects, as well as some of the science from second year level (i.e., for theory and its application in practice.)

Lecturers had various notions of assessment standards, and this was sometimes problematic, as learners did not know what to expect. Cindy (**28 Mar.**), for example, explained that "[p]eople have different standards, which one can pick up...we are confusing the students... lecturers expect different things from the students...they've got different methods, how they test it."

Some lecturers expressed their concern that the kinds of assessment used should be meaningful, both in terms of the level as well as one's vision of the kinds of learning and experience. A lecturer (**23 Mar.**), who was involved more with senior learners, said that she would do away with tests altogether if she had a choice. She believed that there were better alternatives, such as collaborative practical assessments by lecturers and clinical supervisors: the supervisor observed the learner doing the same procedure several times until it was of a satisfactory standard; the latter procedure was then assessed. When a supervisor was unable to do the assessment in the way described, the lecturer assessed a learner over a morning to ensure that she observed the learner implementing a procedure with two or three patients. This lecturer's view was that such an assessment was more realistic and fair to the learner. Although this example does not refer to assessment practices at first year level, it is an indication of the creative assessment possibilities available in an integrated university/workplace setting.

Some lecturers were concerned that learners were being over-assessed: Nadine (**21 Nov.**) commented: “I think everybody just gets on and piles into their assessments without actually thinking, and the students ...there’s an overload on the students.” She was also concerned about the nature of assessments at various levels (e.g., first years interpreting a radiologist’s report) and believed that these needed to be discussed and revisited. She saw first year as a time to lay the foundation, so tests should rather be on “...common kinds of things, ...common terminology. Tests could become more advanced from second year onwards. She was also of the opinion that, if there were fewer assessments, there would be more time for “authentic feedback” with learners on a one-to-one basis.

As mentioned, I was not present during the end of term written assessments, but saw some of these (and learners’ results) afterwards. It seemed to me that many of the assessments required answers to short questions. Learners’ preparation for these tests would have involved much memorisation. As foundational terminology and basic concepts which were to be built upon were being tested, this seemed reasonable. Helen (**25 Oct.**) commented on the difficulties associated with overcoming learners’ rote learning practices:

Those with poor English proficiency are more inclined to do rote learning, and so they cope. A certain amount of our assessments are... will always be sort of facts and a certain amount of regurgitation. There is that in the assessments. And then a lot of our assessments are showing thinking and analysis....Where it is rote regurgitation, they can give it (the information) to you, but as soon as there’s understanding, they can’t... they haven’t ...freed themselves up yet to try that, so they are relying on rote learning...and it can change. Those students aren’t stuck there forever, they are just there now....We try not to have too much of that, but I don’t say we have none, absolutely not. There is an element of Anatomy which is just learning your Anatomy....got to be able to name it, got to be able to put them in the right order...the same with Physics and Chemistry, there is a certain amount that is just solid swot work.

By the end of orientation, the first year learners were aware of what they needed to know for assessments. In our first Group Discussion, they named the subjects that they needed to study and told me what they needed to know about them. For example, regarding Anatomy, Zinzi (GD 1, 23 Feb.) said: “A radiographer must really know the human body...you must be able to identify each and every single bone in the body.” Another focus for assessment was Radiation Science and related safety measures: the group (GD 1, 23 Feb.) agreed that they had to know about keeping the radiation dose As Low As Reasonably Achievable (the ALARA principle that had been emphasised during lectures), and the importance of time, distance and shielding in radiation safety.

Learners also commented on the kinds of practical knowledge needed: Cheryl (GD 1, 23 Feb.) said: “You have to know how to do the practical, do the X-rays, you know, and processes you have to go through while you’re with the patient.” Angela added: “You should be able to know how to position the patient.” The importance of accuracy in their work was also mentioned. Petru commented: “Another thing...is accuracy... the thing with the (identification) markers, you can’t mark the wrong leg... because the wrong leg may be amputated.” She also mentioned the importance of accuracy in Radiotherapy: “...if you’re not accurate (when indicating where the dose should be directed) you can like, um, kill the other cells that are okay, instead of X-raying the right ones.”

When asked what they understood by Outcomes-Based Education and continuous assessment, learners (GD 3, 12 Sep.) said the following:

C: It’s where you don’t write examinations but you do a certain module for instance and there are certain criteria that has to be met, um, covered in that section and you write on that section and you never write on that again, whereas in the old system at school, you’d write from February to June, but here we just write about it once and that’s it, and then we go forward with the next thing,... which I think is good.

Group: Mmm.

H: It’s like, going like you...you like have small assessments which like keep you up to date with stuff...

After reading all relevant sections on the subject of assessment in the Learner Guide, and taking note of references to assessment during lectures, my conclusion about integrated assessment is that it is complex: while the notion of integrated assessments has educational integrity, integrated assessments place an enormous burden on learners, particularly weaker learners who struggle to relate all areas of knowledge covered in several subjects; and the results do not clearly indicate to lecturers areas of strength and weakness of a learner (therefore they do not facilitate intervention). They seem to be disadvantageous to those who have a particularly weak subject, as that can cause them to fail; alternatively, they can cause a learner who has failed one subject to pass, even though the area failed may be of critical importance in radiography. Lecturers were aware of these challenges and were constantly reflecting on assessment - although, during interviews, I gained the impression that some were of the opinion that the whole group of lecturers needed to gather more regularly to discuss and debate assessment issues, as most lecturers were not collaborating sufficiently regarding the number of assessments, their difficulty level, and also the issue of whether or

not it was wise for all subjects to be integrated at first year (other than theory and practice). Nevertheless, lecturers did their best to explain assessment details as explicitly as possible to learners: learners were informed of details of assessments, were prepared for the fact that assessments were going to be continuous and challenging; and that they were expected to take responsibility for much of their success in assessments.

Bernstein (1973: 85) notes that “[c]urriculum defines what counts as valid knowledge, pedagogy defines what counts as valid transmission of knowledge, and evaluation defines what counts as a valid realisation of the knowledge on the part of the taught.” He (2000: 114) also points out that evaluation strongly influences pedagogy because it indicates to educators what they need to teach and what learners need to learn. Entwistle (1993) similarly explains that the focus and type of assessment generates certain notions among learners regarding what their lecturers value and what learning practices are appropriate. For this reason, critical realists would regard assessment as having significant causal power: it generates tendencies among lecturers to choose what to teach, how much attention to accord it, and the mark allocation that is attached to it. The latter practices themselves become causal mechanisms, as they then influence learners’ notions of what knowledge their lecturers regards as valuable, influencing them to focus on particular aspects rather than others when studying for assessments.

5.2 The ‘field of discourse’ at GSH

The constitution of radiographic knowledge also occurred in the clinical departments of the hospital. Here, clinical radiographers and others in the Health Care team, as well as more senior learners, collaborated in the patients’ interests.

5.2.1 The classification of knowledge

Because Groote Schuur is a teaching hospital, the radiographers in the clinical departments were also partially responsible for tutoring Radiography learners of CPUT. However, there was no documented curriculum for this. As Barnett (2006) notes, workplace knowledge tends to be fragmented, with no particular sequence (as it is the unpredictable nature of the patient’s problem and the immediate requirements of the situation that decide the sequence and emphases of learning).

The clinical radiographers at GSH are employed by the Provincial Administration of the Western Cape, so they are answerable to that body, not to CPUT. One of the CPUT lecturers

informed me (30 Oct. 2007) that the university curriculum was workplace-focused: it was directed towards what was done in the clinical setting, and not the other way around. She said that CPUT lecturers provided the clinical HODs with the latest Learner Guides and logbooks for different levels. However, she said that she doubted whether the clinical staff consulted these documents regularly, if at all. However, it was clear that the radiographers had a definite opinion about what was needed for radiography training. As discussed earlier in this chapter, when I visited a clinical department (5 May), the head of department was concerned that Radiography learners were getting insufficient practical experience in their first year. She referred to radiography as “a very practical job”.

From the above description, and from what I observed in the clinical department that I visited, it would appear that the discourse of the radiography departments is predominantly horizontal: I detected many correspondences between Bernstein’s (1999) description of horizontal discourse and that evident in the clinical department: radiographic knowledge was context-dependent; it was conveyed largely tacitly; and knowledge circulation occurred through social relations (influenced by position or status of individuals) and according to community expectations (where the structure of social relationships was critical, as it generated the discourse). However, because the hospital is a teaching hospital, the department is a site of learning. Clinical radiographers therefore teach Radiography learners according to some form of organisation. In other words, intentional pedagogy is involved, with some conception of sequencing and developing the learners’ knowledge and skills, although this understanding may be tacit, as is much of the radiographers’ underpinning knowledge of, for example, human anatomy, physiology and biology. Thus Bernstein’s (1999) vertical discourse is also relevant, involving horizontal knowledge structures with weak grammars (as the constitutive knowledge bases of radiography have to ‘talk’ to each other in the practical execution of radiographic knowledge).

5.2.2 The framing of knowledge

As mentioned previously in this chapter, ‘framing’ refers to pedagogic practices involved in the transmission of knowledge. Even though transmission of knowledge in the department was largely tacit (an experts modelled practices for learners), the underpinning principled knowledge was that of the academy (cf. Gamble, 2003^b, Chapter 2). The required knowledge was thus both principled and procedural. Gamble (2003^b) describes principled knowledge as holistic, entailing an understanding of both abstract theoretical principles and a tacit

visualisation of how these principles manifest in practice (i.e., in understanding the theory, there is a forward reflection on the manual processes involved in an activity). Procedural knowledge entails the practical enactment of that abstract, theoretical knowledge in a particular three-dimensional context involving tactical know-how - what Gamble (2002: 77) terms ‘knowledge *in the body*’. Because principled knowledge is often held tacitly by workplace practitioners, it is difficult for them to articulate this knowledge. While in the traditional academy, principled knowledge has tended to be emphasised, in the skills-orientated, practical workplace (like radiography departments), procedural knowledge has always been the focus. However, Gamble (2003^b) argues that both kinds of knowledge are important and occur in both contexts, as they are collateral and complementary. The CPUT Radiography lecturers certainly stress the importance of both types of knowledge, although they focus mainly on principled knowledge.

From what I observed, learners were inducted into radiographic discourse by largely tacit means: by showing (e.g., pointing at a feature of the radiographic image), modelling (e.g., indicating to a learner how to locate the anatomical landmarks on a patient; or showing how the patient should be positioned in relation to the bucky); and other non-verbal forms of communication (e.g., nodding, a pat on the shoulder). This tacit form of knowledge transmission echoes the former apprenticeship form of learning (cf. Gamble, 2003^b). However, learners were expected to have some prior theoretical knowledge when they arrived for their first clinical practice, such as an understanding of radiation safety, and knowledge of the structure of the anatomy in relation to bony landmarks that would be required for accurate imaging of a particular area of the anatomy.

There was some oral transmission of knowledge, but from what I observed, the degree of explicitness varied considerably from one radiographer to another. Linda (**24 Mar.**) explained that, in the department where she works, the clinical staff taught mostly by modelling:

So there is some explicit teaching but a lot of that kind of knowledge is, I think, almost picked up by osmosis, and that’s watching how others do it. And you’ll get some staff that are extremely good teachers who often just explain; others won’t, and each student will have that in the workplace.

Issues affecting the distribution of knowledge in the workplace will be discussed again in the next chapter, in the context of the tenor of discourse.

5.2.3 The evaluation of knowledge

Before their first clinical practice, learners were told to take their Clinical Work Record books (logbooks) to the clinical departments and when attending clinical tutorials, as the records completed would serve as cumulative evidence of practical work completed to an acceptable standard.

The logbook included qualification information that also appeared in the Learner Guide – the purpose, number of credits for the level, and ELOs. The logbook was explicitly called a “duly performed” requirement of the course. Learners had to ensure all items were completed by a certain date and then hand the completed logbook to their examiner.

The logbook first listed demonstrations that the learners had to attend (e.g., they had to observe a patient being transferred from a wheelchair to a stretcher); then practical nursing procedures that they had to complete (e.g., taking a patient’s temperature, giving oxygen therapy) and procedures related to image recording (e.g., correctly handling all types and sizes of films in general use). For the section entitled ‘Diagnostic Work Record’, learners had to perform various unaided procedures under the supervision of radiography staff who then signed that these procedures had been performed. A minimum of an additional 80 unaided examinations were also required under these conditions. This was followed by a log of procedures required for discipline-specific areas of Radiography (e.g., Radiotherapy).

The balance of the logbook comprised sixteen ‘General clinical placement assessment forms’ (see Appendix T) that had to be completed by supervisors by the end of each clinical practice. It is clear that the criteria listed were not only assessing the learner’s practical competencies, but their general attitude. Although marks were not assigned to any of these criteria, a supervising lecturer who went through these forms would certainly have been able to get an impression of the performance of individual learners.

The learners also had to be assessed on their darkroom performance (see Appendix U).

Linda (**7 Dec.**) indicated that clinical placement forms/reports were sent to the lecturing staff by clinical staff. Lecturers examined these closely, as these reports were the means by which “general values system and professionalism” were tested. Nadine (**21 Nov.**) likewise said that learner responsibility and accountability were assessed in learners’ logbooks. She added that it was important for lecturers and clinical staff to liaise regarding these assessments so that

they had a common understanding of criteria (such as punctuality and dress code): “...you need to sit with the staff, then you need to unpack what all of those (criteria) mean and actually have a training session so that the staff know.” Her concern was that, as no marks with allocated weightings were attached to the criteria (staff merely ticked in the blocks alongside criteria), learners were not held sufficiently accountable.

Learners mentioned that they had taken note of the large number of criteria that would be considered during their clinical assessments. A few learners explained what they thought was important, but their expression of these was not particularly coherent, suggesting segmented knowledge/understanding that corresponds with horizontal discourse. Sandra (GD 1, 23 Feb.), for example, said: “...it’s important to be punctual, and ...there was also a rule they give... you should look before you go into the darkroom for a light which tells you if someone’s inside....”

I did not attend clinical assessments as these occurred later in the second term. A lecturer (30 Oct.) informed me that clinical staff geared their assessments towards what was known to be appropriate for a particular year level. First years were encouraged to observe more senior examinations so that they would know what they could expect in future assessments.

5.3 Conclusion

In the context of Radiography education, lecturers (as a community of practice, with dual identities as radiographers and academics) compiled an integrated curriculum according to their notions of what knowledge should be included in the curriculum to prepare learners in the best possible way for the workplace. This included both academic theory (and some practice) in the university, and practical application of this knowledge in an authentic clinical radiography department.

Pedagogically, the integrated curriculum presented benefits and opportunities, while also presenting challenges for lecturers and learners alike. The framing of knowledge for effective pedagogy at first year level is complex; and many lecturers are of the opinion that a solid knowledge base of the constitutive core sciences is needed before integration can occur meaningfully. It seems that it may be necessary for lecturers to make the structure of the discipline more explicit, as first year learners are sometimes confused about the location of particular knowledge. This would also assist learners to monitor their progress in relation to

the broader structure of the discipline and provide them with some insight into its complexities.

The CPUT Radiography lecturers envisage radiography as an emerging profession with a particular knowledge base. To achieve their vision, they have acknowledged that it will be necessary to equip radiographers of the future with competencies that were not required in the past. While they continue to emphasise certain practices and values of the past (e.g., professionalism and ethical responsibility), they are working towards their vision in various ways: they have improved (and continue to improve) their academic qualifications; they offer short courses for practising radiographers; they share their knowledge with other radiographers in South Africa and the continent of Africa; and through academic research and publication, they are contributing to the knowledge base of the profession. The implication of the latter for the curriculum is that a greater emphasis is needed on language issues: learners, irrespective of their educational history, will need to be empowered to participate fully in the future profession, not only through competent practice, but through research and publication. Many lecturers believe that empowering learners will be a gradual process, and so advocate that learners begin to acquire the competencies from first year level.

Because of the technical and abstract complexity of Radiography subjects, lecturers do much to assist learners to learn about these matters, as well as improve their academic and language competencies in a host of ways, including excellent visual support. There are areas that could be improved, however.

To conclude this discussion of ‘field’ of discourse, it is important to recall that, from a critical realist point of view, knowledge is a map; and, although changes may occur unpredictably over time, the knowledge of a group is inherited and thus pre-exists its users. Through curriculum choices, agents generate structures (systems and social relations), and these structures and associated social relations act as causal mechanisms. Once implemented, systems have their own causal mechanisms and generate further tendencies for particular kinds of knowledge and practices to be accepted and reproduced – or, perhaps, rejected and transformed. In the process, not only the field of discourse, but the cultural discourse is reproduced. In this regard, critical realism recognises that certain kinds of knowledge tend to be valued over others: ‘head’ (or theoretical/principled) knowledge tends to be valued over ‘hand’ (or practical/procedural) knowledge. Critical realism argues that both ‘knowing that’ and ‘knowing how’ are essential, irrespective of the context; and that knowledge is developed

through communicative interaction and labour (both of which occur in the academy as well as the workplace).

Chapter 6

THE TENOR OF DISCOURSE

The ‘tenor of discourse’ refers to interpersonal dimensions that affect relations between individuals in a situation, such as their comparative status, roles, and the formality and duration of their relationship (Halliday, 1978). Eggins (1994) explains that tenor is also influenced by power relations, affective involvement, and contact.

I shall begin this section by discussing how Bernstein’s (1996) ‘framing’ of knowledge (see Chapter 5) is linked to Halliday’s (1978) ‘tenor of discourse’ that is the focus of this chapter.

As mentioned in Chapters 2 and 5, Bernstein (1996: 27) notes that “[c]lassification refers to *what*, framing is concerned with *how* meanings are to be put together, the forms by which they are to be made public, and the nature of the social relationships that go with it.” The reference to the ‘social relationships that go with it’ indicates the link between framing and the tenor of discourse. Bernstein (1996: 27) also links the framing of knowledge to the regulative and instructional discourse: he argues that the framing of knowledge regulates relations within two rule systems, the social order and the discursive order. The social order operates through the dominant discourse, namely the ‘regulative discourse’. This discourse is the moral discourse that sets in place the criteria for conduct, required character, and the way in which messages are to be communicated and received. Implicit in this are relative hierarchical relations, with those in power setting expectations for conduct, etc. These contribute to the realisation of the tenor of discourse. The discursive order is evident in ‘instructional discourse’ (the discourse regarding selection, pacing, sequencing and criteria of knowledge – i.e., in the framing of knowledge). The instructional discourse is always embedded in the regulative discourse (Bernstein, 1996). I thus link the framing of knowledge and tenor of discourse: the way in which knowledge was framed by lecturers and clinical radiographers conveyed to learners certain messages about interpersonal relations between them, namely their relative status, power and expectations.

At this juncture, it is also important to reiterate that any text produces three meanings simultaneously (Halliday, 1978). These meanings cannot easily be separated. In my discussion of the ‘tenor of discourse’, it may therefore seem that an example that I give more properly belongs under the field or mode of discourse. However, if that example provides

particular insight into the interpersonal relations among participants, I have chosen to include it here under ‘tenor of discourse’.

In Chapter 2, it was noted that language choices in interpersonal relations are rhetorical and functional rather than logical. Because the tenor of discourse reflects interpersonal relations (Halliday, 1978; Eggins, 1974), it is involved in the constitution and construction of Radiographic knowledge in teaching and learning situations. Actions and language choices signal interpersonal dimensions such as status, role and power relations between participants in a communication situation. Other relevant dynamics that affect the tenor of discourse include formality, affective involvement and contact (including the duration of contact) (Halliday, 1978; Eggins, 1994).

In my analysis, I will focus mainly on the tenor of discourse involving interactions between lecturers and first year learners in the university; thereafter, I will discuss, to a lesser extent, the tenor of discourse between clinical radiographers and learners in the clinical environment.

Critical realism would observe that lecturers and clinical radiographers’ relations with learners have causal powers that influence how they constitute knowledge (and thus also how learners construe and construct that knowledge). Critical realism would thus also consider an analysis of interpersonal relations between agents as important because unobservable mental processes and social relations (e.g., attitudes, intentions and notions of relative status, role and power) are in the real domain. The only access to these is through analysis of statements and actions that convey interpersonal meanings in the empirical domain (Bhaskar, 1979; Sayer, 1992). As concepts, and the language used to express these concepts, are imperfect (our concepts are not the reality itself; and language has unintended effects), conclusions derived from these sources are fallible (Sayer, 1992). However, as they may contribute to a better understanding of the phenomena being researched, they may have practical adequacy.

As explained in Chapter 2, in a recognisable social context, the audience of communication usually predicts the kind of language that will be used. The audience attributes significance to any text (verbal and non-verbal) by evaluating it against prior experience of (and, hence, notions of) what the discourse could or should be ‘like’ in such a context, given the particular role players and their apparent purpose/s (Halliday, 1978).

Insight into the hidden Radiography curriculum was possible through an exploration of the tenor of discourse between lecturers/clinical radiographers and learners. This tenor of

discourse was inextricably linked to identity, role and status in all contexts of learning. One's identity is not acquired through one's own efforts alone: socialisation into patterns of being that constitute a particular identity requires that such patterns be recognised and accepted by others (Gee, 2000). Lecturers, clinical radiographers and learners enacted roles and also attributed roles to others within the hospital and university contexts. For learners, this knowledge was constituted first by lecturers and later by clinical radiographers. For example, Cindy (1 Feb.¹⁴) informed learners that they had many seniors in the university and the hospital to whom they had to report and from whom they required authorisation. On the same day, before the heads from various hospital departments arrived to be introduced to the learners, a lecturer informed learners that they were about to meet "important people". A week later (6 Feb.), a nursing sister who lectured first years referred to the medical commissioner as "the big shot." I also noticed that seniors in departments tended to be referred to in what I regarded as fairly military terms, e.g. "Chief Radiographer" and "Deputy Radiographer." However, I am told that such terms are often used in medical contexts (e.g., Chief Pathologist).

Thus learners were able to anticipate or predict the tenor of discourse in their interpersonal relations with university and clinical staff. This constituted part of their induction into the expected professional 'code of conduct' of the radiography community of practice.

I will begin by discussing the role of the tenor of discourse in knowledge constitution in the CPUT context. There may be overlaps with the GSH context at times, as lecturers prepared learners for their role and status during their first clinical practice that lay ahead.

6.1 The 'tenor of discourse': CPUT

In face-to-face communication, lecturers constituted the tenor of discourse through their interpersonal relations with learners. This tenor of discourse was evident in the ways in which lecturers communicated with learners generally, as well as through the ways in which they framed knowledge for learners. The manner in which learners responded in these situations likewise communicated a certain tenor of discourse.

¹⁴ This is a reminder that, as mentioned in Chapter 4, information from my daily journal is indicated by a bracketed date, e.g. (10 Feb.); interview information is indicated by a bracketed date in bold text, e.g., (**14 Mar.**). Group discussion sources are indicated by GD, plus the relevant date (e.g., GD 3, 12 Sep.).

In general, the relationship between lecturers and learners, both inside and outside the classroom, was genial and mutually respectful. Through what I observed and experienced, lecturers were patient, helpful and approachable, communicating with learners with concern and interest. Both lecturers and learners addressed each other as 'Mr', 'Ms' or 'Mrs' (with surnames only), particularly during lectures. This suggested a certain level of formality; but, at times, I observed lecturers and learners laughing together and conversing in a more informal and relaxed manner.

While I do not have many details about the full class of first year learners, I shared lectures with them for a term, so certain aspects of their attitude were noticeable to me. For example, in my journal (14 Feb.), I noted that many of these learners were "amazingly confident". They were involved and enthusiastic about tasks; and I seldom noticed any learner not participating in group work, or shirking his or her share of the work. Whether working together in the library (e.g., 14 Feb.), or in clinical tutorials, learners seemed focused and cooperative. (On 15 August 2006, I reflected that perhaps this was because they had just started the course, and were highly motivated and enthusiastic).

Lecturers indicated that they were open to and interested in learners' views: in November 2005, I attended a planning meeting of staff. The express purpose of the meeting was for two first year learners to offer a retrospective view on the past year, stating what they had found useful, enjoyable, etc., as well as to suggest improvements to the programme so that the lecturers could try to address those issues in 2006.

In the first term of 2006, I also noticed that 'group time' was set aside for feedback meetings attended by learner representatives of each year level. Learners could raise issues and concerns about the course. I attended one such meeting (28 Feb.). The issues raised were mostly administrative: fees, mentors, forms and ID photographs. I considered the atmosphere between lecturer and learners to be positive and cooperative.

Lecturers showed respect for learners by the fact that they were usually punctual and generally well prepared for lectures. When they arrived at the teaching venue, lecturers greeted learners politely and generally created a positive learning environment. Most learners were punctual; however, there were a few that regularly arrived late. Lecturers responded to this late-coming in different ways (to be discussed shortly).

Learners would have drawn on their previous secondary schooling experience of teacher and learner roles to help them predict the kind of discourse that they would encounter in teaching and learning situations in Higher Education; and this would also have guided them regarding the kinds of roles that they themselves would need to adopt. When they left secondary school, they were experienced seniors; at CPUT, they were unqualified and among the most junior. By contrast, the Radiography lecturers were both experienced radiographers and qualified lecturers and so learners would have attributed to them a greater status and power by comparison with their own. Thus when lecturers told them – and repeatedly emphasised – that learners had to take responsibility for their own learning (see Chapter 5), they had to accept this injunction if they were to succeed. As Sheila (**6 Mar.**) said: “It’s all on you now, like it’s not high school anymore, I’m the one who has to put more effort into understanding what’s going on... They’re (lecturers) doing the best they can, it’s all up to us to put much more effort into understanding what they’re saying when they’re teaching.”

Thus learners realised at an explicit level that they had to accept the new, different university discourse that contrasted quite markedly with that of their schooling; and, in the process, they had to realise that, to succeed, they would have to accept the notion of their being independent as learners, contributing actively to lecturers’ efforts to constitute their knowledge by the ways in which they constructed their knowledge.

Differences in lecturers’ and learners’ relative rank, status and power were conveyed to learners in various ways. Much of this was subtly indicated by the rules and regulations that learners had to observe. For example, Cindy (**1 Feb.**) indicated that, whether in CPUT or the clinical departments, learners had to report to seniors and that authorisation was needed for everything they did. Learners had to sign in outside the secretary’s office in the mornings (just as they had to in the clinical context).

During lectures in the first term of 2006, introductory lectures were presented by several lecturers, although two lecturers presented most lectures. All lecturers clearly and repeatedly expressed notions of their role and their expectations of the first years’ role in the learning process. Learners regularly received homework tasks to complete independently. As one of the lecturers, Cindy (**15 Nov.**), commented: “They must be able to cope on their own, because we are not in high school.” She added: “They’ve got to be self-directed ... They’ve got to be self-disciplined.” During an interview, Linda (**7 Dec.**) said that, it was necessary for the lecturers to set up firm expectations for first years from the beginning of their studies:

Right up front, gently but, nevertheless, say, ‘This is a different philosophy, a different ethos, and we can help you so far, but you’ve also got to help yourself, and that starts with attending all your classes...doing the reading that’s set for you, ...taking responsibility for your own learning; and if you’re still battling and need help, then we can set more tutorials, we can do more one to one, but you must take responsibility.’

Fiona (15 Nov.) likewise said that learners had to learn to read and find information for themselves. She explained: “I give them very little... and it works.” She added later: “I do not spoon-feed...[they] do a lot of work on their own.”

The responsibilities involved in a radiographer’s work were often emphasised. It was a concern to some of the lecturers that they did not make learners accountable enough in light of the fact that they were preparing them for a very rule-bound workplace. Nadine (21 Nov.) stressed that accountability was “a big one” that needed to be “pushed”.

Because lecturers were facilitating learning, they led and directed interactions: they tended to speak while learners listened. Halliday (1984) discusses factors affecting exchanges of meaning in dialogue: the first is the nature of the commodity being exchanged, namely goods and services or information and knowledge (in this case, information and knowledge were the relevant commodities that learners ‘wanted’ and that lecturers ‘had’); the second concerns roles that are defined by the exchange process, with one person in the role of the initiator of the dialogue (giving and demanding information) and the other in the role of the respondent (accepting information and giving information on demand). This aptly describes the roles of lectures and learners respectively. It also indicates the differences in their respective levels of power during teaching and learning interactions.

L2 English learners face significant learning challenges in Higher Education. Some of these have been referred to in Chapter 1. Fiona (15 Nov.) explained the struggle experienced by a senior (fourth year level) isiXhosa-speaking learner from a rural area where he had had no contact with English, hence his limited English proficiency:

It’s like a foreign language. He is really battling and I can see it. He is confident enough to stop me [and ask]...but I can see it is intimidating, because he can’t do it all the time...one can’t always slow down at that pace for everybody...learners ... they battle, they battle, learners have told me they battle understanding some lecturers ...they speak too fast. I don’t know if it’s the accent or speed, but I think it’s something that lecturers must bear in mind also in terms of lecturing, is not too fast and speak clearly... for someone who’s not English speaking, it’s difficult and what happens in class, then they switch off, they get bored.

Some lecturers were approachable, personable and sensitive to what L2 English learners in particular were experiencing. Linda (**7 Dec.**), Fiona (**15 Nov.**) and Nadine (**21 Nov.**) indicated their understanding of the supportive atmosphere that was necessary. Lecturers needed to interact with learners and create a calm, engaged atmosphere in class. They agreed that one should slow down, explain clearly, and repeat an explanation if necessary. Linda said, “I watch faces and then I’ll see, so reword, reword, reword.” She also constantly wrote up new terms. Nadine indicated that “time and patience” were important.

Nadine (**21 Nov.**) was concerned that lecturers needed to communicate with each other more regularly regarding effective teaching practices so as to learn how best to help particularly L2 English learners:

- N: As lecturers we don’t get together and say: “You know what, this really worked well for me”, “This is a really good way of assessing”, “Let’s see how we can talk.” We don’t talk to one another, we don’t share, we actually don’t. And the Tuesday meeting should be a forum...and I think we don’t listen to one another either. People just get on and do their own thing. There is that kind of stubbornness, you know?’
- J: Talking past each other?
- N: Yes...and I think we just say ‘Yes, yes, yes’ and then nobody actually makes changes and tries to improve. I mean, assessment and teaching must be dynamic, it must change.

Learners (L1 and L2) tended not to ask questions during the first term. A learner, Zinzi (**6 Mar.**), said that a lack of confidence and shyness was the reason, as well as a fear of making a mistake. When asked to explain why she didn’t ask questions in class, Angela (**9 Mar.**) said “I think I’m scared.” When asked to elaborate, she said that she was not shy to make a mistake in front of her classmates, but she was scared that the lecturer would tell her that she should know the work. Sandra (**8 Mar.**) said it was not because she feared any teacher that she didn’t ask questions, but said: “Because I’m a very shy person, so if I ask a question, everyone’s going to be looking at me.” Sharon (**9 Mar.**) said that she didn’t ask questions: “I am afraid... my English is so poor, that’s what I am afraid of.” She admitted to being embarrassed about her English in front of the lecturer, but mostly worried about the possibility of being thought ‘stupid’ by her classmates if her knowledge was incorrect. The reasons that learners did not ask questions were therefore varied, but all related to a lack of confidence.

One of the lecturers (**15 Nov.**) commented on the issue of learners asking questions: “They’re very hesitant about asking questions and, yes, I never get learners asking, ‘I don’t understand this term, please explain’ ...they never do...maybe it’s because we’re not encouraging it a lot...I think we’re not encouraging enough to ask.” She added that she asked questions because learners were too shy to do so. She thought that the more proficient English speakers were probably more “forthcoming in asking questions.” She added that, perhaps, in their first year, they had not yet developed confidence to speak in front of their classmates, or lecturers.

Another lecturer (**25 Oct.**) agreed that both L1 and L2 English first year learners avoided asking questions and that it was a matter of confidence and motivation. She believed that learners who did well were those who were “brave enough to risk being wrong”, who “don’t fear criticism...they want criticism.” She added that learning language “kind of needs you to be brave and use it ...those that don’t fear criticism and that just go in there, boots and all, and write and talk and joke about the mistakes they’ve made, they get it together.” She noted that many learners who did not participate much in class were moderately successful; but added: “...there is no doubt that the ones that participate actively all the time are getting the better marks.” This lecturer thus attributed learners’ success to ongoing, active class participation. While there may be some ‘practical adequacy’ in this notion, from a critical realist point of view, this link creates a necessary relation between class participation and success which is possibly not valid. Critical realism would thus urge that relationships between causes and observable tendencies be regarded as contingent, because what one observes may be the effect of the activation of one or more unseen causal mechanisms.

One of the lecturers (**7 Dec.**) agreed that asking questions in class was related to confidence which improved after the first year. She said: “They’ll come to you afterwards, I do think, they always do that.” She added: “You must always make space at the end (of a lecture) for people to come and chat to you quietly afterwards...midway through second year, I notice that everyone’s asking questions.” She said that one had to compensate for learners’ silence by being sensitive to facial expression, by encouraging learners and following up with those who ‘had a problem’. She added “If you see someone is flagging, make sure you go back and check why, what’s worrying them.”

The way in which lecturers framed knowledge, together with their ‘tenor of discourse’, influenced how Radiographic knowledge was constituted. My conclusions are obviously strongly influenced by my experiences of being a quasi ‘first year’ learner, as I observed

practices that supported and encouraged learners (and those that did so less successfully). Through casual conversation, interviews and group discussions with learners, I also gained insight into how learners responded to such practices. Certain lecturers constituted knowledge in ways that supported and encouraged learners. Learners claimed to enjoy teaching and learning interactions when explanations during lectures were clear, as the following dialogue with Maureen (**6 Mar.**) indicates:

- J: Can you think of a lecture that you've had so far that stands out most clearly in your mind, that you were able to follow and that you really enjoyed, that you found extremely clear?
- M: I think the lecture on Radiation Protection, because I found it very interesting and it was easy to understand.
- J: Who presented that lecture?
- M: [Lecturer's name].
- J: What about it was clear? What did she do which was different from other lectures?
- M: Because she explained like what precautions you must take, why certain people can't work in certain departments, such as pregnant women, what protection you have to wear, like the badges and the aprons.

Maureen's words suggest that other lecturers' explanations were not clear, which was probably not what she meant to imply. There were possibly other motivations for her comments: she said that she found the topic very interesting, so perhaps she concentrated fully on what was said about Radiation Protection. The dangers of radiation were constantly emphasised from the first day of orientation, so perhaps this also added to her interest in knowing more about the topic. Thus, from a critical realist standpoint, the opinion expressed by Maureen was possibly generated by more than one causal mechanism.

During the first group discussion (GD, 23 Feb.), Cheryl commented on her enjoyment of a practical lecture in relation to the way the lecturer had "supported" the learners:

- C: The day we went to the Diagnostic department, just to work on the X-ray tube with...to X-ray something.
- J: That's something you remember... but what was it in that session that you think was particularly helpful in getting you to feel like you understood more?
- C: It was the way the lecturer supported us.

- J: How did she do that?
- C: She made it interesting.
- J: How?
- C: She made it fun, she made it...um... she wasn't just saying everything. She made us participate.

Two weeks later, in an individual interview, Cheryl (the same learner) (**7 Mar.**) again commented on her enjoyment of the same practical lecture:

- C: The way she explained different buttons and the procedure. She goes through first all the things you have to do. Basically, it just stood out and we had fun while learning.
- J: So that made it quite memorable for you?
- C: Yes.
- J: And was there anything which the lecturer did that you can actually pin point? You said she showed you how the machine works. Think back on what else you learned on that day.
- C: Um, she let us play with the machine also.
- J: So you got hands-on experience.

Here, it seems that the lecturer was perceived as supporting the learners' knowledge development by explaining details, demonstrating equipment and making the lecture 'interesting' (i.e., interest was, again, an important factor); however, if a lecture was 'fun' and learners were able to 'do' things practically (i.e., not only listen), the learner enjoyed the lecture.

On 27 February, there was an activity during a lecture that I considered particularly effective. During the lecture, learners received a worksheet and they worked in pairs to match diagrams illustrating systems of the body with terms for these systems, as well as matching components and functions. I noticed that, during interviews, this lecture that seemed such an obvious choice to me (as being clear and enjoyable) was named spontaneously by only one of the learners (Maureen, **6 Mar.**). During other interviews (e.g., with Xoliswa, **8 Mar.**), the worksheet activity was not recalled until I mentioned it. Then all learners commented on it positively, as Xoliswa did:

- J: Any other activities that you can think of before we go on? Worksheets? Which you might do with another person? I was thinking of this one I have actually pasted into my notebook.
- N: That's a very good worksheet.
- J: Mmm, because it was also to do with understanding. Did you know these terms for the systems?
- N: Yes.
- J: So this was just revision?
- N: Yes, but the pictures helped a lot.
- J: Why did they help you?
- N: It shows you exactly what's in the system, and then you see the pancreas near the rib cage, you'll know exactly what system it is.

Nomabali (7 **Mar.**) explained why a particular lecture stood out for her as having been particularly clear, easy to follow and understand:

- N: I think that [the name of the subject] is standing out the most and the most understandable, because of the way she's teaching it.
- J: Tell me about the way she teaches it.
- N: She's not kind of going fast through it. She goes through it and she makes sure we understand; and even with the overhead, she gives us time, and things like that. I know we're probably not supposed to get so much time because it's not school anymore, but it's just the way she teaches and the way she approaches the subject, I think, that makes it easier and more understandable....If she asks us, she looks at us, you know, waiting for us maybe to say something, that we don't understand, and if she sees we're okay, then she'll carry on, and I'm sure that if one of us were to tell her, can she go over that again...
- J: So you don't feel that you can't ask her to repeat.
- N: Yes, yes.
- J: So she makes it clear that it's fine for you to ask questions. What does she do when she mentions new terms?
- N: She writes it down on the board.
- J: She usually writes it on the board.
- N: And then she'll elaborate on it more.

- J: So she'll explain also where the words comes from, perhaps, if you can see
- N: Yes, like yesterday with the pictures of a man and a lady and, things like that, so...she's creative...she's creative like that (laughs).

My dialogue with Sharon (**9 Mar.**) revealed similar findings about the same lecturer's framing of knowledge: "...she speaks softly, she doesn't rush"; "I've got time to concentrate more on what she's saying"; and "...the way she explains things, she makes them clear."

In other words, in the first term, lecturers' employed particular literacy practices to bridge the gap between the learners' initial level of literacy and that which would be required later in the year. It is clear from what lecturers said during interviews (see Chapter 5) that their view was that, in many cases, the first years' (and more senior years') level of literacy (in reading and writing especially) was inadequate in relation to the lecturers' expectations for the purposes of studying in Higher Education. Kress (1989) reminds us that the ideology of any context of culture privileges certain practices, expressed through a particular discourse. Because the social purposes of literacy in at least some of the learners' schooling differed to those of Higher Education (where, typically, elitist notions of literacy pervade teaching and learning), learners had to be socialised into these 'higher' levels of literacy (cf. Gee, 1990; Lave and Wenger, 1991; Baynham, 1995).

Other ways in which lecturers framed knowledge to make it more accessible (and this contributed to a positive tenor of discourse in the teaching and learning context) were:

1. Lecturers explicitly navigated learners throughout lectures: they explained the purpose of a lecture and linked new with previous knowledge; they then gave an overview of key points to follow, thereby providing a logical structure for the lecture (e.g., Fiona, **6 Mar.**). During a lecture, they used cues that enabled learners to follow the information (e.g., "The next point, point 7 on the overhead, concerns..."). Learners found it confusing when knowledge was not structured: Charlize's (GD 3, 12 Sep.) comment illustrates this: "It's just seen as a subject that is just difficult always, so maybe start with the basics and say, 'What we're doing now is magnetism. Now this is what I mean by magnetism....' Not just go [snaps fingers] into the thing..." Another learner indicated that she had taken notes during a lecture, but added: "I had the notes but it's very ugly, very deurmekaar¹⁵." When I asked why this was the case, the learner said: "There was a lot of writing. She did

¹⁵ 'Deurmekaar' is an Afrikaans word meaning 'jumbled' or 'disorganised'.

say a lot but mostly it was jumping, like to different parts.” I noticed that, when a lecturer did not structure the knowledge clearly at the beginning of a lecture (e.g., 3 Mar.), I, at least was rather lost and anxious. The lecturer began by providing a handout on a particular part of the anatomy and mentioned its relevance to radiography. However, she then proceeded through a series of overhead transparencies, without introducing the topic. There seemed to be an assumption that the learners would understand what a ‘Systems Approach’ was (the focus of the first overhead transparency). Personally, I was not clear on this in the context of medicine. I reflected in my journal: “I think I got confused because no relationship was established between the Systems Approach, as an approach to the whole body of the patient/all the systems of the patient, and the relationship of these systems to imaging.” Then the third overhead confused me further, as it moved to a totally different topic.

2. Lecturers indicated the focus of the next lecture and gave learners preparation work to do for it to facilitate the learners’ understanding of new concepts. Sheila (**6 Mar.**) explained that this preparation helped: “She said we must go and write what we know about Nuclear Medicine and ...then I went to find out information more about it, so when she came to give us the lecture, it was easier.”
3. Lecturers explicitly linked assessment to what they were doing, and guided learners regarding how they should answer questions, so that learners understood precisely what was expected of them in tests and assignments. For example, on 6 March, the lecturer told learners which topics would be assessed during the course and referred them to assessment criteria in their workbook (although none of the lecturers discussed these with learners during the first term); and on 9 March, another lecturer cautioned learners against responding broadly and generally when asked to answer a question, as they had to show the lecturer that they understood the specifics: “...so that I know that you know.” She added: “I’ve told you, if you want full marks from me, you’ve got to be very specific.”
4. Lecturers explained concepts in appropriate depth, relative to the level at which the learners’ knowledge had been developed. For example, on 27 February, the first day of the academic lectures following orientation, Katy began lectures on one of her subjects in a simple way, by drawing on learners’ previous knowledge. She referred to a colleague’s introduction to a linked subject a fortnight previously. She then asked learners what they

recalled about the topic of that lecture, and a learner answered correctly. She then went on to elaborate by contrasting the focus of her subject with that of her colleague's subject.

5. Lecturers used numerous examples and explanations to illustrate new knowledge and information. For example, on 3 March, in discussing the conditions for registration as a Radiation Worker, the lecturer went through the details clearly, gave what I described in my journal as 'Insider information', and explained the rationale for conditions, drawing on learners' views. For example, she asked why a Radiation Worker should not be younger than 17 years. A learner suggested that it was because the person was still growing, but was not really sure why this was relevant. The lecturer then explained that the younger one is, the faster one's cells divide and therefore the faster radiation can affect cells which may then mutate.
6. As mentioned previously in this chapter, lecturers helped learners access the meaning of new terms and expressions by illustrating how to analyse terms into component parts (e.g., prefixes, suffixes). Sandra (**8 Mar.**) said it was helpful when lecturers gave learners advice about how to remember the meaning of terms like 'proximal' and 'distal' by linking them to associated words with the same prefixes. When new terminology was not explained, learners lost interest and lost confidence. Recalling a lecture during which a radiographic video was shown, Cheryl (GD 1, 23 Feb.) explained what learners experienced when they could not understand terms used: "We don't actually understand what they are talking about, ...I didn't remember anything of that time... the movie, I didn't understand, I didn't understand what that guy was saying." Petru (GD 1, 23 Feb.), referring to a different video that they were shown during another lecture, described her response and that of her classmates: "I couldn't understand a word the guy was saying. And we were all sleeping, almost half the class was sleeping. And it was awful feeling like I don't understand what he's saying." Zinzi (GD 1, 23 Feb.) admitted to nervousness because of the unexplained terms that were used in lectures: "I was also nervous during the whole week, I was nervous, and a bit scared, because of all those bombastic words they were using. So it made it intense...and other stuff like that. That's what made me scared, like... I don't know what to expect. I also struggled during my biology... with some of the terms, like 'homeostasis'...." (When questioned about what she meant by 'bombastic', Zinzi said: "Those, I'd say, they're medical terms.")

7. Through aspects of their vocal delivery, lecturers showed sensitivity to the learners as an audience who needed to understand them: they spoke audibly and clearly. Charlize (9 Mar.) said that lecturers “speaking softly” had been a problem for her, adding: “It helps if they speak in a more audible voice.” A third year learner (GD, 12 Sep.) described the oral communication of one of the first year lecturers: “Although she is soft-spoken, you can understand what she’s saying.” Such a lecturer repeated learners’ answers for the benefit of those further away who might not have been able to hear. When learners were not able to hear clearly, they lost interest. On 15 February, a lecturer responded to a learner’s question so quietly that I (and certainly others) was unable to hear the full answer. The lecturer seemed unaware of the problem and, as no learners asked her to repeat the information, her response was certainly lost to most learners sitting further away. Xoliswa (8 Mar.) complained about missing information because it was inaudible and the lecturer did not repeat it: “She’ll ask someone to answer, then that person answers, then we can’t hear what the person says; then she won’t repeat it...the person’s sitting on the far side, then we can’t hear anything.”
8. In line with the above issue of sensitivity to the learners’ need for audible messages, lecturers who progressed through the lecture at a moderate pace facilitated learning. All learners, including L2 English learners, were then able to stay abreast of the lecture. This was particularly critical when new information was involved. For example, on 3 March, I reflected: “The lecturer goes at a very fair pace, writes up 90 % of terms on whiteboard.” By contrast, when learners were unable to stay abreast of the lecture, some seemed to get bored and/or give up (as indicated by learners’ no longer taking notes or putting their heads on their desks). On 27 February, I noted in my journal: “Pace very rushed, lecturer jumping down list without giving navigational cues. Quite alarming, insecurity results, I think – how I perceive it, and I’m coping quite well because of my knowledge of some of the terms and general English proficiency.” On another occasion (3 Mar.), a lecturer showed ten overhead transparencies (with many new terms and fresh information). She spoke at what I described in my journal as a “frightful pace”. I wrote alongside my notes: “Missing quite a lot.” Xoliswa (8 Mar.) commented: “I’m always missing what she’s saying because she does everything so fast.” Cheryl (7 Mar.) said that she couldn’t “bear it” when the pace was too fast, and added: “It makes me feel confused....If someone explains to me slowly the first time, it stays in my mind,...but if it’s faster, I’m not

actually paying much attention, because everything is going so fast, which makes you forget.”

After a ‘pressure’ session (27 Mar.), I asked a first year learner, “Zinzi, how did that go?” She responded (with much shaking of her head): “Yo! My head is spinning.” She added, though, that she thought medical terminology was “beautiful” and that the pressure and the number of new terms had motivated her to begin to catch up and work hard. Personally, at the end of the lecture, I realised that I had been so intent on trying to keep up that I had missed an announcement of the due date for completion of a task – and none of the learners sitting near me had taken note of it, either.

A third year isiXhosa-speaking learner (GD, 12 Sep.) was more forthcoming than the first years about the anxiety experienced when trying to take notes during lectures. Although her response was not always clear, her frustration and anxiety are evident:

Taking notes down... you struggle. Like we are just sitting sometimes and now there are these... like there is the one who will lecture. I’m writing, the other learner’s page is full and you’re still on the first line and now it’s become like, ‘Oh God!’ And the lecturer says, ‘Don’t write everything’ and I’m saying, ‘We have to’ and we are...where am I going to start? We do have those things.

A lecturer (Fiona, **15 Nov.**) told me that she had noticed that even senior L2 English learners often didn’t take notes in class, but sat and listened. In her view, they did not take notes because they found it very difficult to do so while listening carefully to the lecturer. She said that, compared with many L1 English learners, these learners thus had an additional burden, as they had to read up on the lecture topic after lectures and make their own notes (I am not aware of whether or not this is the case). Brice Heath (1989) would remind us, though, that this assumes that all cultures regard note-taking as the norm, even though in the learners’ culture, oracy may be dominant. Thus learners may not take notes because they struggle to listen while taking notes, but because they may prefer to listen.

9. Some lecturers reminded first year learners to take notes during all learning interactions, whether in the classroom and, when feasible, in the clinical departments (e.g., Helen, **8 Feb.**). However, I noticed that most lecturers did not do this; nor, it seemed, did it occur to many learners to do so (although lecturers seemed to assume that this was what learners do, or should do). It seemed that some learners had not developed this literacy during their schooling. Angela (**9 Mar.**), for example, said that her English was “...not so

good” and said, “I should still learn to summarise”. Because of this poorly developed literacy, she was often left behind: “When I’m trying to write a sentence...I was writing a whole sentence, so I still have to learn how to summarise it. Sometimes I try to write the whole thing and then I don’t finish it.” All learners in the research group said that they took notes during class, indicating that they considered this an essential part of their knowledge construction. However, one could argue that what was really important was for learners to listen and understand what they were hearing, instead of taking meaningless notes because the concepts being discussed were not understood, or they were lagging behind in their efforts to note everything. When I asked Sandra (**8 Mar.**) if she took notes in class, she said that she did, but that she struggled to do so when lecturers spoke fast (or were too quiet). During interviews, a few other learners explained why they didn’t take notes: Sheila (**6 Mar.**) said that she was only able to keep up with lecturers “Now and then”. When I probed, she said that, when a person spoke “...very fast ...it takes time to catch up.” Then, instead of listening and concentrating, she was busy “writing down.” Nomabali (**7 Mar.**) indicated that, because of the fast pace at which some of the lecturers spoke, learners struggled: “We all take down rough notes, we don’t have time to write a bit slower and write it neater.” When the lecturer spoke at a pace that facilitated note-taking, however, Nomabali said: “I write my notes out one time neatly. I don’t need to go home and re-write anything.”

10. Some lecturers gave learners a short while to copy notes from a transparency before beginning an explanation; or they asked learners not to copy notes until after their explanation. When learners could copy notes without also having to listen to the lecturer, they felt confident that they were staying abreast of explanations. On several occasions when this did not happen (e.g., 3 Mar.), learners missed important information. Xoliswa (**8 Mar.**) contrasted the approach of two lecturers:

I think taking notes helps a lot and the way she [lecturer’s name] uses overheads... that helps a lot because I can go back and at home read through it. The other lecturer puts on an overhead and she doesn’t give you a chance to write it, so you never get a chance to understand what she’s saying.

This excerpt from a group discussion with learners (GD 3, 12 Sep.) illustrates the ways in which learners experience note-taking during lectures:

J: Do you find it difficult to listen and copy notes from the overhead at the same time?

Chorus: Yes.

J: Do lecturers put up overhead transparencies, and then speak and you try to listen to them and write?

Chorus: Yes.

J: Does it work?

Chorus: No.

J: So what do you think the lecturers should do?

Learner: The lecturers, like [name], she gives us a bit of time to write.

J: So the lecturers should give you time to write, or use the overhead projector and tell you not to write and give you time to write afterwards?

Learner: Yes, I think maybe it must be... because some of us are slowly in writing and some are faster.

11. Some lecturers assisted learners by providing supplementary handouts of important information that might not be present in the learners' available sources. For example, Katy (3 Mar.) gave learners a handout on imaging. She (**15 Nov.**) later explained that, although giving notes to learners was not generally encouraged, she gave handouts on material that was either very difficult for first year learners to find, and/or it included information that was only required at more senior levels, which became confusing to first years:

I think that if they have notes, especially certain sections that are not easily...or you can't look the information up easily, so...I do give them a couple of notes...Some sections I've given them are actually all they need to know. If they go to certain books they'll be jumping into a deeper level and bordering on second and third year work and they don't actually know, you know, the boundaries.

12. Lectures that involved variety, with a balance of lecturing and learner activities, were enjoyed by learners. For example, information delivery was combined with individual and group activities. Charlize (**9 Mar.**) said that group teaching experiences during lectures were enjoyable because "[w]e're not just listening to her the whole time." Nomabali (**7 Mar.**) also valued group activities because they provided one with alternative perspectives: "I think the group activities also helped a lot... on your own you probably can think of things like that, but when you're in a group you hear everyone else's opinions as well and... they see it in a different way." Lectures which comprised only lecturing created anxiety and exhaustion among learners. During a lecture (9 Mar.),

when the lecturer spoke throughout the two hour period, with only a five-minute break, I noted in my journal: “Talked a bit too much over long period – attention levels dipping towards end, personally, and I was taking notes. Others just sitting. Learner alongside had head on desk.” Two learners, Charlize and Sharon, both said that they found the two-hour lectures too long (**9 Mar.**).

13. Wherever appropriate, lecturers facilitated the learners’ understanding by using some form of visual support during an explanation. For example, Xoliswa (**8 Mar.**) said that it helped her that one of the lecturers always wrote up new terms on the whiteboard when explaining them. Maureen (**6 Mar.**) gave an example: “They use the skeletal structure (skeleton) and they explain body parts and demonstrate and show you exactly where it is, or they’ll make drawings on the board or on the overhead, like diagrams.” Sandra (**8 Mar.**) agreed that when lecturers demonstrated by pointing to areas on the skeleton, a model, or their own bodies, this was helpful (“That’s helping because when you actually point at it, you’ll remember it.”). Other helpful visual support included diagrams, images on transparencies, radiographs, as well as illustrations from journals and textbooks.

The way in which visual support was used was critical. On 3 March, a lecturer used an overhead transparency with rather small print, illegible from a distance. Learners struggled to follow the lecturer’s progress, instead of concentrating on the information. Angela (GD 3, 12 Sep.) reflected on her frustrating experience of that lecture, “I didn’t understand anything...I didn’t even understand, I still remember those columns, still now...and I was like, ‘What’s going on?’... Everybody doesn’t really follow because we jump like from here to there and I just get confused.”

14. Lecturers explicitly told learners what they expected of them. In my journal (**9 Mar.**), I wrote: “From the first lecture that I attended, I noted that this lecturer expected and demanded good work from the learners.” She frequently reminded them about the need for them to work independently and prepare for lectures. Another lecturer (**8 Mar.**) reminded learners of assessments to come: “If you are struggling you must revise a lot, because I’ll be asking you these things”. A first year learner, Zinzi (GD 3, 12 Sep.) commented on how a lecturer provided clear guidelines for their written tasks: “Each and every assignment...she will say what she is expecting us to write about.”

To summarise, the way in which lecturers framed and transmitted Radiographic knowledge facilitated or constrained the learners' ability to construct knowledge. It simultaneously conveyed to learners the tenor of discourse between them, as it indicated whether or not lecturers considered them and the challenges they were experiencing in their role as learners (particularly if they were L2 English learners).

The following are examples of instances where a positive 'tenor of discourse' was created, not through a lecturer's pedagogic practices, but rather through the manner in which the lecturers interacted with learners:

1. When a learner arrived late, the lecturer gave first-time offenders the benefit of the doubt and either ignored their entry, or quietly requested them to be more punctual in future (e.g., 9 Mar.). Those who were regularly late were dealt with more sternly, depending on the lecturer. Learners' late-coming posed a dilemma for lecturers, because of the differences between the expectations of the university (some lecturers tended to be fairly lenient regarding punctuality) and the clinical workplace for which they were being prepared (where all supervising staff were strict regarding punctuality). As Helen (25 Oct.) said, first year university learners usually had an expectation that they would be able to be a little "irresponsible, kind of carefree"; however, as they were entering a responsible profession from the beginning of their tertiary studies, they had to be the opposite. Learners had to find a balance between being in the university context where they, at times, could "let their hair down a bit" and being serious and professional in the clinical departments. She added that some learners managed to find that balance; others didn't.
2. If learners had not prepared for a lecture and so could not answer questions on that work, the lecturer's reaction was firm but calm and non-threatening. For example, during a lecture (10 Mar.), when a learner could not answer a question (as she hadn't prepared an answer to that question), the lecturer merely repeated the learner's words, "I didn't do that", then moved on to another learner. When a second learner hadn't done his homework, she was very calm and merely commented "Some of you haven't done the work." She then quietly reminded learners of their responsibilities. Another lecturer (9 Mar.) likewise adopted a firm but calm approach to learners who had not prepared for the lecture: when a learner said that she hadn't looked up the terms given to them a week before, because she didn't have a dictionary, the lecturer responded in a mild manner that

there were dictionaries in the library, so that wasn't an excuse. She then said that the learner should please ensure that she did the work.

3. Lecturers asked questions in a non-threatening manner and maintained a lively dialogue with learners. On 9 Mar., for example, I described a lecturer's interaction with learners as follows: "She is patient, explains in depth, involves learners, walks up and down the aisles, selects learners to answer questions from front to back of class – all expected to do the work." In the case of another lecturer, I noted (8 Mar.): "She (the lecturer) repeats, illustrates, and involves learners. Learners very attentive for the most part." By involving learners and asking them for information, she indicated that their understanding was valued. Maureen (6 Mar.) said: "They ...ask you to participate and... ask you to come show them, to see if you understand what they are trying to say."
4. The lecturer was patient and repeated an explanation if requested to do so. For example, when a learner did not understand an aspect, I noted in my journal (9 Mar.) that the lecturer was "...very kind/gentle, reminds learner of what one cycle is again (has already shown it to the class about three times)." When asked what kind of teaching best helped her to cope with her work, a third year learner (GD, 13 Sep.) responded by naming a first year lecturer (not the kind of teaching), describing her as "a lecturer and a parent".

One expects lecturers to have different approaches to teaching and learning and different lecturing styles. Learners described one of the lecturers as 'strict', probably because her expectations of learners were uncompromising from the start. The tacit message that I gained from her was: "We have work to do; and you will work hard for me and with me." During lectures, she tended to move through material briskly, and learners were expected to keep up. I reflected on 8 March that she asked learners many questions. Because the class was quite small, she seemed to get around to each of the learners more than once (i.e., within a single lecture). By the beginning of the second week of orientation, on 7 March, I noted: "She knows learners by name – she uses their surname and (sometimes) 'Mr'/'Ms' before it." She gave learners self-directed learning exercises that encouraged them to learn independently (13 Feb.). Everything that was covered in class, or that they were supposed to study for homework, was tested in class, formally or informally. Charlize, a first year, said (9 Mar.): "I like the way [the lecturer] does her lectures." When asked why, she said, "She just asks anybody, you know, randomly". She added: "I like that because it sort of keeps you on your toes.... Some people don't like it, but I actually like it." She said that she knew some learners

didn't like it when a lecturer focused on their shortcomings, but she had a different attitude: "If you don't know your work, then you have reason to feel bad, you must feel bad." She admitted that in school as well, "I always used to like strict teachers and they who are hard on you, because they sort of keep you from failing." Another learner, Samantha (**9 Mar.**) definitely approved of the 'tough' style of teaching:

I like the way she teaches, I might not like her because she gives us a lot of work, but the way she always keeps us on your toes - because if you don't know the work you look stupid in class, and like there's no-one wants to... that likes to look stupid in class. The ways she interacts with the class by asking us questions every time, that means you have to prepare before you go to class.

Learners felt that they were personally accountable to this lecturer. With a class size of approximately 30, the learners could not easily avoid detection if they were not paying attention, or if they had not prepared. For example, in a class that I observed, (27 Feb.), the lecturer began with a review of a worksheet given two weeks before. Learners unable to answer questions were told: "It's not good enough" (e.g., 7 Mar.) or "Shocking" (9 Mar.). She then gave such learners stern warnings, saying they were on a "slippery slope to failure". She added: "I think I'll need to have a serious chat with some of you ... I'm here to facilitate your learning, not to hold your hand." She warned learners: "If I find this again, I'm going to stop the lecture and tell you to go on by yourself. Life in Radiography is so fast, you're soon going to find yourself running out of time."

On 8 March, as I was walking to a lecture with some first years, I noticed that the group seemed quite abuzz with nervousness. When I asked two of the first years about it as we walked, they told me that the learners were nervous about the upcoming presentation. One of the two seemed quite confident and relaxed about it; the other was less so and said some of them didn't know what the lecturer wanted.

None of the learners said anything directly negative or critical about their lecturers. Anything that could have been perceived as criticism was phrased indirectly as a suggestion; and the learners' comments indicated that they saw themselves as primarily responsible for their learning. The following dialogue with Sheila (**6 Mar.**) illustrates this:

- J: I think what you are giving me, if I understand you correctly, you are coping...and you think the lecturers are doing a pretty good job.
- S: They're not exactly doing a good job, they're trying the best they can to help us. What we have to do is just put in more effort into what we do.

- J: So there needs to be more effort from your side?
- S: Yes.
- J: When you say that ‘they are not exactly doing a good job’, I know you don’t mean this in a negative way, but it does mean there is something that you think they could do differently.
- S: No, I think since they...it’s not high school anymore.
- J: Okay, but what would a good job be?
- S: A bit slowing down, because they speak too fast.
- J: Is that everybody, or just some of the lecturers?
- S: Just some of the lecturers.

Another learner, Samantha (**9 Mar.**), similarly emphasised their responsibility as learners: “We have to put in effort, they are only there to guide us...I think it depends on us, it doesn’t depend on the lecturer.”

Learners’ responses to different lecturing styles therefore varied greatly, depending on individual confidence and maturity. A learner who had frequently been criticised by the lecturer for being unprepared moved to the back of the classroom. However, I noted in my journal (7 Mar.): “Noteworthy that two learners previously ‘caught’ not doing their homework have done it for today. Perhaps focusing class’s attention on them changed their behaviour? One doesn’t know if there were other influences, of course.”

It therefore seems that, in the process of lecturers constituting the learners’ knowledge, lecturers made the rules of knowledge constitution clear to learners – and, for learners to succeed, they had to consciously accept and internalise these ‘rules’ (that they were responsible for their learning, that they had to work independently).

According to the senior lecturer (**15 Nov.**), the diversity of lecturers that learners encountered prepared them for the workplace, where some individuals were more, or less, strict:

Some of us are more easy-going and have different personalities and some of us are much stricter and I think that is good for learners...I’ve never tried to develop a team that is exactly consistent. And if they get different messages within the same framework, it’s fine, because they are going to meet different people out there. And being a professional is not all about being strict and obeying rules.

I shall now consider the tenor of discourse in the clinical context.

6.2 The ‘tenor of discourse’: GSH

The learners’ lesser status and power (compared with clinical radiographers) was emphasised when the first year coordinator informed the first years that they would be subject to numerous rules and regulations when they went into the hospital departments. Helen (25 Oct.) said: “Their uniform, rules and laws and regulations... they have to sort of fit in and the department sets those for us.” She also said that Radiography learners were subject to such rules “quite a bit more than other [university] learners” and that they had to conform to these rules because these were ultimately in the patients’ interests.

The senior lecturer (6 Feb.) informed learners that their performance in the clinical departments would be constantly monitored by seniors. It was explained that, in the hospital, they would be part of a Health Care team who did very prestigious work, though their rank would be most junior in the hierarchy (discussed previously). Nevertheless, in an interview, she (25 Oct.) pointed out that, although they were “the most junior team members...they really are an important role player.” She added that, in that role, they “...neither have to be subservient and yet they have to show respect, so that kind of balance, that’s all professionalism.”

I was struck by the imperative language which was particularly noticeable in the written rules for the clinical workplace; and I recorded some phrases used by a lecturer (10 Mar.) as she went through these workplace rules with the learners:

“have to”; “may not”; “you can’t just (walk off)”; “your responsibility”; “you are required to”; “minimum requirements”; “duties”; “you must work according to the roster”; “the staff must sign you out”; “you may not decide to make up those hours as you see fit”; “you need to discuss...”; “an official roster”; and “If you have not met the required clinical hours, these will have to be made up.”

I wrote in my journal at the time: “Learners constantly kept on the straight and narrow – though in the nicest possible way – through rules, regulations, log books, time record books, needing signatures of lecturers and clinical staff (only senior staff or unit heads) – so surrounded by authority figures and phrases.”

As in the university context, the tenor of discourse between clinical radiographers and learners in the clinical department tended to be implicit. This tenor was realised through interpersonal meanings indicating relative roles, status and power, with associated degrees of formality. When I first visited one of the clinical departments where learners did their clinical

practice, I read two documents that were pinned on the notice board in the department. One was a list of duties for learners; the other was untitled but comprised a welcome to learners; it also listed several 'guidelines'. The latter were expressed more as rules than guidelines (e.g., terms like 'must', 'may not', etc., were included), and referred to aspects such as punctuality, tea and lunch times, the care of personal belongings and reporting lines in the "Staff hierarchy". I believe that these documents were written by seniors in the department, which would account for their greater formality.

Because of the tacit nature of non-verbal communication, it was difficult to assess to what extent my impressions of interpersonal interactions, and the messages that were being conveyed, were accurate. The tenor of discourse between radiographers and learners was realised through various forms of non-verbal communication, such as the amount of eye contact that radiographers had with learners, the degree of enthusiasm apparent in their interactions with learners, their apparent patience when learners responded slowly, and even the degree to which they appeared aware of learners' presence in teaching and learning situations involving patients. When I asked learners about their clinical supervisors, this is what they had to say, both about the manner in which some radiographers communicated with them and how they responded to this:

- J: Which radiographers are the most effective teachers? The ones who explain?
- A: Diane in the department.
- J: Diane ..., I can't remember if I met her.
- A: (Inaudible comment by learner.)
- J: So she's very good because she doesn't even wait for you to ask, she actually seems to know.
- C: Nandi has this calming atmosphere around her.
- J: So she's very calm?
- C: Yes. And she puts you at ease, like, 'No, it's fine, relax, that's okay'. And that puts you at ease with the next patient, you do it with confidence, you don't make mistakes and it really helps. And Lena, she's lovely, she explains everything in depth.
- J: So it helps if the...radiographer anticipates what you need, explaining everything before you ask, stays calm and so calming you.

Learners were expected to know how to behave professionally in their relations with clinical staff. This included knowing both the way in which they should speak to clinical staff and their actions. To me, the tenor of discourse seemed somewhat different to that in the university setting. The relationship of the lecturers and learners in the latter setting tended to be fairly relaxed and informal, whereas the relationship between radiographers and learners in the clinical department seemed a little more formal and ‘distant’. It is possible that this was because the lecturers and learners had learned to know one another better over the preceding months, whereas, because of clinical staff rotation, the radiographers and learners did not know one another very well. Most of the radiographers who were present when I visited were different to those who had been there the time before. Also, as I spent relatively little time in the clinical department, I am aware that this impression could have been subjective. However, some of the lecturers (e.g., Cindy and Nadine) suggested that the clinical staff tended to be quite ‘strict’ with learners; and learners responded accordingly. Cindy (**15 Nov.**) contrasted the way learners applied themselves in the presence of clinical staff with their lack of diligence with university staff. She explained that some learners who were undisciplined in the university context were not like that in the clinical context, because they worked under strict supervision. She added: “You know, we would have a lot of shouts from the department if the learners are not behaving, so I take it, it’s only their attitude towards their studies [that is lax].” In other words, she was stating that the learners were more diligent as workplace learners than as academic learners.

Cindy (**15 Nov.**) commented that, in the university, lecturers prepared learners for the workplace by their expectations. The lecturers therefore encouraged learners to be professional because they were going to be in a medical career where there were certain rules. She added: “...they’ve got to be ethical at all times.” Nadine (**21 Nov.**) also indicated that there was an expected and appropriate way of communicating with patients, peers and seniors; and working in a team required individuals to be accountable. She said: “Especially in the clinical department, there is a hierarchy and you have to respect that and you’ve got to know your place. Because if you don’t, people will talk within the department.” In the clinical department, the tone was set by the medical profession, so greater discipline was required. Giving an example, she said that if a learner arrived late in her classroom, she would usually ignore it, but this was in direct contrast to what happened in the clinical context. She referred to a staff meeting of CPUT and GSH staff during which clinical staff complained that Radiography learners sometimes arrived late and didn’t apologise. Nadine

pointed out that the response of lecturers and clinical staff to learner behaviour therefore needed closer alignment. If lecturers' expectations of learners' accountability increased, perhaps learners would also become more responsible about their academic work, which some learners were reportedly neglecting at that time (as evidenced by instances of poor class attendance, non- or late submission of written tasks, and not taking reading and writing as seriously as required).

In the clinical department that I visited, the main task of clinical radiographers was to accomplish practical tasks as efficiently as possible. I observed several instances of communication between radiographers and learners. Pedagogy tended to be through learners observing radiographers working. Learners also imitated radiographers' practices when there was an opportunity to do so. Some tutors seemed more pedagogically aware than others and instructed learners more explicitly. For example, while modelling practices and ways of interacting with patients, they explained what they were doing and why. They also spoke audibly, considering all learners (sometimes there were four or five learners in a small room).

I wrote in my journal (21 Apr.):

They were all good, but I found two in particular very effective, namely Tracy and Mandy (though her conduct was sometimes less professional, I thought too casual). The former spoke loudly enough for all three or four learners to hear and her explanations were clear. Maintained professional decorum. By contrast, Bert, though professional in manner, spoke quietly and I struggled to catch most of what he said. He seemed to speak quietly to individual learners. However, I asked him some questions later and he was very friendly and amenable to answer. Such approachability is likely very important from the learners' point of view.

Some 'tutors', who were senior learners, were mostly inaudible while modeling procedures.

For example, I wrote in my journal (5 May):

Two 2nd year learners who were working together, supervised Zinzi. (Who was supervising them?) They were friendly and approachable, so I explained that sometimes I struggled to hear what radiographers were saying to learners. The woman said she would speak loudly. I reflected shortly thereafter that she wasn't really speaking any more loudly – perhaps she just forgot. I reflected that a lot of the radiographers were quite unclear. I wondered, 'Am I getting deaf, or is this mumbling a tendency?'

I later reflected that, in the workplace, radiographers usually speak to one another, or to a patient, on a one-to-one basis, in close proximity, so were perhaps unaccustomed to projecting their voices.

Some of the clinical radiographers were noticeably patient with learners, even when they were under pressure to complete their work as there were patients waiting to be seen. On 19 May, during my third visit, Meryl, a radiographer, was working with two first years, Sandra and Angela. The patient's abdomen was being radiographed to detect the possible presence of kidney stones. The learners were shown how to set up for the image, and then it was taken. They had to redo the image as it did not show the full area required. Meryl then tried to show the learners how to move the image up by a rough width of 3 fingers, but one of the learners pushed the wrong button on the equipment. The whole image had to be re-set and bony landmarks relocated. Meryl was tolerant, even though locating the landmarks was difficult and time-consuming, as the patient was obese. Meryl then asked learners what they needed to do next. I thought that this was a sign of a good teacher, as she didn't just tell the learners everything, but encouraged them to reflect and express explicitly what they needed to do.

I noticed that first year learners did not talk to their seniors unless spoken to. However, they seemed quite confident, and that surprised me, as they were still so inexperienced, and had only been in the clinical context for a short while. Also, in their first group discussion ahead of their first clinical practice (GD 1, 23 Feb.), some of the learners had told me how nervous they were about going to the clinical departments. Sandra had said that she was concerned about patients: "I was thinking, 'Am I going to do the right stuff when I have to deal with a patient? Am I going to do the right things? Am I going to follow the right steps?', and that was what made me nervous." Angela had said that she was worried about using equipment: "Am I going to be able to use the machines? Am I going to take long to be able to do stuff?" Personal physical danger was not mentioned much, although Sharon admitted to being nervous that she would be infected through a needle-stick injury: "I mustn't even prick myself with the needle. Very scared."

Such nervousness was not reflected in the demeanour of the first years when I again saw some of them two months later. I wrote in my journal (21 Apr.):

Learners are generally quiet, although they chat and laugh quietly amongst themselves. They are projecting a quietly confident, professional poise already, even though they have been in the clinical dept for such a short time in total – 8 days last term, and this is their 5th day this term.

I was concerned to notice that, as in the university context, learners did not ask questions. I wrote in my journal (21 Apr.): "What struck me is that learners don't generally seem to ask many questions about the actual processes they are observing/doing, nor about terms/

abbreviations when they are unsure of them.” Instead, as the first years were comfortable with one another, they interacted and discussed issues to get clarity. I noted in my journal (21 Apr.): “Nomabali and Petru were discussing why the mAs (milli Amperes) set for two views of a patient were different, but established that it was because the one view was PA (posterior-anterior) and the other lateral, thus half the depth.”

In the third group discussion (GD 3, 12 Sep.), I read to the learners several comments that I had selected from their clinical practice notebooks. I had asked them to keep these with them during their first clinical practice and respond to the questions daily (see Appendix C). Some of these comments indicated not only what they did not understand during that time, but also that they had not asked questions. Examples were: 13 Mar.: ‘Couldn’t really enjoy it because I didn’t know what was going on.’; 13 Mar.: ‘I did not understand the aim of the procedures’; 16 Mar.: ‘Most things are strict, but I fail to know the reasons why it is like that.’ 13 Mar.: ‘I did not understand from which side of the plane am I supposed to start from when treating patients. I did not ask.’; 17 Mar.: ‘I did not understand why you had to halve your given separation because I did not ask them why.’ I then asked the learners to explain why they had been reluctant to ask for clarity. Petru (GD 3, 12 Sep.) said:

Sometimes the reason you didn’t ask was because some staff expect you to remember what they told you before... and so like if it is something difficult that you didn’t do every day I might forget if I don’t do it every day....we were only there for two weeks and couldn’t have taken in everything...I guess I’m afraid of them shouting at me, scolding me if I didn’t remember stuff. But now I think I do ask a lot of questions and I understand.

Charlize (GD 3, 12 Sep.) said:

During clinical, we didn’t know really what was expected of us because you sort of get there and you stand there and you’re not sure...I just expected they were going to say, ‘Go in there’ or something like that. Only afterwards we realised that ...you can’t expect staff to call you to do things because they also don’t know your attitude, they don’t know if you are an eager learner or if you just want to stand around like that, so later on I learned that you had to ask questions...when I asked the staff, they’re quite helpful,...so that’s what I learned...just to ask questions.

All group members said that they had had similar experiences. Sharon added that sometimes, if they asked a question during a procedure, the radiographer didn’t answer them, but would do so afterwards. However, she added that waiting till later to ask a question was sometimes a problem, because another patient would arrive and “...then you forgot what you wanted to ask.”

On 19 May, during my third visit, I asked learners about the quality of the teaching they were getting in the clinical departments. The following is my journal entry:

I questioned them about whether radiographers were teaching them clearly, did they explain everything to all the learners present in the room or just one learner alongside. They said usually it was 'okay'. I asked whether what made the difference between real learning and being confused depended on the radiographer's teaching ability or personality. Charlize seemed to think it was personality: an open, 'in touch' person explained more and they, in turn, felt more confident to ask questions or request clarity.

Later in the year (GD 3, 12 Sep.), learners seemed to be more confident and were more forthcoming in response to requests for information about their clinical practice experiences. When asked whether radiographers were teaching them in such a way that they were learning, Sharon said, "Some of them did, not all". The group then echoed this: "Not all." The following dialogue ensued:

- J: Did you find that you were able to follow explanations when a radiographer was with a patient...could you understand what the radiographer was trying to do? And the explanation to the learners who were present... was that clear?
- S: At first it wasn't that clear because I didn't know the terms they were using. And sometimes the radiographers would speak like they were speaking to a qualified...they didn't speak in a way that a learner would understand. Then I couldn't follow, exactly. But now I understand the terminology and it's much easier for me to understand what they're saying and to follow the stuff that they're doing.
- J: Okay.
- H: I found that in the first week of the clinical, some of the staff expected you to know what they were doing and they were moving so fast, and you weren't even there doing what you were supposed to be doing, and if you didn't follow, you just stood the whole day. They expected us to know our work, terminology and you wouldn't say that you don't understand and you have to say, like, 'I don't know that terminology.' It gets quiet; but after a while you caught onto that terminology.

This indicated that a serious barrier to learning in the clinical departments related to learners' not understanding the radiographic discourse. This will be discussed in more detail in the Chapter 7, 'The mode of discourse'.

There were distinct contrasts between the way clinical radiographers taught learners in the clinical environment, and the way lecturers conducted clinical tutorials. During my third visit

to the clinical department (19 May), I attended a clinical tutorial that a lecturer held with two first year learners. These were my notes:

Between patients 2 and 3, the lecturer used the opportunity to teach and ask the learners questions related to spoiled images in the box. Both learners were new to that particular department (but had worked in other hospital departments), so it was very interesting for me to see how an inexperienced learner (in that context) acted in a novel situation when a good teacher checked their knowledge. In other situations in that department, I had observed only first year learners who already had a week's previous experience (so they had already learned some techniques). During the tutorial, both learners made rather basic mistakes, like putting the L instead of the R on the cartridge for the chest bucky, or forgetting to push in the cartridge, not watching the patient, not instructing the patient clearly before taking the image and so spoiling it and wasting the film. Neither learner could answer most of the questions related to the Request Form (e.g., they did not know that c/o = complained of), nor those that related to the images on display (when asked to identify various anatomical terms). It made me wonder how much instruction they had received in other clinical departments in the past five weeks (as most of these points would have been covered in any diagnostic department), and how much initiative they had taken to ask when they weren't sure.

After the tutorial, I discussed my impressions with the lecturer, explaining that I had noticed a difference between her tutoring and that of the clinical radiographers. I also observed that I had noticed unused opportunities for learning when there were quiet moments in the department - neither radiographers nor learners seemed to take the initiative to use the available time for teaching and practising techniques as she had. To my surprise, she agreed with me about both points.

When I asked a clinical radiographer (second visit, 5 May) about the first years' progress, her view was that they could be progressing far better. She blamed the clinical radiographers for not always guiding them properly. During my third visit (19 May), we discussed this further. She believed that learners weren't always taught correct techniques, nor were they always given the reason/s for these techniques. She gave as an example the way to position a patient for a chest X-ray. We then spoke about teaching by clinical radiographers in general. She agreed that learners did not always take the initiative to ask questions, nor were further demonstrations given when there was time to do so. She pointed out, however, that she herself was not a good teacher. She said she knew she should do more but, for example, when she was asked to take a first year with her to observe and work elsewhere in the hospital, she was not interested. She concluded that some radiographers were good teachers, and others were not.

At the end of my third visit (19 May), I wrote in my journal: “My overall impression is that good learning is taking place, but that so much more could be achieved if the clinical staff were taking more responsibility for explicit teaching.”

On 15 March, I met one of the first year learners (not one of the small group) in a passage of the hospital. When we spoke, she claimed that she had arrived early at a department where she was scheduled to attend a tutorial on the emergency trolley. She said that the staff had chased her away “like I was a chicken or something”. She concluded that the staff had been quite unprofessional: apart from their having been very rude to her, she claimed that she heard them swearing when a patient did not keep an appointment. The learner was clearly shocked by this contrast between what she had learned regarding professional conduct in the CPUT classroom and what she had experienced in the clinical department. She was fairly philosophical about her experience, saying it was better to know the reality. She commented that certain departments were well known for their unpleasant staff and that learners in those departments discussed “when so and so would be retiring – they couldn’t wait”. This description suggested that the tenor of discourse between clinical staff and learners in some clinical departments was in sharp contrast to that which I had observed in the department that I visited, and which certainly had not been evident when I accompanied learners on a tour of the hospital departments earlier in the term. At that time (2 Feb.), I had observed only warm welcomes, encouragement and polite respect from senior radiographers and staff in all the various radiographic departments.

Although I did not observe interactions between radiographers and radiologists in clinical departments, and did not intend to focus on the tenor of discourse involving them, in light of the vision that Radiography lecturers expressed for the growth of their profession, I decided to include the following excerpt from an interview with a Radiography lecturer, as I believe that it provides important contextual information regarding the kinds of challenges involving the tenor of discourse in the clinical workplace, where interpersonal dimensions of power and status affect those (both clinical radiographers and Radiography lecturers) who are trying to develop the profession. During an interview, Katy (**15 Nov.**) informed me that, generally, doctors regarded radiographers as inferiors: “They don’t treat us as equals, many of the doctors in the wards call us ‘X-ray girls’.” She said that the reason that they were seen on a “different level” was because of the source of their degrees. For example, physiotherapists who had a BSc Physiotherapy degree from a university had higher status than CPUT

radiographers, because the Radiography qualification from the former technikon had been a National Diploma - and, at that stage, relatively few learners had done the fourth year BTech degree. Also, the former technikons had been viewed more as colleges to qualify plumbers and technicians, rather than professionals. Katy (15 Nov.) added that the change to a university of technology would help but, depending on where medical staff had trained, they would “always see us as inferior.” There was an impression that if you went to an upmarket, traditional university, your degree (and therefore your work) was better. Katy believed that the stigma would persist while the Radiography division of CPUT accepted learners with E and F symbols whereas, to be accepted to study BSc Physiotherapy, one needed a higher academic level (A’s and B’s). With the new curriculum, entry level qualifications would perhaps be raised, but Katy believed that many of the learners that CPUT accepted would not cope with a higher academic level because of their historical disadvantages.

As mentioned previously in discussions of knowledge distribution associated with horizontal discourse (Bernstein, 1999), the sharing of knowledge and strategies is increased because of the lack of isolation of practitioners, such as is common in a hospital setting. Knowledge circulation also depends on status (and, so, power): thus, if the status of those with knowledge is threatened, withholding knowledge (and training) is a means by which power may be retained. A Radiography lecturer (23 Mar.) described how, several years previously, when she had tried to begin a training course in the hospital for radiographers in a particular specialisation, her plans had been resolutely obstructed. The specialisation had previously been the sole domain of radiologists. At the time, many of the radiologists in the clinical departments refused to train the learners in the required techniques. However, over time, a few radiologists had come to support the change; and eventually, when leadership of the professional body changed, the new incumbent, who was sympathetic to the need for this training, opened the way for the new course to begin.

6.3 Conclusion

To conclude, Bernstein (1996) has linked the framing of knowledge (the instructional discourse) to the dominant regulative (social) discourse. In the university, the way in which lecturers framed knowledge for the learners, with the related interpersonal dimensions of role, status and power, created a variety of dynamics in teaching and learning contexts which were more, or less, empowering and facilitated the constitution of their knowledge. The lecturers set out various rules for the ways in which they would be constituting learners’ knowledge,

and the learners indicated that they had accepted and internalised these rules, understanding that this was what their lecturers required of them if they were to succeed.

Different styles of teaching influenced learners' response to learning: they tended to be encouraged and motivated by certain lecturers and radiographers; but exactly what motivated different learners seemed to be personal. Some learners required nurturing, while others preferred a strict taskmaster; some were influenced by an engaging personality, while others were more impressed by the lecturer's teaching ability.

The differences in alignment between disciplinary practices between the university and clinical departments were of concern to some lecturers, who believed that lecturers needed to be stricter, as learners in the university needed to be made more accountable for their academic work.

Particularly as most of the first year learners were L2 English speakers, it would be advisable if lecturers considered incorporating some alternative practices in line with those suggested in this chapter to facilitate their learners' processes of learning. Some lecturers have expressed their views that awareness-raising in this arena is needed.

In the clinical department, dynamics of individual teaching styles also varied, although pedagogy was more tacit, involving modelling of practices. Generally, the tenor of discourse between some radiographers and learners in the clinical department emphasised quite strongly the differences in their relative power and status. The higher status of the radiographers, and related power relations, might have affected the manner and extent to which some of them shared their knowledge with learners; and first year learners reported that they had initially lacked confidence to ask questions when unsure (GD 3, 12 Sep).

Bernstein (1999) also observes that knowledge circulation (and thus acquisition) is increased through multiple interactions. While there were many interactions between clinical radiographers and learners, the quality of the teaching that occurred in those interactions could, in my opinion, have been more explicit. Clinical radiographers seemed to have a choice regarding whether or not they accepted their role as teacher, which I found surprising, given that Groote Schuur is a teaching hospital.

As I was present for only a term, it is difficult to assess to what extent the tenor of discourse in these two contexts ultimately affected learner success. Because of the diversity of learners'

experiences in secondary schooling and their own individual learning styles, one could argue that, when they began their Radiography education and training in 2006, the Radiography learners had previously experienced many of the interpersonal dynamics that typically existed in teaching and learning situations; and, as language choices are rhetorical (Halliday, 1978), learners would have drawn on those prior experiences to help them predict situations and select the kinds of roles and attitudes that they would need to adopt in response to the discourse of lecturers and clinical radiographers.

From a critical realist viewpoint, lecturers and clinical radiographers are agents with the potential to maintain or change existing practices in the constitution of learners' knowledge. The traditional practices of the hospital and the classroom pre-exist current teachers and learners. The regulative discourse in the clinical workplace is particularly dominant, and changes there may be slow and unpredictable. However, in the university, lecturers are agents with greater choices. They have decisions to make regarding the ways in which they will constitute learners' knowledge as, jointly, they and the learners move the radiography profession forward.

Chapter 7

MODE OF DISCOURSE

The ‘mode of discourse’ refers to the textual form, features and rhetorical aspects of language that convey meaning during communication. Here, as elsewhere in this chapter, the term ‘text’ is used in the sense in which Kress (1993: 254) uses it, namely text as “a unit of meaning which is coherent and appropriate for its context.” As discussed in Chapter 2, language serves three ‘meta-functions’ by conveying ideational, interpersonal, and textual meaning (Halliday, 1978). It is thus this last meta-function, textual meaning, that is of particular interest in this chapter.

At this juncture, it may be useful to recall that language has a predictive function: in a familiar social context, individuals are able to predict fairly accurately the kinds of text that will be used, and for what purpose (Halliday, 1978). Effectively inducting novices into the discourse of a new domain, such as an academic discipline like Radiography and its associated workplace domain, would entail providing learners with explicit information about the kinds of texts and their role in these domains. Understanding the role of the ‘mode of discourse’ in the constitution of Radiographic knowledge is therefore important in this thesis.

Texts used in the constitution of learners’ Radiographic knowledge included both verbal texts (i.e., those involving words), as well as non-verbal texts (i.e., texts without words, including visual texts) (Van Schalkwyk, 1992). What is read is written with a purpose; what is heard is spoken with intent; and what is observed has been selected and composed to convey a particular message/s. For this reason, I will discuss each of these aspects (reading, writing, speaking, listening and observing) and their role in the constitution of learners’ Radiographic knowledge.

In addition to focusing on the medium of communication (verbal and non-verbal texts), I will also consider the channels of communication that were used by lecturers and clinical staff in the constitution of radiographic knowledge. These included, for example, written handouts and kinds of teaching support (such as videos).

Communication acts involved in the constitution of radiographic knowledge, whether in the university classroom or hospital department, occurred in two ‘temporal’ situations, namely during immediate interactions (as in face-to-face interactions between lecturers and learners) and during remote interactions (e.g., between textbook authors and readers, separated in time

and space). In considering the possible meanings conveyed through these oral and written texts, it was also necessary to consider the possible/ probable intention of the composer/s thereof, bearing in mind that all text is rhetorical and intentional, designed to convey meaning.

A critical realist perspective on the mode of discourse is directly related to critical realist notions of the constitution of knowledge: concepts are mediated largely by language (i.e., text); and signs and symbols that have been assigned meanings pre-exist us. Our knowledge of meanings evolves as a process, unpredictably and individually, with unintended effects (this is one of the reasons for the fallibility of all truth claims). Thus, although texts may be used with intention and one might predict their effects, these predictions may prove fruitless, as underlying, unseen causal mechanisms, alone and in combination, may generate unexpected outcomes. Critical realism is interested in trying to uncover the nature of such causal mechanism in the real domain that generates observable tendencies in the empirical domain.

In this chapter I will discuss the various forms of text that were used in the constitution of the learners' knowledge and lecturers' and learners' perceptions of these.

As a point of departure, I should explain that, in this chapter, unlike in the previous two where I separated the two contexts of situation (CPUT and GSH), I include both contexts in discussions, as there were overlaps in the ways in which texts were used to convey meaning in these two contexts.

In each of the following sections, in line with critical realist practices, I will begin by describing the texts through which the mode of discourse was realised before discussing their role in the constitution of Radiographic knowledge. I begin with a description of the written and spoken texts encountered by first year Radiography learners.

7.1 Characteristics of (written and spoken) Radiographic texts

One expects that, in any context of learning, written and spoken texts of all sorts will be used extensively to express facts, convey values, and indicate attitudes and relations. In other words, written and spoken sources of information, such as textbooks and lectures, are important channels of communication in the constitution of knowledge. Having noticed that written and spoken texts used in teaching and learning situations during the first term of 2006

appeared to be derived from several knowledge bases, I compiled my own classification of terminology and added to it during the course of the term. These categories represent my understanding:

1. *Scientific*: Some terms and concepts are derived from Physics and Chemistry, such as ‘positron’, ‘atomic mass’ and ‘voltage’. Many are specifically related to Radiation Science, such as ‘isotopes’, ‘gamma rays’ and ‘half life’.
2. *Medical*: Some terms used by all Health Care practitioners refer to physical features of the hospital environment, such as ‘medical waste’, ‘ward’ and ‘gurney’. Many medical terms are derived from Anatomy and Physiology/ Biology (like ‘patella’, ‘vertebral column’ and ‘mediastinum’). Some terms refer specifically to medical conditions, pathologies and the diagnosis and treatment thereof, for example ‘haemothorax’, ‘barium meal’, ‘neural compression’, ‘hyperventilation’ and ‘fracture’. Many medical terms are lexically complex and may not be particularly accessible for first year learners. Wyrley-Birch (2006: 79) points out that radiographic/medical terms tend to derive from Latin and Greek, and make extensive use of polysyllabic structures, such as a prefix, word root, a combining vowel, and a suffix. She uses the example of ‘radiology’ to illustrate this: radi (rays) - o (combining vowel) – logy (knowledge of). If one knows the meaning of the prefix of a word, this may be particularly helpful in establishing the meaning of the whole word. Thus if ‘haemo’ means blood, one may deduce that all other terms beginning with that prefix are connected with blood, such as ‘haemoglobin’.
3. *Numerical and mathematical*: A radiographer’s work involves mathematical calculations and measurement. On 6 March, in the context of a Nuclear Medicine lecture, the lecturer explained how a radioactive nuclide is transformed. To illustrate this process, a number of equations were written on the whiteboard, and learners were informed that, in their second year, they would have to know how to calculate such ‘transformation equations’. The lecturer explained that, while radiation equipment in modern medical facilities automatically calculated the equations, radiographers working in rural areas with fairly basic equipment had to be able to calculate these equations manually. Also, even when working with the sophisticated equipment found in modern facilities, radiographers had to be able to read and interpret numerical information on the radiation equipment.

4. *Mechanical*: Radiographers work with several machines and kinds of equipment. Radiographers therefore require some insight into their function, handling and operation. The language associated with the operation and movement of these machines typically includes technical terms like ‘swivel’, ‘rotate’, ‘manoeuvre’ and ‘elevate’.
5. *Photographic/ Imaging*: Many terms in Radiography texts relate to imaging principles, procedures and equipment. Previously, according to Helen (5 May), Radiography learners studied a subject called Photography (rather than Radiographic Imaging/Imaging Practice). Examples of photographic terms used in radiography are ‘films’, ‘dark room’, ‘exposure’, ‘fogged’, ‘cassettes’ and ‘hopper’. (The latter term seems to be derived from agriculture, where it refers to a tapering storage unit, through which grain passes into a mill with a hopping motion. In the radiography darkroom, it is “a cone-shaped drawer hinged at its lower edge” (Chesney and Chesney, 1981: 263). It has storage compartments for unused films.

In addition to the above categories of terminology, Radiography learners needed to learn terms that indicated dimensions of relationship, such as relationship of position, direction and degree. A lecturer (3 Mar.) provided learners with handouts on ‘Directional terms’ (e.g., ‘superior’, ‘inferior’, ‘proximal’, ‘distal’) and ‘Regional terms’ (with labelled line drawings of specific anatomical regions of the human body). I noticed that some of these terms were expressed in oppositional pairs (e.g., ‘deep’ and ‘superficial’; ‘proximal’ and ‘distal’; ‘anterior’ and ‘posterior’; and ‘hyperglycaemic’ and ‘hypoglycaemic’) (13 Feb.).

Radiography uses a common international terminology: Nadine (7 Mar.) explained the importance of this: “If you pick up a textbook in South Africa or Amsterdam, the two people reading it should be able to picture the position of the patient, because that’s standardized terminology used throughout the world.”

I observed that radiographers, like many Health Care practitioners, used numerous abbreviations, both in writing and speaking. Learners were given lists of these to memorise. While some of the abbreviations were commonly known, some of their meanings were more complex. As Nomabali (7 Mar.) said, “Okay, things like AIDS, we obviously know, and things like CA [cancer] we know, but other things were totally foreign...maybe not the abbreviated version, the other version, the written up version.” An example was a ‘CAT scan’: they had heard the term, but did not know that it means ‘computerised axial

tomography scan’. Cheryl (7 Mar.) said of these lists: “There’s a lot of abbreviations that we have to get used to. It will only help if you study it.”

Learners had notions of whether or not their English proficiency was sufficient to enable them to cope with learning not only the new language of Radiography, but also learning about Radiography through the medium of English. Sheila (6 Mar.), for example, described her English proficiency as follows: “I’d probably describe it as okay, I don’t think that well. I am English first language speaking, but like not up to scratch.” Samantha (9 Mar.) stated bluntly, “I think I should improve my English.”

In Chapter 5, I discussed lecturers’ concerns about learners’ level of academic and language competencies. They perceived that learners needed to be able to improve greatly if they were to achieve academic success and grow the profession. In the following pages, I have focused on the kinds of texts used by lecturers and clinical staff in the constitution of Radiographic knowledge, and learners’ responses to such texts. I shall begin with visual texts, as these often accompanied the written/read or spoken/ heard text.

7.2 Knowledge constitution through visual texts

When I use the term ‘visual text’ in this chapter, I am referring to images seen by learners in Radiography lectures (such as diagrams and radiographs), as well as to observed practical demonstrations by both Radiography lecturers (in the classroom and in clinical tutorials) and by radiographers in clinical departments.

Visual texts (e.g., maps, graphs, and tables of information with levels of differentiated components) were extensively used in lectures. Sometimes lecturers spontaneously drew diagrams on the whiteboard in response to a question. The textbooks that I saw for Anatomy and Physiology were abundantly illustrated. During lectures, learners were often required to respond to, or interact with, a variety of images. For example, they had to match diagrams illustrating systems of the human body with jumbled descriptions thereof (27 Feb.); or they were required to draw structures or images, such as a double helix of the DNA molecular structure (6 Mar.). Diagrams represented form, location, relationship, direction (of movement), and abstract planes in a three-dimensional conceptual framework.

Visual and spoken texts were usually combined, particularly in academic contexts. Some lecturers made extensive use of the whiteboard to illustrate what they were explaining at the

time. For example, on 6 March, while a lecturer was focusing on new vocabulary and concepts as these arose, she wrote the component parts on the whiteboard. She also illustrated concepts (e.g., light waves), drew figures, hierarchies or tables of information to illustrate relationships among concepts and details. She elicited learners' understandings of terminology from their prior knowledge, noting these on the whiteboard as they were arose; then wrote alongside several alternative terms that they might encounter in newer information sources.

Overhead transparencies were also extensively used by lecturers. The following paragraph illustrates how a lecturer used a combination of verbal and non-verbal texts to support explanations of concepts (27 Feb.).

In preparation for a lecture on homeostasis that would be held later that week, the lecturer requested learners to analyse the term 'homeostasis' into its component parts, the better to understand its meaning. She wrote the parts of the word on the whiteboard: 'homeo-' (meaning 'like' or 'the same as') and 'stasis' (that is, 'maintaining' or 'remaining'). Stated simply, the meaning of the term 'homeostasis' was therefore 'staying the same'. She then explained that, in discussions of the human body, homeostasis means "keeping the internal environment in equilibrium/balance". She elicited additional explanations of the term from learners. One learner's explanation was: "maintaining a constant internal environment while the external changes". The lecturer, in turn, asked: "What is the internal environment of the body?" The learner responded that it was tissue fluid. Using an overhead transparency that illustrated the body systems, the lecturer then led the class into a discussion of the internal environment of the body. As she discussed the topic, she drew a rough diagram of tissue cells on the whiteboard to distinguish the meaning of 'intra' in 'intracellular' from 'extra' (in 'extra-cellular'). 'Inter' (as in 'intercellular') was also distinguished, with an everyday example given for clarity (viz., inter-school sports). As the lecture concluded, learners were instructed to read up on what had been discussed.

Radiography teaching and learning also involved identifying, analysing and naming parts of a variety of authentic, non-verbal workplace images (e.g., radiographs and scans). On 27 February, learners received a list of anatomical terms that they were required to understand and memorise. Learners were expected not only to describe each listed anatomical feature or structure, but also to identify it on a radiograph. Examples included the 'olecranon fossa', the 'epicondyle', the 'proximal interphalangeal joint', the 'trapezoid' and the 'radial tuberosity',

to name but a few. (These examples further illustrate the complex terminology that the first year learners were required to know and use).

In Anatomy and Physiology, lecturers helped learners to visualise theoretical knowledge of the structure and organs of the human body by using a skeleton and a three-dimensional model of the organs within the torso. In this way, Radiography learners were led to appreciate unseen components, such as organs of the body and the skeletal structure, as well as visualise sites for dynamic processes, such as respiration and digestion.

As radiographers to be, Radiography learners also had to understand abstract features in relation to the body: they had to be able to visualise different ‘body planes and sections’ (3 Mar.). These planes are not visible to the naked eye: they are constructs that facilitate discussion during the alignment of the human body in relation to the source beam (e.g., X-ray beam). Thus if one divides the body along the ‘median’ or ‘mid-sagittal’ plane, one is using an imaginary plane to divide the body into a right and a left side. When learners were taught this theoretical information, they had not yet been in the workplace so as to appreciate fully its relevance to their work as radiographers. Notes on the subject did not explain at all how knowing this information would assist them in their work as radiographers. The notes illustrating these three-dimensional planes were obviously in a two-dimensional visual form, so this visualisation was initially fairly difficult.

In learning about human anatomy, Radiography learners were therefore required to use their imagination to visualise not only what exists but is (generally) not visible (such as the liver), but also what does not exist, except as a concept. In the workplace, they would have to draw on these understandings of the anatomy and the planes of the body (principled knowledge) so as to position the patient correctly and select accurately the area/s of the body to be imaged (procedural knowledge) when requested to do so by the radiologist.

Before their first clinical practice, learners observed simulated practices: before their first clinical practice, lecturers demonstrated how radiographers manoeuvre the human body using ‘dummy’ patients, or volunteer learners; learners then emulated these manoeuvres. Then, in the workplace itself, radiographers guided learners by modelling and correcting learners’ movements, such as by guiding the movement of a learner’s hand to help the learner to locate a ‘bony landmark’ on a patient’s body. Radiography learners had to learn to visualise the

location of bones (etc.) in relation to particular anatomical landmarks so that the radiographic image would accurately include the required area/s of the body).

Teaching in the clinical departments was not always explicit: learners therefore needed to be observant so as to learn to emulate various tacit practices, such as the amount of pressure applied to the patient's body when locating a bony landmark, the sequence of actions in performing a manoeuvre, or the speed and interplay of hand movements. In addition, they were expected to learn how to interact with patients and other members of the Health Care team by observing the myriad tacit ways in which experienced radiographers communicated.

Learners found the visual facilitation of their anatomy learning most helpful. This enabled them to locate various unseen parts of the body and understand them in relation to one another. Petru (**8 Mar.**) said: "You need to see, you need to see what you're talking about...having a picture of what you are talking about, you see that skeleton in the class, I think it's helping us a lot because if you can see something maybe you can memorise it in your mind, like the calcaneus is there, the humerus is there...." Helga (**9 Mar.**) agreed that the use of the skeleton or an overhead transparency with diagrams of parts of the body helped: "It makes me aware of where it [the part] actually is, because you may know the terminology but not know where it is in the body, and it make me aware where it all comes together within the body." When asked what lecturers did to help her understand the new knowledge, Charlize (**9 Mar.**), using mostly everyday terms, related how, in one of their practical learning sessions, she was able to relate anatomical images in textbooks to the radiographs:

We received a radiograph of the chest, or whatever - I got the hand - and then you needed to say what you can see on there, because we know from the diagrams in the textbook...okay, that's the scapula, that is the [inaudible] process, or whatever. So now when you get it on the radiograph,...you know, you can't see some of the things, so now you must say what can you actually see, can you recognise that, can you connect it to, like the normal diagram in the textbook with what you see on a radiograph. I like that exercise.

In other words, visual texts (such as radiographs and images in textbooks) provided novice learners with the necessary holistic principled knowledge that they would need when performing procedures with patients in the clinical workplace, as there they had to visualise where various parts of the body were located, even though they could not see them at the time. As mentioned in Chapter 2, novices and experts approach workplace problem-solving in different ways. As Geisler (1994: 58-62) explains, in interpreting what they are seeing on

X-rays, novice radiologists tend to use literal concepts expressing everyday, ‘ideal’ understandings, whereas experts extend their processing beyond the perceptible, drawing on their knowledge of the abstract (principled) and general in relation to the concrete (procedural) and particular before them. Geisler (1994: 61) points out that experts are not usually confronted by ‘textbook’ problems, so they have to exercise judgement in a reflective way that brings together their mediation between the disciplinary, abstract representations and the concrete case before them. However, at this early stage of their learning, the Radiography learners were novices so, with the exception of a few anatomical terms, their descriptions of what they had observed on the X-rays were generally concrete and expressed in layperson’s language.

I shall now discuss various textual competencies that learners were required to demonstrate (and that, potentially, might become increasingly important in the constitution of their knowledge). I have separated required reading and writing of texts as there is a temporal separation between the writing of a text and its being read. Also, both reading and writing were accorded much attention by the Radiography lecturers. Thereafter, I have discussed speaking and listening under one subheading, as they generally occurred ‘simultaneously’.

7.3 Knowledge constitution through written texts

Before they arrived at the university division for the first day of orientation (1 Feb.), learners had already acquired some knowledge of radiography from a variety of ‘external’ textual sources, such as from the local clinic, or from family or friends (GD, 23 Feb.). Most knowledge was gained through written texts. Some learners had visited the university website. Once they had phoned (or written to) the Radiography division, they were sent documentation that informed them in more detail about radiography and the course. Such information concerned both general and specific aspects of radiography as a profession, as well as guidelines for applicants.

Information on the website and in the above documentation was phrased factually, fairly formally and the use of the passive voice conveyed an impersonal tone. The reader was not addressed directly (Radiography learners were referred to in the third person as “they”, “candidates” and “learners”). One of the documents included statements like these: “Radiography is a profession for which thorough training is required”; and “They [referring to learners] must accept that they are working under hospital discipline and must comply with

instructions given to them by members of the hospital staff.” The word ‘you’ was used only in the context of the applicant’s selection of a discipline (“your selected category”) and in relation to expenses, such as books and fees (“your course fees”).

Once potential learners had applied to study Radiography, they were informed in writing about psychometric tests that they would have to write and a panel interview that selected candidates would have to attend. Throughout this document, applicants were addressed directly (“you”), suggesting a more personal connection between the (as yet unseen) Radiography lecturing staff and the applicant. This clearly relates to the tenor of discourse discussed in Chapter 7: the general information in the public domain was mostly in the third person, the tone was factual and the person of the author absent (which conveyed the distant tone); by contrast, once learners had moved beyond the initial selection, they were, in effect ‘closer’ to becoming an accepted learner, so perhaps the use of the more personal, direct address (“you”) seemed appropriate to the author, even though this was possibly at an unconscious level, as rhetoric usually is. As Halliday (1978) emphasises, because language is a semiotic system, and we use language for particular purposes and in particular forms, our choices are rhetorical rather than logical: we make choices that will convey the meaning that we believe will fulfil our intended purpose.

From orientation onwards, learners encountered numerous written texts that they were required to read. Some of these were directly related to the administrative aspects of being a learner in a hospital setting (e.g., application forms for radiation monitoring, an annual clinical roster, a list of rules and regulations, and health procedures in case of injury). Others were directly related to their academic programme (e.g., a first year Learner Guide, supplementary lecture notes, task instructions, test question papers, etc). Because of the close integration of the work of the university division and that of the hospital, and between theory and practice, many documents were, unsurprisingly, relevant to both contexts (e.g., rules and regulations). All documents tended to be written in a formal, factual style. References to the learner were usually written in the third person mode (“the learner/s”). An exception was the university-generated ‘rules and regulations’ document where a mixture of impersonal (“learners”) and the personal (“you/r”) modes was noticeable. To me, this mixture of personal/ informal and impersonal/formal text reflected the somewhat ambivalent relationship between Radiography lecturers and learners: the lecturers were genuinely concerned about the well-being of the learners and, in the division, shared a relaxed, warm,

but professional relationship with them. By contrast, the tenor of discourse in the workplace was more formal, reflecting the prevalent rule-governed, no-nonsense, business-like approach of the clinical staff. As discussed in the previous chapter, some lecturers expressed concerns that the difference in relationship between lecturers and learners compared to the relationship between clinical staff and learners was problematic; and that perhaps the lecturers were not adequately or appropriately preparing learners for the more formal, rule-bound workplace.

Academic texts that Radiography learners read varied in density and thus accessibility. The following paragraph from a Radiography textbook illustrates that the language may be inaccessible, particularly for a novice:

An additional modified anteroposterior projection with forced inversion may be required to demonstrate lateral ligaments. This has the effect of widening the lateral aspect of the joint space. A routine anteroposterior view should be taken first to exclude bony injury. The forced inversion must only be carried out by a medical officer suitably protected with a lead protective apron and lead rubber gloves (Bell and Finlay, 1986: 98).

When asked to describe the language of Radiography, apart from recognising that many of the terms were derived from medicine, physics, maths, etc., learners were particularly aware of the complexity of the language. For example, Helga (**9 Mar.**) said: “I think the language is quite precise... it’s very precise, when you say what it means exactly at that point. It’s not like normal English.” Samantha (**9 Mar.**) likewise said: “It’s very complex, the words is very...you might not understand the term ‘thoracic cavity’, you might not think it’s the chest, it’s far different words to what you actually thought it was.” Cheryl (**7 Mar.**) associated the language with status: she said that if you spoke to others outside Radiography, they would not understand her: “...it’ll be like impressive language....”

Linda (**7 Dec.**) explained: “In terms of reading, they have to read a lot of quite dense texts and with new terminology...in an effort to get to the Radiographic knowledge, ...and in that reading is deciphering diagrams and graphs and that sort of comprehensive and quite complex reading. You can’t go quickly, you need to perhaps go back and forth and back and forth, and I think that’s where students battle sometimes.”

Medical textbooks and, in particular, journals were generally highly dense, technical and contained many polysyllabic words. According to Cindy (**15 Nov.**), reading these texts was very challenging for L2 English learners:

That's where I think... even English first language students struggle...whether you are third year or first year level because, even in our journal articles... I mean if you give students journal articles, you get certain journal articles that are just written at a certain level that makes it... that you as a lecturer will know that students will struggle to understand this. And even the textbooks...they are written for medical doctors, ...okay now there are newer textbooks, you know, but most of our radiographic-specific textbooks are on techniques, etc., but there is nothing (or) very few textbooks on pathology written for radiographic level, so those textbooks are written at a certain level and that's why students I think struggle the most because even if you... because I've noticed with third years if you give them something to go and read or say, 'Please go and consult that textbook'. I mean, I do understand, because I've been in the profession for a long time, but they come back and you ask them, 'Please interpret what you understand,' and they can't explain....

Fiona (15 Nov.) said that Radiography learners needed to read extensively and that this was a challenge for L2 English learners: "They've got a lot of reading to do. I think it's very difficult for the English second language students...."

Some of the learners (GD 3, 12 Sep.) commented on the difficulty level of language in their textbooks:

J: Are you still finding that the meaning of words in English is an obstacle to your learning?

Chorus: Yes.

A: English is not our first language

J: I understand that, that's why I am asking. So even though you've learned so many words, you still find that that terminology is difficult.

Chorus: Yes.

J: Do you think that the lecturers are using understandable words in their lectures?

A: There are words which is difficult.

J: That they don't explain? New words?

A: No, they do explain.

J: And that helps. Because I thought that your lecturers were mostly very good at explaining new words. And words in textbooks, are you still struggling with that?

A: Yes.

J: It's quite 'high' English?

A: Yes.

Z: And old English. The textbooks, I've just got something here in Radiography. Most of the textbooks which we are using here are like three years old and it's not like the type of textbooks which we were using, like in Science, in high school, because it was a sort of ...simple English, and also there were graphics. But here everything is just like in words. You just read and do not see any stuff to help you.

This was not, strictly speaking, true, because I saw one of the prescribed textbooks for first year (Tortora and Grabowski, 2002), which was fully illustrated. However, learners obviously encountered many other kinds of texts when searching for information. The meaning of these texts was often fairly inaccessible, not only because these texts were not written in the 'simple English' that the learners had been accustomed to in their secondary school textbooks, but because, as Geisler (1994: 12-14) explains, journals and discipline-specific textbooks are written for other experts, and these learners were still novices. Texts for experts are written in a particular way: their metadiscourse (what Geisler (1994: 11) terms "discourse about discourse") is only understood by other experts. It comprises various rhetorical 'signals' that are deliberately incorporated for a number of reasons, such as to remind readers of supporting evidence, include them in discussions of uncertainty in the field, and to encourage the reader to accept truth claims made. In other words, in expert texts, the use of these rhetorical features by writers enables expert readers to assess to what extent they should accept the claims made in the text. When writing for laypersons, however, scientific writers do not write persuasively: they merely state facts, as they assume that their claims will be uncontested. During their schooling, reproducing such facts acquired from 'autonomous texts' usually ensured learners' success. However, as discussed in Chapter 5, lecturers in Higher Education require much more of them: perhaps not at entry level, but by second year, lecturers said that they expected learners to be engaging with research topics in journals and expressing their views on what they read in relation to their practical knowledge. In other words, the constitution of Radiographic knowledge in Higher Education required of learners very different literacy practices to those that had previously been sufficient during the learners' secondary schooling.

Some lecturers expressed concerns that the learners did not read enough from the very start of their studies. Fiona (**15 Nov.**), for example, said that she deliberately set journal readings for senior learners – and she was convinced that reading and critical reading practices needed to be implemented from first year onwards:

They need to read, be able to read English, at an appropriate level in terms of their texts, obviously, and, when they come into first year, start reading medical journals to get used to this terminology, the style of writing - I think particularly journals, there is more than just the terminology and the language, there is also the ability to critically analyse things and to look at things more critically when you are reading journals, rather than just the text, so I think they need to be able to do that and, again, we don't do enough of it at first year level.

Nadine (**21 Nov.**) was also concerned that inadequate attention was being paid to reading: "Students don't read enough." Helen (**25 Oct.**) likewise said: "I expect them to read, that's the thing my students don't do enough, and I say this over and over again, but I just know that that is what they don't do enough of, and they come to me in their BTech...and they now want to write this assignment, but they haven't read enough. And if they read more authors then they would just write more easily." She added that this was because the reading exposed them not only to knowledge, but "...also just the words, the vocabulary, the... everything else that reading builds."

Helen (**22 Mar.**) discussed her observation that even senior learners struggled to summarise and respond to written sources in an original way: "...even 3rd year level students, they've been around for a while, but they really struggle to read an article or a chapter in a book and summarise it and then discuss it together with other things that they've read, and their own thoughts." She added that it was not the content that was difficult, but it was difficult for learners to make that knowledge "...their own and being able to discuss it." She (**25 Oct.**) said that learners who optimised their learning opportunities were those "who are reading a lot from the beginning." Those learners who avoided reading because it was difficult for them, did not improve:

What they don't realise is that, if they were reading and even not understanding everything, it would come, but by avoiding reading, it's not going to happen for them, it's not going to improve. So I see learners who have weaker language abilities at the beginning and some sort of confidence and who do read...overtake other learners who had better language skills than them.

In discussing the literacy requirements of the academic programme, Helen (**25 Oct.**) also commented on the importance of reading in relation to the writing that Radiography learners were required to do:

They have to be able to read from multiple sources and they are not all ‘digested’ - if I can call them that - sources, so journals, so scientific writing. Some of the textbooks are simpler [but] some of them are quite complex writing; and then they have got to be able to digest that, interpret it and then write it again in their own words for assessments, for assignments, for tests. So I think those skills are quite extreme... the sort of university side....

An example of the kind of Radiography text that first year learners were expected to read in class during the first term was Peer’s (2003) article entitled ‘Professional ethics for radiographers’. This was one of several documents handed out during a lecture (6 Mar.). Groups of learners were asked to make notes from this article and present the information to the class. The terminology was neither particularly medical nor technical; but, for L2 English learners, accessing the meaning of the texts would have been fairly challenging, as the language was formal and legalistic in style. A typical sentence read: “Corresponding to the rights and privileges conferred on registered radiographers are certain ethical obligations. These ethical duties towards patients and society demand that ethical guidelines be formulated for all health professionals” (Peer, 2003: 14). The accessibility would probably have been affected by terms like ‘corresponding’, ‘conferred’ and ‘obligations’. Perhaps it would have helped learners if some of these terms had been glossed, or if learners had been assigned the reading beforehand, with an instruction to find the meanings of particular words that were critical to an understanding of the text.

One of the handouts issued by the hospital and that learners received during orientation focused on accidental exposure to dangerous fluids. This text was mostly accessible, although there were a few terms that I think would have been challenging for some of the entry-level L2 English learners to grasp, such as “non-intact skin”. (Strangely, further along in the text, the author used the more accessible term “broken skin”.) Another example of an incomprehensible term on the form was “percutaneous” (as in ‘A Percutaneous Innoculation Form’). There was also mention of “AZT and 3TC supplies.” None of these terms or abbreviations were explained.

In another handout concerning hospital policy on patient consent for medical or surgical procedures, the language was moderately accessible. In places, the author had attempted to provide alternative explanations. For example, the first point stated: “The patient’s consent must be explicit.” This was immediately explained: “i.e., it should never be assumed, simply because the patient has placed him/herself under the doctor’s care.” Elsewhere in the document, more formal and less simple language was used, so these sections would probably

have been less accessible to learners, e.g.: “However, each patient’s competence should be assessed relative to the complexity of the intended procedure, and the degree of insight required to make an autonomous, informed decision.”

The accessibility level of information in class notes/handouts and tasks varied: some were written in simple, everyday English while others included technical, polysyllabic terms and dense information. It was helpful when notes and handouts were glossed. For example, in a handout on the production of radiographic images, some parts of the text were generally accessible (e.g., “A person standing in sunlight casts a shadow which shows the outlined shape of the whole body, because light cannot penetrate it.”). Where meaning was less accessible, terms that were likely to affect comprehension of meaning were glossed. For example, in the sentence, “The higher the effective atomic number, the greater the amount of attenuation of the X-ray beam”, ‘effective’ and ‘attenuate’ were glossed. (‘Effective’ would perhaps not normally be considered a challenging word for L2 English learners, but its use in the above sentence was different to its normal use).

Gee’s (2003) notion of ‘teaching for acquisition’ is relevant here, and has implications for teaching and learning practices, if the Radiography learners are to acquire the kind of academic discourse that their lecturers require. As discussed in Chapter 2, disciplinary discourse is acquired through observing what experts do, by listening, and by being included with other members of that group in various activities. Learners are exposed to radiography experts’ discourse in the clinical departments. However, the kind of discourse used in that context is different to the academic discourse that learners need to acquire to satisfy academic requirements. While they do have exposure to a more academic discourse during clinical tutorials (i.e., those presented by their lecturers), this does not occur on a daily basis; and, during lectures, learners tend to be in ‘listening’ mode (i.e., they are mostly receiving, not producing, academic discourse). Gee (2003) indicates that novices need exposure to contexts in which experts (here read ‘academics’) are engaged in dialogue. The novices should then be able to ‘try on’ this academic discourse by simulating the experts’ actions and words (spoken and written) in an experimental manner, in a non-threatening environment. In this way, they will have opportunities to explore combinations of meaning while discussing, for example, radiographic images, practical procedures during imaging, and so forth. They will then be able to assess for themselves how their grasp of the academic discourse is developing. Gee (2003) explains that, while learners are ‘trying on’ the discourse, an expert’s guiding response is necessary, but

experimentation should be encouraged. This has implications for teaching and learning contexts: to acquire the disciplinary discourse, novices need to be engaged in an empowering learning (fairly time-consuming) process in rich, meaningful contexts so that learning is authentic. In Chapter 8, I will discuss guidelines related to this.

Other handouts given to learners during lectures included discipline-specific technical terminology (e.g., from Physics), but many first year learners would have known many of these terms (such as ‘velocity’, ‘frequency’ and ‘waves’) from their secondary school subjects. When learners did not understand terms in written sources, they were expected to search for the meaning of these independently by consulting general and medical dictionaries, as well as textbook glossaries.

In the workplace, learners had to read and memorise not only medical and radiographic terms but their abbreviations, as radiologists used mostly abbreviated instructions on Request Forms (see Appendix P). Examples include DM (diabetes mellitus), LOW (loss of weight) and PTB (pulmonary tuberculosis). Many of these would not have been encountered by the learners during their schooling.

Cindy (15 Nov.) said that learners in the clinical departments also needed to read reports:

...they sometimes need to go through patients’ folders and pick up things, you know, a patient might say, ‘Now, I’ve got this and this disease’ or ‘I was treated for this and that’, and students - even at student level - they might have to go through patients’ notes and read that and interpret. So it’s not just formal, straightforward symbols, etc. that they need to interpret....

Thus, even as learners, they had to understand the situated literacy practices of the workplace discourse community, some of which would have been implicit: the notes in patient folders were written by experts (referring doctors and radiologists) who, while writing as experts, might or might not have understood that Radiography learners could be among their readers, so their discourse might have been composed for other experts, or at least for senior and other clinical staff.

In the clinical department that I visited, I observed few written texts, although there were probably many written documents in the management and doctors’ offices. On notice-boards, I noticed a few single or double-page (i.e., short) documents regarding rules for the department, such as a list of ‘Learner duties’ about work expected of learners in the clinical examination rooms and the department. In the examination rooms, there were various notices

indicating ways in which images should be taken. These included conversion tables and warnings/advice. The information tended to be listed and in point form, often phrased as injunctions and rules.

The ‘General Rules’ document that the department had prepared for the first year learners’ clinical practice in the department was formal, and learners were mostly addressed directly (i.e., “you”), which was probably intended to engender a sense of personal responsibility among learners. The language was mostly accessible, with the exception of a few words, such as those italicised in this sentence: “We welcome you to the [name] X-ray department and trust that you will enjoy your time here with us. In order to *promote integration* into the department, we have *devised* the following guidelines for you.” As mentioned in Chapter 6, these guidelines were expressed in imperative language, e.g., “We expect learners to exercise self-discipline at all times and this includes arriving punctually on duty at 08h00 (unless otherwise rostered)”; and “Do not work with your peers. Attach yourself to a third year learner or staff.”

The tone of the above suggests that the radiographers had constructed a different role for the learners than that which they experienced in the academic division. Whereas, in the academic division, they were expected to be responsible and independent (i.e., they had agency), in the clinical department, they were in a far less empowered role. One could argue that this was for good reason: novice learners were working with potentially dangerous equipment and dealing with often severely ill patients. In the rushed workplace, radiographers who were responsible for the learners possibly felt that these learners needed to be strictly monitored while they were in the departments. These unequivocal rules were thus stated from the first day. However, the contrast between the learners’ agency in the academic division and the clinical workplace was noticeable, and has been commented upon previously in discussions of a lecturer’s concerns around learner accountability (see Chapter 5).

7.4 Knowledge constitution through learners’ writing of texts

The importance of writing competency for Radiography learners was discussed in Chapter 5 in the context of developing the radiography profession through research and publication, as well as in this chapter in the context of reading, so I shall not repeat those details here. Linda (7 Dec.) commented on this requirement: “The biggest challenge ... for the students in writing is, yes, they’re learning to spell words that have very Latin and Greek roots...they

need to get the spelling right because it could be two completely different diseases...But the biggest issue is being able to write with an original voice.”

Helen (25 Oct.) said that, for the academic progress of learners, writing was critical because of its role in assessment:

I think the written communication is probably the most important, because they are required to do a lot of assignment work and assessment is a lot by written work.

Lecturers were generally dissatisfied with the learners’ ability to express themselves in the appropriate formal academic discourse of written radiography. However, as the Radiography learners did no formal writing during the first term while I was there, it is difficult to assess to what extent the learners’ writing competencies received attention. Some took notes during lectures and they would have taken notes from sources when preparing for lectures or for oral presentations, but these notes were not submitted for assessment purposes. My insights into the required writing for Radiography were mostly derived from what lecturers said.

In Chapter 5 (The field of discourse), I discussed the point that, in the current South African Diagnostic radiography practices, limited writing is required. Thus, according to a lecturer (15 Nov.), Diagnostic Radiography learners in South Africa, who were not previously required to write reports or deliver reports orally, were now being trained to do so, like their counterparts in several other countries (e.g., the United Kingdom). She said that, to write competent reports based on ‘pattern recognition’, learners needed to be able to write in a precise, descriptive way. Radiographers were required to study various images (e.g., a radiograph or MRI scan) and “describe the appearance, the density, the location of the mass etc., because that is what you would expect in a radiologist’s report.” The lecturer gave learners an example of the kind of language involved in such a report (3 Mar.): “A small, rounded hyper dense lesion is visible on the base of the 5th metacarpal.”

The influence of several inducements for radiographers to take writing more seriously are beginning to be felt. These include the growing emphasis on writing for pattern recognition, the new CPD (Continuous Professional Development) requirements of the HPCSA, and the anticipated new Radiography qualification (awaiting approval from SAQA). In light of the vision of Radiography lecturers and radiographers for the growth of their profession, it is likely that there will be an increased requirement for research and publication (for which reading and writing competencies are required). In Chapter 5, I discussed instances of

lecturers encouraging particularly reading during the first term of 2006, when first year learners were expected to find and read further information on certain topics that had been introduced in class, or read in preparation for a coming lecture. However, several Radiography lecturers expressed anxiety that, even at third and fourth year, the Radiography learners' level of reading and writing was below their expectations; and they believed that a structured programme was needed to develop the learners' reading and writing competencies.

7.5 Knowledge constitution through spoken and heard texts

The formality and textual difficulty of the spoken Radiographic language varied, depending on the audience and context. In the classroom, the dialogue between lecturers and learners was generally semi-formal, but lecturers tended to revert to the more formal medical/radiographic phraseology while lecturing or discussing content. Learners found the new terminology difficult, particularly if it was used in lectures without explanation. Helga (**9 Mar.**) commented: "Um, well, actually [they are] using some of the ... terminology and just throwing them out and not saying what it is." When asked if lecturers could do anything differently to help them learn such terms, Xoliswa (**8 Mar.**) said it would help if lecturers explained all medical terms used. Samantha (**9 Mar.**) was also concerned about this: "The [subject] is very hard, ...it's words you never heard before, therefore in class you don't actually understand what she [the lecturer] is talking about." As Petru (**8 Mar.**) explained: "If you don't understand a word, it's hard for you to remember it."

As already mentioned in Chapter 5, learners found it helpful if lecturers divided words into the word root, prefix, etc. Charlize (**9 Mar.**), for example, said: "They usually write it down, or say, you know, 'This is the prefix of that and it means that'. Then they tell us 'Learn by association. You know the middle term means that and the prefix means that, then you put the two together.' Then you know...." They also found it helpful if the lecturer linked new words with more common terms that they knew, e.g., those that shared the same prefix. Helga (**9 Mar.**) illustrated this: "She give an example of 'telephone', then 'teletherapy'...one understands where the word comes from, and then you associate with... and you remember it better." In other words, when lecturers paid attention to the structure of words during lectures, this assisted learners to understand a wide range of medical terms that they heard (and read).

Initially, lecturers explained new medical/radiographic terms used, but towards the end of the first quarter, I noted several instances where new terms were not explained. However, in line with their usual approach, lecturers informed learners that they expected them to note new/unknown terms and search for their meaning.

Distinctions between formal and informal spoken texts seemed more pronounced because of the greater hierarchy of Health Care workers in the workplace. The textual form varied in formality, depending on the audience of a message. When radiographers spoke to members of different groups, textual choices conveyed meaning regarding their respective identities, roles and relationships in that context (i.e., the tenor of discourse was also realised). Linda (7 Dec.) discussed the importance of radiographers (and thus Radiography learners) using an appropriate ‘professional’ language in interactions with different groups, such as doctors, senior radiographers, colleagues and patients. Nadine (21 Nov.) agreed that appropriate communication was very important and so Radiography learners were guided about how to speak to others appropriately: “It’s...the medical, the etiquette and how to speak in front of patients, how to call patients, how to address patients.” Wyrley-Birch (2006: 74) explains how different texts are selected in the radiographic workplace, depending on who is involved in an interaction. For example, a doctor would tell a patient that radiographers are going to take a ‘picture’ of his chest (i.e., the doctor uses a layperson’s term). The radiographer or nurse might, instead, use the term ‘X-ray’ when speaking to the patient (‘X-ray’ is a term commonly understood by laypersons, but is also an example of slightly more technical, semi-formal professional jargon). When speaking to a radiographer, a radiologist would also use such professional jargon, but now, instead of ‘X-rays’, she would use the term ‘films’ (and might request them ‘ASAP for IR’ - as soon as possible for immediate report). In a seminar with colleagues or learners, radiologists would use the term ‘images’; and in a written case study for publication, the most formal level of text would be ‘radiographic images’.

Wyrley-Birch (2006: 75) explains that, during an interview conducted for her research, a Radiography colleague had commented that the reason she taught learners how to speak appropriately in the professional context was because it was important for the learners’ status in the clinical hierarchy. She said that if learners could speak appropriately and respectfully to colleagues in front of patients, using the “proper terminology”, this inspired confidence, “...because they sound as if they know what they are talking about.” Appropriate use of spoken text was thus highly rhetorical in situated contexts, as it was concerned not only with

conveying facts but deliberately shaping meanings about the identity of the speaker of the text. Using text appropriately thus enabled others to recognise the role (and associated status) of the user of that text.

While most learners recognised that they needed to learn the Radiographic language to succeed in their studies, Charlize (**9 Mar.**) was motivated by an awareness of how knowing the language of radiography in the workplace could contribute to her status in that arena. She had thus made a conscious link between language and interpersonal power relations in the Health Care field. She said: “I mean, you’re not just going to encounter people from the normal...I don’t know, normal vocabulary, you’re going to encounter people who uses those big words and I always like to be on par with you if you’re saying those words.”

By the time first year learners went on their first clinical practice, they were already aware of some of these different levels of appropriate language used in the workplace, even if they had not yet acquired them: Helga (**9 Mar.**) said, “You must be able to translate the medical terms and the Physics terms and the Maths terms into normal language so that you can explain to your patient what you are actually doing with them.”

According to Linda (**7 Dec.**), while the clinical jargon is not the same as the official medical/professional terms, it has become part of the common jargon of the department (what Gee, 2003) terms “dialogic talk” that expresses situated meanings. The learners as novices emulate this discourse and gradually acquire it implicitly while observing practices and simultaneously listening to the radiographers. The clinical radiographers expect the first years to learn this discourse gradually, and so tend to be fairly tolerant of their errors in their first year. This is what Gee (1990) terms ‘teaching for acquisition’. The challenge was then for learners to distinguish between the less formal clinical jargon/shorthand that they heard (and read) in the workplace (e.g., ‘sup’ and ‘ant’) and the more formal terminology (i.e., ‘superior’ and ‘anterior’) required for academic writing. As Linda said, “...there’s a whole little subtext underneath the shorthand sentence... and sometimes students are inclined to use that shorthand in tests and written things.” They had to be reminded of this, as it caused them to lose marks during written assessments.

Learners may find it difficult to distinguish between clinical jargon and academic Radiographic terminology, in some cases. An example of clinical jargon that I heard in the Nuclear Medicine department was ‘Hot lab’. This term refers to the laboratory where

radioactive chemicals are mixed. As radiographers cannot be shielded from the highly dangerous radiation during their time in this laboratory, the term 'hot' logically indicates danger.

The terms 'bucky' and 'Potter bucky' were also confusing. These terms were used by a lecturer during an orientation tour of a clinical department (14 Feb.). As I had only ever encountered the term 'bakkie' in connection with a small truck (in South African parlance), I was puzzled. By the end of the lecture, I was a little better informed, as the lecturer had told the class that a bucky was a kind of drawer below the bed into which a film cassette was inserted for the taking of an image. I later asked the lecturer what the 'porter' part was about (as I had interpreted what I *heard* as 'porter bucky' – 'porter' had originally seemed sensible in the context of patients, many of whom needed to be transported or carried!). She told me that the correct term was 'Potter bucky', so named as 'Potter' was the surname of the man who invented the system. I later tried unsuccessfully to find the term 'bucky' in a regular dictionary, as I was interested in its origins. I eventually located it in the fourth Radiography textbook in which I searched; but even then, it appeared only under the terms 'table bucky' and 'vertical bucky' without explaining the term 'bucky' (Bell and Finlay, 1986: 222, 226). I subsequently learned from a Radiography lecturer that a 'bucky' is correctly termed a 'diaphragm', so the formal term is the 'Potter bucky diaphragm'.

The origin of the term 'bucky' remained a mystery (but I no longer pursued the issue). The only approximate dictionary reference I found was for 'buck', meaning the body of a cart (this sounded feasible, given that a cart holds and transports goods). The origin of the word 'buck' was obsolete, but Tulloch (1993: 184) explains its possible derivation from the Old English word 'bouk' (meaning belly), originally derived from Germanic languages. Using an online dictionary (Cancer Web Project, 2007), I eventually discovered that 'Bucky' was the surname of a radiologist named Gustav, about whom I could find little else except that he lived from 1880-1963. I was unable to locate information about Potter, although the term 'Potter-bucky' appeared in several dictionary and encyclopaedia entries. I reflected that lecturers' not explaining the origins of the term 'bucky' perhaps indicates that, when they themselves were learners, their tutors or lecturers did not explain the term to them. It merely became a meaningless label for an object.

One other confusing term (for me) was 'insult'. As in most disciplines, there are distinct ways in which everyday terms are used. Before attending the first year Radiography lectures, I was

aware that the term ‘insult’ means disparaging or scornful. However, in a medical context, an ‘insult’ is “a bodily injury, irritation or trauma” (Free Dictionary, 2007).

The above confusions are discussed to illustrate that even L1 English learners with many years of experience may become confused during a lecture/practical when new terms are not explained, or when laypersons’ terms are used in new ways. Writing new terms on the whiteboard and explaining taken for granted, insider jargon, may be especially important to learners like Angela (9 Mar.), whose English proficiency, by her own admission, was somewhat limited (“I’m not so good in English, I don’t know it properly”). When I asked her what she thought about the kind of language used in Radiography lectures and textbooks, she said that it was “the language of technology” (a reasonable answer). However, further on in our discussion, she said: “The technology is the things like the hands is ‘proximal’ to the ...whatever, or the head is ‘superior’ to the thorax”. She was thus confusing the words ‘technology’ with ‘terminology’. This illustrates that terms that lecturers probably considered fairly common may present a challenge to some learners.

7.6 Conclusion

In conclusion, a variety of texts were used to constitute learners’ knowledge of radiography in teaching and learning contexts. Verbal and non-verbal texts were used, and a variety of channels typical of such contexts (e.g., face to face lectures, handouts, videos, radiographs, transparencies, three-dimensional models and practical demonstrations). Each of these modes of discourse contributed to the learners’ knowledge base.

Textual choices and the messages that these convey had a significant impact on the learners’ construction of knowledge. Visual texts were generally very helpful; however, many of the written Radiography texts that entry-level learners were exposed to were highly dense and technical. Radiography lecturers are generally most supportive in helping learners to understand and acquire this discourse; but perhaps greater awareness of the readiness level of many of their L2 English learners may be needed. Annotating texts, providing more opportunities for reading, writing and discussion of Radiography texts, and an explicit discussion of their features (such as I compiled earlier in this chapter) might help to demystify the features of the texts and bring their meaning to explicit awareness, making it easier for learners to acquire the discourse. In addition, if lecturers would like learners to write with an original voice, perhaps a precise description of what this means needs to be

made explicit to learners, beginning with simple examples in first year and progressing to more advanced, authentic examples from the Radiography literature later in their second and third year.

For this to be possible, lecturers themselves would require a heightened awareness of the textual forms that they use and that they expect learners to understand and produce competently.

From a critical realist perspective, any change in practice constitutes a causal mechanism. By providing learners with regular, explicit exposure to Radiographic texts (through experiences of reading, writing and discussing), and making learners aware of textual choices and their significance in the field, lecturers will not only potentially empower learners to cope better academically, so that they may engage with the ‘arcane’ but powerful voices that affect practices in their profession, but they may empower themselves. Thus, not only content knowledge, but the rhetorical processes that are available to shape that content, will provide a foundation on which learners’ future careers, and that of the profession, may grow.

Chapter 8

CONCLUSION

As explained in Chapter 3, I used a basic case study research design (Yin, 2003) in order to provide an in depth exploration of a single Radiography education context, using “thick” description and “multiple perspectives” (Babbie and Mouton, 2001: 281). My purpose was therefore not to generalise so much as to understand and explain the interplay of culture, structure and agency in a single educational programme to answer these questions:

1. How is Radiographic knowledge constituted in a university of technology classroom and a clinical workplace?; and
2. What is the role of discourse in this process?

My case study had four traits described by Merriam (1988): it was particularistic (as it focused on the role of discourse in knowledge constitution); descriptive (it described concrete and abstract aspects of the research site and processes of knowledge constitution); it was heuristic (in that it generated a deeper understanding of the situation researched); and it was inductive (in that it led to conclusions of relevance to the research site and its participants). As discussed in Chapter 3, I also used abduction and retroduction as modes of inference.

As already noted in Chapter 3, Danermark *et al.* (2002: 151) use the terms ‘extensive’ and ‘intensive’ research design to describe practical research work. In my research, I used only intensive design. In other words, I focused on questions and processes relevant in a small number of cases. Agents, their actions, and necessary relations were of interest. However, because of the fallibility of perception, I understood that what appeared to be necessary relations were possibly not actually causally related (i.e., they were contingent) because other unseen causal mechanisms might have been at play. I also understood that what I observed might also not have been ‘usual’ or ‘generalisable’.

I chose to use critical realism as an analytical lens for my research (see Chapters 2 and 3). Critical realism, like other critical theories, rests on the notion of transformation in areas of social injustice. As an ontological metatheory, critical realism views reality as stratified and suggests that all aspects of reality (natural and social) emerge from these strata because they possess unseen causal mechanisms that generate tendencies. The implication of this for my research was that, while observable practices in the theory-laden empirical domain suggested

possible causes, I could not rely solely on these – or even what participants said about these – to provide me with causes or reasons for what I was observing, as other intransitive domains of reality could have generated what I observed. For this reason, the knowledge claims that I make in this thesis should be understood within a critical realist framework: it is a fallibilist philosophy, so I strove not for ‘truth’ but for practical adequacy, such that my learnings might be useful to those whose practices I researched. As an ethnographer, I also attempted to conduct my research in the cultural sense which Spradley (1979) endorses, namely as a researcher who strives to learn from those in the research site.

Critical realism is strongly averse to all forms of conflation – upward, downward and central (see Chapter 2). The outcomes of the interplay between the strata of culture, structure and agency may be explicable, but are not predictable. Hence one should not regard elements of the status quo (i.e., the current educational and workplace structures with their inherited language practices and social relations) as deterministic. While they may exert influences on agents’ practices, agents have the capacity to make informed choices, and so they may choose to discuss and implement practices that, in turn, trigger causal mechanisms to generate and perpetuate further tendencies in certain directions in areas of practice. However, agents also obviously have the capacity to make uninformed choices: they may unquestioning reproduce apparently ‘normal’ practices, thereby generating tendencies for those practices to continue. In either case, it is the lecturers’ discourse that has the power to generate particular tendencies.

Critical realism recommends that, in explanatory social science research, one should begin with a description of the concrete, then proceed to an explanation and interpretation of the abstract before returning to a stage of ‘concretisation and contextualisation’ (Danermark *et al.*, 2002: 109-110). In Chapter 4, I first described the concrete aspects of my research site (the physical location and the participants); then, in the following three chapters, using discourse as my unit of analysis, I used a form of abstraction (abduction) to relate my data to a conceptual framework of relevant social theories, simultaneously striving to understand the vital essence of the objects I was studying (retroduction) and to identify possible causal mechanisms that were operating and generating observable effects and tendencies. In those three chapters, I related concrete descriptions to theory and attempted to provide some practical guidelines for the future constitution of Radiographic knowledge. In doing so, I was aware that one reason that social scientists of education and language may fail to generate

‘buy-in’ from those whom they research is that they fail to make their discourse explicit to those outside their discourse community when communicating - while (ironically) advocating that their audience do precisely that for their learners. For this reason, in this chapter, I shall attempt to explain my notions clearly and provide concrete, illustrative examples.

8.1 Misconceptions regarding language and discourse

‘Language’ and ‘discourse’ have long been neglected and misunderstood in Higher Education and elsewhere with predictable, enduring effects. Perhaps the term ‘language’ is, itself, responsible for some of the misconceptions, as it is often used very broadly. It is also used interchangeably with ‘discourse’, as well as in other ways that must be confusing to those outside language communities of practice. Agents are widely needed in Higher Education, as elsewhere in education, to address and reverse such misconceptions. ‘Language specialists’ themselves are partially responsible for these misconceptions, as they have not clarified amongst themselves what they mean by ‘language’ and so it is unlikely, under these circumstances, that the term would be accessible to those outside their discipline. It is for this reason that I repeat this quotation (see Chapter 2) from Sayer (1992: 19) who argues: “Language... needs to be put in its place, elevated from its present position of neglect, though not abstracted from its context.” In other words, the significance of language needs to be shared more widely; and if this is to occur, the term ‘language’ should be understood not only by language specialists but by content specialists as well. The significance of language for particular disciplinary contexts should be shared in accessible ways if disciplinary specialists are to accord it more attention in their curricula.

I will now respond to the two research questions. In doing so, I will refer in as concrete a manner as possible to the various social theories, findings and conclusions in previous chapters. My conclusions will be considered through the lens of critical realism.

Discourse was the unit of analysis in my research, and is a central concern of all the social theories that I employed. Discussion of the discourse forms that were the focus of Chapters 5, 6 and 7 was therefore intended to explore and illustrate how Radiography lecturers and clinical radiographers, as overlapping communities of practice, used discourse to constitute Radiography learners’ knowledge. I came to realise that discourse itself was a causal mechanism, capable of generating and projecting a world of particular knowledge and associated practices, values and

ideology. This discourse would be interpreted within the limits of what it was possible to speak about and do within the cultural contexts of Health Care and Higher Education.

8.2 A Hallidayan framework

Halliday's (1978) notions of 'contexts of culture' and 'contexts of situation' provided the underpinning structure for my working model of knowledge constitution (see Appendix L), a simplified version of which appears in Chapter 4 (see Fig. 2), because these notions incorporate discussions of discourse and resonate with Halliday's Systemic Functional Linguistics. This research involved two cultural contexts (Higher Education and Health Care), within which were embedded two contexts of situation (the university classroom and the clinical department). In each of the contexts of situation, the Radiography learners' knowledge was constituted by lecturers and clinical radiographers through discourse that simultaneously conveyed three kinds of meaning. This discourse conveyed (largely explicit) theoretical meaning and (largely tacit) practical meanings about radiography and associated knowledge practices. The tenor of this discourse was simultaneously conveyed by lecturers and clinical radiographers through interpersonal meanings conveyed in the research site; while the mode of discourse, evident in textual choices employed, further helped to constitute the field of Radiography. Each of these aspects of knowledge constitution - the field, tenor and mode of discourse - was the focus of discussion in Chapters 5, 6 and 7 respectively.

Halliday (1978) argues that language is a semiotic system, so texts should be seen as a dimension of human behaviour, irrespective of the cultural context. Texts are used rhetorically rather than logically to achieve particular purposes. Understanding that different cultures order meaning in their own particular, symbolic ways provides an essential perspective on the prejudicial notions of deficit and difference that are often superficially attributed to learners' language. In light of South Africa's turbulent history, and particularly in the current and ongoing era of educational and social transformation, I believe that it is imperative to reject unproductive notions and, instead, focus on teaching and learning practices that support, as fully as possible, the advancement of all learners in Higher Education, especially those studying through the medium of English as an additional language. These learners will then have a better chance of achieving their potential and being fully empowered to contribute to the ongoing development of the profession through research and publication.

8.3 Communities of practice

Communities of practice theory has contributed to understandings of group dynamics, particularly in relation to the use of a community's discourse as a hallmark of, and gate-keeper to, disciplinary knowledge (hence the link between discourse and disciplinary boundaries). As a community of practice, Radiography lecturers and clinical radiographers inherited pre-existing knowledge, social relations and associated practices with their causal powers that, together, comprise the Radiography discipline. From this inherited knowledge base, they selected and organised knowledge for pedagogy in accordance with their notions of what knowledge and practices were important, both for the workplace and in line with their vision for the future of the profession. The ways in which this knowledge was selected, transformed (recontextualised), framed and assessed to constitute the field of Radiography reflected what they valued, as well as their interpersonal relations with learners (i.e., the tenor of discourse). The sum of the pattern of their choices comprised a causal mechanism that would have influenced how learners constructed and construed that knowledge.

As novices, Radiography learners were required (by their lecturers and their clinical supervisors) to demonstrate within a specified period of time not only an adequate grasp of selected content knowledge, but also that they had been socialised into the appropriate language, values, attitudes and practices of the discipline and of the workplace (including the competent use of relevant texts). In other words, they had to demonstrate adequate acquisition of the disciplinary discourse of the two communities of practice. Learners who did not acquire this discourse at a satisfactory pace risked failure.

8.4 Boundary theory

Community of practice theory (e.g., Wenger, 1998) and boundary theory (e.g., Klein, 1996) are closely intertwined. Boundary theory considers how discourse cues demarcate the boundaries of a community of practice. A particular interest of boundary theorists (e.g., Gans, 1992) is invisible boundaries, as these may make it difficult for novices to understand fully the values and motives of members of a community of practice. In the radiography workplace, for instance, much of the discourse of clinical radiographers is non-verbal. Novices may not be deliberately excluded from an explicit understanding of the rationale underlying some of this knowledge, but my research indicates that, at least in the first six months of their first year, many Radiography learners did not understand multiple aspects of what they observed in the workplace context, yet lacked confidence to ask for clarification.

This might have been because, in the first few months of their studies, entry level learners seemed highly aware of their low status in relation to that of clinical radiographers. Their stated reasons for not asking questions were that there was not always time when a patient was being treated; then they forgot to ask afterwards; they were “shy”; or they feared annoying the supervisors. Their confidence improved with time.

The same lack of confidence was perhaps a factor affecting their learning progress in the university classroom. Perceived differences in status and related power relations, combined with poor learner confidence, might therefore have acted as causal mechanisms that generated significant boundaries and barriers to effective learning.

To address this confidence issue, it might be useful, until first year learners’ confidence has grown sufficiently, to allow learners to meet informally and regularly (e.g., every week or fortnight) with senior learners, mentors and a lecturer/s for query sessions. Learners tend to talk more openly and express their confusions amongst themselves, or with senior learners, particularly in groups. Groups could submit requests or questions, and these could be addressed by the lecturer in plenary and/or in individual consultations. Although I did not specifically ask learners about group work during interviews, when I asked them how lecturers helped them, some said that group discussion helped them to understand new words and concepts, as well as understand different perspectives on a topic. Nomabali (7 Mar.) commented: “On your own you probably can think of things like that, but when you’re in a group you hear everyone else’s opinions as well and that helps a lot, because maybe they see it in a different way and you see it in a different way.” Xoliswa (8 Mar.) gave her view: “I think the group work [helped] as well, because I was working in a group the other day, so if one person in the group does not understand maybe the next person will, and so you learn....”

8.5 Identity theory

Communities of practice and community boundaries are closely linked to identity theory: the three are ultimately inseparable in Higher Education. The notion of academic identity has developed as part of an idealist notion of academic self-regulation and exclusive knowledge (see Chapter 2). Community membership, knowledge and accessibility are usually elitist and strictly regulated by academic disciplines (Henkel, 2000). In the traditional academy, individualistic identities were the norm; however, today’s trend is a ‘social turn’ away from individualism towards understandings of social practices of communities. One of these social

practices is literacy (Gee, 1999). Identity within an academic discipline (a community of practice) is thus relational, with members' discourse often conveyed through complex interrelationships of role, status and power.

Individual identity is embedded in and projected through the group discourse (a causal mechanism). It is this discourse that generates tendencies to hold dear certain values, attitudes and practices that distinguish members of a discipline. As mentioned previously, novices need to acquire the community's discourse for full membership of that group; once they have done this successfully, they are empowered to join the conversation of that community and add their own voice. The more competent their acquisition of the community discourse, and the closer their adherence to the rules and norms of the community, the greater their tendency to be successful in that field.

Various factors may affect the permeability of a community's boundary and so affect individual identity. Moore's (2003: 210-211) research suggests that "cognitive-adaptives" tend to work in disciplines comprising a hybridity of other sub-disciplines (like Radiography's several sub-disciplines). This tends to make them open to interdisciplinary developments in their field. The CPUT Radiography lecturers' openness to learning and progressive development across the boundaries of Radiography (as indicated by their integrated curriculum, their collaboration with others in the Health Care team, and their cross-disciplinary/work-based research) suggests a fairly permeable boundary.

8.6 Educational practices affecting knowledge and identity constitution

Moore (2003) points out that the identities and associated priorities of academics are influenced in particular by their daily knowledge work. To me, it seemed that the geographical separation of the Radiography division from its faculty management on a remote university campus, and its embeddedness in the daily work of the hospital environment had, understandably, created for the division's lecturers and learners a closer identification with Health Care concerns than with many of those of Higher Education. This could explain the lecturers' apparent priority to constitute for learners an appropriate workplace identity, rather than an academic identity.

Some theorists argue that today's educational practices generate undesirable workplace identities. Theorists such as Gamble (2003^a), Geisler (1994) and Wheelahan (2006) have criticised Higher Education for excessive codification of knowledge and for bowing to the

demands of marketisation, as if knowledge and learners are products to be ‘sold’. In the process, ethics and values appropriate for the workplace (and life) have been neglected, resulting in graduates with limited personal motivation, self-regulative capacity and guiding values. These graduates ultimately find little satisfaction in responding to the external motivation imposed by the demands of corporate goals and ideology. Gamble (2003^a) has contrasted this endemic kind of education with that experienced in traditional master-apprentice learning, where moral transmission of knowledge was central to the formation of the occupational identity. Referring to Bernstein (1996), who contends that the instructional discourse is always embedded in the dominant (moral) regulative discourse, Gamble (2003^a) advocates that, to counteract today’s marketised, fragmented and excessively codified knowledge and associated identity, teachers need to recognise and accept their role as moral transmitters of values and professional identities, as well as conveyers of content knowledge. In other words, from a critical realist standpoint, the moral/ regulative discourse has the capacity to generate tendencies towards sound occupational identities.

In many respects, it is clear to me that the moral/ethical emphases of Radiography education, together with the personal altruistic motivation of many of the Radiography learners to become radiographers, have helped to ensure that Radiography learners do not develop fragmented and marketised identities. In the university classroom and the workplace, the regulative discourse was unmistakable: in all teaching and learning contexts, there was a strong emphasis on professionalism, ethics and individual responsibility, with the best possible patient care being the central motivation for adhering to the professional code of conduct, along with others in the Health Care team. The numerous rules, particularly in the workplace, suggested that little deviation would be tolerated. This discourse suggested a moral/value orientation that was quite different to that which I had encountered elsewhere in Higher Education where, often, learners were motivated by worldly notions, such as increased status and/or material gain. Critical realism would regard the inclusion of this explicit regulative discourse in the curriculum as a causal mechanism with the capacity to generate tendencies towards self-regulating, value-based practices among learners and future employees.

8.7 Critical, social practices theory

As mentioned, there are several overlaps among the social theories drawn on in my research; many of them fall within the ambit of the social practices theory of the NLS and rhetorical

studies theorists. This research has a critical orientation and is concerned with reversing the effects of social injustice. Their contribution to my research lies in their focus on the importance of understanding the social and historical nature of literacy - that texts and literacy practices are socially (i.e., humanly) produced - and their strong criticism of deficit notions of literacy.

Winberg's (2000) review of various generations of theoretical approach to content and language integration notes critical theorists' concerns around issues of social justice and equity, and how some of these may be addressed through language, academic development and information literacy in the context of the target discipline. The contribution of the Genre theorists to integration was to draw attention to how learners might be empowered through explicit access to the powerful disciplinary discourse. Although discourse acquisition occurs, knowledge of the conventions and values of the discipline are often not made explicit, possibly because content specialists hold this knowledge at a tacit level. Reading research (e.g., Carrell, 1988) and writing development research (e.g., McCutchen, 1986) indicate that the content knowledge of experts is of great importance to their adequately developing their learners' disciplinary discourse, such as would be required in writing in the appropriate genres and style in that discipline. The Critical approach to the integration of content and language obviously resonates with the concerns of other critical theorists who are particularly opposed to elitist hierarchies that use literacy to exclude others (e.g., Street, 1996, Wenger, 1988, Klein, 1996, Halliday, 1978 and Baynham, 1995).

As discussed in Chapter 2, the work of the Rhetorical Studies theorists is also closely linked with the above theories. Bazerman and Prior (2004: 2) note that rhetoric originally involved the writing of powerfully persuasive texts to influence others' thinking and action (i.e., it was a social practice). Readers read critically to discover not only what texts meant, but how the writer had achieved that meaning. Nowadays, prevailing (and faulty) notions of expertise have been created through the division of previously holistic knowledge into content domain and rhetorical processes. As this separation has been pervasive and not openly discussed, practices that perpetuate these faulty notions of expertise have come to be regarded as 'normal' and are therefore generally invisible. Geisler (1994) argues that real expertise - and therefore access to real power - lies in knowledge of the rhetorical domain, as it is this domain that provides the tools for experts to organise argument and (particularly) to write and speak persuasively. She (1994) explains that today's 'arcane' literacy practices restrict laypersons' access to power and she cites the autonomous text and its dominance in formal

education as one of the reasons for this situation: through separation of author and reader in time and space, and the lack of critical reading practices in schooling, learners have come to understand written texts as the epitome of wisdom and unquestionable truth. They therefore conceive of their own expertise as unquestioning mastery of content. Repeating what they have been told or what they have read has usually been rewarded: years of fact-focused schooling, rote learning and assessment practices that suggest that content repetition is valued have taught many learners that merely reproducing facts from 'expert' texts is the key to their success. Yet reproducing disciplinary knowledge alone has little epistemic value. Accepting current notions of expertise has generated tendencies for learners' critical faculties to be poorly developed, so that there is little, if any, comprehension of what it means to engage with the ideas of others and to write or speak with an original voice. (It may be recalled that, in the Radiography division, lecturers (e.g., Linda, 7 Dec.) expressed concerns that learners found it very difficult to develop an original voice in their writing.) Grasping the notion that human authorship underlies disciplinary knowledge (and thus the techniques of knowledge production) is the generative mechanism with the potential to provide learners with an alternative understanding that may motivate them to acquire the kinds of rhetorical competencies that will provide them with real power to engage with existing knowledge and generate new knowledge.

Geisler (1994) advocates reform in Higher Education to reintroduce the rhetorical and thereby empower learners. However, she appears to lack confidence that this will occur, as she contends that the motivation of equity tends to pall in the face of global notions of 'efficiency'.

Boughey and Volbrecht (2004) argue that one cannot hope to convince educators to dismiss global trends and pressures in favour of equity, and that a balance is needed. In my view, a balance between equity and efficiency is fully possible in the Radiography context: lecturers can grow the profession through continuing to share content knowledge (in the interests of workplace efficiency), while simultaneously beginning a structured process of empowering learners through introducing critical insight into the rhetorical aspects of knowledge (in the interests of equity).

8.8 Dilemmas and opportunities

During interviews with lecturers, it became evident that lecturers face a dilemma that only they can resolve, as they have a deep understanding of the radiography workplace, the complexities of the academic discipline, and a vision for the future of the radiography profession. The lecturers emphasised the importance of learners being able to read and write appropriate academic texts, because they want to advance the discipline and the profession. As discussed in previous chapters, several lecturers expressed concerns that, even by second and third year, learners had not attained a satisfactory level of English language proficiency and that their academic writing was particularly unsatisfactory. They therefore contended that a more serious effort would be needed to improve learners' general and academic (particularly, written English) competencies (see Chapters 5 and 7). However, the Diagnostic radiography workplace (the largest clinical radiography sub-discipline) would have been unlikely to give learners the impression that improving their writing competencies was vital, as little writing is currently required there. Indeed, this environment would probably have conveyed the message to learners that clinical radiographers attach little value to reading and writing practices, especially of the calibre required by academia.

Because of their different discourses regarding required literacy practices for radiography, the two communities of practice - the university division and the clinical department - therefore seemed to be sending conflicting messages to learners. Which discourse was most likely to appeal to learners? In the workplace, Radiography learners experienced a level of prestige as part of the Health Care team, irrespective of their junior status in that hierarchy. The clinical context also provided first year learners with immediate learning experiences in a real world of work. There the atmosphere had a certain mystique created by the hospital/ medical world of white coats and the scent of chemicals, the hierarchy of doctors, nurses, radiographers and other Health Care staff. At times, what learners observed was akin to a reality television drama, with the doctors, patients and radiographers in lead roles. This environment would certainly have made the workplace enticing, perhaps especially for entry level learners whose life experience outside the home and school classroom might have been far more mundane.

In the academic arena, in addition to the various challenges presented by their academic subjects, L2 English learners encountered lecturers' expectations regarding their reading and writing of academic texts. The implication was that this challenge would extend throughout their academic careers. Perhaps, by comparison with the attractions of workplace learning,

the academic field offered too little enticement. Besides, as mentioned, during the first term of 2006, the limited, ad hoc attention paid to developing learners' academic competencies would probably not have suggested to learners that these competencies were very important.

The former Peninsula Technikon's (2003) Language Policy advocated academic and language support, especially for first year learners. Fifty-one per cent of learners at that time were isiXhosa-speaking, and many others used English as an additional language, so it was anticipated that it would be a challenge for many of these learners to cope with English as the medium of instruction. Since the merger in January 2005, CPUT, little has changed in this respect. Like many 'new' institutions of higher learning in South Africa, is in the process of developing an institutional language policy. Based on a survey conducted by members of Fundani (the institution's centre for Higher Education Development), the draft policy recommends that English be the official medium of instruction. This implies that support for learners studying through the medium of English will need to continue. The academic staff of the former Peninsula and Cape Technikons remain predominantly English- or Afrikaans-speaking, with English generally the medium of instruction. Lecturers' ability to use the local indigenous African language, isiXhosa, even at a conversational level, generally falls greatly short of the level required for academic teaching. In addition, the language corpus is as yet insufficiently developed for academic purposes. A goal of the draft language policy is for academic teaching staff to develop an adequate level of conversational ability in isiXhosa over the next few years.

From my experience, I would argue that any add-on support offered by language specialists in the form of a few lectures focused on specific aspects like 'reading skills' or 'vocabulary development' is not really achieving desired results. Firstly, it is not usually credit-bearing; secondly, ad hoc interventions tend to be offered by language specialists and so perpetuate notions of language and academic competencies as separate from mainstream academic concerns; and thirdly, such interventions tend to be offered only when they can be accommodated around other mainstream work (i.e., as an aside). What is required instead is sustained, integrated, explicit guidance by content lecturers such that learners appreciate the embeddedness of the rhetorical processes in the content domain. However, literacy issues related to the conflicting university and workplace discourses will probably remain unresolved in the foreseeable future. Staff development may help lecturers to achieve the kinds of goals that they envisage with a measure of success. For example, lecturers may need

assistance to develop the necessary insights so that they, in turn, can develop the learners' meta-awareness of the kinds of discourse-rich texts that they need to read and understand, respond to and produce. These competencies are not particularly grammatical by nature but require instead a raised awareness of how texts produce kinds of meaning, such as how a writer of a medical or radiographic text sets out arguments, justifies her position, or endeavours to persuade the reader. During an interview (**21 Nov.**), one of the Radiography lecturers indicated that she and other lecturers needed one-on-one consultancy with someone who could help them to assist learners:

I would like there to be a Jenny coming to us and doing things for the students and...not so that you could take the load from us, but so that we could actually learn from you how to do it better, because I think we're going in there and we are essentially content people and I would like to learn alongside you, and so that we can do it better than we're doing it.... I would like to have it, you and I sit down and we say: 'Show me what you're doing with Dental Technology [a programme where I work with learners at several levels] and is there any way that we can do it, incorporate it, but in a more structured way?' because I think it's done in a very sort of haphazard way.

Although the following questions cannot resolve the discourse divide between the two communities of practice regarding required literacies, it may be useful for lecturers to engage in dialogue (initially amongst lecturers themselves and, perhaps later, with clinical staff), to ask and, hopefully, arrive at answers to the following questions:

1. 'Why, precisely, do we think that learners should improve their writing competency?' (i.e., for what purpose beyond their academic study?);
2. 'If we want to develop their writing competency, how will we structure this development within the academic programme?';
3. 'How much time and emphasis does this development warrant?';
4. 'Who will facilitate and coordinate this development so that all lecturers are involved?';
and
5. 'How will we motivate learners to improve their (particularly) academic writing?'

Regarding the last question, coercive or persuasive options exist: coercion could involve insisting on more credit-bearing written assessments (that could perhaps be allocated a higher weighting in the assessment total for written assignments). However, perhaps explicit,

transparent motivation would be more persuasive: learners should know the rationale behind the level of academic written competency required of them, not merely think of their writing as an additional secondary school English requirement that is boring and a waste of time. Their lecturers' vision for the growth of the profession through research and publication, and the role of language competency to help achieve the latter, should be shared among all lecturers and learners. Because the learners' culture is often so different to that of the institutional culture, it may be necessary for lecturers to explain these notions to learners in terms like: 'This is what we are (our identity) and why'; 'This is where we want to go, and why'; 'This is what we think we need to do to get there'; and 'This is your role and this is mine'. Linda (7 Dec.) commented that all lecturers need to be involved in a collective effort to develop learners' academic and literacy competencies: "... it's not a sticking plaster approach, we've all got to do the same thing." To relate this to theory discussed in Chapter 2, lecturers and learners need to aspire to the same group academic identity which has what Clark (1972: 178) terms an "organisational saga", that is, "...a collective understanding of a unique accomplishment in a formally established group." Clark reminds us that a saga is a story with a large following of believers. Without their belief, the story merely becomes history.

Understandably, the clinical radiographers have a different identity to the Radiography lecturers, and possibly very different values and associated aspirations: while the lecturers are able to identify with the clinical radiographers' identity because of their previous workplace experience, the reverse does not apply. However, if it has not already been done, it may be useful for Radiography lecturers and clinical staff to discuss and collaborate around their respective visions. In their discussions, because of their previous radiography workplace experience, the Radiography lecturers may have an advantage, as they are able to use the clinical discourse competently, and so are able to communicate effectively with clinical staff when they enter the clinical domain. The clinical staff possibly do not have a similar grasp of the lecturers' academic discourse, so the Radiography lecturers may have to bear this in mind during their interactions so as not to alienate them through their academic discourse.

In the meantime, the lecturers of the Radiography division should continue with what, in my view, is excellent work. There are many commendable and distinguishing characteristics of their practice that the Radiography division can be proud of: they are qualified teachers with much experience; most of their teaching and learning practices are beyond reproach; they are

aware of their learners' language needs; they address language issues (even if in an unstructured way at present); they are committed, dedicated and hard working; they model professional and ethical practices for their learners; and they are constantly open to new knowledge, whether professionally or personally. Helping learners access the meaning of Radiographic terminology should continue, along with continued efforts to increase learners' oral, reading and writing competencies. Several positive practices are already being practised and these can be emulated by all Radiography lecturers (see Chapters 5, 6 and 7).

Critical realism argues that knowledge is like a map or recipe for doing things (Sayer, 1992). What is the implication of this for knowledge constitution? I endorse the view of theorists like Gee (1990, 2003), Winberg (2000) and Luckett (2001) who suggest that, to provide learners with meaningful access to the disciplinary discourse, acquisition alone is insufficient: a meta-understanding of the structure of the discipline (and its implicit values) is essential. Teaching learners about the structure of knowledge in their discipline and how new knowledge fits into that structure is what Gee (1990) terms 'teaching for learning'. Social theorists from related theoretical positions advocate the same or similar practices (e.g., Bernstein, 1999; and Gamble, 2003^b). Luckett (2001: 52-53) argues for an "epistemically diverse curriculum" that balances Mode 1 and 2 learning, and that links theory and practice in a reflective manner, i.e., with meta-awareness. She (2001: 51) also argues for opportunities in the HE curriculum for reflection and democratic discussion. Drawing on Barnett (1997), Luckett (2001: 54) advocate that Higher Education institutions ought to be "democratic discursive spaces" where there is specialisation in meta-knowing and engagement with multiple knowledge frameworks and their discourses.

Wheelahan (2006) similarly urges that boundaries between different knowledge types should be made explicit for learners, so that learners can plan how to traverse them, if need be. Then, to empower learners further, they should understand features and influences of relevant social structures and power relations in their discipline. In addition, the reasoning patterns and use of rhetoric in the discourse should be explicitly discussed to provide learners with the kind of meta- knowledge that ensures that they are 'academically literate' in the true sense of the term: they have a shared, explicit understanding of the academic and literacy practices of their profession.

Sharing their meta-knowledge of the discourse of Radiography - that knowledge that includes an understanding of the structure, values and rhetorical features of the discipline - may be

challenging for Radiography lecturers, much of whose knowledge may be tacit. Learners who have been instructed through tacit procedures in the workplace may also find it difficult to talk about what they have learned. Theorists (see Chapter 2) seem to disagree about whether or not tacit knowledge can be made explicit. Several argue, indeed, that this knowledge cannot be expressed explicitly. Personally, I think that some of it, at least, may be. I agree with Jacobs (2006), for example, who argues that lecturers' awareness of the tacit knowledge underpinning their discourse may be raised by others, such as language colleagues. There are two reasons for this: language colleagues are more likely to have a heightened awareness of the rhetorical features of language; and they are likely to have the confidence to request clarification of what is not clear to them (unlike many learners). Other theorists like Perkins (1992) and Wenger, McDermott and Snyder (2002) also argue that tacit knowledge may become more explicit. The latter (2002: 9) suggest that, to accomplish this, opportunities need to be created for interaction and "informal learning processes", like relating stories and experiences, conversation, coaching and shared reflection. Such experiences are not usually allotted attention or time in the curriculum because of pressures (both in the workplace and the classroom). In line with Wenger, McDermott and Snyder's (2002) suggestions, I envisage informal gatherings of small groups of learners, each with a facilitator (e.g., a lecturer, a clinical radiographer or a senior learner/mentor). Activities could include discussion (in groups and/or plenary), demonstrations, and perhaps role plays of recent experiences in the clinical workplace. During such informal 'debriefing' (which may be particularly valuable for less confident, entry level learners after their first clinical practice), the facilitator/s could encourage learners to share their experiences openly, with facilitators helping to clarify issues of confusion regarding, for example, practices that learners have observed, jargon heard, and so on. Through having to respond to these learners during such interactions, facilitators might find that this helps bring tacit dimensions of their knowledge to a level of explicit awareness. Then, if Perkins's (1992) four levels of metacognition are accurate - with tacit knowledge and awareness being levels one and two respectively - the next two levels of metacognition may develop, namely strategic thinking and, ultimately, reflective thinking.

A critical realist would regard the above processes as opportunities to use the empirical domain (discussion, demonstration, role play) to gain access to the actual (experiential) and, perhaps, real domains through informal, relational dialect. The action of creating discursive opportunities to interact on an informal level, with the common purpose of learning, may serve as a causal mechanism that generates tendencies for facilitators and learners alike to

move their understanding beyond the tacit, so that they all become more explicitly aware of the ways in which knowledge is developed.

The following is a summary of my concrete guidelines for practice derived from my discussions in this and previous chapters:

1. Share knowledge of the structure of the discipline of Radiography

In consultation with one another, Radiography lecturers should compile a diagram (to be shared with entry level learners during orientation) that reflects their agreement on the structure of the Radiography discipline in terms of horizontal and vertical knowledge and the kinds of formal knowledge/ sub-disciplines and subjects included in Radiography education (cf. Bernstein, 1999). The rationale for inclusion and possible overlap of formal subjects in the integrated curriculum (e.g., Maths and Radiation Science) and differences among different specialisations (e.g., between Radiotherapy and Ultrasound) should also be agreed upon by lecturers and shared with these learners. This will help learners acquire a meta-cognitive understanding of the knowledge that is being constituted for them. Thus the focus would not be on OBE and ELOs which, while reflecting somewhat the content areas, have a pedagogic focus, but on the knowledge base of Radiography education and the rationale for the way their lecturers intend to constitute knowledge for them.

2. Explain the term ‘discourse’

Once learners have been in the clinical environment during their first clinical practice, lecturers could then explain to learners what discourse is, and learners could draw on their experience in both the university and the workplace to give examples.

3. Link knowledge structures and discourse

Flowing from 1 and 2 above, lecturers would link their understanding of knowledge structures with associated vertical and horizontal discourses. In other words, their understanding would not be decontextualised but associated with two familiar contexts. Learners would focus on identifying differences between university and workplace discourse, e.g., different language forms, values, practices and ideology. Professionalism and ethics are examples of concepts that are commonly referred to in teaching and learning situations, and that reflect expected values and practices in the radiography profession.

4. Explain tacit and explicit, principled and procedural knowledge in pedagogy

In relation to how they learn in the two contexts, learners would need to understand the differences between tacit and explicit forms of knowledge: that in the workplace, horizontal knowledge, values and expectations are often tacitly communicated and learned; and this means that the teacher in a clinical department depends on a concrete, tangible context in which she will demonstrate and correct learners' actions. By comparison, in the academic classroom, the lecturer will tend to be more explicit, because much vertical knowledge is abstract; and, while abstract knowledge has the advantage of being 'portable', it is not always immediately relevant to a concrete, tangible context. Also, while workplace knowledge is unsequenced and promotional levels are not always easily distinguished, academic knowledge tends to be strictly structured and sequenced in increasing levels of complexity (and, usually, abstraction). Learners would recognise the knowledge structures of academic disciplines because of their presence in their schooling.

It would also probably be helpful to explain that, because the workplace and academic knowledge forms are different, it is sometimes difficult to teach workplace knowledge in the classroom – and so it is not always easy to relate what is learned in the classroom to what is experienced in the workplace. Barnett (2006) argues that it is vital to conceptualise very clearly the links between the academy and the workplace. I contend that this insight should not be restricted to experts alone, but shared with learners. In the paragraphs below, I have tried to explain this link by drawing on Gamble's (2003^b) extension of Bernstein's (1999) model of knowledge and discourse as it provides a useful distinction between knowledge as it is constituted in the university and knowledge as it is constituted in the workplace. In both cases, knowledge is partial, as some knowledge is related to the visible and/or concrete, while other knowledge is related to the invisible and/or the abstract.

Gamble (2003^b) argues that because principled (theoretical) and procedural (practical) knowledge are complementary, they are both involved in each of General and Particular forms of knowledge and are thus both necessary in vocational education. To understand General theory (abstract theory, involving principles) of Radiography, learners need to visualise their knowledge of the theoretical principles in relation to their knowledge of the concrete and associated procedural applications. For instance, if learning the theory of spongy bone, learners have to visualise the composition and location of spongy bone by comparing it to the other type of bone (i.e., in relation to the composition and location of compact bone).

They also then visualise both types of bone tissue as they are found in specific bones of the body, such as the femur; and the femur is visualised in relation to other bones that comprise the whole human skeleton. Having seen images of bones and skeletons in textbooks, and three-dimensional skeletal models in the classroom, learners integrate segments of theoretical knowledge to form a composite visual image that relates to the unseen but ideal visualisation of a three-dimensional patient who has, for example, a fracture of the femur in the area of spongy bone. In the workplace, this principled knowledge would suggest ways in which, in practice (i.e., when using procedural knowledge) radiographers should lift, turn, or otherwise position the patient in preparation for a radiographic image to be taken.

A similar ‘reverse’ process would apply in the case of Particular knowledge: ideally, in a practical, concrete context in which a procedure was being performed, learners would be able to demonstrate their procedural knowledge competently because they would draw on visualisations of the theory (i.e., that which is not visible). Thus, if the radiographer were requested by a doctor to radiograph the head of the femur for evidence of a suspected fracture, the radiographer would draw on principled knowledge: she would visualise the invisible components involved: the head of the femur in relation to the adjacent skeletal structures, the composition of the bone in that area and knowledge of associated pain caused by the fracture that is likely to be experienced by the patient. With the background of all this theoretical/principled knowledge, the radiographer would be able to decide how best to manoeuvre and position the patient for radiographic imaging.

It is therefore clear that Barnett (2006) is correct in arguing that both disciplinary and situated knowledge are required for vocational education; and that preparing for vocational pedagogy requires a double recontextualisation of workplace knowledge. This should best be accomplished by those who are firmly grounded in both the workplace and the academy, and whose repertoire includes a sound foundation in pedagogy. The Radiography lecturers certainly meet all these criteria.

However, this understanding should not be a hidden process. Bernstein (1999: 168) states unequivocally: “Explicit transmission refers to a pedagogy which makes explicit...the principles, procedures and texts to be acquired.” In other words, learners require an explicit understanding of the relationship between the underpinning theory, the complementary workplace practice and the role of texts in each. There may, of course, be knowledge that is difficult to share, such as tactile ‘knowledge at the fingertips’ (Geisler, 1994); but the more

explicitly learners are guided regarding practical experience in relation to theory, the more meaningful and memorable that knowledge is likely to be, and the more strategically and reflectively learners will be able to appropriate and share that knowledge for particular purposes.

5. Link workplace structures and power relations

According to Engel-Hills (2005), dramatic advances in Health Care and associated technology over the past few decades have affected training requirements for the daily operation of Health Care service providers, necessitating changes in the way personnel are prepared for employment and expectations of the desirable characteristics of employees. The latter are expected to be flexible and able to assume leadership in less hierarchical organisations than previously. In my view, learners who need to work within hierarchies, however flat these might be in contrast to those of previous years, need insight into power relations in both the workplace and academic contexts. This would involve understanding hierarchy and associated notions of status, power and purpose, and how these affect practices. For example, as discussed in Chapter 6, the tenor of discourse affects the constitution of workplace knowledge for novices. Those with higher status (the radiographers) have the choice to dictate the pace of learning (although they may not perceive that they have power in this way). The more frequent the interactions and the more numerous the opportunities that experts facilitate for learners, the greater the distribution of knowledge to those learners.

While Radiography lecturers mentioned the hospital hierarchy to learners, they did not explicitly point out that this hierarchy was linked to power, although this was implicitly evident in the ‘rules and regulations’ that abounded in the context, and the high level of discipline and responsibility expected, especially in the workplace. This is not to imply criticism of hierarchy: in this context, firm boundaries are probably needed to protect the rights of patients and ensure that all Health Care workers adhere to a common code of conduct. However, learners should understand at a conscious level the role of hierarchy in regulating practices and its impact on individual freedom of choice.

6. Make academic purposes/vision explicit

While learners require workplace knowledge and discourse, with an underpinning academic knowledge, as the basis of their radiography careers, learners need to understand the rationale for being able to write in the target language/s. In their future careers, they will be required to

write various documents if they are promoted to management levels. It is even more critical for the future growth of the radiography profession, though, that they develop the knowledge base of radiography through contributing to research and publication. For the latter, a particular form of academic knowledge and associated literacy practices are required. Access to academic knowledge is usually only through formal education that qualifies those whose level of understanding is considered to be sufficient. Social practices theory would also argue that learners need to understand that true empowerment, true expertise, comes through being able to join the conversation of the powerful: if they wish to do this, they need to acquire and retain access to what Bernstein (2000) terms ‘esoteric’ knowledge, the only form of knowledge that is truly powerful. In her discussion of this knowledge, Wheelahan (2006) argues that it is the site of transformation and possibility, from which one can challenge the social uses of power.

7. Provide improved information literacy resources and training

Learners (e.g., Angela, **8 Mar.**) thought that finding information for oneself was valuable, but many lacked the competencies required to do this. Many entry level learners were also not computer literate. Some third years (GD, 12 Sep.) complained that there were insufficient library sources for them to use and this affected their ability to study and prepare for lectures.

The library and computer facilities were noticeably limited: as mentioned in Chapter 4, these venues were very small and cramped with limited workspace. It is understandable, therefore, given the limited library space, that sources might not be sufficiently abundant for the needs of all levels of learners. It would therefore certainly support the development of Radiography learners’ reading and writing competencies if there could be improvements to these facilities.

If learners are to become competent, independent library users, they should undergo a basic library information literacy exercise (which should be explained in plenary beforehand and discussed afterwards). In addition, basic computer and word processing lessons would require very little time during the first year orientation programme, but would provide a valuable, confidence-boosting foundation on which they could build, writing initially for their own purposes and gradually developing towards the level of academic writing that their lecturers expect of them.

8. Create dialectical forums

In the clinical workplace, knowledge is shared through face-to-face interactions involving clinical radiographers and learners. The more radiographers share their knowledge, the greater the circulation of that knowledge. To accomplish this, radiographers may have to make their usually tacit practices explicit (although, of course, demonstrating and illustrating in commonly understood contexts may reduce the need for this). For this reason, movements like Continuous Professional Development (CPD) are positive in that practitioners will have opportunities to share their practices, their knowledge of sound pedagogy, and their insights into the development of the profession. In the university, by contrast, the sharing of academic knowledge occurs within situations that are highly regulated, in both face-to-face contexts (e.g., in lectures) and through remote interactions (e.g., between author and reader). In both contexts, it is important, especially for entry level learners, to have forums in which they are encouraged to ask questions and discuss issues of confusion.

Creating compulsory, regular, informal, but structured forums will provide entry level learners with opportunities to engage in dialogue with more experienced learners and/or lecturers. In such forums, they could request clarity on issues and get responses to their questions. Involving all lecturers, perhaps on a rotational basis, would be ideal, with those lecturers not present kept abreast of topics, discussion, attitudes and tendencies via e-mail.

9. Encourage reflection

If learners are provided with a conceptual design of the discipline, and the function of its discourse and power relations, this map will provide learners with a meta-awareness of the kind of knowledge described by Luckett (2001) as Quadrant 4 knowledge: it is true epistemic knowledge, both reflexive and metacognitive. As Luckett (2001) points out, the kind of knowing set out in Quadrant 4 of her framework (see Appendix A and Chapter 2) is the kind of knowing that involves the learner's metacognitive abilities so that they learn to think in terms of systems and contexts. Unless reflective practices are structured, learners are unlikely to sustain them. For example, although learners were introduced to the notion of reflection in an orientation lecture (Helen, **8 Feb.**), when I asked learners (GD 3, 12 Sep.) whether they had ever tried reflecting on their learning, my question was received with uproarious laughter. Learners informed me that work pressures meant that they had no time and that it was a matter of survival. When they went on their first clinical practice at the end of the first term, I gave each of the learners in the small group a structured notebook (see Appendix C)

with a few questions to respond to each day. These questions were designed to encourage learners to think about what they had experienced, what they understood and did not understand, and reasons for their responses. Such a 'work journal' could be part of learners' clinical practice visits, and could become source material for various kinds of reflective writing assignments and for dialectical forums such as the regular (e.g., fortnightly) session suggested earlier (point 9). Without reflection, opportunities to appreciate the significance of much of what learners are experiencing during their learning are lost.

10. Openly value holistic knowledge

An understanding of the difference and relation between content and rhetoric is important, so that learners come to understand that experts use language artfully to achieve their purposes. Unlearning ingrained practices and developing learners' rhetorical expertise is likely to take time. However, active teaching from entry level can facilitate and increase the pace at which this rhetorical expertise develops (Geisler, 1994). Developing learners' meta-awareness of the rhetorical functions of language in their discipline would involve, for example, helping learners to improve their oral presentations by focusing not only on the content, but on the impact of various non-verbal dimensions, such as the use of voice, eye contact, gestures, and aspects of visual support. In the case of writing, lecturers could help learners to demystify written Radiography texts by exploring how writers of such texts tend to organise information and argument, introduce and explain concepts, justify their position, and convince others of the rationale for their practices. As mentioned earlier in this chapter, none of these practices is particularly concerned with language as grammar, although language cues may help one to recognise features, e.g., shifts in the development and direction of an argument signalled by words and phrases such as 'because', 'otherwise', 'the following', 'by contrast', etc. With the assistance of language and HED specialists, lecturers can learn how to analyse texts in this way, and then share their insights with each other and with learners. Together with an explicit understanding of academic structures, values, power relations and reasoning patterns (i.e., true academic literacy), learners with a meta-awareness of the rhetorical features of texts, particularly those that are relevant to their studies and future careers, may then appreciate the rationale for improving their academic and literacy competencies, as their lecturers have always encouraged. Helping lecturers in Higher Education to understand the rhetorical function of texts is thus particularly important, so that they, in turn, can share this understanding with learners. Withholding this valuable knowledge is not in the best interests of the learners who will

eventually lead the profession - and hopefully will do so in an enlightened way as ‘experts’ in the true sense of the word.

8.9 Conclusion

The institutional Vision for CPUT is: “To be at the heart of Technology Education and Innovation in Africa”; and the Mission is: “...to develop and sustain an empowering environment where, through teaching, learning, research and scholarship, our students and staff, in partnership with the community and industry, are able to create and apply knowledge that contributes to development” (CPUT website, 2007).

In the context of my research, certain concepts in the university’s Vision and Mission are instructive. The Vision for Radiography - to be at the heart of Technology Education and Innovation in Africa - means that those who are educated and trained as radiographers must be fully equipped to carry forward and develop not only the procedural knowledge of radiography, but the principled knowledge as well; and this is not truly possible (except, perhaps, for a few) without fulfilment of the Mission, namely the development and sustainability of an *empowering* environment involving a *partnership* between community/industry and *both students and staff*. This *partnership* should involve not only teaching and learning, but *research and scholarship*, with the purpose of achieving developmental goals, namely to create and apply useful, developmental knowledge. The word ‘partnership’ strikes me as particularly significant in the context of knowledge constitution, research and scholarship. Productive partners share their knowledge and vision through communicative interaction and work (Sayer, 1992); and, in their common interest, empower one another and their partnership.

All the knowledge-related theories in Chapter 2 (regarding knowledge structure, production, distribution, associated identity, power relations and discourses) provide guidelines for sound teaching and learning practices to ensure that knowledge constitution occurs with a full appreciation of the role of discourse. It is clear from this theory and my findings that insight into the role of discourse in knowledge constitution - how discourse creates the field, tenor and mode - should not be regarded superficially.

Critical realism reminds us that we should beware of conflating structure and agency. Each belongs to its own stratum; and each stratum has its own power and potential. While structures and knowledge pre-exist users, Archer (1995) argues that agents operating within

those structures have the potential to initiate and continue transformation of practices within those structures through reflective action and social interaction. Radiography lecturers have the choice of whether or not to pursue the choices that will ultimately have the best chance of generating the most empowering tendencies among their learners. Radiography lecturers' caring indicates their commitments which, as Archer (2000: 11) explains, are "...constitutive of who we are, and an expression of our identities." Through their agency choices, focusing on what they care about most, Radiography lecturers have the capacity to bring about an as yet unimaginable future for Radiography. For this to be possible, though, an ongoing dialectic is necessary: this would involve lecturers and learners (amongst others) sharing their vision. Dialectic would also involve exploring the relation between inherited and new knowledge; and between former and new (possibly exploratory) practices. Together, these dialectical practices may generate tendencies that lead towards the envisaged radiography profession.

In Chapter 1, I recalled that Winberg (2004) urges Universities of Technology to re-examine their practices and priorities. My research has attempted to bring an outsider's (educational and language) perspective on the practices and priorities of Radiography education. Lecturers in Radiography education serve as practitioners of sound academic and pedagogic practices - certainly an example for many others to emulate. However, if the profession is to grow as envisaged, the lecturers should bring an explicit understanding of the structure of the knowledge bases of Radiography, its related discourses and rhetorical practices to their teaching. Knowledge is not merely about facts and practices; it is about how an integrated, strategic and reflective meta-awareness of the use of texts and practices can work together to achieve important purposes.

Gee (2000) suggests that one's I-identity (institutional identity) may be attributed to an individual by others. If it is welcomed by that individual, the identity may be regarded as a calling; if it is not welcomed, it may be regarded as an imposition. To what extent will Radiography lecturers regard these suggestions to expand their role as 'a calling', and to what extent will they regard such suggestions as 'an imposition'?

Elsewhere (Wright, 2003), I have argued that entering another domain of knowledge, with its strange discourse and associated practices, requires crossing disciplinary boundaries; and I have cautioned that crossing boundaries is, in some respects, like entering a foreign country: when one enters an unknown territory, one's acceptance may lie in how convincingly one is able to convince the gatekeepers (like the officials at passport control) of one's honest

intentions and purpose. The gatekeepers have the choice of either facilitating or obstructing one's entry into their territory (even if one has an official 'passport'). It is possible that negotiation will be required, not only to get into the territory, but to navigate one's way through it. Knowledge of the foreign language helps. In the process, one may require assistance from strangers if one is to gain a deeper understanding of the culture, traditions and language of the citizens. Sensitivity and diplomacy will be required. During the course of my research, my colleagues in the Radiography division were hospitable and welcoming. They allowed me into their territory, openly discussed their practices, concerns and goals and made it easy for me to cross through their foreign landscape. Like all visitors, I could not stay for too long, however, so I was not fully naturalised into their world. For this reason, as critical realism warns, what I have learned may be far from the truth; my hope, however, is that it may have practical adequacy.

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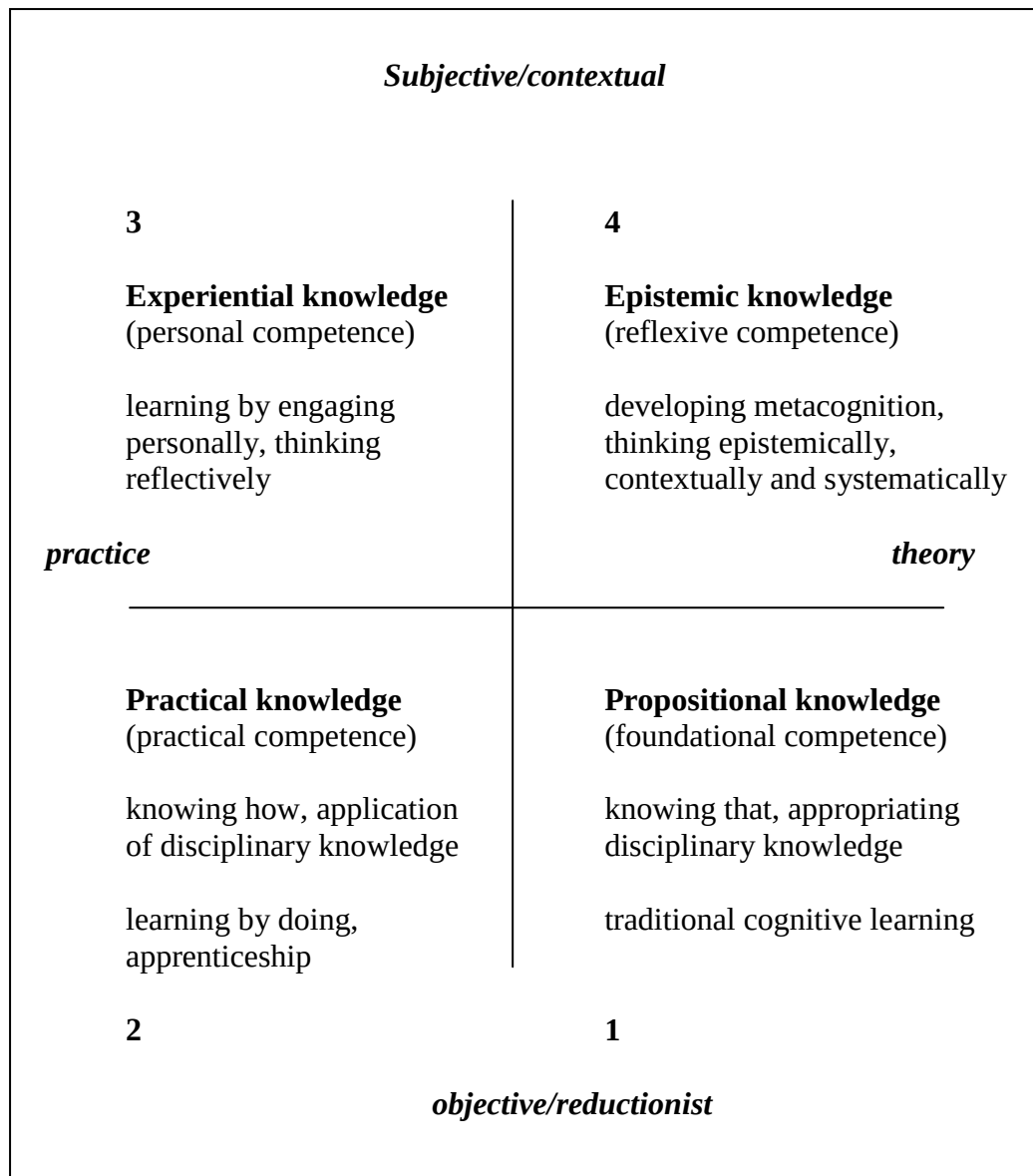
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Appendix A: An epistemic framework: four ways of knowing (Lockett, 2001: 54)



Appendix B: Sample of field notes from journal, indicating colour coding

	Dire warnings of what will happen if you are irresponsible about putting wrong IM (Identification marker on X-ray).
	Rules and regulations re students at GSH campus of CPUT. Discussion of need for uniform – professional, neat, but lecturer points out it tells patient you’re a Health Care worker, they can trust you.
	Meaning of ‘disrepute’ not explained. Meaning of ‘fog’ (fogged) explained, i.e., exposed, therefore useless.
	Unwritten rule: when door closed, don’t go in, someone working there.
	Absence from duty: “adhere to” (not explained) “offence” (ditto) “Initiate disciplinary procedure” (ditto)

Key to above colour codes

	Dangers/threats
	Professionalism
	Language/meaning
	Radiographic knowledge/workplace information

Appendix C: Notebooks for learners' first clinical practice

On the first page of each notebook, I provided these instructions:

Instructions:

Every day, complete these, providing a reason for your responses wherever possible:

Today I did these:

1. I watched...
2. I did...
3. I understood...
4. I did not understand...
5. I heard/read these new words...
6. Any other comments

I then filled in on each page of the notebook for the number of days the learners would be in the clinical department the following:

16 March 06 Thursday

Today I...

1.
2.
3.
4.
5.
6.

Appendix D: Interview 1 with lecturing staff: Radiography focus

17 and 22 to 24 March 2006

Focal areas:

Radiographic knowledge

Teaching experience and attitude

Learner challenges

Lecturer role

Views on teaching/ qualifications

Views on integrated curriculum, emphases

1. Could you describe for me the nature of Radiographic knowledge?
2. For how many years did you work as a radiographer before lecturing?
3. Why did you choose to specialize in your particular area of Radiography?
4. How many years have you been lecturing Radiography?
5. Why did you decide to teach? Had you always wanted to do so?
6. Do you have a teaching qualification? If so, where did you qualify and did it help you? (If not, do you have any intention in that regard?)
7. Which part of Radiography do you teach and what do you enjoy/not enjoy about teaching it?
8. Which parts of your subject do students struggle with most? What do they find easy/ier?
9. What is your view on the integrated curriculum?
10. What are the advantages and disadvantages of being part of an integrated team?
11. When I examined the Learner Guide, I noticed that the first 12 pages are not about Radiography itself but about rules, regulations, and assessment. I also noticed during orientation that much attention was paid to rules and regulations, and assessment. Could you comment?
12. Did you consciously teach differently because of my presence in the classroom?

Appendix E: Interview 2 with lecturing staff: Language focus

15 November – 7 December 2006

Focus areas:

Radiographic language;
Acquiring radiographic discourse;
Learner–staff roles;
Diversity in language proficiency;
Assessment, success.

Questions		Rationale for question
1	How would you describe the literacy demands of Radiography (i.t.o. reading, writing and speaking Radiographic language)?	Individual insights into language of R
2	Describe the values, attitudes and actions that, in your view, radiographers adopt and practice.	Insight into identity of radiographers
	Place of language	
3	What language/literacy/communication outcomes do you think are important for the Radiography context? Why?	Insight into perceived value of Communication
4	Do you regret that, in your division, there is not a subject Communication/ English? Why?	Insight into lecturers' agency/motivation regarding language
5	What helps or hinders you from helping learners develop their Radiographic language and literacy?	Notions of enabling and constraining influences on practice
	ICL project impact	
6	In your experience, how has your colleague's involvement in the ICL project changed practices here in Rad. Ed?	Retrospective reflection on earlier language initiatives in division
7	Do you think that the responsibility for aspects like literacy, language and communication is evenly spread among the lecturing staff?	Spread of literacy responsibility
	L2 teaching and learning	
8	Are you aware of any significant differences between the way L1 and L2 English learners learn about Radiography? Can you give an example?	Lecturers' perception/awareness of L1/L2 differences
9	Do you think a learner's language proficiency affects his/her understanding of lectures and textbooks?	Perception of effect of proficiency on knowledge accessibility
10	In your experience, do L2 English learners ask questions if they do not understand work?	Lecturers' perception of learners' role

11	What do lecturers do that helps learners to cope with learning (a) through the medium of English (for L2 learners) and (b) the language and values of Radiography? Do you also do such/similar things?	Lecturers' role in supporting L2 English learners
12	What do you expect learners to do to help themselves to acquire this language?	Perception of learner role/ responsibility in learning L2 & Rad discourse
13	Do you assume that learners read information handouts and the Learner Guide on their own?	Perception of learners' individual engagement
14	Does language proficiency impact on assessment and therefore learner success?	Lecturers' notions of links between English proficiency and assessment
	Growth of Radiography profession	
15	What, in your view, contributes to the growth of a profession?	Insight into lecturers' vision for future of radiography profession
16	What is the role of the learners' academic and language/ literacy instruction in the future of the profession?	Insight into envisaged role of language

Appendix F: Learner interview: questions on the language of Radiography

Mon 6 March to Friday 10 March

1. How would you describe your general English proficiency?
2. How would you describe the language of Radiography to someone outside the course?
3. Are you coping with learning the language of Radiography? How?
4. What do lecturers do that helps you to cope with learning the language of Radiography?
5. What could they do differently that would help you with the language of Radiography?
6. What are you doing to improve your language, firstly, your general English and secondly, your Radiographic language?
7. Are you worried about being assessed through the medium of English, e.g., tests, assignments, oral presentations?
8. Are you able to find and use sources of information for your studies on your own, e.g. books, journals, the Internet?
9. Are you coping with the development of your knowledge of the content of Radiography? If not, what are you doing during and after class?
10. Can you recall a lecture that stands out most clearly as being easy to follow and understand? What did the lecturer do to make this possible?

Appendix G: Group discussion 1, first years, 23 February 2006

FOCUS: What is Radiography/ -ic knowledge?

1. Drawing on Learner Guide: I am sure you noticed, when one of the lecturers went through this Learner Guide with you, that there was a description of what radiographers actually do. Before you came to study here, or applied, did you have these two documents? (Show). You have also been told various things about Radiography and visited places at the hospital where radiography is people's work. ***What, in your understanding, do Radiographers do?***

Covert items:

- What knowledge do they need to do this?
 - Is any one aspect more important than another?
 - What did they know before they arrived, before orientation, vs now?
 - Were their earlier notions correct?
 - Why did they choose R?
 - Words/terms used to describe R knowledge.
2. Drawing on observation of an introductory lecture: the lecturer introduced Radiographic Practice and Clinical Practice to you on 13 February (10 days ago). Do you remember that she explained a bit about procedures and processes involved in Radiographic theory and practice? At one stage, she asked if you had any questions, then asked how you were feeling. She asked if you were feeling ***“Excited? Scared? Nervous?”*** I heard voices saying ‘scared’ and ‘nervous’. ***Do you remember whether you said ‘excited’, ‘scared’ or nervous, and why?***

Covert items:

- Pleased with choice of career? Attitude towards it? (e.g., proud).
 - Have you changed your mind about R and wish you'd chosen a different career? Also in medical world? Why?
 - What appeals most about R? What least?
 - What is most difficult or off-putting about it?
 - Language demands for L2 English speakers?
 - Coping?
3. Drawing on my field notes, using visualisation (see below, list of activities).

First read visualisation, then ask: ***What has helped you to deepen/grow your understanding of R since you started orientation?***

Covert items:

- Reference to vocabulary used – explanations, discussion of meanings
- Visuals, chalkboard, videos, hands on experiences, visits, workbook, etc.
- Teaching methods, e.g., groups, discussion, questions invited, participation etc.

Transcript of visualisation of orientation activities

I read this to the learners before asking them to reflect on activities that deepened their understanding of Radiography:

“In preparation for today, I wrote down a list of some of the activities that you’ve been through during orientation. Now what I want you to do is I want you to close your eyes, and I’m going to read through the list and I just want you to try to remember that session, and then afterwards I’ll ask you a question related to that, but I first want you to try to clear your mind..., cast your mind back, close your eyes so you don’t start looking around ... and I want you to remember these sessions.

“We were upstairs in the second year classroom and you were introduced to the staff members, and you had to fill in a whole lot of forms, you had to go through rules and regulations... there was an introduction to Radiography by the Senior Lecturer, I think, and I know one of your lecturers also did something. We went, in groups, on a hospital tour that was quite long and everybody’s feet hurt when they came back; you also had a main campus orientation which I didn’t join you because I know main campus but you went on an orientation tour... and then a lecturer did a session on professionalism and ethics; then one of the hospital sisters came and did infection control with you. You did a ‘use and care of the library’... there was a session; a lecturer did a lecture on reflection, the importance of reflection in your studies; you saw a video on Radiation protection; and when you were on the tour around Radiotherapy - I’m assuming you saw the same video we did, the Radiotherapy video on Plato, the Plato machine or equipment; you also were introduced to the Learner Guide, you had an introduction to Anatomy, ...you had an information session on Radiation badges with the Radiotherapy lecturer; and you were each issued with your radiation badge. You did oral presentations and took notes and drew mind maps, some of you; you learned a little bit about referencing, how to reference your sources; and you went to visit the departments: Diagnostic, Radiotherapy and Nuclear Medicine and were given the opportunity to see what people do there and you were offered the chance to ask questions; and, of course, this week you’ve been busy with First Aid.

“And now you can open your eyes. That was meant to refresh your memory about what you’ve been through ...in just about two-and-a-half weeks. What I want to know is, if you can give me any idea, if it’s in your recollection, how have the presenters of all of these sessions, whether they are lecturers, or staff in the various departments that you visited, how have those lecturers or staff in the departments helped you... and in some cases it was a senior learner, you know, the tour for example, the group I was with had a 2nd year leader and when we went to Nuclear Medicine we had, I think, a third year who was giving the talk there. Whether your presenters were lecturers, staff in the department or senior learners, how did they help to deepen or grow your understanding of Radiography throughout the time of orientation, from what you knew before you came here? In what way did you think those staff...how have they actually helped you to grow in your understanding of Radiography?; What are the kinds of things that they’ve deepened?. Can you think of anything in particular that stands out for you?”

Summary of events:

Introductions to staff
Filling in forms
Going through rules and regulations
Introduction to Radiography
Hospital tour
Main campus orientation
Session on professionalism/ethics
Infection control
Library use/care
Session on Reflection
The video on Radiation protection and
The video on Plato (Radiotherapy)
The introduction to the Learner Guide
The introduction to Anatomy
The introduction to Radiographic Practice and Clinical Practice
Information on Radiation badges
The introduction to the workbook
Oral presentations
Referencing introductory work
The introductions to departments: Diagnostic, Radiotherapy, Nuclear Medicine

Appendix H: Group discussion 2, first years, 28 March 2006

Questions on the Content and Language of Radiography (after first clinical practice of 8 days)

1. Notebooks: What did you see? What did you do? What did you understand? What did you not understand? Did you understand the language used? What new terms did you learn? Any other comments/reflections?
2. Comment on your duties in the clinical depts.
3. Comment on the way the clinical staff related to you: did they help you? Did they encourage you to speak, ask questions, give opinions, help you with new terms?
4. Did you develop confidence during your visit? What contributed to this?
5. Were you aware of a strong sense of hierarchy among clinical staff, students, nurses, doctors? (Levels of authority). How did this manifest itself?
6. Rules/regulations: how much were these emphasised?
7. Do you recall I asked how would you describe the language of Radiography to someone outside the course? Has your opinion changed as a result of what you have experienced in the past two weeks?
8. Are you confident that you are coping with learning the language of Radiography? Where is your confidence on a scale from 1 to 10?
9. Are you confident that you are coping with the development of your knowledge of the content of Radiography? If not, what do you do inside and outside class to help yourself to improve?
10. If you could give advice to clinical staff to help you with the knowledge and language of Radiography, what would that be?

Appendix I: Group discussion 3, first years, 12 September 2006

Focus: Teaching and Learning in the Radiography division

Independent learning, initiative, strategies, motivation

Lecturer/clinical guidance

English language proficiency

Academic competencies

1	In Term 1, you were asked to read the Learner Guide . Have you? Why/not? What would motivate you to do so? What is the purpose of the LG? Is it valuable/ useful? What does “OBE” mean? “Integrated curriculum”?	Individual responsibility Motivation Amount of lecturer responsibility/ student perception of value, purpose
2	Have you read and used the workbook ? Which parts? Has it been helpful?	Insight into student response/ independence/ responsibility level
3	Have you read the handouts given, e.g., GSH medical injury policy and procedures, rules and regulations?	Insight into student response/ independence/ responsibility level
4	In early Feb., the senior lecturer discussed reflection with you, and encouraged you to take notes, not only about what you were learning but about your thoughts on what you were learning. Have you done this? Reason.	Insight into what students are applying i.t.o. academic learning/study guidance
5	Assignments and assessment: Do you know about and use reading skills? When you write essays , what difficulties do you experience? Do lecturers tell you how to organise your information? Do you know how to reference sources correctly? What are assessment criteria ? Do your lecturers explain criteria that will be used to assess your assignments?	Insight into students’ coping with academic competencies; level of student insight into assessment
6	Classroom practices Do you get bored in class? Do you bunk lectures? If you miss lectures, do you try to catch up? Do you take notes in class? Do you take active roles in group work in class? In lectures, do you ask questions? What kind of lecturer teaching style do you prefer? Does it work to listen and copy notes from the OHP at the same time? Which subjects are you struggling with? Why? Which are easy/ier? Why? Who helps you with problems?	Insight into student involvement, responsibility level, practices, perception of subject accessibility
7	After class – independent study time Do you have a study group/partner? Does this help? What motivates you to work hard, to study?	Individual responsibility for learning Motivation

8	Language proficiency Do you find that not knowing the meaning of words/terminology is an obstacle to your learning?	Insight into perceived level of language proficiency as it affects their learning
9	Talk about poster presentations (group, last day of orientation): what helped, what hindered? Have you done any oral presentations since?	Insight into students' perceptions of the usefulness of their experiences
10	Clinical perceptions Do you ask questions? Which radiographers are the most effective teachers, and why? On 1-10, where is your confidence as a radiography learner? Do you talk to patients, irrespective of their language? What has changed since your first clinical practice?	Insight into student responsibility level; Insight into effective radiographer teaching Perception of own confidence Multilingualism in w/place
11	Have you made the right career choice ?	Perception of radiography as a personal suitable career choice

Appendix J: Group discussion, third years, 12 September 2006

Focus: retrospective views on learning and role of language

Questions:

1. When did you start studying here?
2. In your first year, do you remember any particular difficulties that you experienced?
3. Did you cope with learning your new subjects through the medium of English? Were you able to follow in lectures?
4. How many of you began studying Radiography? How many of that group is in third year? Why did learners leave?
5. What have lecturers done that helps you when you are studying through the medium of English?
6. Did anyone teach you about assignment writing?
7. Where there any other times when you learned about communication?
8. Do you think you need more of this kind of assistance?
9. In which lecturer's class do you cope best with your studies? Why?/ What do you like about the way she teaches?

Appendix K: Sample of interview transcript, colour coded

Sometimes there were overlaps in codes within a sentence. These are indicated by a second stripe of colour alongside the first.

		N:	...I think they seem to be, they take their academic work more seriously because they know they're putting their name to it.
		J:	[Lecturer] also said she gets them to read journal articles and they've got to report on them. So she is actually incorporating reading and writing quite a lot in her programme.
		N:	If I look at the Diagnostic diploma, in 1st year they've got a case study, but I think it was taken away. It is now, most of the assessments are tests and film evaluations. In fact, even the film evaluations they do for clinical, I felt that it wasn't enough, but I tried to push the numbers up a bit on film evaluations - that's where they get the film...If you look at the film evaluations, again, radiographers need to look at the technical quality. Once they have taken that X-ray they need to say, 'This is good enough to be sent for reporting'. But it is a visual thing. They don't actually write a technical report. And I think, so, somehow we need to make them more accountable and I think that is half the problem and how...maybe if there is some way of writing some sort of workplace writing where they actually sign their name to it and they've actually, 'Right, I've checked this', and this, so, ja...

Key to colour codes

	Tenor of discourse
	Mode of discourse
	Field of discourse

Appendix L: A Working Model of Knowledge Constitution with Discourse as Unit of Analysis

Explanation of abbreviations in table:

BT: Boundary Theory

COP: Community of Practice Theory

CPUT: Cape Peninsula University of Technology

CR: Critical Realism

GSH: Groote Schuur Hospital

HE: Higher Education

ICL: Integration of content and language

IT: Identity Theory

NLS: New Literacy Studies

PD & CS: Pedagogic discourse and Curriculum Studies

RS: Rhetorical Studies

SFL: Systemic Functional Linguistics

MODES OF EXPLANATION	CRITICAL REALIST PERSPECTIVE	KNOWLEDGE CONSTITUTION AND THE ROLE OF DISCOURSE IN TWO INTERRELATED SITES	
Context of culture Encountered by entry level learners; literacy a social practice, influenced by culture, ideology (NLS, SFL)	Cultural stratum is causal mechanism. Culture (historical, political, ideological) and needs linked to knowledge; discourse outward expression of these.	Historical, political and ideological context of HE culture Culture evident in discourse; conveys beliefs, values, attitudes; influences and delimits practices in contexts of situation.	Historical, political and ideological context of Health Care culture Culture evident in discourse; conveys beliefs, values, attitudes; influences and delimits practices in contexts of situation.
Contexts of Situation The specific context of operation of a text with associated meanings: any text simultaneously produces 3 meanings (ideational, interpersonal and textual) and these construct the significance of 3 aspects of register, viz. field, tenor and mode (SFL).	Causal mechanisms in contexts of situation are culture (see above) and separate strata of structure and agency. Each structure (an intransitive object of knowledge) comprises internally related objects, either social and/or biological. Structures with relations precede agents; have causal properties, so generate social phenomena expressed through particular discourses. Structure macro to micro social relations of agency.	CPUT Radiography division Radiography lecturers constitute Radiographic knowledge. Knowledge constitution in contexts of situation influenced and constrained by pre-existing HE culture in which embedded. Teaching and learning in all contexts of situation involve influences of inherited structure: institutional systems of organisation, social relations (hierarchy), practices; and agents: e.g., Dean, HOD, Senior Lecturer, lecturers, in HE context.	GSH Clinical department (Diagnostic) Clinical radiographers constitute radiographic knowledge. Knowledge constitution in contexts of situation influenced and constrained by pre-existing Health Care culture in which embedded. Teaching and learning in all contexts of situation involve influences of inherited structure: institutional systems of organisation, social relations (hierarchy), practices; and agents: e.g., radiologists, clinical radiographers, etc. in Health Care context.

MODES OF EXPLANATION	CRITICAL REALIST PERSPECTIVE	KNOWLEDGE CONSTITUTION AND THE ROLE OF DISCOURSE IN TWO INTERRELATED SITES	
<i>Field of discourse</i> The discipline, what texts are about, constituted by ideational/ experiential meaning (SFL). COP values, selects particular knowledge. Discourse signals domain boundary, excludes outsiders – power implications (BT). Mastery of discourse signals membership, common identity (IT). Classification, framing and evaluation of knowledge. R discipline is region comprising singulars, so is multi-disciplinary; weakly classified (PD & CS), i.e., boundaries between sub-disciplines weak because fields of knowledge overlap in workplace context.	Knowledge is concept-dependent. Knowledge as map; knowledge of group inherited, pre-exists users. Culture, structure, agency in field inherited. Each belongs to own stratum, with own causal mechanisms. Discourse is external reflection of notions about concepts; latter have power to influence by tendencies generated. Identity projected through discourse influences curriculum choices. Choices indicate interests: power, resources, physical territory, future prospects. Curriculum choices are causal mechanisms that generate tendencies for particular kinds of knowledge to be valued and constituted, and for language to be understood in specific ways.	Reduction employs both vertical (in university context), and horizontal discourse (in workplace tutorials). Vertical discourse of R comprises largely principled knowledge. With workplace experience, this related to visualised procedural knowledge. Two knowledge structures relevant to vertical discourse: 1. Hierarchical (e.g., Physics). Aim at general theories, strong integrating motivation within; strong grammars, strong boundaries (but reduced boundary strength in R division); and 2. Horizontal (e.g., Psychodynamics). Variety of specialised languages, each with distinct forms of interrogation; weak boundaries but weak grammars, so language difficult to acquire (integration thus difficult).	Authentic r workplace knowledge. Some vertical, but largely horizontal discourse, conveyed largely tacitly. Like craft knowledge, learned by apprenticeship, by much modelling (non-verbal) and oral sharing of knowledge. Minimal writing (depending on specialisation). Mostly procedural knowledge with underpinning principled knowledge (PD & CS). Clinical radiographers provide knowledge metalayer through modelling and guiding practices. Valued knowledge of COP is competent practice; influences notions of appropriate ways to constitute radiographic knowledge.

MODES OF EXPLANATION	CRITICAL REALIST PERSPECTIVE	KNOWLEDGE CONSTITUTION AND THE ROLE OF DISCOURSE IN TWO INTERRELATED SITES	
Vertical and horizontal discourse: within vertical discourse, hierarchical and horizontal knowledge structures. Each type has varying degrees of classification (strong/weak, related to languages). General ('head'/theoretical/abstract) knowledge both principled and procedural; likewise Particular ('hands on'/ concrete/practical) knowledge.	Spoken and written ('head') knowledge often elevated above practical (manual). CR: knowledge not only about 'knowing- that' but about 'know-how'.	Workplace knowledge doubly recontextualised for pedagogy. Disciplinary knowledge largely explicit, often abstract, so portable in various forms. Valued knowledge of COP is competent academic mastery of theory, plus practical competency - influences notions of appropriate ways to constitute radiographic knowledge. R knowledge classified and framed: curriculum categories selected and grouped (classification); through pedagogy, elements given more or less emphasis, paced, sequenced (framing); valued knowledge assessed (evaluation), reflecting valued knowledge of COP. Framing and evaluation strongly influences learning practices.	

MODES OF EXPLANATION	CRITICAL REALIST PERSPECTIVE	KNOWLEDGE CONSTITUTION AND THE ROLE OF DISCOURSE IN TWO INTERRELATED SITES	
<i>Tenor of discourse</i> Realised through interpersonal meanings (SFL). Involves social role of participants' relationships in knowledge constitution; negotiated by, and built through, interpersonal meaning, signalled by discourse. Language choices rhetorical and functional - not logical - in relationship with others (SFL). Discourse reproduces valued culture and practices of COP; indicates and shapes member identity and role (IT). Discourse related to aspects of power and relative status. Dimensions of power, affective relationship, contact and formality influential.	Knowledge developed through work and communicative interaction (Sayer, 1992): i.e., involves activity in interaction with others). Through dialectic, negotiation between old (prior) and new knowledge. Generative mechanisms of culture, structure and agency and individuals' notions of them: culture pervades structures comprising systems of organisation with social relations. Relative status, power, roles manifest through discourse (i.e. reflected through practices and language that indicate interpersonal meaning), so discourse is causal mechanism. Lecturers (active agents in field) have causal powers and properties; knowledge constitution through their social, expressive functions of language.	R lecturers as COP use R discourse rhetorically, functionally as relational, purposive social beings in classroom, mainly to accomplish pedagogic task, viz. to educate Radiography learners to be theoretically (and practically) knowledgeable about R. R lecturers and learners use language to negotiate interpersonal meaning i.t.o. power, status and roles. Tenor of discourse evident through interpersonal meanings exchanged: not only what is said/done (field) but how it is said/done conveys tenor of discourse and influences knowledge constitution (hence link with framing of knowledge). R lecturers, R learners and clinical r staff contribute to same Health Care team and endeavours.	Clinical radiographers as COP use r discourse rhetorically, functionally as relational, purpose social beings in workplace to accomplish tasks. Pedagogic tasks accomplished by modelling/demonstrating and explaining workplace practices to R learners. Clinical radiographers' use of discourse in relation to learners conveys interpersonal meaning i.t.o. power, status, roles: tenor of discourse evident through interpersonal meanings exchanged: not only what is said/done (field) but how it is said/done creates tenor of discourse. Clinical radiographers, R learners and R lecturers contribute to same Health Care team and endeavours.

MODES OF EXPLANATION	CRITICAL REALIST PERSPECTIVE	KNOWLEDGE CONSTITUTION AND THE ROLE OF DISCOURSE IN TWO INTERRELATED SITES	
Literacy a social practice, so social relations between participants during knowledge constitution influences choices in production of meaning.	Lecturers and learners both have agency: historical, inherited roles and relationships in teaching and learning situations. Roles and relationships are thus also causal mechanisms.	Interpersonal relationship with R lecturers: positive tenor of discourse through common/ similar workplace experience; thus common r workplace discourse provides transaction space (Nowotny <i>et al.</i>). Any boundary possibly created by differences in discourse, goals and status (related to academic qualifications). R lecturers' discourse signals changes in R lecturers' conception of valued knowledge: changing balance of academic and practical required for growth of profession.	Interpersonal relationship with R lecturers: positive tenor of discourse through common/ similar workplace experience; thus common r workplace discourse provides transaction space (Nowotny <i>et al.</i>). Any boundary possibly created by differences in discourse, goals and status (as part of ongoing, current experience in real, functional w/place).

MODES OF EXPLANATION	CRITICAL REALIST PERSPECTIVE	KNOWLEDGE CONSTITUTION AND THE ROLE OF DISCOURSE IN TWO INTERRELATED SITES	
<i>Mode of discourse</i> Refers to the form, features and role of text developed through textual meaning. 'Mode' describes how text used including medium, channel and rhetorical aspects.	Complex role of language: -concepts captured, mediated by texts (of all kinds). -Language (and its expression of concepts) pre-exists us - inherited.	Form, features and role of R texts inherited, includes academic and workplace discourse: verbal (written and spoken words) and non-verbal. Language of R/r has specific characteristics related to origins (e.g., medical, scientific).	Form, features and role of text inherited, largely workplace discourse of R (verbal, mostly spoken, limited writing; extensive non-verbal text). More written text in some specialisations than others, e.g., Ultrasound reports, pattern recognition (emerging).

Semiosis (SFL): role played by language as potential (multi-faceted, multi-meanings, social, symbolic, metaphorical, categorical, unique); language as behaviour, for exchanging meaning, not (purposively) knowledge (SFL); language expresses concepts, knowledge concept-dependent, therefore role of language critical.	-Texts may be verbal (oral and written words) and non-verbal (not involving words) in social contexts of labour and social interaction. -Language a process, develops slowly, erratically. -Language has unintended effects (multiple interpretations possible; knowledge expressed through language, therefore fallible.) -Dialectic between old and new knowledge largely through language.	Written texts generally dense, affects accessibility. Common international terminology used. Spoken and written discourses: face to face as well as distanced (absent author, video presenter, etc.). R lecturers use texts to express facts, values, relationships in teaching and learning. Degrees of formality. Use of verbal and non-verbal text in classroom and in clinical tutorials. Much non-verbal text is visual (e.g., 3-d models, radiographs). Visualisation needed (relating principled to workplace procedural knowledge). Learners' R discourse development gradual, unpredictable, unique per learner.	Abbreviations commonly used. Workplace management roles also require writing. Common international terminology used. Different formality levels of language used, e.g. jargon extensively used among staff, situated (i.e., related to regional languages and workplace parlance); lay language used with patients. Much spoken and non-verbal discourse, thus immediate, face to face contexts. Spoken and written texts usually fairly formal. Visual texts non-verbal. Learners visualise relationship between immediate procedural knowledge and previous underpinning, principled knowledge. Learners' r discourse development gradual, unpredictable, unique per learner.

Appendix M: Ethics permission: CPUT Research Ethics Committee



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Symphony Road Bellville 7535

OFFICE OF THE CHAIRPERSON: HEATH SCIENCE RESEARCH ETHICS COMMITTEE

At a meeting of the Health Science Research Ethics Ex-co Committee Meeting on 6 February 2006, ethics approval was granted to Jennifer Wright for research activities related to the PhD degree at Rhodes University. Research participants include academic staff, clinical tutors and students on the Groote Schuur campus of the Cape Peninsula University of Technology.

TITLE: Boundary crossing in content-language integration in higher education: a case study in Radiography

Comment:

Research activities are restricted to teaching sites in the hospital environment, without involvement of patients.

A handwritten signature in black ink, which appears to read "Penelope Engel-Hills".

MS PENELOPE ENGEL-HILLS
CHAIRPERSON: HEATH SCIENCE RESEARCH ETHICS COMMITTEE

e-mail: engelhillsp@cput.ac.za

Appendix N: Ethics permission: UCT Research Ethics Committee



UNIVERSITY OF CAPE TOWN

**Health Sciences Faculty
Research Ethics Committee**

**Room E52-24 Groote Schuur Hospital Old Main Building
Observatory 7925**

**Telephone [021] 406 6338 • Facsimile [021] 406 6411
e-mail: preaward@curie.uct.ac.za**

20 March 2006

REC REF: 101/2006

Mrs JL Wright
Language Coordinator's office: A004
Old Science Building
Bellville campus
Cape Peninsula University of Technology
P O Box 1906
Bellville
7535

Dear Mrs Wright

**PROJECT TITLE: BOUNDARY CROSSING IN CONTENT-LANGUAGE INTEGRATION IN HIGHER
EDUCATION: A CASE STUDY IN RADIOGRAPHY**

Thank you for submitting your study to the Research Ethics Committee for review.

It is a pleasure to inform you that the Ethics Committee has **formally approved** the above-mentioned study on the 16 March 2006.

Please quote the REC. REF in all your correspondence.

Yours sincerely

**DR. M. BLOCKMAN
CHAIRPERSON, HSF HUMAN ETHICS**

lemjedi

Appendix O: Criteria for first year panel interviews

Personal /40:

- 20 past achievements (personal, social, academic)
- 10 interpersonal skills
- 10 community involvement

Radiography /30

- 20 understanding of career
- 10 knowledge of course

Aptitude /30

- 10 physical activities
- 10 creativity
- 10 self-management (e.g., time and stress management, organization)

Appendix P: Request Form used in Clinical Departments of GSH

PD 119 GROOTE SCHUUR HOSPITAL DEPARTMENT OF RADIOLOGY		COMPLETE BY HAND OR USE LABEL Surname Name Folder no. Age..... Sex	
Appointment	When Applicable	Firm/Consultant.....Dept..... Ward.....	
Date.....	Date of L.M.P.....		
Time.....	Date Last X-rayed?	Walking Chair Stretcher Bed O ₂ Mobile ☐ ☐ ☐ ☐ ☐ ☐	REASON FOR MOBILE?
	Where Previous Films?		
NUMBER AND SIZE OF FILMS TAKEN 100mm 35 x 35 35 x 43 30 x 40 24 x 30 18 x 24 18 x 43 30 x 60 Dental Occlusal Panoral Others		<u>INCOMPLETE FORMS WILL NOT BE ACCEPTED</u> FULL CLINICAL DETAILS:	
		EXAMINATION REQUIRED Doctor's Name (Print) (Sign)..... <u>Ext./Bleep no.</u>	FOR DEPARTMENTAL USE
		Incomplete forms will not be accepted Date.....	Fluoroscopy time..... Radiographer.....

Appendix Q: Radiography lecturers' descriptions of Radiographic knowledge

Nadine (17 **Mar.**) described Radiographic knowledge as "...very much a practical thing...what happens in the classroom." She also described the knowledge as "...very technical, but it's not exclusively technical. You need that background, that theoretical background." Learners had to be able to 'marry' the theory and practice, but the theory was vital: "...they've got to have the understanding in the classroom... whether it's reading a procedure in the actual text, you explaining it and then them watching you do it, and then actually doing it themselves. There's a whole chain of events that have to be in place." She said that the theory of Radiography included knowledge of Anatomy and Physiology, and "...a general sort of knowledge about ...the equipment, the technique, the actual terminology that you read on the Request Forms, so it is an all-encompassing field...."

Katy (23 **Mar.**) described Radiographic knowledge as follows: "It's the use of radiation, either to image patients or to treat disease, it depends on which discipline.... Like Radiotherapy you would be treating patients, not imaging patients. Nuclear Medicine, Diagnostic and Ultrasound would be imaging patients, not treating them; and then, of course, the radiographer would be aiding the radiologists."

Linda (24 **Mar.**) noted that Radiography "...comprises a whole lot of other disciplines." She described Radiographic knowledge as "...the professional knowledge that you need to undertake your job ...so that you could carry out that practice, as defined by the HPCSA." She added that "[t]he thing with radiographic knowledge is, it's not knowledge...I don't ever see it as knowledge on a page only." She added: "I'm reading Radiographic knowledge not just, as I say, paper knowledge; it's the whole profession." She explained that the theoretical knowledge became increasingly applied and tacit in second and third year: "...the more it goes into the workplace, then a lot of the Radiographic knowledge is actually implicit and it's almost learned by 'osmosis', in a way."

Helen (22 **Mar.**) commented: "I've always had difficulty with the concept of what is knowledge. Radiographic knowledge is essentially the knowledge around practice, so it includes the theory side of things such as Anatomy, Physiology, Physics – and that's really

pure disciplinary knowledge, as it were, but then what turns it into Radiographic knowledge for me is the application of that to practice....”

Cindy (**28 Mar.**) described Radiography as “medical” and “very clinically based, it’s absolutely driven by clinical practice and very Radiographic specific....”

Petru (**23 Mar.**) said that radiographers “...take images of the human body, try to identify the disease processes which will obviously help with the patient’s management and, after, treatment of that, if the disease is treatable.” Thus, she said, radiographers deal with “medical images” for diagnosis and therapy. Radiographic knowledge also required one to understand Maths and Chemistry, as learners needed to know about chemicals and how to mix them in certain proportions to produce radiographic images. Knowledge of X-ray equipment also involved Maths, as there were “...certain specifications, so the Maths helps with specifications, settings....”

Fiona (**23 Mar.**) said that she would describe Radiography as having four disciplines “...at the moment”. She pointed out that, previously, one could describe Radiography as imaging, but she added, “[i]t’s not only imaging, it’s also for diagnosing and for treatment.”

Fiona likewise stressed that Health Care workers in the medical field needed “...a solid background of ... ‘core knowledge’ and that is the Anatomy, Physiology, Chemistry, Physics, Maths. It’s all of those.” She expressed concern about a loss of depth in the core knowledge and believed that these should be emphasised in first year, with integration occurring from the end of first year onwards.

The knowledge base needed also included psychological aspects (“...because you’ll be communicating with people, and you’ll be working with people, that’s kind of...your patient-centred part”). A radiographer also needed to know how to produce images and how to produce X-rays to treat patients. Radiography work also included management of a department and “...the health part of nursing.” She commented: “We tend to rather gloss over that bit.”

Appendix R: Exit Level Outcomes for the 2006 Radiography curriculum

Exit Level Outcomes (ELOs) and Specified Outcomes (SOs) described associated learning and assessment tasks. Here I have summarised each ELO and its associated SOs:

ELO 1 stated: “Provide patient care responsibly and effectively according to the patient’s needs and departmental protocol to ensure the welfare of the patient is maintained.”

Various related Specified Outcomes were detailed over the next few pages, each stressing the importance of interpersonal communication: SO 1.1 covered patient care; SO 1.2 focused on the need for learners to “[d]emonstrate the ability to communicate effectively with patients, the health care team and the public”. Further subdivisions related to understanding the communication process; human development; cultural differences; and the psychology of the ill patient. SO 1.3 concerned the importance of non-verbal indicators of professionalism, namely appearance and behaviour (such as acting in accordance with confidentiality, ethics and professionalism).

ELO 2 focused on the radiographer as a radiographic scientist and included radiation safety (safety regulations, effects of radiation exposure), physical science and imaging principles related to radiography and radiographic practice. This ELO stated that learners should be able to “[a]pply appropriate health and safety regulations, guidelines and codes of practice in the performance of radiographic services.”

Regarding ELO 3, in the section of the Learner Guide entitled, ‘The schedule and relevance of the learning programme,’ it was stated that “[t]he main focus of ELO 3 is information literacy.” The guide elaborated on this as follows:

The emphasis here is to equip you with the skills such as computer literacy, sourcing information, academic writing and presentation skills. Time management will also be covered. Our aim is to help you become an independent learner with the aim of promoting life long learning and research.

The first part of ELO 3 in the tabled section stated: “Apply self-management and basic administrative tasks to ensure a quality service and access and utilise information applicable

to radiation medicine and imaging services.” This was followed by details of each SO, as follows:

SO 3.1 indicated the individual responsibility of the radiographer as a member of the Health Care team; and the importance of personal stress management; SO 3.2 focused on departmental administration “in line with prescribed protocols.” SO 3.3 covered the concerns of information literacy. These were divided into Library skills, Reading skills, Note-taking skills, Assignment skills and Presentation skills. SO 3.4 and 3.5 focused on basic computer skills and telecommunication skills respectively.

The description of ELO 4, Radiographic Practice, was particularly detailed and comprehensive. It stated that learners should be able to: “Apply specified radiographic techniques appropriate to the clinical presentation for the production of optimum image quality.” This ELO was further subdivided into five SOs, summarised here:

SO 4.1: “Apply a specified range of radiographic techniques to produce diagnostic techniques.” This focused on ‘Imaging Practice’ and ‘Human Biology’. The former concerned the X-ray procedure, all relevant terminology (anatomical, medical and radiographic), patient care in practice, the imaging request form, and the ALARA principle (acronym for keeping the radiation dose ‘As Low As Reasonably Achievable’). ‘Human Biology’ was a lengthy section of almost 6 pages and provided great detail on the relevance of human biology to radiographic practice.

SO 4.2: This focused on how radiographers “[p]roduce images of optimum quality”. It included knowledge of image recording media (their construction, composition and properties), principles of use, and evaluation of image quality.

SO 4.3: This indicated darkroom processing procedures, including film loading, film handling and cleaning of used materials.

SO 4.4: This provided greater detail about imaging, radiographic equipment and techniques. There were also introductions to specialised areas of radiographic practice, namely Diagnostic, Radiotherapy, Nuclear Medicine and Ultrasound. Topics such as knowledge of equipment used in radiation medicine, oncology (cancer education and treatment options),

radioactivity, and radiopharmaceuticals, were included. A Physical Science unit included general principles of chemistry, an introduction to organic chemistry, and physical principles applicable to radiography imaging and equipment.

SO 5: This concerned the diagnostic quality of radiographic images: image evaluation, and identification of normal and abnormal patterns of anatomy and pathology.

The balance of the ELOs in the Learner Guide focused on discipline-specific differences between Diagnostic Radiography and the other specialisations.

Appendix S: Specified Outcome relevant to Information Literacy work

Specified outcome 3.3:

Gather and interpret information applicable to radiation medicine and imaging services. (3 credits)

TOPIC	LEARNING TASK	ASSESSMENT CRITERIA
1. Library skills (Workbook: unit 2)	1.1 Dewey Decimal system 1.2 Library information 1.3 ALEPH system	Information is prioritized, scientifically written and professionally presented
2. Reading skills (Workbook: Unit 3)	2.1 Previewing a source 2.2 Scanning and skimming 2.3 Comprehensive reading 2.4 Critical reading 2.5 Annotated reading 2.6 Reading for textual features	Information is prioritized, scientifically written and professionally presented
3. Note taking skills (Workbook: Unit 4)	3.1 Note taking in lectures 3.2 Note taking from a written source 3.3 Mind-mapping techniques	Effective note taking is demonstrated
4. Assignment skills (Workbook: Unit 7)	4.1 Process approach 4.2 Seven stages of writing 4.3 Referencing techniques 4.4 Assessment criteria	Produce assignments according to these criteria
5. Presentation skills (Workbook: Unit 9)	5.1 Oral presentations 5.2 Visual presentations	Prepare an oral and a poster presentation. Give the presentation.

Appendix T: Page from Clinical Work Record Book/Logbook

GENERAL CLINICAL PLACEMENT ASSESSMENT FORM

Hospital & area:.....Week:.....To:.....

1. Needs attention 2. Fair 3. Good 4. Excellent

Patient care: Does the student:

1.	Explain instructions clearly to the patient?	1	2	3	4
2.	Have a good knowledge of lifting/manoeuvring the patient?	1	2	3	4
3.	Gain the patient's confidence and cooperation?	1	2	3	4
4.	Show an awareness and implementation of radiation protection?	1	2	3	4

Please comment:
.....
.....
.....

Technical ability: Does the student:

1.	Interpret and understand the request form?	1	2	3	4
2.	Approach the work in an organised manner?	1	2	3	4
3.	Recognise limitations and ask for help?	1	2	3	4
4.	Show an ability to assess his/her own radiographs?	1	2	3	4
5.	Is his/her performance commensurate with his/her level?	1	2	3	4
6.	Is the student competent in this area/needs remedial teaching?	1	2	3	4

Please comment:
.....
.....
.....

Use of equipment: Does the student:

1.	Care for the equipment?	1	2	3	4
2.	Show an aptitude for handling the equipment?	1	2	3	4
3.	Make practical use of accessory equipment?	1	2	3	4

Please comment:
.....
.....
.....

Interpersonal skills: Does the student:

1. Communicate well with the patients/escorts?
2. Have a good communication with peers/staff?
3. Respond to constructive help?
4. Have the ability to work in a team?

Please comment:

.....

.....

Punctuality

Starting work	1	2	3	4
Tea/lunch	1	2	3	4
End of day	1	2	3	4

Please comment:

.....

.....

Appearance

Please comment:

.....

.....

Days absent:..... **Reason for:**.....

General attitude: Tick the appropriate areas

☐	Good team worker	☐	Helpful	☐	Confident
☐	Shows initiative	☐	Anxious	☐	Interested
☐	Introverted (timid)	☐	Enthusiastic	☐	Not motivated
☐	Has common sense	☐	Asks questions	☐	Lacks interest
☐	Any other attitude	☐		☐	

Comment from supervisor (to include any difficulties the student is having in the clinical environment):

.....

.....

.....

.....

Comment from student:

.....

.....

.....

Staff:..... **Date:**.....

Student:..... **Date:**.....

Appendix U: Darkroom Assessment

DARKROOM ASSESSMENT
PENINSULA TECHNIKON/GROOTE SCHUUR HOSPITAL
HEALTH SCIENCES – RADIOGRAPHY
STUDENT ASSESSMENT IN DARKROOM

STUDENT'S NAME:.....

PLEASE TICK WHERE APPROPRIATE, AS MANY BOXES AS APPLICABLE.

1. ATTENDANCE

☐	Frequently absent
☐	Punctual
☐	Stays when busy
☐	Came in early for cleaning of processors

2. ATTITUDE TOWARDS STAFF

☐	Pleasant
☐	Helpful
☐	Co-operative
☐	Not co-operative

3. ATTITUDE TOWARDS INSTRUCTION

☐	Interested
☐	Not interested

4. PRACTICAL ABILITY

☐	Accurate
☐	Organised
☐	Quick
☐	Reliable
☐	Careful
☐	Careless
☐	Slow
☐	Disorganised

5. APPEARANCE

☐	Wears correct uniform

SUMMARY OF PRACTICAL KNOWLEDGE

	ABOVE AVERAGE	AVERAGE	BELOW AVERAGE
Use and care of equipment			
Overall performance			

COMMENTS:.....

.....

.....

STAFF SIGNATURE:.....**DATE:**.....

COMMENTS BY STUDENT:.....

.....

.....

STUDENT SIGNATURE:.....

