People and pedagogy:

problem-based learning in the MBChB curriculum

at UKZN medical school

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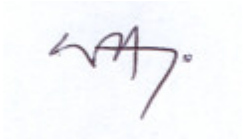
Signed: T Sommerville Date: 25 November 2011

As the candidate's Supervisor I agree to the submission of this thesis



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Abstract

This study explores problem-based learning (PBL) as a form of pedagogy, and its interrelationships with the students, staff members and institution of the Medical Faculty at the University of KwaZulu-Natal. Little has been written previously about the interaction of student diversity and resource-constrained circumstances with PBL. I investigate perceptions and experiences of PBL as a pedagogic strategy, using Bernstein's theories of classification and framing as an organising framework. I draw also on his writings on discourses and knowledge structures and the pedagogic device.

Within an interpretive methodology, I use three methods to generate data. I analyse numerically the test marks of a cohort of 202 students over three years for demographic influences on pedagogic engagement. I explore in semi-structured interviews the perceptions and experiences of PBL of 19 students and 6 staff members, and relate these to Faculty documents; I analyse these sources thematically in order to describe the roles of student, teacher and institution. These perceptions and experiences I then examine according to the eight elements of Bernstein's classification and framing.

A number of contradictions emerge: between PBL theory, echoed by Faculty documents on one hand, and staff/student perceptions and experiences on the other; between staff members and students at some points but not at others; between high-achieving and low-achieving students; between different respondents' understandings of 'integration'. Some demographic characteristics prove on analysis to be highly significant influences while others, counter-intuitively, are not.

Bernstein's theories about knowledge structures are pertinent to the tensions revealed. Medicine has thought of itself as akin to the pure sciences – implying a hierarchical structure in which all knowledge aggregates towards a point of abstraction. However, the structure and function revealed by respondents suggests a

horizontal knowledge structure, in which disciplinary knowledge is kept distinct. Students and teachers thus struggle to integrate areas of knowledge that are inherently discrete. In terms of Bernstein's 'pedagogic device', some students are able to discern PBL's implicit rules of engagement, while others are not. Consensus on medicine's knowledge structure might settle ambiguities and help PBL achieve its potential as a complex pedagogy in a complex field.

Declaration

I, Thomas Edward Sommerville, declare that

i. the research reported in this thesis, except where otherwise indicated, is my original work
ii. this thesis has not been submitted for any degree or examination at any other university
iii. this thesis does not include other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons
iv. this thesis does not include other persons' writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted, then
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A M D G

Abbreviations

DET	Department of Education and Training
EME	End-of-module examination
ETT	End-of-Theme test
HoD	House of Delegates
HoR	House of Representatives
HPCSA	Health Professions Council of South Africa
LGRS	Large Group Resource Session
MBChB	Bachelor of Medicine & Bachelor of Surgery
NRF	National Research Foundation
NRMSM	Nelson Rolihlahla Mandela School of Medicine
OLS	On-line learning system
PBL	Problem-based learning
SAQA	South African Qualifications Authority
SUME	School of Undergraduate Medical Education
UKZN	University of KwaZulu-Natal

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Introduction

Setting the scene

I emerge from my office into a rush of chatting, laughing and shouting students, streaming along the corridor. I join the current, passing other staff members who also clutch folders and notes. As the surge of some two hundred students progresses, individuals flow up and down stairwells to other floors and disappear at different corners until only ten students and I enter the door at which I've been aiming. We sit ourselves around a large table, smiling and greeting one another. Nomsa groans theatrically and rolls her eyes when she sees me, which leads me to say, "Yes, it's me again; no, we won't finish early."

We introduce ourselves. Most of the students know one another from having previously worked together in groups, and I remember some from previous years. We begin by establishing some ground rules about punctuality, politeness and 'phone calls. We elect, with some grumbling, a 'box person', who will be responsible for fetching and returning the box in which my office staff places whiteboard marker pens and messages for the group every week. Choosing a chair and a scribe for today's meeting is an easier task, as everyone will eventually have a turn.

The chair takes us through the process of reading, dissecting and analysing the 'case' for the week. The group members determine which questions they need to research in order to be able to understand the case. I interrupt often, querying their initial grasp of the case and their prior knowledge of the topic, saying things like "Why do you say that?" "Sizwe, what do you think of what Bertha said – does it sound logical?" "What does 'dysrhythmia' mean to you?" Sometimes they get stuck, and I wait until somebody suggests a way forward. I may occasionally query a part of the case that they have not yet discussed, or a term that they do not seem to understand. These are 3rd year

students, so they know most of the terminology, but every so often a word trips them up; sometimes it is an English term rather than a medical one, as the majority of the students are second-language English speakers.

At last we finish. The students rush off to a lecture or to the library. We shall meet again at the end of the week and they will report back, combining the insights they have gathered from scheduled activities and from their own reading. My role will then be to challenge what they have understood; for example, pretending: "I'm Mr Mkhize. You're explaining what's going on in my body but I can't make out what you're saying – please explain to me in simple language." "You say my heartbeat is abnormal because of shortage of blood supply to the heart itself. How does the blood get to my heart? Will the abnormality affect my blood pressure? Is it likely to affect my kidneys?"

For six weeks we shall meet twice weekly as a group. After the end-of-theme test, the groups will be re-formed by my office, and I and the twenty other facilitators will be assigned to new groups.

Background

Focus and purpose of this study

These students are learning content knowledge, and I am trying to help them to understand what they are learning, and at the same time to help them learn how to learn. This is how problem-based learning (PBL) has been practised at the University of KwaZulu-Natal's Nelson R Mandela School of Medicine in Durban, South Africa, since 2001. Small-group learning is for me the most enjoyable and rewarding – as well as the most time- and energy-consuming – part of my work. After ten years of this process, questions still arise: "How do students learn if we don't teach them everything?" "Can we trust them to pool knowledge rather than reinforcing each other's ignorance?" "What is the pedagogy of problem-based learning and how does it play out in our

diverse, multi-racial, multi-cultural, multi-lingual, multi-educational, multi-*everything*, non-first-world circumstances?" This study is *not* a ten-year audit of PBL and it is *not* a SWOT[1] analysis. It is also not an apologia for PBL. It *is*, however, an exploration of PBL in a particular setting at a specific time; an examination of a type of pedagogy and its interaction with the people exposed to it – its influence on them and their shaping of it.

The focus of this study is problem-based learning and teaching in the undergraduate medical (MBChB) programme at the University of KwaZulu-Natal from 2001 onwards.

The purpose of this study is to explore PBL as an entity, to investigate how it is practised in this locale through descriptions of the roles in learning and teaching of students, staff members and the institution, and finally to build a theory that explains the ways in which the field of medical knowledge and the pedagogy of PBL interplay with one another and with the people who enact the pedagogy and share the knowledge.

Rationale

As of 2011, the medical school's problem-based curriculum has produced its first six cohorts of graduates, has taken in three cohorts of school-leavers from the new outcomes-based school curriculum, and has made a number of changes to the order and weight of items in the MBChB curriculum. As these developments occur, fundamental questions recur about the nature of PBL, its suitability to the South African setting, the reasons for its embrace by this medical school, and indeed its aptness for the teaching and learning of medicine. It seems appropriate at this stage to assess the interplay of factors that may contribute to the efficacy, or lack thereof, of PBL in this setting.

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[1] Strengths, Weaknesses, Opportunities, Threats ("Albert Humphrey's tam® model ", no date)

Others (Reddy, 2010; van Wyk, 2009) have described the reasons for and the process of this medical school's adoption of PBL in 1997, the subsequent planning, and the implementation of PBL in 2001. I shall not retrace that journey in detail; suffice it to say that South Africa is not immune to the changes felt in academe world-wide: changes in primary and secondary education, the 'massification' of higher education through the admission of larger numbers of students, the 'brain drain' of qualified graduates to other countries, and an influx of students from other countries in the region. All these changes affect the student mixture and strain the resources of tertiary institutions. On-going discoveries and developments in education have brought about an increased understanding of valid principles of teaching and learning. Medical education particularly has been affected by the 'knowledge explosion' in recent years, the requirement that doctors' knowledge be practically applicable, patients' growing reluctance to bear the brunt of tyro doctors' training, and the expectation that doctors should keep current with developments and continue learning throughout their careers. Problem-based learning seeks to address a number of these issues, as I shall show in the following chapter.

The restructuring of the medical curriculum was undertaken in order to provide hoped-for advantages such as co-operative learning, stimulation of self-directed learning, and inculcation of lifelong learning. The curriculum was restructured from a layered six-year programme to an integrated five-year programme. My involvement with the 3rd year programme has brought me face to face with one unforeseen side-effect of the reconfigured curriculum, namely that the integration of cognate material in 'themes' is interrupted in the 3rd year of study by intercalated clinical placements in hospital wards. Students perceive the competing claims of problem-based thematic learning and ward-based teaching on unrelated topics – in other words, the loss of integration – as problematic and difficult to cope with.

While students may wrestle at one point in their programme with a change in the locus and focus of learning, their teachers have been trying for over ten years to come to terms with what, in Kuhn's (1970) terms, is a paradigm shift. Because PBL is seen as student-

centred, teachers may feel disenfranchised, and because they are called upon to facilitate small-group learning and to deliver fewer lectures, they may feel that their own cognitive achievements are devalued. This may in turn affect their participation in the pedagogy.

Previously, while investigating a particular influence on the performance of students at the medical school, I found a number of demographic factors that appeared to relate to students' results[2]. A factor like a student's school-leaving exam marks can be seen as having a fairly obvious and direct influence on her[3] marks in the MBChB course. Other demographic features – such as language, sex, 'race', high school attended, and stage of life at which she entered medical school – may indirectly affect a student's results in terms of the interaction of these features with the teaching and learning of the problem-based curriculum. I feel that purely quantitative measures are unlikely to explain the nature of the influence of these factors with the enacted (as distinct from espoused) pedagogy of the curriculum. Indeed, my interactions with students and staff suggest a number of non-quantifiable aspects that might be expected to affect students' engagement with the curriculum. Some of the perceived enhancements or obstacles to academic excellence may be common to other educational settings, but a number of them are unique to this setting and are connected with the aftermath of the apartheid era's discriminatory policies, the country's unequal secondary schooling provision, the widely differing socio-economic circumstances of the students, and the educational methodology that is here employed.

With an understanding of complexity theory, Mennin (2007) suggested that study of PBL in terms of causal relationships between aspects was unlikely to be successful, and that study of contextual factors that help shape outcomes might be more fruitful.

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[2] Internal audit, unpublished, 2004

[3] I use the feminine pronoun not to indicate a particular student, but in recognition that medical students generally, and the cohort that I have studied in particular, are predominantly female.

Prideaux (2007) remarked that certain contradictions in PBL (*e.g.* between teacher-defined endpoints and student-centred enquiry) had not been widely debated[4]. A qualitative study to explore the pedagogy as well as the non-cognitive influences on students' engagement with that pedagogy, and a quantitative study to gauge the extent of influences that are expressed numerically or categorically, might be expected to address some of the issues around PBL in developing countries. My desire is to tease out the nature and extent of factors that have influenced medical students' and teachers' involvement in the new curriculum, and to inform our view of the pedagogy employed. This could be useful to other medical schools with diverse student populations in a rapidly-changing pedagogical environment.

Research questions

Given the focus upon which I decided, despite there being many other enticing avenues of research, I have conducted this study with the following questions in mind:

1. What features arising from students' diverse backgrounds appear to influence their academic achievements?

2. How is problem-based pedagogy perceived and experienced by students and staff members at the University of KwaZulu-Natal (UKZN) Medical School?

3. Why do students and staff experience the problem-based pedagogy of the UKZN Medical School the way they do?

[4] Not widely debated, but wryly noted – *e.g.* "What the students are doing is not so much self-directed learning but directed self-learning." D Wilkinson, personal communication, 2009

Researcher and framer

I present myself not in my accustomed guise as disinterested, anonymous observer and recorder of scientific phenomena, commenting in the third person passive voice on numerical data analysed statistically in the search for a p value less than 0.05. This has been the genre in which I have written in the past and to which most medical research adheres. My undergraduate and postgraduate education was couched in terms congruent with such a position. I am a doctor, with an intercalated degree in physiology. My specialty – anaesthesia – is based on physiology, pharmacology, physics and clinical measurement, with some practical knowledge of applied anatomy. These areas were all taught, thought about, and written about in the style of the pure sciences; that is, of positivism. I present myself here, however, as the researcher in a qualitative study, and I shall argue in Chapter 3 why I do not take my accustomed stance in this study. For the present, I declare, with reference to my position as researcher of my chosen topic, that I act several times a week as a facilitator in the PBL curriculum, I train new facilitators and monitor their performance, I coordinate the 3rd year of the MBChB programme, and I lecture in the programme. I can hardly be said to be an unbiased observer. I have interpreted for my respondents the concepts on which I wished them to reflect, and, through this report, I act as recorder and interpreter, from a position embedded in the topic of my study. The first person singular will very often appear as the lens through which the data are analysed and the conclusions are drawn.

This is perhaps an apposite time to point out that I write with two readers in mind: the educational and the medical. Each will therefore find some terms explained in greater detail than is needed, but this is done for the benefit of the other reader, and, on occasion, in order to clarify my own idiosyncratic use of a term or concept.

Limitations

This study is confined to one medical school, which may be atypical of institutions in South Africa and the rest of the world. While my findings may not be applicable globally, the paucity of information coming from resource-constrained circumstances where there are diverse student populations is itself a reason to pursue this research.

I have recorded the responses of nineteen students who participated in qualitative data construction. Their demographic characteristics may not relate to the quantitative data extracted from records of their year cohort as a whole, and their opinions may not reflect those of their class. I have however tried to select a representative sample. Similarly, I chose six staff members representing a number of backgrounds, trusting that they express a corresponding range of opinions. I have analysed all the official documents to which I had access, as well as any unofficial documents that have been brought to my attention, but again note that these may not fully represent the Faculty's opinions.

I have chosen not to include observations of teaching and learning in action (the enacted pedagogy) as a cross-check on what my respondents have shared with me. Apart from my own interactions with students, I have from time to time over the years sat in on colleagues' lectures, on small-group meetings and on ward rounds. These experiences may or may not make me what Eisner (1998, pp. 6-7, 38) calls a "connoisseur" (of PBL), but they do nonetheless contribute to my judgement that what the respondents have told me accurately reflects what actually happens.

The curriculum against the background of which this study is set is not static. Since the details are adjusted with each annual repetition, the curriculum evolves gradually; this study represents a snapshot at a particular time and may not be valid for PBL pedagogy in years past or in years to come. The pedagogy enacted here may also not be representative of PBL in the main. I am aware that this medical school's interpretation of PBL may have led to a more radical change from the traditional medical curriculum

than has occurred at other medical schools in South Africa, yet it is not as far-reaching as that of the universities of McMaster, Maastricht and Aalborg, for example.

With regard to the school backgrounds of my students, it may be that I succeed in documenting only the tail ends of the apartheid era's legacy and the attempts to introduce outcomes-based education (OBE) in schools via "Curriculum 2005" (Chisholm *et al.*, 2000). Subsequent generations of school-leavers may be quite different in their interaction with PBL pedagogy, thus making my study a historical footnote rather than an enduring contribution. As is the nature of educational research, this type of study should in any event be repeated from time to time, in order to fine-tune the pedagogy with respect to the students and staff who live it.

Layout of thesis

In this study I explore PBL as a pedagogic concept seen through the eyes of the international literature on the subject, and expressed locally through the 'voices' (Giroux, 1988, p. 207) of the institution under study, its staff members and its students. I analyse numerical data statistically and qualitatively, I analyse interview data both thematically and from a particular perspective, and I also propose explanations to account for the findings of these analyses.

Chapter 1

In the current chapter I introduce the study and describe the way in which the study is presented in the chapters that lie ahead.

Chapter 2

This chapter surveys the literature on PBL with regard to its origins, its principles and its uses. I describe some possible pedagogic antecedents, some of the insights of those

who have studied PBL previously, and some of the recorded experiences of teachers and learners involved in PBL.

Chapter 3

In this chapter I explore the concept of 'pedagogy' in order to find a theoretical framework through which to examine PBL as a pedagogic method. I describe Bernstein's (1971) 'classification and framing' as my preferred framework, comparing it to other possible *schemata*. I introduce Bernstein's (1996a) theory of discourses and knowledge structures, and that of the pedagogic device, in preparation for my use of them to explain a number of the salient features arising from the analysis of my data. I also examine critiques of the theoretical edifice that Bernstein constructed over the years.

Chapter 4

This chapter discusses the theoretical position I adopt and explains how I choose between alternative paradigms. I explain my choice of the interpretive paradigm and, within the methodology that this choice implies, my use of mixed methods: numerical descriptions, interviews and document analysis. Correspondingly, I describe the ways in which students' demographic details were accessed and analysed, the details of my choice of interview subjects and the methods of analysis of the interview transcripts, and the documents that I consulted. I discuss some considerations arising from the design of this study. In examining the trustworthiness of my study findings, I pit the traditional positivist criteria of internal and external validity, reliability and objectivity against the qualitative criteria of credibility, transferability, dependability and confirmability. I consider the values assumed by the study, including those of an ethical nature.

Chapter 5

This is the first of five chapters portraying my data. It addresses the first research question. End-of-Theme[5] test marks (as a surrogate indicator of engagement with the pedagogy) are analysed according to demographic characteristics: high school attended, prior tertiary education, year of study in the MBChB curriculum, end-of-school marks, age, financial status, 'race', sex, and first language of students, and the academic background of small-group facilitators.

Chapter 6

This and the following two chapters combine to depict the answer to my second research question. In this chapter I construct – using the voices of students, staff members and institutional documents – an impression of the role of the student in PBL at this medical school. I depict her learning in terms of scholarly engagement, mental activity and motivation. I depict learning in terms of process, understanding and memory, clinical application of knowledge, and student development.

Chapter 7

This chapter portrays, from the same sources as in the preceding chapter, the role of staff members as teachers in general, and as lecturers and small-group facilitators.

Chapter 8

This chapter draws together the roles and functions that are not obviously those of students or staff members, but are those of the medical school as a whole. Planning, implementation, assessment and evaluation are described here. As in the preceding two chapters, the voices of students, staff and institution combine to describe these roles.

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[5] I capitalise the Themes of cognate material into which the curriculum is divided to distinguish these from the themes arising from qualitative analysis of data.

Chapter 9

Cutting across the themes that arose in the previous three chapters, I examine interviewees' responses to questions couched in terms of the eight aspects of Bernstein's classification and framing, which are: boundaries between everyday knowledge and the specialised knowledge of the medical school, boundaries between different disciplines, boundaries within disciplines; control of subject content, the organisation of subject content, the timing of the presentation of content, student assessment, and the hierarchy between students and staff.

Chapter 10

In this chapter I build a theory to answer my third research question. I appraise the following salient features of the five data chapters: demographic characteristics that appear unexpectedly significant or insignificant; the aspects of roleplayers' roles that contradict one another or the literature on PBL; and areas of classification and framing where students and staff members have differing perceptions and/or experiences of PBL. I collate the several differing uses of the term 'integration' and suggest firstly that PBL is a complex phenomenon and secondly that it has been associated with a number of senses of 'integration'. Failure to appreciate these disparate uses of the same term may have led to misunderstandings. A number of disparities that arise in this study can be ascribed to the fact that medical knowledge has been thought of for (at least) the last century as an applied science, with the implication that its knowledge structure is hierarchical. My argument is that medical knowledge has more of the characteristics of a horizontal knowledge structure. Appreciation of this could lead to more explicit handling of the various forms of integration, which I argue PBL is likely to facilitate to a greater extent than a traditional curriculum would.

Summation

This introductory chapter introduced my topic, its focus, purpose and rationale. I stated the questions that propelled my research and introduced myself as the research instrument. I listed the areas in which the study is limited, and explained the extent of those limitations, and the order in which successive portions of this report appear. I now turn to the areas of literature on the subjects of problem-based learning, medical education and pedagogy.

2

Literature Review

In this chapter, I review the literature pertaining to two aspects of pedagogy. Firstly, the very particular form of PBL – which, because of its nature, has become a curriculum-organising device that has been applied to many fields in many different ways. I seek, out of its many manifestations, the common elements that allow a definition of its essence for the purpose of this discussion. Secondly, I trace the origins of PBL, investigate its theoretical underpinnings in mainstream educational writing, examine evidence to support its efficacy, and review the practical experiences of learners and teachers who have used it.

Problem-based learning

Towards a definition: student-centred self-directed collaborative learning in response to a problem

PBL was introduced in the 1960s at McMaster University in Canada. In their classic text, the rationale that Barrows and Tamblyn (1980) gave for its introduction was: the rapid fall-off in students' knowledge of basic science when they reached the clinical years of study. By presenting students with problems couched in terms of clinical situations, they hoped to contextualise learning and stimulate students' own desire to learn. They described the clinical reasoning process that they hoped to reproduce in the pre-clinical setting and also sketched the advantages of self-directed study. Their encapsulation of PBL was as follows: "Problem-based learning is the learning that results from the process of working toward the understanding or resolution of a problem. The problem is encountered *first* in the learning process!" (Barrows and Tamblyn, 1980, p. 1, repeated p. 18; italics in original). Subsequently, other authors have claimed to use 'problem-based learning' as a vehicle for a plethora of programmes in a multitude of disciplines,

namely: medicine (Burgun, Darmoni, Le Duff, & Weber, 2006; Hamdy, 2008; Jippes & Majoor, 2008; Kiesseling, Schubert, Scheffner, & Burger, 2004), nursing (Baker, Pesut, McDaniel, & Fisher, 2007; Becker, Viljoen, Botma, & Bester, 2003), other health professions (Araz & Sungur, 2007; Duffrin & Holben, 2001; Michel, Bischoff, & Jakobs, 2002), engineering (De Graaf & Kolmos, 2007a; Hsieh & Knight, 2008), social work (Altshuler & Bosch, 2003), humanities (Powell, 2009), hospitality (Kivela & Kivela, 2005), and indeed in an increasing variety of settings (Savery, 2006; Savin-Baden, 2000). The widespread enthusiasm for this pedagogy and the fact that it has appeared in so many forms (Murad, Coto-Yglesias, Varkey, Prokop, & Murad, 2010) makes it difficult to tease out which features constitute the core of PBL.

Various kinds of small-group work, as well as teaching around problems, problem-solving exercises, interdisciplinary teaching, and the use of trained or untrained, expert or non-expert facilitators have all been described as 'PBL'. Barrows (1986) himself, in recognition of this variety, proposed a taxonomy based on the following two aspects: the extent of the description of the 'problem' and the extent to which the thinking process is directed by the teacher or the learner. Interestingly, Barrows did not clearly enunciate one of the generally accepted characteristics of PBL – namely small-group discussion – although a number of his descriptions may be taken to imply it. An earlier account of what was afoot at McMaster (Neufeld & Barrows, 1974) did however describe small-group learning as a component of PBL, although more attention was paid to the role of the "tutor" [*sic*] than to the group process. Albanese and Mitchell (1993, pp. 53-54), in their review of PBL, included the following as aspects of PBL: "...patient problems as a context ... students … actively involved in the discussion ... the problem is presented first ... Small-group tutorials and independent study..." In an extensive review for The Network towards Unity for Health, Mennin and Majoor (2001), recorded: "Problem-Based Learning (PBL) is a method of learning in which students first encounter a problem, followed by a student-centered inquiry process... Typically, five to eight students work collaboratively in a group (tutorial), together with one or more faculty facilitators (tutors)...". Savin-Baden (2000, p. 3) summarised PBL in much the

same way: "The focus here is in organizing the curricular content around problem scenarios rather than subjects or disciplines. Students work in groups or teams to solve or manage these situations but they are not expected to acquire a predetermined series of 'right answers'." Savery (2006, p. 12), in an extensive attempt to define PBL, stated: "It is an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem". More recently, Taylor and Miflin (2008, pp. 753-758) endeavoured to define the core of PBL, which they did by revisiting its roots in an attempt to trace its development.

> [In] ...self-directed learning ... the problem comes first ... problems for PBL must be those that are prevalent and important in practice ... the sequencing of problems should allow students to build upon their acquired knowledge in a structured and logical way ... genuinely small groups (up to 8 students) .. good facilitation ... perhaps generalists are appropriate PBL tutors ... the ideal individual is the qualified medical practitioner ... certain qualities in the students that were accepted into their programmes, namely 'self-motivation, ability to cope with ambiguity, effective interpersonal skills, and self and peer assessment skills'.

Strobel and Barneveld (2009), struggling like so many others to define PBL, used a 'definition by negation': "In contrast to PBL, we considered traditional learning approaches to be large-class, instructor-driven, lecture-based deliveries within a curriculum which compartmentalized the content..."

Without wishing to oversimplify, and yet wishing to establish a conception of PBL that will serve as background to this study of a particular implementation, I take the pedagogic features as commonly agreed upon in the literature on PBL to be:

- foregrounding the learning of the student (rather than the teaching of the faculty member);
- encouraging the student to determine the extent of her own study;

- expecting the student to cooperate in discussion, meaning-making and knowledge-building with a small group of her peers, guided by a trained facilitator;
- presenting (as a stimulus for learning), a practice-based 'problem', that is not necessarily meant to be solved, but rather requires an understanding of basic scientific concepts in order to grasp the nature of the 'problem' – thus applying theoretical insights to practical realities.

Having chosen, from a wide range of variants, not all of which necessarily agree, a working definition of PBL that I imagine would be recognisable to the majority of those who espouse this pedagogy, I now trace the antecedents of PBL and describe pedagogic theories and research that may be adduced in support of it.

Antecedents in medical education

The development over the centuries of medical education in Europe and its colonies[6] has been described as a coming together of practical apprenticeship and theoretical teaching (Shryock, 1965). This development was accompanied by progress from loosely-structured opportunistic teaching, through discipline-based and organ-system-based models to the current problem-based and clinical-presentation pedagogies (Papa, 1999).

Some adverse features of the medical curriculum, as noted during the last century, were: overcrowding of content (Bowditch, 1900; Osler, 1913; R. Smith, 1989), didactic lecturing (R. Smith, 1989); subjects being taught one at a time, in sequence (Bowditch, 1900); separation of basic science from clinical study and medical teachers from medical practice (Editorial, 1911); and a deficiency of scientific approach and research (Flexner, 1910; Goodenough, 1944). The record over that period reveals plans and pleas for

[6] This is not meant to ignore or decry systems of health care in other parts of the world that have honoured histories. I trace only the recent history of Western-style medicine, since this is the background of the MBChB programme under scrutiny.

change on both sides of the Atlantic (S. Bloom, 1988; Christakis, 1995; Goodenough, 1944). Changes based on Flexner's report reformed the circumstances under which medical education was offered in the USA. As regards the pedagogy employed, despite Osler's early and radical suggestions, little action was taken until relatively recently, when in the 1960s and '70s (Editorial, 1971), the tide of medical education started to turn in keeping with the force of the rapid expansion of scientific knowledge, changing social and demographic factors, and a greater understanding of the principles and practice of teaching and learning.

The recommendations that were made with a view to solving the perceived problems included limiting the content of the curriculum (R. Smith, 1989), distinguishing between essential and desirable content (Bowditch, 1900) and delineation of a simplified core curriculum. (McMillan, 1965; Osler, 1913; A. B. Taylor, 1965). The recommendations encompassed: the affiliation of medical schools to universities, making mathematics and science entrance requirements, and having laboratory science teaching followed by clinical teaching (Flexner, 1910; Regan-Smith, 1998). Allowing more free time, minimising or abolishing lectures, the use of continuous assessment, and the cultivation of self-reliance and reflection were all suggested a hundred years ago (Osler, 1913). Emphasis on principles rather than masses of facts, active partnership between students, teachers and the general public, and a bias towards the needs of the general practitioner were the burden of several commentators (Daubenton, 1965; Goodenough, 1944; Malherbe, 1965; A. B. Taylor, 1965). Moves were made towards improving medical schools' social relevance, re-humanising medicine, integrating material and teaching students how to learn, with a view to producing a general practitioner able to find and assess information and continue his education in any direction (Editorial, 1971; Read, 1971). Use of rural hospitals for teaching, provision for electives, and assessment of skills and attitudes as well as knowledge (Rundle, 1971) was advocated. Suggested qualities expected of a medical graduate included: curiosity, critical judgement, imagination, a sense of values, social consciousness and a knowledge of the profession's working methods (McMillan, 1965). Downplaying of didactic lectures in favour of small-group

learning, encouragement of greater student participation, more frequent assessment and feedback, and fostering a capacity for independent enquiry and on-going self-development began to take place (Bromhead *et al.*, 1971).

It was arising from this background that the medical teachers at McMaster, and subsequently those in many other parts of the world, devised and propagated PBL. This PBL was intended to be a means of focussing on the core material that is important for medical practice, downplaying didactic lecturing and memorisation of vast amounts of factual information, and guiding medical students into learning how to learn (small-group discussion being the vehicle). Other than in the sense of moving away from over-burdened curricula and a theoretical atmosphere in which patient care was perhaps not foremost, could the innovators have expected PBL to succeed? In other words, was there educational theory or practice to support their ideas?

Indirect support for PBL pedagogy

In providing theoretical support for their innovation, Barrows & Tamblyn (1980, p. xi) pointed to discovery learning as well as Schmidt's (1965) and Hilgard *et al.*'s (1953) studies. These studies both showed that while students who were helped to understand problems took longer to work through examples, they were able to solve both similar and progressively more complex problems. Although Barrows and Tamblyn cited no other writers directly, a number had already recorded their ideas about education prior to PBL's development. Authors such as Dewey (Garforth, 1966), Rogers (1969), Bruner (1960/1977, 2006a, 2006b) and Freire (1992) might have been quoted in support of its philosophy. Over a span of some decades these writers expressed a degree of consensus about certain aspects of pedagogy, whether applied to young children, students in tertiary education, or adults with little formal educational experience.

Dewey described education as both a psychological and a social experience (Garforth, 1966), the school – and, by analogy, other educational institutions – as a community

rather than merely a site for giving out information, and encouragement of the learner's "active side" (Garforth, 1966, p. 54) as the heart of educational methodology. The search for knowledge arising out of practical work was a tenet of his school. Nowadays we might balk at his dictum "...ignore and minimize the child's individual peculiarities, whims, and experiences. They are what we need to get away from. They are to be obscured or eliminated" (Garforth, 1966, p. 126) – but that would be to miss the point that his aim was to disregard superficial appearances so as to structure an ordered learning environment based on principles that would benefit all his learners. Dewey's watchwords were experience, growth, transaction and enquiry. He saw 'experience' ("intercourse of a living being with its physical and social environment") (Garforth, 1966, p. 281-2) as less cognitive than active and passive engagement, but argued that the *value* of experience was in the learner's apprehension of cognitive relationships between the items experienced (Garforth, 1966, pp. 281-294). 'Growth' (or development), he argued, is part of education which, like growth, is an end in itself (Garforth, 1966, p. 296). Dewey believed that 'transaction' is inevitably part of life; an organism cannot survive without exchanging elements with its environment. For Dewey's learners, culture and language were amongst the transactional activities to be acknowledged, integrated and balanced with their other transactions. Finally, Dewey saw 'enquiry' – linked to reflection – as invariably arising out of circumstances directly experienced. He envisaged the sequence: possible solutions → intellectualisation of the problem → generation of a hypothesis → elaboration of the supposition → testing the hypothesis in some way (Garforth, 1966, pp. 310-315). It was over a century ago that Dewey espoused this active, structured, practically-based form of learning.

Rogers stated: "Teaching, in my estimation, is a vastly overrated function" (1969, p. 103). He conceded its theoretical usefulness in an unchanging environment, but, given the continually changing circumstances of modern life, his opinion was that "facilitation of change and learning" was crucial (Rogers, 1969, p. 104). His bases for a facilitative stance included: sharing a puzzlement about things, being real with one's learners, trusting them ("If I distrust the human being then I *must* cram him with information of my own

choosing, lest he go his own mistaken way.") (Rogers, 1969, p. 114; original italics) and living with the uncertainty of discovery. Rogers worked largely with postgraduate students but was able to support his views with evidence from studies from a range of educational situations. He recognised that his leanings, carried to their logical conclusion, had radical implications for teaching, learning, assessment and certification, but nonetheless was able to expound a number of practical guidelines for facilitators (see pp. 164-166). At the time that PBL as a pedagogic methodology was being constructed, Rogers was describing the principles by which he believed learners could be empowered and encouraged to take responsibility for their own learning, operating in an atmosphere of support and expectation that they could and would *learn* adequately without being *taught*.

Bruner is another who wrote voluminously about education. In the 1960s he depicted a "structuralist view of knowledge" (Bruner, 1960/1977, p. vii), following the ideas of Piaget, Chomsky and Lévi-Strauss. Bruner described the importance of the learner understanding the structure of the knowledge being acquired. He made the startling proposition that "the foundations of any subject may be taught to anybody at any age in some form" (Bruner, 1960/1977, p. 12). He encouraged the development of intuitive thinking ("the shrewd guess, the fertile hypothesis, the courageous leap to a tentative conclusion") and advocated stimulation of the desire to learn (Bruner, 1960/1977, pp. 11-15). He wrote of the "derivational structure" of knowledge and the need to "create intellectual skill" (Bruner, 1960/1977 pp. viii-ix). In terms of practice, he wished to start "where the learner *is*" (Bruner, 1960/1977, p. ix) and follow a "spiral curriculum" (Bruner, 1960/1977, p. 52), revisiting topics and modes of thinking at successively higher levels, thereby scaffolding learning so as to present, at appropriate times, what the learner can aptly discover on her own. Of particular interest in the South African setting is Bruner's perception that "the introduction of a Western European ideal into African schooling, implicitly pressing the child to become his own thinker and his own authority, in effect undermined the traditional authority structure of the indigenous society" (Bruner, 1960/1977, p. xi). Bruner (2006a) documented studies of Discovery

Learning, a methodology associated with his name, and which used ideas akin to those of Dewey and Piaget. His description of discovery learning reads very much like that of PBL, and Barrows and Tamblyn (1980, p. xi) evidently felt that it lent support to their efforts.

Freire spent many years in teaching-learning sites, learning *with* his "educands" (1992, pp. 15, 19), recognising that he had to start from where they were rather than where he was. He recognised that teacher and learner are both agents of knowing and that "teaching and learning are moments in a larger process – that of knowing…" (Freire, 1992, p. 37). 'Recognition of prior learning' (SAQA[7], 2006) and 'the zone of proximal development' (Zaretskii, 2009) are not phrases that Freire used, but they are certainly concepts that he understood. He appreciated the danger of the teacher's "directivity" interfering with the learner's creative capacity (Freire, 1992, p. 66) and thus declared "The real evil is not in the expository lesson... [but when] ...the educator regards himself or herself as the educands' sole educator..." (Freire, 1992, p. 102).

I read in Dewey, Rogers, Bruner and Freire the need to displace the teacher from a central position, to attract the interest of learners and help them engage actively with their material, to engage with learners as individuals, to acknowledge inequalities of power in the field of education, to empower learners to construct their own knowledge, and to acknowledge and build on prior learning. These observations and conclusions, as made sporadically over the last century, sound remarkably like the tenets of PBL and support the proposition that PBL as a pedagogic tool has some theoretical legitimacy.

Bernstein, writing as a sociologist who entered educational studies by way of linguistics, did not, to my understanding, commit himself to a favoured mode of pedagogy, but described what he termed as "collection" and "integrated" codes (1971, pp. 207, 209). He made it clear that his was a theoretical description and that these two codes represented

[7] South African Qualifications Authority - the body appointed by the Education and Labour ministers to oversee the integration of all phases and areas of education in the country.

poles on either end of a continuum, rather than opposing types. The fact remains that he captured, in his description of the integrated code, something of the essence of PBL: "…*subordination* of previously insulated subjects or courses to some *relational* idea, which blurs the boundaries between the subjects" (Bernstein, 1971, p. 209; original italics); "…reduced discretion of the teachers within integrated codes is paralleled by *increased* discretion of the pupils … focus attention on the *deep* structure of each subject…" (Bernstein, 1971, p. 217; original italics). It appears that at least one university – Roskilde, in Denmark – related its introduction of PBL to Bernstein's description of the integrated code (Bernstein, 1975, 2003a, p. 12). I shall have more to say about Bernstein's ideas subsequently.

Other educationalists such as Bloom, Ausubel and Gagné wrote from a more teacher-centred aspect. While the efficiency and long-term efficacy of Bloom's 'mastery learning' (1984) have been criticised (Slavin, 1987), nevertheless, the importance of feedback, the reliance on the students' own efforts in the personalised version of mastery learning, and attempts to involve the whole class in the group-based version of mastery learning (which includes peer teaching) are ideas that resonate with PBL.

Ausubel's (1968, p. ix) suggestion of facilitating learning by imposing structure in the form of "advance organisers" makes intuitive sense, but since the advance organiser constitutes new knowledge, it does not relate well to the PBL notion of activation of prior knowledge. In fact, there is evidence to suggest that the provision of hints as to the resolution of the problem may hinder knowledge transfer (Norman & Schmidt, 1992)[8]. Ausubel was evidently *not* a proponent of discovery learning, citing twelve "psychologically and educationally untenable arguments" against it (Ausubel, 1968, p. 473ff)[9]. His chief objection was the inefficiency of an entirely self-directed process.

[8] It must be conceded that NRMSM's provision of broad objectives for each week may act as advance organisers. We endeavour to make these 'weekly objectives' sufficiently open so as not to short-circuit the resolution of the week's problem by signalling an 'answer'.

[9] Bruner had already noted (1960/1977, p. 21) that leaving learners to find out for themselves *all* the information they require on any subject is too time-consuming.

Ausubel did however make the point: "The facilitation of learning is the only proper end of teaching" (Ausubel, 1968, p. 12).

Gagné wrote extensively on theories of learning (his use of the term implies a shift of focus away from the teacher), and a number of congruencies may be traced between his ideas and those of PBL: stimulus-response learning, chaining, concept learning and problem-solving (Gagné, 1977). However, the concept that knowledge is hierarchical (Gagné, 1985) sits uneasily with PBL's assertion that pure and applied knowledge can, with advantage, be learned simultaneously. His support might be claimed for the concept of the 'spiral curriculum', in which material is revisited at a more advanced level later on in the curriculum.

I alluded above (p. 22) to Vygotsky's concept of the 'zone of proximal development', which has been cited in support of a teacher-as-guide type of pedagogy. Although Vygotsky's work was not available in the West until after PBL had been developed, (Vygotsky, 1978), and was based on observations of childhood development, he claimed that learning at any age is dependent on interaction with others and that structured guidance by somebody more knowledgeable is a key to learning. Similarly, while Lave and Wenger's theory of social learning (Lave & Wenger, 1991; Wenger, 1998) were not available at the time, PBL's constructors based their practice on principles congruent with this theory.

Lee Shulman said that, for members of the professions (including medicine) that he had studied, understanding and action/practice were necessary, but not sufficient, to develop a professional stance, and that formation of character was of enormous importance (Shulman, 2005). In describing the routine of a teaching ward round, Shulman noted that the roles of teachers and learners changed continually as different members of the team made their successive inputs. He ascribed the power of this teaching instrument to the routine that allowed an understanding by all concerned of a common procedure. He referred to the concept of "accountable speech" in which "contributions are accountable for their continuity with those that preceded and with

the text or source materials on which the conversation is based" (Shulman, 2005, p. 8). Shulman referred to these examples as "signature pedagogies" (Shulman, 2005, p. 9), in other words, modes of teaching that he identified with preparing people for particular professions. A signature pedagogy has three characteristics: it is peculiar to that profession; it is pervasive within the curriculum, so that students learn certain commonalities that are part of what it means, for example, to 'think like a physician'; and it is essential to the general pedagogy of an entire profession, as an element of instruction and socialisation.

Shulman's interest in the long-established form of clinical teaching does not directly support PBL, which is mainly employed in the preclinical years. (In fact, clinicians maintain that they have always taught in a problem-based mode, since each clinical case represents a problem to be solved and a spur to discussion and learning.) PBL has, since its inception, striven to apply the stimulus of clinical relevance to the integrated learning of otherwise unrelated pieces of preclinical information in a secure and co-operative setting. Shulman, as an outsider to the medical field, identified some features of medical training relating to the creation of a pedagogical environment that is stimulating and safe, the necessary engagement of students with the material and of faculty members with students, collaborative dialogue as a part of the learning process, and the aim of forming a certain vocational attitude. These features are generally understood to be either characteristics or beneficial side-effects of PBL; PBL is certainly felt, in medical education circles, to contribute to these ends.

From the literature cited above, I gather that there is a degree of theoretical support for a number of aspects of the espoused pedagogy of PBL. Medical education can be viewed as a unique form of pedagogy because of the clinical setting in which, or against the background of which, information is processed into knowledge. However, PBL theorists, along with other educational theorists, undertake to: encourage active learning, through experience, enquiry, growth and transaction with others (Dewey);

trust learners to learn and live with the uncertainty of discovery (Rogers); promote understanding through discovery, aided by intuition, and build intellectual skills starting at the learner's point of departure and then revisiting certain material at more complex levels (Bruner); and share learning but also step out of the learner's way (Freire). Ausubel's strictures on discovery learning could be applied with advantage to PBL: a significant degree of guidance does need to be provided. PBL must establish a balance between an overly-controlling teacher-dominated pedagogy and a 'hands-off', undirected process (Miflin, Campbell, & Price, 1999 & 2000).

Insights into PBL pedagogy

Much of the theoretical and empirical support for PBL was gathered subsequent to its initial conception. Barrows and Tamblyn (1980) attempted to enhance retention of learned material by engaging their students actively in discussing clinical problems to which the basic sciences would help provide the answers. They noted, like others before them, the ever-growing amount of medical knowledge and the need for doctors to be able to select and maintain knowledge appropriate to their practice. Quoting prior studies, they proposed PBL as a way of enhancing medical (and other health science) students' learning. They shunned the use of educational "jargon" (Barrows & Tamlyn, 1980, p. x), but the educational principles they adduced to support PBL were that learning is a constructive process that should be self-directed, set in an appropriate context, and take place in a social and collaborative environment. Since that time, evidence has been accumulating that supports PBL as an effective pedagogic method.

Albanese and Mitchell (1993) ascribed to PBL activation of prior knowledge, use of clinical problems, and elaboration of knowledge. Norman and Schmidt, (1992) at the same time, used the literature on cognitive psychology to support some of the features of PBL. They were able to corroborate that activation of prior knowledge, elaboration of new knowledge and placing knowledge in context, as PBL strives to do, all enhance

subsequent recall. They were *un*able to substantiate the existence of a generalised problem-solving skill that could be learned and transferred across disciplines and contexts. (This continues to be elusive.)

The Position Paper of the Network Towards Unity for Health (Mennin & Majoor, 2001) described PBL as contributing to active learning, being more satisfying for learners than is the passive transfer of information from teacher to learner, and leading to better retention and recall. Discussion of clinical problems in small groups was claimed to encourage the making of connections between ideas and concepts as well as cooperation rather than competition among students. PBL was asserted to provide conditions for the development and practice of self-directed learning and life-long learning in the face of the exponential expansion of knowledge.

While not providing a full analysis of PBL's strengths and weaknesses, but making comparisons with traditional lecture-based teaching, Strobel and Barneveld (2009) drew a number of conclusions from a synthesis of eight prior meta-analyses comparing traditional lecture-based teaching and problem-based learning. In Strobel and Barneveld's metasynthesis, basic medical science knowledge, when assessed in the short term with regard to the recognition of material in MCQs, appeared better served by traditional didactic lectures. However, longer term retention, understanding and recall of material in response to open-ended questions appeared better served by PBL, which also resulted in improved clinical performance when both knowledge and skill were required. The authors noted that learners and teachers generally found more satisfaction with PBL, stating: "...preference should be given to instructional strategies that focus on students' performance in authentic situations and their long-term knowledge retention, and not on their performance on tests aimed at short-term retention of knowledge" (Strobel and Barneveld, 2009, p. 55).

Two prominent writers in the field of medical education have described the intricacy of PBL. Stewart Mennin (2007), from his interest in complexity science, analysed small-group PBL extensively. He described its roots in cognitive psychology and the roles that

it might be expected to fulfil: acquisition of knowledge in the context in which it would be used, facilitation of transfer of principles and concepts to new problems, and accumulation of examples that can be used to solve similar problems on the basis of pattern recognition. Mennin repeated others' claims that PBL is challenging, satisfying and motivating, and that the eponymous problems are designed so as to arouse and focus curiosity and create a need to know more, this all being enacted collaboratively. He emphasised the systematic process and the importance of feedback and reflection. Mennin started from the premise that PBL is a complex – rather than a merely complicated – process (meaning that multiple interactions, and a whole that cannot be represented merely by the sum of its parts, render a formulaic depiction impossible). Using complexity theory, he claimed that PBL could be expected to generate self-organisation; namely spontaneous emergence of new "structures, patterns and properties" from an environment "characterized by multiple feedback loops and nonlinear dynamics" (Mennin, 2007, p. 307). To effect change, such a system has to be perturbed and moved away from its state of equilibrium; "Important phenomena happen at the edge of chaos; cognition, metabolism, new organisational rules, self-organization" (Mennin, 2007, p. 307)[10]. A degree of metacognition by all the group members is needed if the whole group – rather than just a few individuals – is to succeed in its task.

David Prideaux (2007), in examining medical education from the standpoint of the curriculum, acknowledged the complexity of the PBL milieu while arguing for a structured approach to PBL pedagogy. While the five major elements of the curriculum – namely end-points, content, teaching and learning, assessment, and evaluation – require attention, each element interacts with the others, making attempts to pursue or document change in one element in isolation problematic. He saw PBL and assessment by means of objective structured clinical examinations (OSCEs) as two major

[10] Fraser and Greenhalgh (2001, p. 800), while affirming "Learning takes place in a zone of complexity", made the point that frank chaos is not productive, and that maintenance of structure and process are necessary.

achievements in the drive to reform medical education. Once introduced, PBL had the effect of focussing medical education on learning rather than teaching alone, and re-focussing curriculum from content to end-points and assessments, while OSCEs balanced the competing requirements of validity versus reliability in clinical assessment. Prideaux noted the interdependence of learning and assessment and noted that while 'assessment drives learning', new aspects of learning have also produced new types of assessment, and that educational impact is an appropriate aspect to consider along with validity, reliability and feasibility.

PBL arose out of frustration with the inability of the traditional curriculum and its positivist mind-set to keep pace with developments in the fields of medicine and education. Theory and research evidence to underpin PBL has been gathered largely in retrospect; indeed, educational theory and PBL have grown almost in parallel – the one mirroring developments in the other. Thus, both PBL and general educational theorists can be seen to espouse learner-driven, collaborative processes based on practical realities. At the same time, claims beyond the conceptions of the originators have arisen around PBL. While its development was empirical to a degree, its epistemology can be traced to well-established roots, and one might have expected that it would prove effective not only in medical education and not only in those schools arising out of the western allopathic medical tradition. Indeed, much of what has been written about PBL in medicine has been based on European and North American experiences, where PBL has been applied to students with relatively homogenous scholastic, linguistic and socio-economic backgrounds. Quantitative comparisons of lecture-based and problem-based pedagogies have been useful in forming consensus on the benefits of having made the change from old to new ways of teaching and learning. Quantitative studies on heterogeneous populations of PBL students are few, as are qualitative studies of features of PBL that do not easily lend themselves to numerical recording and manipulation.

Experiences of PBL

I turn now to the experiences of learners and teachers in PBL. In the variety of disciplines (medicine, nursing, pharmacology, hospitality, information technology, librarianship) and settings (preclinical, clinical, undergraduate, postgraduate) in which PBL has been employed, similar patterns of experience have emerged.

Amongst students, PBL is said to be popular (Barrows & Tamblyn, 1980), enjoyable (Michel, *et al.*, 2002), stimulating (Breier & Wildschut, 2006), and it is also said to engender enthusiasm (Burgun, *et al.*, 2006).

In terms of cognitive skills, PBL has been claimed to stimulate or encourage: enquiry and information gathering (Becker, *et al.*, 2003; Horne *et al.*, 2007; A. F. Williams, 1999), self-directed learning (Horne, *et al.*, 2007; A. F. Williams, 1999), life-long learning (Breier & Wildschut, 2006), an improved learning style (Baker, *et al.*, 2007; Kivela & Kivela, 2005; Michel, *et al.*, 2002), learning skills (Horne, *et al.*, 2007; Nalesnik, Heaton, Olsen, Haffner, & Zahn, 2004), improved knowledge retention (Hsieh & Knight, 2008; Michel, *et al.*, 2002), a reduced reliance on 'spoon-feeding' (Kivela & Kivela, 2005), and improved performance in assessments (Nalesnik, *et al.*, 2004).

With regard to the way that PBL shapes its graduates, the following have all been claimed: a holistic view of patients (Becker, *et al.*, 2003; A. F. Williams, 1999), different views of problems, improved clinical reasoning, and appreciation of community aspects of medical practice (Becker, *et al.*, 2003), linking of theory and practice (Becker, *et al.*, 2003; Horne, *et al.*, 2007), increased relevance of knowledge to practice (Kiesseling, *et al.*, 2004) and making meaning of information for oneself (Kivela & Kivela, 2005).

Aspects that can be related to the PBL *process* include: reduced competition, increased contact with teachers (Kiesseling, *et al.*, 2004), improved interpersonal and

communication skills (Horne, *et al.*, 2007) and reduced stress (despite, interestingly, more absences due to illness than in traditional courses) (Jones & Johnston, 2006).

Negative aspects of PBL that have been documented include: increased time expenditure (Breier & Wildschut, 2006; Horne, *et al.*, 2007; Kivela & Kivela, 2005; Michel, *et al.*, 2002), a wish for more didactic teaching (Breier & Wildschut, 2006; Miflin, *et al.*, 1999), less basic science knowledge and clinical skills (A. F. Williams, 1999), generally less coverage of material (Nalesnik, *et al.*, 2004), increased staffing needs (Michel, *et al.*, 2002) – although in a clinical setting there was a feeling that PBL needed fewer staff than did conventional teaching methods (Nalesnik, *et al.*, 2004) – and ambivalence about resource allocation needs (Horne, *et al.*, 2007).

Amongst teachers, discomfort in an educational setting quite different from their own experience (Barrows & Tamblyn, 1980; A. F. Williams, 1999), and dependence of the effectiveness of PBL on teachers' perceptions (S. M. Williams & Beattie, 2008) have been noted. Barrows and Tamblyn pointed out that, when they started PBL, those medical faculty members who learned by self-study and were willing to help others to do so were in the minority. The majority had been educated in the traditional teacher-centred, subject-based mode, and thus felt comfortable with it, and in the main excelled at it. Such teachers would likely feel ill at ease in a mode requiring different skills. (This observation is probably still valid, a generation later.) In a more recent paper, Barrows, while acting as an expert (neurology) facilitator, nonetheless wrote "In PBL the facilitator is an expert learner, able to model good strategies for learning and thinking, *rather than providing expertise in specific content*" (my emphasis) (Hmelo-Silver & Barrows, 2006, p. 24). Whether or not facilitators' expertise does in fact make a difference to the learning of their groups is moot. Some studies have supported the notion that an expert facilitator's students achieve more (Hay & Katsikitis, 2001), while others have shown that facilitator expertise is not a significant influence (Kwizera, Dambisya, & Aguirre, 2001; Park, Susarla, Cox, Da Silva, & Howell, 2007). At least one study has suggested that subject experts might affect facilitation negatively by interfering with discussion amongst students (Silver & Wilkerson, 1991). The Maastricht group, having surveyed

the research on facilitators, reported "contradicting findings" in studies on facilitators' content expertise (Dolmans *et al.*, 2002, p. 179).

Concern about the coverage of subject material among learners and teachers appears to be widespread in the realm of PBL (Dahlgren & Dahlgren, 2002). If one allows students time to discuss and explore topics, it is reasonable to anticipate that the breadth of coverage would necessarily be less than when material is presented in lecture form. Interestingly, staff members in a clinical setting felt that PBL required less time than did conventional teaching – perhaps a reflection of their pre-existing high staff-student ratio and high contact time (Nalesnik, *et al.*, 2004). (These writers did not record that students learned correspondingly more material as a result, but rather the reverse.)

In a number of studies (Jones & Johnston, 2006; Kiesseling, *et al.*, 2004; Nalesnik, *et al.*, 2004), perceived or observed differences between the capabilities of students following traditional and PBL curricula were ascribed chiefly to the curricular changes. Examination of each study reveals other points of difference, albeit related to the curriculum change, which may have contributed to the differences discovered. Changing from a traditional to a PBL curriculum involves many ancillary changes. That being so, the possibility is remote of constructing any study so as to isolate those aspects that relate directly to PBL pedagogy, as in a randomised controlled trial or other positivist mode of enquiry. This could be seen as a weakness of investigational methodology; it could also be seen as an inherent property of the change to PBL, inasmuch as the changes are necessarily very far-reaching.

It seems from the wide range of literature on PBL that common themes have been identified. The effects of PBL on staff and students, and their reactions to it, have been recorded as: enthusiasm, conservatism, freedom, deeper learning, greater motivation, more sense of direction, life-long learning, and more psycho-social enquiry. On the negative side, diminished coverage of material and less direction by and of teachers,

with attendant anxiety and frustration have also been recognised. These were documented most commonly at one remove; it is not often that the voices of individuals are heard, and when they are, it is with a focus on the process or outcomes of PBL, rather than reflecting their own stories as they intersect with PBL.

The effect of non-cognitive factors on learners' interaction with PBL is another area that does not seem to have been extensively studied (Ravitz, 2009). Mergendoller *et al.* (2006) found that students with language difficulties gained more from PBL than from predominantly lecture-based teaching, that those with more interest in the subject were able to explore it further in the PBL classrooms, and that those particularly good *and* particularly bad at problem-solving learned more in the PBL classrooms. Gordon *et al.* (2001) demonstrated improvements in science learning and the behaviour of disadvantaged urban children when a small amount of PBL was added to their curriculum.

Summation

Although McMaster's development of PBL appeared with very few direct antecedents, it is apparent that a number of authors in the field of education had already advanced theories that supported such a pedagogy. The fact that other disciplines at other universities (Roskilde and Aalborg in Denmark, for example) started remarkably similar projects at approximately the same time suggests that PBL was 'an idea whose time had come'. Its widespread adoption in various settings is an indication of its popularity rather than an argument for its validity, but the amount of research and theory that has gathered around the topic suggests that PBL is to a degree robust.

The form of PBL at UKZN's medical school appears on initial perusal to conform to the broad outlines of PBL insomuch as it promotes: problem-based, collaborative, student-centred, self-directed learning. The local form of PBL is admittedly a hybrid, having a significant number of didactic lectures interspersed between the small-group meetings.

My study explores the extent to which in fact it meets all or any of the defining criteria, and whether or not PBL in this form has survived the transplantation from the First to the Developing World. Research and experiential descriptions have largely been sited in the First World. I describe and explore the implementation of PBL in a heterogeneous developing country that has material and staffing constraints as well as a student body drawn from a wide variety of school types, homes and communities (which represent a multicultural and multilingual population). In approaching such a study, I construct a framework for my enquiry; this is described in the following chapter.

3

Theoretical and conceptual frameworks

Building on the background of the literature on problem-based learning that was provided in the previous chapter, this chapter discusses the concept of pedagogy as well as my reason for choosing a particular point of view through which to study the pedagogy of PBL and people's interactions with it. I introduce a writer relevant to my interests, establish some of the concepts he developed and that I use in this study, and explain how I construct my frame of enquiry using his work. I also consider expressed or implied critiques of his work by others.

Pedagogy

While much has been written about pedagogy, the concept is not always defined precisely. Leach and Moon (2008, p. 6) stated "…we have found that those who talk and write most deeply about pedagogy also tend to avoid neat formulations summed up in a tidy phraseology. Nevertheless, we do hope, in the pages that follow, to convey our view of pedagogy as a dynamic process informed by theories, belief and dialogue, but only realised in the daily interactions of learners and teachers and real settings." Leach and Moon provided a number of definitions of the term (2008, p. 176), which include:

> Alexander ... distinguishes teaching from pedagogy. 'Teaching is an act while pedagogy is both act and discourse. Pedagogy encompasses the performance of teaching together with the theories, beliefs, policies and controversies that inform and shape it'. Alexander [also] ... points out that in France 'didactics deals with the logical aspects of teaching while pedagogy covers the psychological aspects: on the one hand the disciplines, on the other hand children and learning' (p. 543), while in the Central European tradition 'pedagogy is the overarching concept

> and didactics is that branch of pedagogy which deals with what is to be taught and how' (p. 547).
>
> Watkins and Mortimore ... define pedagogy as 'any conscious activity by one person designed to enhance learning in another' [and] ... cite a Swedish definition of pedagogy as 'a discipline [which] extends to the consideration of health and bodily fitness, social and moral welfare, ethics and aesthetics, as well as the institutional forms that serve to facilitate society's and the individual's pedagogic aims'.
>
> Simon ... argues 'by pedagogy is meant the theory and practice of teaching'.

In South Africa, the cognate term 'pedagogics' has been in use for many years. Du Plooy and Kilian (1980, p. 30) used it as equivalent to 'education', defining the process as "...study and verbalise the accompaniment of a child up to a stage when it [*sic*] can find its own way independently in life."

It is apparent from the literature on the subject that pedagogy may be conceptualised from several different standpoints. The process may be viewed as an unproblematic transference of knowledge from one generation to the next (du Plooy & Kilian, 1980). The role of the learner in making meaning of the information she gathers may be emphasised (Bruner, 2006a; Leach & Moon, 2008; Lesko & Bloom, 1998; Sotirou, 1993). The dynamics of power-based relationships may be foregrounded (Allen & Rossatto, 2009; Cummins, 2000; Freire, 1992; Lewis, 2009). The relationships and values involved in the process may be explored (Briton, 1996; Edwards & Usher, 2008). These four views of pedagogy I regard as corresponding to the following four paradigmatic stances respectively: positivist, interpretive, critical and postmodern.

(Present-day South African educationalists, I suggest, understand particularly acutely that 'pedagogy' may have far wider ramifications than does the teaching-learning interaction. 'Fundamental Pedagogics' (du Plooy & Kilian, 1980) was associated with the apartheid government's Christian National Education, was critiqued extensively (Beard

& Morrow, 1981) and was accused (Suransky-Dekker, 1998) of being an ideological distortion of the theory upon which it was supposedly based.)

Whatever stance is taken, the importance of the pedagogic interaction between teacher and learner is a common feature in the literature. While mindful of the broader scope implied by alternative concepts of pedagogy, I wish, for the purposes of this study, to use Leach and Moon's expression of it as: "...a dynamic process ... realised in the daily interactions of learners and teachers and real settings." I recognise that pedagogy inevitably implies a philosophical background, but my primary interest is the interactive process of teaching and learning. For the purposes of this study, I distinguish pedagogy from syllabus – meaning the subject matter of an educational programme; from curriculum – the ordering and planning of a programme; and from education – the wider theory and practice of teaching and learning. Given that social interaction is a significant part of this process, on what basis might I construct a framework on which to build an investigation and analysis of a specific form of pedagogy in a specific place and time?

Classification and framing

Basil Bernstein, a sociologist who wrote extensively around the social aspects of education, started his four-volume series on class, codes and control in the 1970s (when PBL was in its infancy). He contrasted these two educational codes: "collection" and "integrated" (Bernstein, 1971, pp. 207-210). The collection code requires learners to collect content matter from a number of distinctly circumscribed subjects in interactions largely controlled by the teacher. In the integrated code, the boundaries are open between the content matter of different subjects, and the learner has relatively more control over the process of her learning. Bernstein (1971, p. 205) distinguished between these two codes according to the following eight aspects:

Classification –

- boundaries between 'everyday' and 'special' knowledge
- boundaries between disciplines
- boundaries within disciplines

Framing –

- control over content selection
- control over organisation of knowledge
- control over pacing (timing)
- control over evaluation (assessment)
- teacher-learner hierarchy

'Classification' describes the degree to which areas of knowledge are distinct from one another. In the medical context, for example, one would compare the knowledge of the man in the street with that of the doctor, the knowledge of the physician with that of the surgeon, knowledge about liver physiology with that about kidney physiology. At each level of classification, strong classification indicates a very distinct and well-defined boundary between the areas being compared. Bernstein later pointed out (1996c) that strength of classification can be seen as an indication of the power relationships within a sphere of knowledge. One maintains boundaries as an exercise of power over one's area of knowledge, over those who teach and work in it, and over those who learn it. Later still (Solomon & Bernstein, 2000, p. 204), Bernstein described classification as establishing the " 'voice' … a necessary condition for establishing what could be said and its context".

'Framing' describes the degree of control that the teacher and the learner each exert over their mutual engagement with pedagogic circumstances and events. Thus, strong framing implies more explicit control by the teacher over what material is dealt with (the syllabus), over how the material is sequenced for consideration by teachers and learners, over the amount of time allocated to various sections of the material, over the

nature and details of assessment (of learners) and evaluation (of the programme), and over social relationships between teachers and learners. According to Bernstein (1971, p. 205), "The concept 'frame' is used to determine the structure of the message system, pedagogy." I use the whole of the eightfold *schema* of classification and framing to describe the pedagogy of PBL at the medical school under study, understanding that the implied issues of power and control respective to each aspect are pertinent to the relationships and interactions between teachers, learners and subject matter.

Collection and integrated codes can be regarded as either ends of a spectrum of teaching and learning experiences. At the collection end, the classification is strong, with firm distinctions between everyday and specialised knowledge, between the various subjects that constitute that specialised knowledge, and between different aspects of individual subjects. Similarly, with strong framing, the content taught, the order and timing of its presentation, its evaluation, and the relationship between teacher and learner are controlled by the teacher, with learners having no latitude. The other end of the scale – the integrated code – has minimal distinction between everyday knowledge and what is presented to learners, subjects overlap and blend, and areas within subjects have indistinct edges. Furthermore, learners have input into what is learned, the sequencing of learning, the rate at which they move from topic to topic, and the nature and timing of evaluation. Learners' relationships with their teachers are also more open.

From Bernstein's theoretical description, a traditional medical curriculum would be closer to the collection end of the spectrum and a PBL curriculum relatively nearer to the integrated end. Bernstein examined pedagogy from a sociological perspective; his insights provide a framework for analysis of PBL as enacted by lecturers and students in a particular setting – given that there are perhaps as many 'flavours' of PBL as there are PBL curricula.

Analysis of pedagogies according to Bernstein's eightfold *schema* has allowed educationalists to observe that schoolchildren from different backgrounds may relate better to, and thus benefit more from, pedagogies having particular characteristics. Thus Morais *et al.* (2004), studying science education, emphasised the explication of assessment criteria and recommended weak framing of pacing and hierarchical rules and weak classification of spaces and discourses, but strong intra-disciplinary relations.

Muller (2004) expressed the view that disadvantaged learners could be helped by a judicious mix of strong classification and framing of some aspects (*e.g.* of evaluation criteria) and weak classification and framing of others (*e.g.* weak classification between educational institution and community, and weak framing of pacing and sequencing). He felt that maintaining an invisible pedagogy (*i.e.* one in which the rules of engagement are largely implicit, as in an integrated code) would maintain the link between social class and educational achievement which Bernstein (1975, 2003a, p. 2) initially documented. That is to say: those middle-class learners who came from homes in which an "elaborated" (*i.e.* more generalised and abstract) family discourse was maintained would more easily make the transition to the relatively abstract school discourse, and would thrive academically. In contrast, those working-class learners accustomed to a more "restricted" (*i.e.* more contextualised and concrete) discourse at home would engage with the school discourse with difficulty, and struggle academically. The less visible the rules governing the learning situation, the greater the divide between the social classes.

Rose (2004), who has worked with learners at all levels of education, pointed out that if learners are disadvantaged in terms of poor acquisition of early reading skills in the home, they tend to struggle right up to tertiary level. He related this to strong pacing and sequencing in schools, with a tacit expectation of acquisition of literacy that favours elite learners and leaves the disadvantaged further and further behind. His solution was to make evaluation criteria more explicit with respect to reading skills and to weaken the pacing of reading instruction across the span of education, so as to equip the disadvantaged with the reading skills that they need at tertiary level. Hoadley (2006)

advocated, for learners from lower socioeconomic groups, weak framing of the pace of learning and clear explanation of assessment requirements.

It is hardly surprising, given Bernstein's background in the sociology of education, that those who have applied his theories have found that they illuminate aspects of class distinction among learners. I apply his eightfold *schema* of classification and framing as an analytical device that focuses its lens in such a way. I deem its use appropriate in South Africa at this time, given that the previous imposition on all aspects of education of an artificial class system based on a conception of race has only recently begun to be eroded. Bernstein's lens also helps reveal interactions between teachers and learners. These interactions, as part of the enterprise of education, are a social interplay, rather than the 'purely educational' transaction that our positivist predecessors had in mind.

At this stage I acknowledge the growing understanding (see, for instance, Coffield *et al.*, 2004 for an extensive review) of students' different learning styles. Entwistle's (2001) description of deep, surface and strategic learners has been referred to in the literature, with hopes that PBL inculcates deep learning. PBL has also been claimed to allow for different learning styles. I have not, however made use one of the many models available, in structuring my study.

In theorising about education in general, Bernstein contrasted the English school system of progression towards the choice of a few subjects to be taken at A-level with the wider spread of subjects maintained in the European and American school systems. The majority of those who work with his *schema* also appear to have focussed on teaching and learning in schools. I am using his *schema* in a tertiary education setting that is largely specialised. (Even a liberal arts degree – let alone a professional degree – would be considered specialised when compared to the wide range of subjects in the school system.) I consider that my use of his *schema* does not distort his intent, since he himself has discussed it in terms of tertiary study (Bernstein, 1996c, p. 23).

Discourses and knowledge structures

Expanding on the concepts of classification and framing, Bernstein subsequently (1996a) described in dichotomous terms the interrelationships of knowledge discourses and knowledge structures. He contrasted the *horizontal'* discourse[11] of everyday language with the *vertical* discourse[12] of specialised fields (science in its broadest sense). He explained his choice of the words *horizontal* and *vertical* by way of the respective absence or presence of levels of recontextualisation (rearrangement for the purpose of transmission – *e.g.* in teaching/learning). I take the words *horizontal* and *vertical* to be illustrative of separate organising principles, like axes that may have only a single point in common (where the horizontal and the vertical lines intersect). *Horizontal'* discourse is the mode we use in everyday life; it is segmented into many non-cohesive, contextual and possibly contradictory areas. Knowledge of how to tie one's shoelaces, use different kinds of toilet, drive a car, or use an ATM is each acquired independently of the others; neither the specific knowledge nor the way that one acquires it is of any help in a different context – features of different areas of knowledge may in fact contradict those of others. A community shares a reservoir of expressions and understandings that outsiders may not initially be able to penetrate, and each member of that community develops her own repertoire according to local circumstances. *Vertical* discourse, by contrast, is that used by exponents of a systematically organised specialised body of knowledge – such as medicine, physics or history; it is coherent within that specialised field and is context-independent.

Bernstein further subdivided *vertical* discourses into those that have a *hierarchically*-arranged structure (*e.g.* natural sciences) and those that have a *horizontal"* structure (*e.g.*

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[11] *Horizontal* and *vertical* discourses correspond (Dowling, 1999) to Bernstein's "restricted" and "elaborated" discourses.

[12] Having struggled to follow Bernstein's descriptions myself, I italicise his specialised uses of these words, and designate his two (!) uses of horizontal as *horizontal'* and *horizontal"* so as to distinguish them from each other and from the everyday understanding of horizontal ("parallel to the plane of the horizon" (Little, Fowler, & Coulson, 1973, p. 984)).

the humanities and social sciences). *Hierarchical* knowledge structures aggregate and subsume knowledge in the building up of general principles (Maton, 2009); Bernstein suggested that they are associated with integrated codes (which I mentioned above – p. 36), having weak boundaries between constituent disciplines in a field of knowledge. *Horizontal"* knowledge structures tend to include a series of separate descriptive languages (Maton, 2009) that do not lend themselves to being combined into an overarching theoretical structure; indeed some may be incompatible with others, even while categorising aspects of the same field of knowledge. Such structures align more with a collection code (*v.s.* p. 37).

Bernstein conceded that his use of the same term – *horizontal* – for both discourses and knowledge structures was potentially confusing but explained that they share similar features in terms of separating different areas of knowledge[13]. Given more time, Bernstein might have expanded on these concepts. His habit was to revisit aspects of his theory in subsequent publications, and in this case he did so (1999) just prior to his death in 2000, but without providing further examples. He stated (Bernstein, 1999, p. 162): "Hierarchical knowledge structures appear, by their users, to be motivated towards greater and greater integrating propositions, operating at more and more abstract levels." The few examples that he afforded the reader do not make for easy extrapolation to other fields of knowledge, and his terminology is not particularly transparent. The word *vertical* implies more structure than does the word *horizontal'*, since construction of an upright edifice entails bringing together and carefully arranging materials into a stable configuration. Thus the term recontextualising – gathering, choosing and arranging knowledge for a purpose with more than local relevance – can be understood as contributing to a *vertical* discourse. Within *vertical* discourse, what constitutes a *hierarchical* knowledge structure is less clear. Does such a structure contain

[13] Bernstein referred to 'segmentally structured' *horizontal'* discourses and 'serial codes' in *horizontal"* knowledge structures. See Bernstein (1996a, p. 171 & 173). He differentiated them according to their 'potentially volatile' (changeable) contents: their referents (people/things referred to) in *horizontal'* discourse; their 'specialized languages' (ways of thinking, discussing, expounding) in *horizontal"* knowledge structures (*Bernstein, 1996a*, p. 178).

only items that can be built one on the other, in a sequence? Is sequencing indeed a factor in defining a hierarchical knowledge structure? By that token, language should be more hierarchical than arithmetic because one need not learn all the numbers 1 to 9 before one can be taught counting, addition and subtraction, whereas one must learn virtually all the letters before one has enough to combine into meaningful words and then combine those words to make sentences. Similarly, mathematics would be less hierarchical than physics because one can, to an extent, pursue algebra and geometry independently, whereas optics, mechanics and energetics share basic concepts that have to be learnt before any one of these branches can be pursued. A physicist might argue that the subdivisions of his field are almost independent. As with a number of ideas that Bernstein initially presented as dichotomies, he would probably have conceded that predominantly *hierarchical* structures may show elements of *horizontal"* structure, and *vice versa*. (Certainly Maton (2009) questioned the sharp distinction that Bernstein had drawn between different knowledge structures, and accordingly proposed a continuum dependent upon the extent to which the meaning depends upon context.) I ask, nevertheless, if such contrasting elements would not make for a different way of teaching and learning – a different pedagogy – in areas with different knowledge structures? My thinking is that a *hierarchical* structure demands that material be taught in a specific sequence so as to build the hierarchical edifice; by contrast, I expect sequencing to be less crucial in a *horizontal"* structure, and differing circumstances – differing pedagogical relationships – might drive one to start teaching or learning at differing points.

The question of the nature of knowledge structures is not abstruse; medicine is evidently part of *vertical* discourse, but should it be regarded as *hierarchical* or *horizontal"*? For the last century or so, medicine has been taught in a hierarchical fashion in terms of sequencing certain disciplines' knowledge before that of others; one of the major changes brought about by PBL is that the layered sequence is broken so that cognate material from different layers is encountered simultaneously. If, in fact,

medicine is a hierarchical knowledge structure, trying to teach at the same time what should be taught in sequence could be expected to make learning more difficult. One can understand the wish of disciplinary specialists to teach their own subject matter in a monolithic sequence. I suggest that this may not be for the reason that material would be meaningless if juxtaposed with what has traditionally been taught beforehand or afterwards; it may just be an attempt to maintain internal coherence.

Juxtaposition of knowledge areas has been described in terms of "singulars" and "regions" (Bernstein, 1996c, p. 23). "[A] singular is a discourse which has appropriated a space to give itself a unique name"; it is "a specialised discrete discourse with its own intellectual field …" (Bernstein, 2000, p. 52). "A region is created by a recontextualizing of singulars" (1996c, p. 23), in other words "larger units which operate both in the intellectual field of disciplines and in the field of external practice … the interface between disciplines (singulars) and the technologies they make possible" (2000, p. 52). A singular can be regarded as a self-sufficient discipline (*e.g.* mathematics) while a region combines a number of singulars (*e.g.* engineering comprising both applied mathematics and applied physics). Medicine, in these terms, is manifestly a region. The importance of this distinction is in terms of the orientation of the singulars constituting a region. A singular on its own (as the name implies) is orientated inwards, focussed on its own integrity as an intellectual endeavour, and strongly insulated from other disciplines (or strongly classified, in Bernstein's terms). A singular as part of a region is orientated externally, focussed on the practical application of its knowledge and the requirements of that practice. This orientation necessitates a reduction in the autonomy of individual singulars and an increase in central control by the region. Individual disciplines, whether as singulars or as parts of a region, may inherently have *hierarchical* or *horizontal"* knowledge structures independent of whether they be orientated inwards or outwards.

Bernstein apologetically (?) introduced a further subdivision of *horizontal"* knowledge structures according to their "grammar". "[S]trong grammars [are] those discourses based on explicit, formally articulated concepts, relations and procedures, as in

economics and linguistics". In "weak grammars … concepts, relations and procedures are much less formally articulated as in sociology and social anthropology" (Bernstein, 1996a, p. 174). Moore and Muller (2002, p. 630) explained: "[A weak grammar has] a conceptual syntax not capable of generating unambiguously precise empirical descriptions [or relating] empirical descriptions to theoretical descriptions non-contentiously". An advantage of introducing this extra complexity should be that it allows further nuances of description and categorisation, albeit at the risk of losing oneself in the terminology. I see this complexity as rendering a threefold division of vertical knowledge structures: *hierarchical*, *horizontal"* with strong grammar, and *horizontal"* with weak grammar.

Bernstein's ideas were helpfully illustrated by Moore and Muller (2002, p. 632).

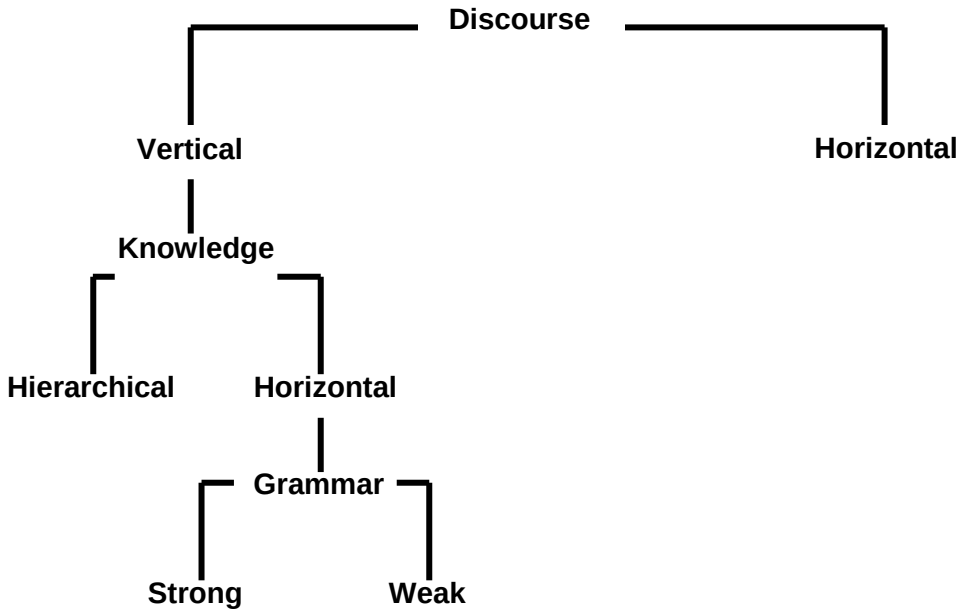

Figure 3.1 Discourses, knowledge structures and grammars
After Bernstein (1996a, p. 175) and Moore and Muller (2002, p. 632)

Neither Bernstein nor those who followed his description have provided an exhaustive categorisation of fields of knowledge in the terms he developed. Those who would use them as a classificatory device must interpret for themselves what was intended and how best to make use of the concepts.

The pedagogic device

The interface between a field of knowledge and the pedagogy by which that knowledge is taught and learnt is what Bernstein (1996d) described as the pedagogic device. This is the mechanism – the collection of rules – by which knowledge is transformed into pedagogic material. Distributive rules regulate what knowledge is considered part of the field under consideration (for example, physical phenomena relating to the human body). The recontextualising rules govern the way this knowledge is made available for teaching (in other words, how it is converted to pedagogic discourse[14]) for example, the principle of electrical and chemical phenomena as means of communication between cells. Evaluative rules direct the way in which acquisition of knowledge is recognised: for example, a student's ability to explain nerve action potentials or the mechanism of action of hormones. While the three rules are each dependent upon the preceding rule, my study focuses its attention on the middle rule. How is esoteric knowledge translated by experts into terms understandable by non-expert learners? Bernstein asserted that "the recontextualizing principle not only recontextualizes the *what* of pedagogic discourse, what discourse is to become subject and content of pedagogic practice. It also recontextualizes the *how*; that is *the theory of instruction*" (Bernstein, 1996d, p. 49, emphasis in original).

[14] What Bernstein called recontextualised knowledge, Shulman (1987, p. 8) called pedagogic content knowledge: "It represents the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction."

Other possible analytical schemata

Attempts to document individual 'flavours' of medical curricula have included the SPICES model (Harden, Sowden, & Dunn, 1984), which allows description in terms of six spectra:

Teacher-centred	↔	**S**tudent-centred
Information-gathering	↔	**P**roblem-based
Discipline-based	↔	**I**ntegrated
Hospital-based	↔	**C**ommunity-based
Standard programme	↔	Core plus **E**lectives
Opportunistic teaching	↔	**S**ystematic teaching

This model pits the traditional layered medical undergraduate programme against corresponding characteristics of a PBL programme. It implies a dialectical rather than a dichotomous relationship between each pair; any medical school may find itself operating at one or other end of a continuum between each pair, or somewhere intermediate between the two extremes, and its position on each continuum may not be the same. Such a model has the advantage of indicating what aspects of a curriculum are considered important and worthy of attention; it also indicates the direction in which curriculum reform efforts might be exerted in order to promote PBL. The model has been used to draw comparisons between different medical curricula (Tekian, 1997; van den Berg, 2004) and also to evaluate a medical school's readiness to change to a new-style curriculum (Sommerville, 2000).

More recently, the acronym PRISMS was proposed by Bligh and others (2001):

Product (*i.e.* clinical practice) -focussed

Relevant (to students and communities)

Inter-professional (multi-professional, not just multidisciplinary)

Shorter courses (and smaller classes)

Multi-sited (not limited to the medical school)

Symbiotic (partnership between learners, teachers and communities)

Rather than proposing different pedagogies, PRISMS is a suggestion that the medical curriculum be further shaped to its purpose.

The SPICES and PRISMS models present initially appealing multifactorial *schemata* that could provide bases for analysis of a form of pedagogy but in fact they relate more to the curriculum as a whole than they do to its pedagogy. The SPICES model compresses pedagogy as such into only one of its spectra (Teacher-centred ↔ Student-centred). While the elements of PRISMS have implications for teaching and learning, the model does not directly address pedagogy.

Mennin and Prideaux revealed some of the difficulty in dissecting and examining the pedagogy inherent in the concept of PBL. Prideaux (2007) hinted at the inhomogeneity that makes PBL less a monolithic artefact than a piecemeal construction, the pedagogy of which may well vary as one examines different contextual circumstances. Mennin led us to foresee that analysis of PBL may be less helpful than expected; since the emergent nature of its cognitive benefits is more than the sum of its parts, dissecting the phenomenon may in fact destroy what one is searching for.

I appreciate the need expressed by Hugo *et al.* (2008) for a more deeply penetrating instrument of analysis than is provided by Bernstein's *schema*, a need that led to their adding Bloom's taxonomy to the *schema* to probe the *quality* of pedagogy when comparing the teaching at South African schools of disparate circumstances. I think that at a single institution, where all the staff members are trained to a post-tertiary level, the nuances in terms of quality of teaching may be smaller than at school level. Granted, staff members are, with few exceptions, not trained as teachers, and may have

reservations about PBL. Analysis in Bloom's terms might well reveal inconsistencies; for example, Moodley (2009), in analysing test questions (from a single department), found a disproportionate number of low-level questions. Nonetheless, my primary interest is teachers' and learners' views and experiences rather than the quality of the pedagogy *per se*.

Framing the study

I wish to give a sense in this study of how learners and their teachers portray their views of PBL, each in pedagogic dialogue with the other. I wish to interrogate these perceptions through the framework of the eight facets of Bernstein's *schema*, and also consider to what extent the knowledge structure of medicine contributes to, and is revealed by, this framework. Those who have applied Bernstein's theories in the practical pedagogic setting have observed that different combinations of classification and framing may be more or less appropriate when working with learners from different backgrounds (*v.s.*). Noting this, it seems apt, as part of this study, to delineate the variety of backgrounds represented in the cohort from which my student respondents are drawn. Meantime, having chosen to base my study of PBL pedagogy on Bernstein's theoretical *corpus*, I ask to what extent does this provide a valid framework?

Views of Bernstein

Dowling (1999) described responses to Bernstein's work according to the strength of Bernstein's own "voice" (meaning the integrity with which his concepts were reflected) and the degree to which his theory was reproduced or used to generate new insights. This categorisation produced four types: those of the "disciple" (strong voice and reproduction), the "vulgarizer" (reproduction with weaker voice), the "heretic" (strong voice, producing new insight), and the "exploiter" (new production with weak voice)

(Dowling, 1999, p. 2). I use Dowling's categories to describe the critique – expressed or implied – that he and other authors have brought to bear on Bernstein's work.

Disciples

This appellation implies an adherence (to the extent of hagiography) to the Bernsteinian *corpus*. In fact, although his associates evidently held him high in esteem and affection, their adherence was not slavish (Brannen, 2001; Halliday, 1973; Hasan, 2001; Holland, 2001; Moore, 2001; Morais, 2002; Moss, 2001; Muller, 2004). These authors by and large provided empirical evidence that corroborated Bernstein's theoretical insights.

Apple (2001, p. vii), speaking about educational developments in the light of political changes, said: "Bernstein, I think, is much more related to the realities of schools, curricula, and teaching [than Bourdieu]. ... more deeply connected to the kinds of things those of us in education are about". At the same time, he said: "I think that Bernstein is a [*sic*] rather too structuralist. In his work, you don't see real people act, nor do you see real social movements in formation and acting, nor finally do you see the processes and results of social transformation." Muller and Gamble (2010) were of the opinion that Bernstein's work in the structuralist field might better be called 'realist', and averred that it enabled the creation of "...a powerful and precise language for modelling pedagogic modalities and explaining their effects." Maton (2000, p. 149) saw a positive advantage to the concept of "…educational knowledge as a structured and structuring structure."

Vulgarisers

In Dowling's view, the vulgarisers are those writers who (mis)appropriated Bernstein's ideas without having fully understood them and expressed their own interpretations, failing to express Bernstein's own conceptualisations and thus creating myths. Bolander and Watts (2009) carefully traced the misapprehension that Bernstein's was a theory of verbal *deficit* (rather than language *difference*) and that he was biased against the lower class (Haavelsrud, 1997). Bolander and Watts pointed out that Labov, an early critic, had

apparently been misled in this way, and in fact had much in common with Bernstein. Bernstein himself (1996b) commented on misunderstandings that had arisen about his work, and remarked that he continually revised his own thinking, so that criticisms that might previously have been valid might no longer be so.

This revision is illustrated by Bisseret's (1979, p. 111) point that "Some of the results which remain obscure to Bernstein reveal their significance as soon as they are analysed according to the hypothesis that the forms used in each social sphere have something to do with concrete power relationships and their articulation in speech". In a review of Bernstein's 1996 book *Pedagogy, symbolic control and identity: theory, research, critique*, Haavelsrud (1997, p. 261) noted Bisseret's argument that "one reason for [the] incorrect use of Bernstein in policy-making was that his work had so far not dealt adequately with power relations". Haavelsrud did not record this as a failing of Bernstein's theorising, but thought that contributions like Bisseret's had fed back into the development of Bernstein's theories. This assessment would accord with Bernstein's own assertion that his theories developed with every reconsideration, implying that critiques of his early work had been overtaken by later formulations (Bernstein, 1996b, pp. 1-2) (Bolander, 2009, p. 199).

Heretics

These, among whom Dowling cast himself, were writers who engaged with Bernstein's work and used it as jumping-off point for their own theorising. In constructing his particular curriculum theory, Dowling (2009) took issue with Bernstein's conflation of classification and framing, pointing out that "Within Bernstein's work, the concepts are associated with opposing sets of terms".

Classification	**Framing**
power	control
space	time
between	within
what	how
voice	message
recognition rules	realisation rules

Figure 3.2 Classification and Framing from Dowling, 2009, p. 9

While Dowling's perception of the differences between classification and framing is accurate, I take these distinctions not as detracting but as *adding* to the extent to which they allow varieties of description of curricular structures and pedagogic methods.

Erickson (2009) listed five examples of Bernstein's theories expressed in dichotomous terms. Erickson felt these dichotomies were too rigid to relate to the reality of a mixture of, for instance, restricted and elaborated speech, the mixture varying according to circumstance rather than class. Erickson noted that "...other scholars, looking for clear distinctions between strong and weak classification and framing as they examine closely specific examples of educational materials and school talk find those analytic boundaries more fuzzy than the theorizing would suggest" (Erickson, 2009, p. 140). Erickson also reported that Bernstein was said by his critics to have known too little about language, about schools and about cognition to have been able to theorise effectively.

Maton (2009, p. 43 ff) also criticised the strong dichotomies that he and others saw in Bernstein's thinking. He questioned how one might fit particular discourses into the model that Bernstein's theory suggested, and propounded a more continuous measurement scale according to "semantic gravity (context-dependency of knowledge)". My perception is that Bernstein himself cautioned against regarding his descriptions as dichotomous; the fact remains that his work served as a springboard for others in the field.

Exploiters

This category of writer Dowling described as weakly reflecting Bernstein's articulation of theory while subsuming it as part of their own discourse. No doubt we are all guilty of such distortions, since we naturally tend to put our personal slant on other's theories after seeing in them a resemblance to our own. Thus plagiarisers would fall here; I include in this category those who disagree with Bernstein – often due to a misperception of his thrust. Nash (2006) concisely summarised the theory with which Bernstein started his academic career: "...the socio-linguistic theory holds that speech is

generated by principles, shaped by class relations, in such a way that middle-class speech tends to be elaborated (explicit, universal and abstract), whereas working-class speech tends to be restricted (implicit, particular and concrete), with the consequence that working-class children tend to underachieve at school..." (Nash, 2006, p. 541). Nash then queried the basis of the theory, pointing out that "...it can easily be ascertained that social class means for verbal and non-verbal IQ tests are much the same. This evidence is quite contrary to Bernstein's and it seems most probable that his sample of 309 GPO telegraph messenger boys was not representative of working-class young people..." (Nash, 2006, p. 546). This contradiction, if valid, would cast doubt on the basis of the socio-linguistic theory as an explanation of Bernstein's (and others') observations, although it does not directly question Bernstein's descriptive *schema* of classification and framing.

Good (2009) also discussed Bernstein's 1962 paper comparing post-office and public-school boys and observed: "In many parts of his work, Bernstein was somewhat loose with methodological and statistical issues, and thereby provided rich pickings for his critics" (Good, 2009, p. 188). Good further stated that Bernstein "…would have been better served if he had received rather more critical treatment every time he submitted a journal article" (Good, 2009, p. 187).

Kyratzis *et al.* (2009) claimed that "Bernstein viewed parents as the primary source of code socialization and did not view peers or peer groups as developing their own ways of communicating" and concluded from their observations of children at play that "Contrary to Bernstein's theorizing, speakers' communicative resources are not static products of socialization but active constructions of their social identities" (Kyratzis *et al.*, 2009, p. 283). Cook-Gumperz (2009), researching gendered language, commented that "Bernstein's original notions of gender code can be made more dynamic and may ultimately be made more useful as an analytic concept" (Cook-Gumperz, 2009, p. 306). King (1976) made the same point as Bernstein himself (1971) that the latter's theorising about classification and framing was neither empirically based nor (initially, at least) researched.

Although it is not a critique of his theories themselves, I note Bernstein's use of language as a recurring theme in the literature, a use which has evidently contributed, as is shown by the following quotes, to misperceptions of his meaning: "...failure by Bernstein to use key terms consistently and to constitute neologisms when and only when they are needed" (Dowling, 1999, p. 14); "Bernstein's comments are somewhat elliptical..." (Ensor & Hoadley, 2004, p. 98); "...the terms themselves are not particularly well chosen and almost invite the kind of erroneous criticism they have received" (Bolander & Watts, 2009, p. 171); "...it must be said that his formulation invited such misuse" (Erickson, 2009, p. 141); "...his choice of terminology is disadvantageous ... he often does not express himself clearly..." (Bolander, 2009, p. 199). The man himself was aware of these criticisms, and quoted some himself: "...his exposition of these developments is virtually unreadable... The opacity of Bernstein's writing is also partly responsible for the continuous criticism to which it has been subjected..." (Bernstein, 1996b, p. 1). Various writers have attempted to interpret Bernstein's lexicon, and Moore (2001, p. 369) wrote: "...with careful reading it becomes clear that he writes with intense precision..." but the fact remains that his writings remain opaque to the casual reader.

I conclude that I and others may have misapprehended Bernstein at various points. Because of the evolving nature of his thought, he often addressed critique of his work in a subsequent publication. Despite objections to various aspects of his *oeuvre*[15], I have not come across any demolition of the *schemata* of classification and framing (C&F), discourses and knowledge structures, or the pedagogic device. My own thought, on first encounter with it, was that C&F was perhaps too subdivided (eight aspects) while each aspect was insufficiently nuanced (two extremes: strong and weak). I note that others

[15] In this chapter I have presented a number of aspects of Bernsteins's theory. They may, from my descriptions, appear to be separate theories, but those better acquainted with his work (Brannen, 2001; Holland, 2001; Moore, 2001; Sadovnik, 2001) consistently portray it as one extensive development of a unitary theory of teaching and learning.

who have used C&F as a device to describe a form of pedagogy have in fact introduced gradations for their purposes: *e.g.* ++, +, –, – – (Bertram, 2008; Morais & Neves, 2001). These gradations would have to be understood in context; what in a primary school setting might be designated '+' might at tertiary level be judged to be '– –' due to differing concepts of strength and weakness under differing circumstances. I found, as I analysed my data using C&F, that using all eight aspects allowed interpretations that I might otherwise have missed. Conversely, I have not subdivided the strength or weakness of each aspect, since the literature does not suggest sufficient consensus as to how to make meaningful gradations.

Summation

In this chapter I outlined the various conceptions of pedagogy and the sense in which I use it. I introduced Bernstein as a theorist relevant to my interests in terms of his background in sociology, his long-established focus on education, and the gradations of his consideration of pedagogy that gave me a structure by means of which to examine a particular pedagogy. I propounded some of the concepts he developed and that I use in this study, and explained how I constructed my frame of enquiry using his work. I considered implicit and explicit critiques of his thought. In the next chapter I indicate how I have gone about gathering data in order to answer my questions.

4

Research design and methodology

This chapter discusses broadly the research paradigms that could possibly be apposite to such a study as this. I then give my reason for choosing a particular point of view through which to study the pedagogy of problem-based learning and people's interactions with it. I discuss the epistemology implied by my paradigm of choice. Within that methodological frame, I discuss the actual methods and the various instruments used to gather and interrogate data. On the basis of the paradigm in which I choose to work, I describe how the methods and instruments contribute to the collection and interpretation of data and the themes that the data express. I discuss the broader considerations around my research.

Theoretical positioning

It has gradually become clear to me over a period of years that the positivist approach followed by generations of medical practitioners is not necessarily the method of choice in educational studies; rather it is one of several possible approaches.

Possible paradigms

When investigating the field of research epistemologies, I found the wealth of description overwhelming. Various authors have written of positivist, scientistic, quantitative, post-positivist, interpretive, hermeneutic, constructivist, qualitative, naturalistic, critical, critical realist, social realist, emancipatory, post-modern, feminist and other paradigms, and of methodologies within these differing paradigms (Blaxter, Hughes, & Tight, 2004, p. 61; Cresswell & Plano Clark, 2007, pp. 21-26; Denzin & Lincoln, 2005, p. 24; Guba & Lincoln, 2005, pp. 194-196; Lincoln & Guba, 1985; L. T. Smith, 2005, p. 88; Terre Blanch & Durrheim, 2006, p. 6). Not having sufficient depth or

breadth of experience in the fields of education, sociology, anthropology and other related areas, and not wishing to conflate conceptions that their exponents might rightly defend as distinct from all others, I looked for a simple understanding of the field of research. In so doing, I found Habermas's (1978) categorisation of cognitive interests appealing. Habermas described three arenas of human thought that relate to survival and development of the species, and the corresponding areas of knowledge that they stimulate us to explore. He designated these three spheres of interest as: the natural world (which we seek to know in order to apply technology to control the environment); the social world (in which we seek to communicate and thus understand one another); and the political world (which we seek to critique in order to reveal power relationships and emancipate the oppressed) (Edgar, 2006, p. 10).

Using these three areas of interest as an organising framework, under the first I include the positivist/scientistic/post-positivist[16] group; under the second, the interpretivist/ hermeneutic/ constructivist/ naturalistic[16] inquiry group; and under the third, the critical/ emancipatory/ advocacy group. With regard to postmodern/ deconstructivist/ poststructuralist / feminist / queer theory / post-colonialist epistemologies: while Habermas engaged with postmodernism, he argued that its challenge to prevailing presuppositions was antithetical to modernism[17], of which he regarded himself as a defender, maintaining that modernism was not yet complete (Edgar, 2006) and that it contained within itself the self-criticism that postmodernism demands (Habermas, 1992). Without suggesting that protagonists of this last group are necessarily opposed to all that has arisen during the modern period[18], I categorise this group as a fourth broad paradigmatic area, characterised by its refusal to take received wisdom or convention

[16] Some writers include naturalist (as in 'natural science') as a synonym for positivism, and post-positivist as a modern modification of the same, while some use naturalist (as in 'uncontrived'/'non-experimental') or post-positivist as synonyms for qualitative/non-positivist. The sense in which these terms are used is usually evident from the context.

[17] Meaning the progressive development of science, art, culture and education since the Enlightenment.

[18] *Pace* Sarantakos's characterisation of postmodernism as "anarchist, existentialist and nihilist" (2005, p. 315).

for granted, by its exploration of assumptions and presuppositions from alternative viewpoints, and by its disavowal of metanarratives (Waugh, 1992, p. 3)[19].

Critical – or social – realism defies categorisation in terms of the abovenamed four groups. Bhaskar (1978) critiqued both positivist and non-positivist paradigms for their focus on epistemology rather than ontology. He made the point that, while these paradigms came at epistemology from opposite sides, they assumed that reality was defined by what could be known. (Bhaskar (1978, p. 16) described this as the "epistemic fallacy".) Bhaskar approached 'science' (under which term he included all areas of knowledge) from the philosophical viewpoint that reality exists intransitively, independent of our knowledge of it, and is to be distinguished from the actual and empirical, which are transitive, each being a sub-set of the previous. While Bhaskar (1998) mentioned the potential emancipatory effect of this approach and others have argued for its emancipatory nature (Willmott, 2005), my impression is that the term 'critical' is used for the theory's *critique* of other theoretical stances rather than in the sense of revealing power-based relationships as in 'critical theory'. Critical realism appears to straddle the other categories, in my view tending towards the positivist end of the spectrum, positing that there is indeed a reality and that its laws can in fact be discerned, but that what we perceive is not necessarily that reality.

In aggregating paradigmatic viewpoints into the four broad categories described above, I do not intend to suggest that subdivisions within the categories are artificial and unsustainable – research endeavours, over the last half-century and more, have generated a wealth of methodologies, and as each has been developed it has claimed a nuanced distinction from the rest, even within the same field. I am conscious also that my assigning of an epistemology to a particular paradigmatic group may be challenged;

[19] I am simultaneously chagrined and reassured to learn that McKenna (2004) suggested the same four categories, also based largely on Habermas's ideas.

the same term, I note, has been used sometimes by different writers to denote different paradigmatic characteristics. As I erect a scaffolding (see Table 3.1) to sustain my own frame of reference, I am dimly aware of the subtleties that I lose in its building, but it is important for me to draw broad-based distinctions as, with my bias toward the positivist viewpoint, I must note initially (and retain in the back of my mind continually) explicit differences when working outside this paradigm.

I am aware of what have been called 'paradigm wars' (Cresswell & Plano Clark, 2007, p. 14; Denzin & Lincoln, 2008; Johnson & Onwuegbuzie, 2004; Maxwell & Loomis, 2003, p. 241) and the distrust with which protagonists of positivist and non-positivist research regarded one another's methodologies in the past (Denzin & Lincoln, 2008, p. 2). Of interest here is an alternative description of these 'wars' as 'science wars' (Holstein & Gubrium, 2008, p. v; Lynch, 2008, p. 717), since, in a large measure, the debate centred on what kind of research activities constitute 'science'. The crucial question was whether or not the positivist paradigm that had for so long held sway in the natural sciences was appropriate for use in the social sciences. Researchers in the latter realm immerse themselves in the real world as it is, rather than as it might be constrained by a laboratory setting or another tightly-controlled experimental situation, and explicitly state their possible biases rather than attempting to eliminate them. Such researchers gain access to knowledge of a very different, but equally legitimate, kind.

Table 3.1 A classification of research paradigms*

	Positivist	**Interpretive**	**Critical**	**Postmodern**
Ontology (nature of reality)	Stable, single external reality that can be apprehended	Internal, subjective, multiple realities	Power dynamics shaped by multiple factors	Local, specific, co-constructed realities
Epistemology (nature of knowledge)	Distanced Objective → truth revealed Reductionist	Engaged Relative, negotiated experiences	Value-mediated findings	Transactional build-up of findings
Methodology (nature of research)	Deductive Experimental hypothesis-testing	Inductive Interactional, interpretive, qualitative	Dialectical critique Collaboration	Deconstruction, Textual & discourse analysis
Axiology (role of values)	Bias eliminated/ minimised	Bias revealed, discussed	Bias negotiated	Bias discussed, deconstructed
Truth	Reality Hypothesis → law	Contextual	Evaluative Structural & historical insight	Local stories Coalescence of consensus
Aim	Explaining Drawing out natural laws Prediction and control	Understanding	Challenging Transformation Restitution Emancipation	Changing perceptions
Researcher's stance	Detached, objective	Empathetic, subjective participant	Suspicious political advocate	Facilitator of multi-voiced reconstruction
Type of data	Quantitative	Qualitative	Qualitative	Qualitative

* Incorporating insights from Blaikie, 2003, p. 17; Blaxter, *et al.*, 2004, p. 61; Cresswell & Plano Clark, 2007, pp. 21-26; Denzin & Lincoln, 2005, p. 24; Guba & Lincoln, 2005, pp. 194-196; Neuman, 2000; Terre Blanch & Durrheim, 2006, p. 6.

Paradigms compared

My own background is that of positivism. I was trained in natural science and medical disciplines by scientists who were themselves products and exponents of that paradigm. My inclination would thus be to approach this current study as a search for an objectively 'knowable' body of information. My own stance as researcher would be a clinical detachment from the subjects of the research, from the information derived from them, and from the process of observing and handling these data. I would focus on a single aspect and ensure that all others were kept constant while intervening to ascertain what effect changing the aspect of interest would have. The conclusions of the study would then be expected to be generalisable to other PBL pedagogies, allowing improved control of teaching and learning. This is what one might expect to be the outcome of a modernist/post-Enlightenment piece of research located within the positivist paradigm.

However, I feel that the worldview[20] that this paradigm implies and the methodology that it invokes are not appropriate for the field, the topic or the people that interest me. Positivism assumes that reality is external to those who observe it, that aspects of it can be isolated and objectively measured, and thus that reality can be known (Blaikie, 2003, p. 17; Denzin & Lincoln, 2008, p. 36). This may well be so for some aspects of natural science and in some areas of medical science – medical researchers go to a great deal of trouble to achieve the "double-blind"[21] randomised clinical trials that are the gold standard for evidence-based medical practice. The positivist observer carefully suppresses biases/hunches/presuppositions behind the hypothesis being tested, so as not to disturb the objectivity of his work. This detached stance contrasts with the empathetic interaction of the interpretive researcher, aware of his subjective biases and

[20] It can be argued that part of the ferment in medical education over the last few decades has been over the shift from a positivist towards a critical paradigm, and the changes in mindset that this has occasioned in those prepared to make the shift. This is something with which medical educators are still coming to terms.

[21] Meaning that neither the investigator(s) nor the subjects are aware to which arm of the study the subjects have been randomised, and thus to which intervention they are exposed.

declaring them explicitly to his participants and readers. I feel that positivism is inappropriate as a stance from which to engage my current and soon-to-be colleagues in an attempt to understand the perceptions and experiences that we share of the pedagogy at the heart of PBL. I have not set up a controlled experiment to search for an objective truth confirming a hypothesis, I am not seeking a universally applicable endpoint, and I remain intensely engaged with my study, its participants and its outcomes.

The interpretive paradigm is one in which the investigator specifically engages with his participants, who are granted more agency than are the relatively passive subjects of a clinical trial. Each of us interprets events and circumstances from our own viewpoint. Knowledge-gathering and truth-making are relative rather than absolute, negotiated rather than merely annotated experiences. The interpretive paradigm provides flexibility (allowing for modification of the study as it progresses), is concerned with the social processes whereby meaning is constructed by participants, and allows simultaneous collection and analysis of data (with theory emerging from the data rather than being superimposed upon it) (Burgess, 1985, pp. 8-9). I wish to engage in meaning-making from within rather than as an objective observer. I wish to document the way that I and other individuals involved in teaching and learning negotiate and construct understanding and experience of PBL in the medical school under consideration.

As regards the critical, emancipatory stance: issues of power, control, hierarchy, dominance and oppression are appropriate areas for research in this country at this time. PBL can be seen as aiming to empower learners by enabling them to control aspects of their own learning as well as consciously learn how to learn, the latter being a cognitive skill that should last them throughout their careers. Interpretation of their interactions with such a pedagogy does not however automatically constitute a critical study. I regard the critical paradigm as both interrogating aspects of power and control and examining the relationships between actors rather than between actors and the pedagogy with which they interact. Some of the themes emerging from my study are related to these matters, but my aim at the outset was to cast my net as widely, and to

describe the themes as fully, as possible. I did not set out to emancipate the colleagues with whom I teach and learn; that may be for an activist to attempt at another time.

The interrelationship of PBL with postmodernism is intriguing: both tend to call into question the assumptions of a dominant discourse, and both tend to de- and re-construct meanings that have been taken for granted; but a similarity between the pedagogic method that is under study and a potential research epistemology does not place this study of PBL in the post-modern fold. Furthermore, there is still sufficient positivism in me to recoil from the thought of deconstructing the foundations that my science is built on, so I eschew a postmodern approach. According to Habermas (1992, p. 170), accepting the strictures of postmodernism means essentially abandoning the modernist project. This, in turn, implies discarding some of the central constructs on which at least two of modernity's enterprises are based. The construct of education over the centuries of this modern era is that one can improve the mind of the individual as well as the culture of the populace through education. Similarly, the system of Western medicine assumes that one can cure the disease of the individual and improve the health of the nation by health care interventions. Education espouses at least some metanarrative understanding of itself and its background. While not wishing to take matters for granted, I start my study from certain axioms where others might choose to deconstruct and interrogate these same axioms.

While I find critical realism's philosophy attractive, I have no wish to delve back towards whatever ultimate reality there may be behind my respondents' interactions with PBL, and am also wary of the risk of reifying the social structures that may influence these interactions (Cruickshank, 2010, p. 588).

Choice of interpretive paradigm

I choose to establish my approach within the interpretive[22] paradigm. This choice implies my stance as an active participant in the generation, handling and interpretation of data. It also implies a stance towards the other participants with whom I interact, namely that they have an active role in interpreting and making meaning as and after information is shared. This in turn implies that data are generated as "negotiated accomplishments" (Fontana & Frey, 2005, p. 716) rather than collected or observed as if they existed independently of those who produce them. Above all, I wish to *understand* (Sarantakos, 2005, p. 312) more than merely *describe* PBL pedagogy and people's interactions with it. For these several reasons, I regard an interpretive stance as appropriate. I choose to think that while natural science and positivism have their place, they render but a poor reflection of the richness of social science as constructed by interpretive research.

Eisner (1998, pp. 32-40) usefully described seven features that he felt characterised a qualitative study:

1. It is field-focused: the researcher enters a field of enquiry, does not seek to manipulate it in any way, but studies it intact (*i.e.* as she[23] finds it) as part of a 'naturalistic enquiry'.
2. The researcher uses herself as instrument, understanding that "...the features that count in a setting ... do not announce themselves" (Eisner, 1998, p. 33) but instead require an interpreter. Eisner argued that qualitative research entails the ability to see "what counts", meaning the researcher's sensibility alerts her to important

[22] As implied above, I am not distinguishing between the terms interpretive, hermeneutic and constructivist. The term hermeneutic appears to have been used first by scriptural scholars in the technical sense of interpreting a text and its meaning in the context of its day (Sarantakos, 2005, p. 312). A similar technique is used in the sense of interpreting language and actions, and constructing meaning in terms of the context of the respondent's and interpreter's settings (Weinberg, 2008, p. 29).

[23] I use the feminine pronoun, not because I have a particular individual in mind, but to make the point that researchers, like students, are no longer typically male.

nuances and her research *schema* alerts her to the significance of what she sees. He proposed the "unique insight" of a connoisseur of the subject as being the vital attribute of the researcher.

3. The interpretation(s) that the researcher makes include explanations. "… inquirers try to *account for* what they have given an *account of*." (Eisner, 1998, p. 35; original italics).
4. The researcher seeks motives for actions and makes meaning of experiences. Eisner referred to Geertz's (1973) explication of "thick description", which involves penetrating beyond the surface of what is observed to discern its meaning. This penetration may require that the researcher appreciate the history, the culture, the protagonists' perceptions, and the intentions behind what is observed.
5. Expressive language and presence of voice: in other words, the researcher's engagement with her topic, use of personal, non-neutral language, and the evocation of empathy. There is no pretence that events occurred and that observations were made in a vacuum. The research record strives to capture an accurate description of what transpired and how and why, including the emotions that are said to be "the enemy of cognition" (Eisner, 1998, p. 87). Eisner was careful to reject such a view. In contrast, he asserted that "Good qualitative writing helps readers experience" (Eisner, 1998, p. 38).
6. Attention to particulars: Eisner contrasted this to conventional (positivist) science, which uses particulars to arrive at generalities, making the point that "Connoisseurs of the fine arts are able to make very fine-grained distinctions... [so as to] provide a sense of the uniqueness of the case..." (Eisner, 1998, pp. 38-39).
7. Coherence, insight and instrumental utility: the qualitative researcher attempts to persuade the reader by virtue of the weight of evidence drawn from multiple sources, by the coherence of the case she constructs, and by the cogency of her interpretation. The aim is to achieve a perspective that seems intrinsically and collectively 'right'.

The epistemology of the interpretive paradigm is that the researcher is the instrument and that she, in conjunction with the respondents (who are not passive 'subjects'), makes meaning of the data by way of actively engaging with and interpreting it. How, then, in practical terms, can I relate these principles to the realities of my area of interest?

Methodology and methods

Having clarified the implications of my choice of the interpretive paradigm, with its attendant inductive, interactional methodology (see above, p. 61), I wish to make equally clear the distinction that I draw between research methodology (the science of method) (Little, *et al.*, 1973, p. 1317) and research methods (modes of investigation, of pursuit of knowledge) (Little, *et al.*, 1973, p. 1317). I argue that methodology relates to the bigger picture of which paradigm one adopts, whereas method relates only – but importantly – to how one acquires data. Thus my chosen methodology has extensive philosophical implications as to my sense, as a researcher, of ontology (how things arise) and epistemology (how we come to know things). These in turn bear upon the coherence with which I approach the field of study and plan my research activities, and thus also upon the processes of data construction, analysis and interpretation (Leshem & Trafford, 2007). Method relates to the instruments with which are gleaned the data to be handled according to the chosen methodology. Bryman (1984) made the useful distinction between epistemological positions (relating to methodology) and research techniques (methods).

I draw a further distinction. With *quantitative methods*, one measures and collects numbers or data that can be expressed numerically; using *qualitative methods*, one interviews and collects or co-creates ideas, opinions, insights and values, expressed verbally. With reference to quantitative and qualitative *methodologies*, however, 'quantitative' has been used as a synonym for positivist and 'qualitative' for

the other three paradigms as I have grouped them above[24]. I have the impression that methods and methodologies can be conflated. This conflation has the straitening effect of implying (if not explicitly stating) that one can use only quantitative methods in the quantitative paradigm, and only qualitative methods in the qualitative paradigms (Teddlie & Tashakkori, 2003, p. 5). This, in my view, makes for a restricted scrutiny of the matter under study. Part of the fall-out from the so-called paradigm wars seems to have been a tendency to claim particular methods as belonging to either side and to mark the user of each as a proponent of that faction. My blindness to that distinction may be a reflection of my bias towards the positivist paradigm, with its previous hegemony (now, I trust, largely broken) over research. My conviction with regard to this study is that, working within my chosen paradigm, I may gain more information from using a combination of methods than I might have garnered had I used each method on its own. I hold to the belief that by using more than one method to construct insights I obtain a richer picture of my area of study. One of my methods happens to be quantitative. Nonetheless, I view and shape the study through a qualitative, interpretive lens. In using a mixed methods approach, combining quantitative and qualitative methods, I believe that the former reveals the extent of the 'what' of a research question, while the latter fleshes out the 'how' and 'why'.

I do not take 'quantitative' as a surrogate for 'positivist' – I am aware of the need to avoid formulating a hypothesis at the start of my study and then seeking data to confirm or refute that hypothesis. I do not assume that the phenomena I investigate come neatly together into a 'proven' conclusion, as might be inferred from presupposing the equivalence of quantitative *method* and positivist *paradigm*. While nobody in actual fact comes to a piece of research without any ideas about what may be found, the interpretive researcher is committed to following the data where they may lead, and to

[24] I understand that 'non-positivist' or 'non-quantitative' would be definitions by negation and probably distasteful to those who have laboured to establish the tradition and excellence of social science research as an entity to rival (at least) that of positivism. 'Qualitative' is both a more affirmative term and a description of the nature of that group of investigative methodologies. It remains, however, a catchall expression that may include a variety of investigative *methods*, either qualitative or quantitative.

shaping ideas in fidelity to the data and to the respondents who share them. I am aware that data do not speak for themselves. (It is debatable whether, even within the positivist paradigm, data in fact speak for themselves – they are collated, averaged, depicted as graphs, and subjected to statistical manipulation in order to make a point.)

By differentiating between methodology and method, I am forced to think about how each method would contribute to my overall methodology, rather than choosing a methodology and assuming that the method(s) would therefore automatically fall into place. It is possible to take quantitatively gathered data that have a range of numerical values and reduce them to qualitative representations (*e.g.* data in the range 0-30 become 'small', those in the range 31-60 become 'medium', and those between 61 and 90 become 'large'). That may be an appropriate way of rendering all data in the qualitative form; it would, however, deprive one of the advantage of manipulating data as *numbers* (for instance, of applying statistical methods to search for interrelationships that qualitative handling would neither reveal nor even seek). Similarly, qualitative data could be reflected quantitatively: *n* respondents fall into the category *x*. While the data would still have some truth value, their credibility, having lost rich descriptions in the compression into bare numbers, would be suspect. Although numbers are impersonal, they can be used in interpretive methodology to explain and to build a theory inductively rather than as deductive confirmation of an *a priori* theory.

Choice of methods

My background (as a medic and a practising anaesthetist in particular) predisposes me to be pragmatic about the methods I use to achieve my ends. If my rough lumping of research methodologies into four paradigmatic groups and my willingness to use a mixture of methods cast me as a *bricoleur*[25], then I am not alone. For a number of reasons, a substantial field of study using mixed methods has developed (Cresswell &

[25] My elderly French dictionary (Girard, Dulong, van Oss, & Guinness, 1964, p. 110) translates *bricoleur* as 'potterer', 'jack-of-all-trades'.

Plano Clark, 2007; Greene & Caracelli, 2003; Johnson & Onwuegbuzie, 2004; Maxwell & Loomis, 2003). Practical and historical grounds for the use of mixed methods existed, prior to and independent of the paradigm wars and the proposal that different methods were incompatible (Teddlie & Tashakkori, 2003, p. 5). Other reasons advanced for the use of mixed methods are that some research questions are amenable to mixed methods but not to other approaches, that mixed methods give rise to stronger conclusions, and that mixed methods provide a greater diversity of outlooks (Teddlie & Tashakkori, 2003, pp. 14-15). An area of study may require both quantitative and qualitative methods, and one method may enhance the other, particularly when quantitative data need further explanation by way of qualitative means, or when quantitative data are needed to apply qualitative insights to a greater number of respondents (Cresswell & Plano Clark, 2007, pp. 32-35).

At this point, I acknowledge the work of Glaser and Strauss (1967). Although 'Grounded Theory' has come to be thought of as a technique associated with their names, they argued for inductive development of theory that is grounded in systematically gathered observations, by professionals in the discipline concerned (sociology, in their case), using qualitative and/or quantitative methods. They, along with Guba and Lincoln (1988), did much to establish the rigour of qualitative methodology, to the extent that virtually all research pursued in the qualitative paradigms follows a similar inductive course, whether or not it claims to generate 'grounded theory'. "[T]he challenge is to appropriately match methods to questions rather than adhering to some narrow methodological orthodoxy" (Patton, 2002, p. xxii). What methods do I use in this study?

Numerical descriptions – in other words, gathering mean values, making comparisons while paying attention to statistical significance, and executing sophisticated manipulations – are very easy to do nowadays, thanks to the software that can be run on an office or home computer. The outputs of the software are very beguiling because of their (relative) ease of use and because – if one has pressed the correct sequence of keys – the *p* values 'tell' one what is worthy of attention and what is not. However, the aphorism of the computer age is still valid: 'garbage in, garbage out'. Blaikie (2003), at

the beginning of a text devoted to quantitative analysis, sounded three caveats. He warned of the conflation of the hypothesis with which a (positivist) researcher starts a piece of research and that which a (qualitative) researcher derives from the data towards the end of the research. He warned that tests of significance are meaningful only in extrapolating from an adequately-drawn sample to the population from which it was drawn. He warned that associations between variables are an elaborate form of description but they do not explain why the variables are related nor do they establish causal relationships. Blaikie regarded quantitative data analysis as an important step towards identifying characteristics, patterns, influences or relationships, but conceded that this route is one of several means of analysing data.

Interviews have a long history in research (Fontana & Frey, 2000). Group interviews may be termed focus groups. The advantages of individual interviews are privacy and maximum use of the respondent's time. The disadvantages include the respondent forgetting or deliberately falsifying information. Group interviews may be more efficient in terms of the interviewer's time and may be more beneficial in terms of group members' interactions with the interviewer and with one another, yielding more information than if each member were interviewed separately. In terms of numbers, a group may dilute the authority of the researcher and permit members to take ownership of the proceedings (Kamberelis & Dimitriadis, 2005). There is always a risk that a group may be dominated by forceful individual(s) and the group itself may interfere with individuals' expressions; knowledge of group dynamics is thus a help (Krueger, 1998). In group or individual interviews, gaining the trust of one's respondents in a limited time span may be a problem.

Unstructured interviews do not suffer from the limitations of the structured version, and they signal that the emphasis is on the contributions of the interviewee(s) rather than the agenda of the interviewer (Morgan, 1998). Nonetheless, the same three sources of error may be pertinent: respondents may hide or distort information in an attempt to protect themselves or others or to please the interviewer; the posing, sequence or interpretation of the questions may give rise to errors; and the interviewer's nature or

the way in which questions are posed may lead to erroneous communication (Fontana & Frey, 2005).

Documents generated by others are as much a data source as are hard-won personally conducted interviews (Rapley, 2007). Access to documents may be easier to acquire than to individuals, and documents and personal recollections may reflect different facets of an event or an idea (Mason, 2002). Documents are "socially produced" (McNiell & Chapman, 2005, p. 147) and subject to the same vagaries as individual memories (Silverman, 2006). Documents, however, may be seen as more meaningful (Mason, 2002) because they are generally more carefully constructed than is speech. Since the author(s) of documents may not be available to explain, clarify or justify their texts, the trust-worthiness of the texts may be difficult to establish. Criteria of authenticity, credibility, representativeness and meaning are more important (McNiell & Chapman, 2005, pp. 156-159). Sarantakos (2005) listed ten strengths of document-based research, but perhaps more important are the following seven weaknesses that he enumerated: possible problems with representativeness, access, completeness, authenticity, comparability, methodology, or bias.

The documents that I examine as part of this research are official records or semi-official communications produced at one or other level of the medical faculty. The majority were ratified by the body on whose behalf they were produced, so I take them to be both authentic and credible. Their representativeness is substantial, since I have accessed virtually all the documents produced over the period of planning and implementing the PBL curriculum. Although most were generated by committee clerks, their meaning is generally clear. Documents may be analysed by quantitative, textual, or thematic means (McNiell & Chapman, 2005, pp. 161-166). A textual approach would have been interesting in terms of what the institutional documents included and omitted from mentions of PBL and its associated pedagogy. My primary interest, however, was in thematic analysis of the documents, in conjunction with the thematic analysis of my interview data.

Data collection

Samples were taken from various sources: the university's student record system, interviews with students and staff, and faculty documents.

Demographic characteristics

I downloaded information recorded in the university's integrated tertiary software (ITS) system for the cohort of medical students that was in its 1st year of study in 2007. I followed that cohort's test results through the three years of the programme that are problem-based (*i.e.* up to 2009). There are six 'Themes'[26] in each year, yielding eighteen sets of end-of-Theme test (ETT) results over the three years. This spread of data allows searching for relationships between students' performance in assessments and their demographic characteristics, and tracing the effect and duration of such relationships.

Data gathered:-

Sex	Age	Ethnic origin	Home language	Academic status	School type	Study finance	Matric points	Facilitator status	Year/ Theme	ETT mark

It is evident from the literature that there is no single measure of pedagogic engagement. Equally, assessment scores are influenced by a number of factors. However, using assessment scores as a surrogate measure of students' engagement with the pedagogy affords an easily accessible indication of possibly significant interactions. Although these are numerical data, I do not regard them as a *measurement* of pedagogic engagement; no doubt, in a positivist framework, a number of interesting numerical relationships could be drawn out. Descriptive and comparative statistics cannot of themselves define causal relationships and a p value of less than 0.05 cannot determine

[26] I distinguish the Themes of cognate material into which the curriculum is arranged from the themes that emerge from the qualitative data analysis.

significance in anything other than statistical terms (Carter & New, 2004, p. 18; Dallal, 2009).

Interviews

A selected stratified sample of students, representing as wide a spectrum as possible of the demographic characteristics listed above, was invited to participate in interviews. I envisaged three groups of eight. As matters turned out, students arrived in ones and twos, and the interviews were thus conducted as two groups (one of eight and one of five), plus two pairs, and three individual interviews. One student was present on two occasions (although he did not contribute verbally on one of these), thus the total number of student respondents was nineteen. Their demographic details and pseudonyms are listed in Appendix C. Each interview had three phases. Initially I posed an open-ended question about PBL as a means of learning, and this permitted unstructured responses. I then followed with the eight aspects of Bernstein's classification and framing, allowing the ensuing discussions around each aspect to take their own course and moving on to the next aspect when responses seemed to dry up. In the third phase I presented as stimuli to discussion a series of graphs depicting (past) students' assessment performance in terms of various demographic characteristics. This was to flesh out the statistical findings from the analysis referred to in the previous paragraph. The interview schedule is reflected in Appendix D and the graphs in Appendix E.

Although I wished to make my interviews as unstructured as possible, I recognise that the original use of the term 'focus group' was for the posing of specific questions following preliminary research (Fontana & Frey, 2005, p. 703). Thus there is precedent for following an unstructured interview with probes in specific areas. The identification of key informants is another possible purpose of focus groups. That was why I invited the silent participant from one group interview to return with a friend. I was disappointed that only two sessions might have been described as 'focus *groups*'. However, there was some lively discussion between those who attended in pairs, and I

enjoyed the dialogues with the three students who each came alone, and felt that they were able to express themselves perhaps more freely than they might have in a group.

Following a similar three-phase process (and using the same interview schedule), individual interviews were held with six selected staff members (see details in Appendix C.) I made no attempt to set up a group session with staff; because of their clinical and teaching commitments in scattered hospitals and different campuses at diverse times, medical school staff are notoriously difficult to gather in one place at one time. (It took me six months to pin down one respondent.) Furthermore, because I wanted to include representatives of various degrees of opinion, I was unsure if a joint meeting would spark off useful exchanges or simply cause a polite silence to prevail. My feeling is that allowing each staff member to speak his/her mind with minimal interruption was more fruitful than arranging a focus group process in which each would have had much less time to speak. (In the event, the six interviewees spoke for a total of 8½ hours – an average of nearly 85 minutes each.)

I recorded and transcoded the interviews, then returned them to the respondents for comment, addition or correction. The involvement of respondents in the correction and, if necessary, expansion of records is an important part of collaborative meaning-making. It affirms them as partners with whom to engage rather than subjects to be examined and commented on. I rendered the transcoded versions anonymous and then entered them into NVivo® (version 8.0.335.0 SP4 2009) for coding and analysis for common themes.

Documents

Faculty Board minutes, records of Curriculum Development Task Force (CDTF) meetings, Undergraduate Committee minutes, Faculty handbooks, module templates, Theme timetables, and the Faculty's self-assessments for HPCSA[27] accreditation describe

[27] The Health Professions Council of South Africa is the statutory body responsible for the training, registration and regulation of health care workers.

the pedagogy envisioned by the faculty during the planning and implementation of the PBL curriculum. I take these as defining the 'official' pedagogy at this medical school. I compared this with staff members' and students' perceptions of PBL over the years since its implementation; I compared these in turn with the principles set forth in the relevant literature.

The interviews I subjected to thematic analysis and I also analysed them in terms of Bernstein's eight aspects of classification and framing. Student test results and other descriptive data as captured by the university student record system I described and analysed numerically. I combine these three differing methods to fashion an interpretive description and understanding.

I have expressed my conviction as to the complementary nature of qualitative and quantitative methods in contributing to the description and interpretation of the phenomenon under examination (in this study, the phenomenon is the pedagogy of the medical PBL programme). Bearing this in mind, I derive further insights from comparisons and contrasts between the data obtained by different methods. One may regard this as 'triangulation' (Denzin, 1978) or, as described by Richardson and StPierre (2005, p. 963), "crystallisation". The latter expression moves away from the surveyor's metaphor of measuring angles from two different places and using the distance between them to calculate the distance and height of the point being triangulated. The apt analogy of a faceted crystal is suggested: the view of an area within the crystal being different when viewed through each of its facets. Ellington (2009) described crystallisation as a mixture of methods drawn from various methodologies previously thought to be incompatible. Wanting to use such an eclectic combination of methods to reveal and express her findings, but feeling guilty for not being true to a particular tradition, she eventually allowed herself to do so, and found the result more satisfying.

The table below attempts to describe the pertinence of the methods employed to the three key research questions listed previously. I am aware that this cut-and-dried categorisation does some violence to the exploratory nature of the interpretive paradigm, but it does at least indicate my expectations of the different phases of the study and how they combine and contrast.

Table 4.2 Relationship between research methods and research questions

Data collection/production technique → / Key question relevance ↓	Student focus groups & individual interviews	Document analysis	Staff interviews	Student cohort follow-through
1. Influences on academic achievement	✓			✓
2. PBL pedagogy at UKZN Medical School	✓	✓	✓	
2. Student perceptions and experiences of PBL pedagogy	✓			
2. Staff perceptions and experiences of PBL pedagogy			✓	
3. Why do students and staff experience PBL pedagogy the ways they do?	✓		✓	

It must be noted that the quantitative analysis of students' assessment results contributes to only one of the research questions; this raises the question of whether this 'alien' method has a contribution to make to the study as a whole. For reasons explored above, I think that it does. One might with equal force question the use of document analysis as it too contributes to but one question, but it provides information that is not readily obtained by other means and it also provides a perspective on other data.

Data analysis

Chapter 7 consists of the numerical data extracted from the university ITS, plus respondents' comments on similar items related to past students. The data are described, compared statistically, and then combined so as to determine which of the factors were actually significant influences on the cohort of students. Data were uploaded into MS Excel® (version 11.5612.5606 2003) spreadsheets and rendered anonymous by coding. In order to maintain comparability of results, I excluded from analysis the results of those in the original 2007 cohort who subsequently failed and repeated a year, since they were then sitting different tests. In order to maintain comparability of the students' demographic features, I have not included the results of more senior students who failed and by repeating a year became part of the class being followed. The exception is those who were repeating 1st year in 2007, who were followed through (unless they failed again) with the cohort starting in that year.

Using the Statistical Package for the Social Sciences (SPSS®, version 18, 2008), I examine with reference to assessment results the first seven demographic characteristics in the list above (*i.e.* Sex, Ethnic origin, Home language, Geographical origin, Academic status, School type, and Study finance). I make statistical comparisons between the categories of each characteristic (*e.g.* Male cf. Female within the characteristic Sex) using the general linear model (GLM). This is similar to analysis of variance (ANOVA) using regression (Field, 2009, p. 350). GLM can be regarded as the overarching term that includes comparative tests such as the *t* test, ANOVA and regression analysis. It has the advantage of being able to incorporate matrices that represent sets of data and also make multiple comparisons (Trochim, 2006). This is what I use it for – every student's dataset has eighteen[28] ETT results which are examined in the light of each demographic characteristic. I include learners' and teachers' comments on the graphs related to each

[28] With the exception of those who failed 1st or 2nd year, who have six or twelve ETT results respectively.

characteristic and compare the statistics and their comments with what the literature has to say about each.

Having examined *individual* characteristics for their relationships to the ETT results over time, I use a generalised estimating equation (GEE) to analyse these characteristics collectively so as to provide a sense of their *relative* influence on ETT results. As an instance of the GLM, the GEE procedure allows repeated measurements to be analysed (*e.g.* student test marks on 18 occasions). In this way it differs from the technique of linear regression, which is used in a similar fashion to build a mathematical model showing which factors independently influence the dependent variable in a single instance of measurement (*e.g.* student marks in one test). Use of a GEE allows handling of data that are – or may be – clustered (Hardin & Hilbe, 2008). For example, ethnicity, language and school may each show significant relationships with ETT results, but this may be because they reflect a common construct. A GEE is able to test whether one or more of these three factors is an independent influence on students' results. A GEE has the advantage of coping with multiple factors and multiple measurements over time, particularly when the time course itself is not of primary interest (Liang & Zeger, 1986). By using estimations of the results that linear regression would produce, a GEE is able to cope with a multiplicity of interactions (Liang & Zeger, 1986, p. 14) and relate these to one another. Possibly because it operates on estimations rather than by the precise calculation of a model (Ghisletta, & Spini, 2004), the GEE appears to avoid one of the drawbacks of linear regression. Thus the order in which variables are added to or removed from the process is immaterial. Indeed, all variables are specified at one time.

Being aware of Miles and Huberman's (1984) portrayal of the variety of ways of describing and analysing findings in the qualitative paradigms, I set down here some detail of the process that I followed. Data display in terms of the 'nodes' (themes of analysis) that I determined when using NVivo can be seen in Appendix F. Initially, I looked for themes emerging naturally from respondents' expressions. I grouped them

broadly in terms of student and staff perceptions or actual experiences of PBL, gathering a range of 5-18 nodes from each interview, using a number of references from each (Table F.1). Under the rubric of 'perceptions' I categorised 25 nodes, and 22 under 'experiences' (Table F.2). In terms of data reduction, these nodes were combined to describe the experiences and perceptions of the role of the student, that of the lecturer and that of the institution in PBL as a pedagogy. These roles are depicted respectively in chapters 6, 7 and 8 below, and are compared to what the faculty's documents prescribe. I have used sufficient quotes illustrative of each sub-category to allow the reader to judge the veracity of my depiction. To gain a different perspective – looking through a different facet of the crystal – I re-examined the interview transcripts in the light of Bernstein's eight aspects of classification and framing. Appendix G shows 16-27 nodes arising from interviews (Table G.1) and 25 nodes arising from a variety of interviews (Table G.2). Data reduction down to Bernstein's eight aspects and their sub-categories, illustrated by representative quotes, yielded chapter 9.

By analysing test results statistically, then analysing both local medical school perceptions of PBL and respondents' experiences of PBL thematically, and finally analysing experiences in terms of Bernstein's classification and framing, I hope to achieve not triangulation – which implies precision of measurement – but 'crystallisation' (*v.s.*), which implies different viewpoints of the pedagogy that is at the heart of this study.

Design considerations

The basing of my analysis on Bernstein's work can be questioned paradigmatically. I am interested in describing (in order to understand) PBL pedagogy and its interaction with teachers and learners, while working within the interpretive paradigm. Bernstein's engagement as a sociologist with education could be described in terms of the critical paradigm (Sadovnik, 2001), although against this is the aforementioned (*v.s.* p. 51)

observation by Bisseret (1979) that Bernstein did not in fact initially recognise that the linguistic findings upon which he built so much of his work were expressions of power relations. It is tempting, in these emancipated times, to couch my study in terms of power relationships, and indeed, as I have remarked above, one could argue that PBL properly applied has critical, or even post-modern, elements. I imagine that, in the 1960s, staff members at McMaster had no thought of addressing the multiple aspects that critical theory would expect. Similarly, while this study may reveal a number of power and control relationships, my referring to concepts used by writers who can be categorised as operating within a particular paradigmatic framework does not necessarily mean that I wish to share that framework. My data may be seen to demand analysis in terms of critical theory; at the outset, and without excluding considerations of power, I aim to describe and understand my topic in more general terms. In contrast, others (Ensor & Hoadley, 2004; Maton, 2009) have viewed Bernstein's stance as social realism. I have not seen any statement of his own that claimed a specific paradigmatic stance, and thus feel free to adopt that which best suits my own interests.

Purists on either side of the positivist/qualitative divide may question whether or not a quantitative arm has anything to contribute to an interpretive study. As acknowledged above, assessment results tell one little *directly* about experiences of the pedagogy within which they are generated. It may be that any demographic aspect thrown up as being of significance would have been revealed by the interviews in any case. While the interviews brought out a wider range of issues than did the quantitative arm, statistical analysis is one way of testing the extent to which perceptions of pedagogy are reflected in assessment achievement. This achievement is one way of gauging the end-result of the pedagogy under scrutiny.

I trust that my use of a variety of sources allows corroboration of my interpretations. I am a single observer using multiple sources, and I thus strive to include as much detail of their perceptions as is feasible so as to allow readers to draw their own conclusions. I attempt in this report to make clear the links between what my respondents have told me and the conclusions I draw.

Trustworthiness

The question must be raised of the veracity of my data analysis and interpretation as well as the reproducibility and wider applicability of my conclusions. In the positivist paradigm, these would be thought of as the study's validity and reliability. These terms featured prominently in the 'paradigm wars' – indeed, they may be said to have been the precipitants of those disagreements as to what rightly constitutes scientific research.

Lincoln and Guba (1985) fired a major salvo in the paradigm wars[29] with a book in which they noted a number of challenges to, and critiques of, positivist research. They advanced arguments in favour of what they termed 'postpositivism' or 'naturalistic inquiry', defined its characteristics, and argued for its legitimacy in comparison with positivism. In a chapter on establishing the trustworthiness of research, they discussed four questions that researchers ought to pose to themselves, and the criteria that positivist research sets against these. The authors proposed four corresponding criteria that they felt were more appropriate for the paradigm that they were describing. I list these criteria below:

Table 4.3 Aspects of trustworthiness

Question item	Positivist criterion	Naturalist criterion
Truth value	Internal validity	Credibility
Applicability	External validity	Transferability
Consistency	Reliability	Dependability
Neutrality	Objectivity	Confirmability

Extracted and combined from Lincoln & Guba, 1985, pp. 290 ff, 294 ff

[29] The bellicose nature of that period may have been exaggerated by this term. My impression is that the term 'war' reflects mainly the amount of energy expended by those who were arguing for the new paradigm – just as might be expected from Kuhn's (1970) description of the nature of scientific progress.

Lincoln and Guba made the point that a single, universal set of criteria is not possible, since each paradigm carries its own assumptions and generates its own values. Hence, against **internal validity** ("the extent to which variations in an outcome (dependent) variable can be attributed to controlled variation in an independent variable") (Lincoln & Guba, 1985, p. 290) they set **credibility** ("the reconstructions ... that have been arrived at via the enquiry are credible to the constructors of the original multiple realities") (Lincoln & Guba, 1985, p. 296). The contrast is between a single reality – which we seek to know by controlled experiments – and the many perceived realities experienced by our respondents. Qualitative methodologies seek to reflect these perceptions accurately, recognising that what is 'truth' for one person is not invariably so for another.

External validity ("we infer that the presumed causal relationship can be generalized") (Lincoln & Guba, 1985, p. 291) is contrasted with **transferability** ("an empirical matter, depending on the degree of similarity between sending and receiving contexts") (Lincoln & Guba, 1985, p. 297). The point here is that quite different – almost incompatible – belief systems are involved. External and internal validity have an inverse relationship: the greater the one, the smaller the other; furthermore, they assume a relationship with a single objective reality. Transferability and credibility do not necessarily oppose one another, and transferability relates to multiple perceptions of reality, recognising that the applicability of findings from one specific context to another is inherently unlikely. A judgement therefore has to be made as to whether or not the contexts are sufficiently similar to make the findings pertinent to a new setting.

Reliability ("measurements ... are more or less stable and relatively predictable") (Lincoln & Guba, 1985, p. 292) is compared to **dependability** ("taking into account both factors of instability and factors of phenomenal or design induced change") (Lincoln & Guba, 1985, p. 299). Reliability is a necessary condition for validity (although "reliability and validity tend to operate orthogonally with each another" (Ensor & Hoadley, 2004, pp. 87-88), *i.e.* the greater the one, the smaller the other). Similarly, credibility is reliant upon dependability. The striving for dependability recognises that what is being examined is continuously changing and that, as a study develops, the researcher's

interpretation of it may change too; the researcher must be aware of this and make explicit the possible influences on consistency.

Objectivity ("isomorphism between the data of a study and reality") (Lincoln & Guba, 1985, p. 299) is distinguished from **confirmability** ("factual, confirmable or confirmed") (Lincoln & Guba, 1985, p. 300). Again, positivism assumes that there is a constant reality against which findings can be measured, and that minimising the influence of the observer enhances neutrality. Qualitative research places the emphasis on the data themselves, understanding that different participants perceive different aspects, but insisting that interpretations be believable.

In the twenty-five years since Lincoln and Guba's book, both qualitative and positivist research have progressed and developed to the extent that the positions described may be less extreme now. However, I think it worth quoting their thoughts, since the rigour with which they addressed their subject is exemplary. They established a high standard to which research of any kind should aspire and to which I trust this study measures up.

The trustworthiness of this study in general relates firstly to my ability to interpret, for my respondents, the constructs with which I have chosen to work. Since very few of the faculty staff or students have formal training in education, they rely on those who do have such training to construe the discourse and terminology for them. Secondly, I have had to interpret their experiences in terms of these constructs. Thus, whether the study actually addresses what it sets out to and achieves what I intend depends upon my ability to act as interface between design and participants and between the data they produce and its final presentation. There is a risk that the whole exercise becomes a circular path between my own presuppositions and confirmation thereof. Checking the accuracy of transcription of group or individual interviews with the participants is a first step in establishing its legitimacy, but cannot be the end of that process.

The credibility of this study depends upon the closeness with which the data reveal actuality. This in turn relates to the degree to which interviewees reflect correctly their own opinions and experiences, the accuracy of data capture by the university system, and the precision with which documents reflect the deliberations they purport to summarise. There is always a risk, when attempting to triangulate (or crystallise) by way of different instruments, that the instruments may be capturing data of different natures that do not in fact corroborate one another. I hope, by purposive selection of individuals, to have ensured that the areas revealed by the different arms of the study overlap to as large a degree as possible and add to its credibility.

Appraisal of the transferability of my findings, their analysis, and the conclusions that I draw, must lie with the reader. In declaring my stance and my possible bias, in describing the circumstances of the medical curriculum and providing multiple examples of respondents' views, I trust that I have provided sufficient information to enable the reader to judge whether transfer to other contexts is possible.

The dependability of this study relies on the consistency of my stance as two-way interpreter and analyser. Indeed, I found myself wishing, as the series of interviews progressed over an extended time-period, that I had phrased certain questions differently, or had perhaps included others. I resisted the temptation to alter my interaction with respondents; any variation in responses rests, I hope, purely on the (deliberate) variety of backgrounds of the respondents.

My choice of interviews – group and individual – as data-constructing methods raises the issue of confirmability. In the paradigm I choose to work in, the positivist stance of the interviewer as disinterested recorder (Fontana & Frey, 2005, pp. 697, 698, 702) – if that were ever achievable – is inappropriate, as is the fiction that interviewer and interviewee(s) are on equal footings (Fontana & Frey, 2005, pp. 714-715). The inequality is acknowledged, but it may be offset by my position as a participant observer. At any rate, it is said that higher status interviewers tend to generate more of a response (Fontana & Frey, 2005, p. 703). The possibility of my 'race' influencing responses to do

with racial matters must also be borne in mind (Fontana & Frey, 2005, p. 703). My declaration of possible bias does not negate that bias, and I alert the reader to its potential effects on my interpretation and analysis of the data.

Axiology

Writing about the role of values, Lincoln and Guba (1985) recorded that positivist research deems itself to be value-free because the methodology is objective. (Ironically, this itself is a value claim.) Qualitative researchers are conscious of the multiple ways in which values impinge on the process, and aim for "value-resonance" (Lincoln & Guba, 1985, p. 38) – *i.e.* congruence of the values inherent in the various features of a study. The four value-laden areas of impact they discussed are: the researcher, the paradigm guiding the research, the methodological paradigm, and the setting of the research.

As a (relatively) elderly white male, trained in the positivist tradition and in a position of authority over students and influence over staff in the medical school, the values that I hold could, consciously or unconsciously, influence my interactions with my respondents. I have indicated the paradigm, with its associated values, in which I couch my research, and the methodology flowing from that. My research is set in a field – medical studies – that is considered conservative in some senses, but in a location – UKZN Medical School – that for many years was considered a hotbed of anti-apartheid resistance. I leave the reader to contemplate the intersection of the varied values that may pertain to such a setup.

Ethical considerations are bound to arise when students' marks, students' demographics and staff members' conceptions of teaching and learning are probed at a more than superficial level. Our students have been accustomed to anonymised focus group sessions for the purpose of feedback into the curriculum and are fairly accepting of these, particularly when their purpose is explained. Staff members are used to discussing teaching and learning in open fora. The fact remains that what purports to be

a conversation – however animated my contribution – is to a degree a one-sided exchange for my benefit (Fontana & Frey, 2000). What I record and interpret is the respondents' bald words, shorn of their non-verbal elaboration, and the choices and juxtapositions of respondents' words are mine alone (Fontana & Frey, 2005).

Informed consent, the privacy of respondents, their protection from harm, principles of respect, honesty and justice, responsibility and common sense have all been highlighted by experts in the area of the interview (Fontana & Frey, 2005, pp. 715-716). They state that telling the truth is the most salient imperative in the ethics of interviewing for research.

The University Ethics Committee gave its approval for this study to take place (see Appendix A). The Dean of the medical school gave permission for faculty records to be searched and referred to. The students' representative council gave permission for student records to be analysed. The head of management information consented to and facilitated the provision of data from the ITS. Individual students and staff members were provided with an information sheet and each signed a consent form (see Appendix B). The consent forms that respondents signed have been dissociated from the audio recordings and notes. All respondents are referred to by pseudonyms, as listed in Appendix C.

All demographic data were cross-linked in an Excel® spreadsheet before being entered into SPSS® for statistical analysis. A number (not related to the student's registration number or to the numbers by which I identified my individual respondents) was assigned to each student record so as to allow accurate tracking while removing evidence of that student's identity.

The interviewees were given an opportunity to correct my transcoded records before the latter were analysed.

Records will be archived securely after the study is complete so as to maintain the integrity and confidentiality of the collected data.

Summation

In this chapter I distinguished between the methodology, within the theoretical framework, and the actual methods and various instruments used to gather and interrogate the collected data. I discussed considerations raised by my study design, its trustworthiness, and the value-laden aspects of my research.

In the following chapters I present selections of the data obtained by the methods described above, illustrating the themes into which I group the data. I first explore, using statistical techniques, the extent to which broad demographic features can be seen to influence students' performances in this setting.

5

Numerical data

South African tertiary education

Factors contributing to success or failure

From the literature, a number of features arise that have been significant influences on learners' academic achievements. Fraser and Killen (2005) and, separately, although evidently using the same methodology, Ngidi (2007), in studies conducted at three South African universities – one historically white, one historically black and one offering distance education – found a measure of agreement on factors contributing to students' academic success (see Appendix H). The top ten items identified by students and lecturers at the two contact universities had six factors in common, all of which had to do with motivation and application. While the remainder of the students' factors were related to similar aspects, those of the lecturers included one item related to cognitive skills, namely: ability to reason logically. General academic ability was ranked relatively low down: 33rd by students and 29th by lecturers (out of 34 items).

Only three factors relating to failure were common to the polls of both the students and the lecturers, but students and lecturers ranked them differently. These factors appear to relate to the quantity or quality of students' application to their studies. The students included in their top ten items two aspects that might relate to cognitive ability: inability to perform well and inability to distinguish between important and unimportant information. The lecturers included two cognitive factors in their top ten items: failure to reach the required depth of understanding and inability to use higher order thinking skills. Lack of academic ability was ranked 36th by students and 16th by lecturers.

The results of these studies imply some disagreement between learners and teachers about what makes for success or failure in students' tertiary studies. More telling is that the factors thought to be significant were, in the main, non-cognitive. This suggests that

broader aspects of students' demographic background may be significant influences on their engagement with whatever pedagogy they are exposed to, and thus on their academic achievement.

Zeleza and Olekoshi (2004) commented on the greater proportion of young people in the populations of African countries and the concomitant problems of 'massification', with there being insufficient underpinning of learning and financial support in Africa's universities, which continue to suffer a 'brain drain' of their academic staff. Massification is not a problem unique to the developing world, but lack of institutional support and loss of teaching staff are significant problems.

Medical education

In a Human Sciences Research Council (HSRC) study of the profession and professional education of doctors in South Africa (Breier & Wildschut, 2006), the observation was made that over the period 1999 – 2003, despite an increase in enrolment of medical students, there was a decrease in the number of graduations. Over the same period, enrolment of African and 'Coloured' students at the country's medical schools increased, but the success rate of Africans diminished nationally, although that of Coloureds increased (granted, off a small base). At UKZN, whose student demographics most nearly correspond to the national statistics, both Africans and Coloureds under-achieved, while Indians and Whites achieved better graduation rates compared to the country as a whole. The writers of the report made the point that, particularly for students from disadvantaged backgrounds, physical access to higher education does not necessarily equate to epistemological access.

Demographic analysis – NRMSM students

In this chapter I analyse numerical data related to factors that might be expected to influence perceptions and experiences of the pedagogy under scrutiny. For lack of a direct measure of students' engagement with PBL, I have used as a surrogate their test results over the first three years of the MBChB programme – the years in which PBL is employed in the form of 'problems' set in a clinical context that are dealt with by way of collaborative learning in small groups. The university's student record system[30] and medical school records both contain information that sheds light – albeit indirectly – on learners' engagement with the pedagogy.

I analyse data on the 202 students who started in 1st year in 2007; of these, 182 passed through to 3rd year in 2009. The analysis of numerical and categorical data takes three forms:

1. Expression of relationships in visual form as graphs, plus statistical comparisons using a general linear model (GLM) in SPSS®

2. Students' and teachers' comments on graphs

3. Statistical analysis of learners' marks using SPSS® in the form of a generalised estimating equation (GEE)

The graphical and GLM analyses view students' achievements in the PBL milieu through different facets *individually*. The question arises: since all of these facets apply *simultaneously* to any given learner, what are the interactions between the different demographic factors? In order to explore these matters, the dataset was restructured so as to allow exploration of interrelationships; for this, the GEE was used.

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[30] Information was provided by Anil Pillay and Lennard Wood of the Division of Management Information at UKZN.

The GEE relates the dependent variable (theme test marks) to the factors (*e.g.* sex or 'race') and covariates (non-categorical features such as matric points score and student's age) that might influence it, and incorporates the aspects that are added to the calculation. Here, I am interested in influences over time on not one but several test marks. The GEE enables me to capture a wider view of each factor compared to other factors, and to see effects against time. Using the GEE function in SPSS®, I added factors in succession in order to see which of them would have an independent influence on students' test results. The GEE assumes that cases are dependent within subjects (*e.g.* an individual student over all 18 tests) and independent between subjects (each student is distinct from all the others as far as assessment marks are concerned). This calculates correlations to portray factors that are mutually dependent within each subject.

Three caveats arise, relevant to the use of these modes of analysis (1, 2 and 3 above):

- Graphical representation and statistical testing of this cohort's test results according to various criteria appear to indicate certain relationships. One could surmise intuitively that some of these relationships are interlinked, and when subjected to GEE analysis – which tests for *independent* influences on test results – it can be seen that some factors fall away, since they are in fact dependent upon other factors.
- Despite the complexity of the numerical analysis, the statistical procedures can describe only *what* factors were significant; I thus turn again to my respondents to establish *why* these factors might have been influential.
- Since the students interviewed had not completed their 3rd year when I interviewed them, the complete set of their own test results was not available at that time. The graphs I used as stimulus for comment on numerical and demographic relationships were those from a study on a previous cohort of students[31], and thus the numerical

[31] Unpublished audit, 2004

values and their relationships were not those of the cohort under study[32]. However, I believe that the comments made are still relevant.

Bearing these caveats in mind, I present the descriptive statistics, graphical relationships, respondents' comments, and results of the multifactorial GEE analysis, for the ten demographic factors that I explored. The order of presentation is according to the relative influence (according to the GEE analysis[33]) of each factor.

High school

The high schools previously attended by 127 of the initial cohort of 202 students could be classified according to their quintiles[34]. There were 9 students from quintile 1 (Q1) schools, 4 from Q2, 8 from Q3, 13 from Q4 and 93 from Q5[35]. For the purpose of comparison, I have added, oxymoronically, a 'sixth quintile': data on the 21 students from independent (*i.e.* non-state) schools.

I am assuming that the government's categorisation of schools into socioeconomically-based quintiles provides an index of the quality and quantity of the resources available to those schools. I am aware that assigning a particular school to a particular quintile

[32] The graphs used as stimuli for discussion are displayed in Appendix E.

[33] The table showing the results of the GEE analysis, the relative weightings, and the degree of statistical significance of the different factors forms Appendix I.

[34] An indication of the socioeconomic status of the community surrounding the school – used by the government in calculating differential funding of schools based on "income, unemployment rates and the level of education of the community" (http://www.create-rpc.org/pdf_documents/Policy_Brief_7.pdf). Thus Q1 schools in the lowest socio-economic communities receive more funding per capita than Q2, etc. Q5 schools, however, are probably all levying substantial contributions from scholars' parents, and 'Q6' schools generally rely entirely on parents' contributions.

[35] I am indebted to Dan Wilson of EduAction for data on KwaZulu-Natal schools.

does not automatically imply that the school is equivalent to all other schools in that quintile; indeed, it has been shown that some schools in straitened circumstances can deliver good quality teaching while others in similar positions cannot (Christie, Butler, & Potterton, 2007; Chutgar & Kanjee, 2009).

The graph below (Figure 5.1a) confirms the statistics, showing that students from Q1 high schools do significantly ($p < 0.001$) worse than the rest (in the GLM analysis), which are indistinguishable from one another. Two interesting observations may (tentatively) be made. Firstly, having attended an independent (private) school does not confer on one a particular academic advantage, possibly because resources at such schools are used for extracurricular activities as well as for directly academic pursuits. Secondly, although Q2 schools are not statistically distinct from Q3 to Q6 schools, the Q2 line on the graph tends to lie above the others. (There were only four Q2 students and these might simply have been exceptional. All were Zulu-speaking females, from different schools; two had prior experience in tertiary education – see below for possible significance.)

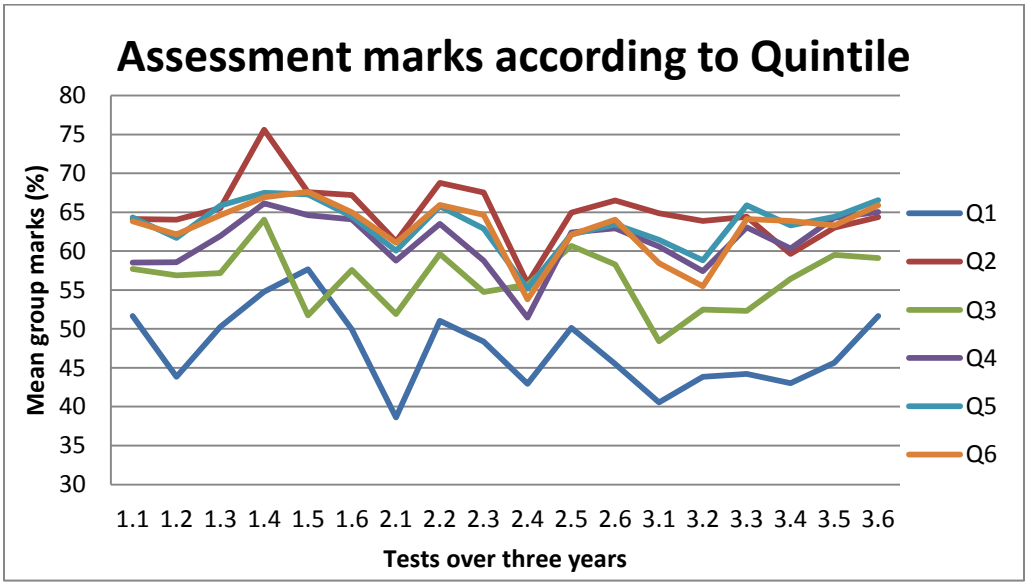

Figure 5.1a Aggregate test marks over three years according to students' high school of origin, classified by quintile.
Q1-6: Quintiles as described in text

Combining quintiles to achieve greater numbers (comparing 21 students from Q1-3 with 127 students from Q4-6) shows a distinct difference between the lower and upper quintiles (Figure 5.1b)

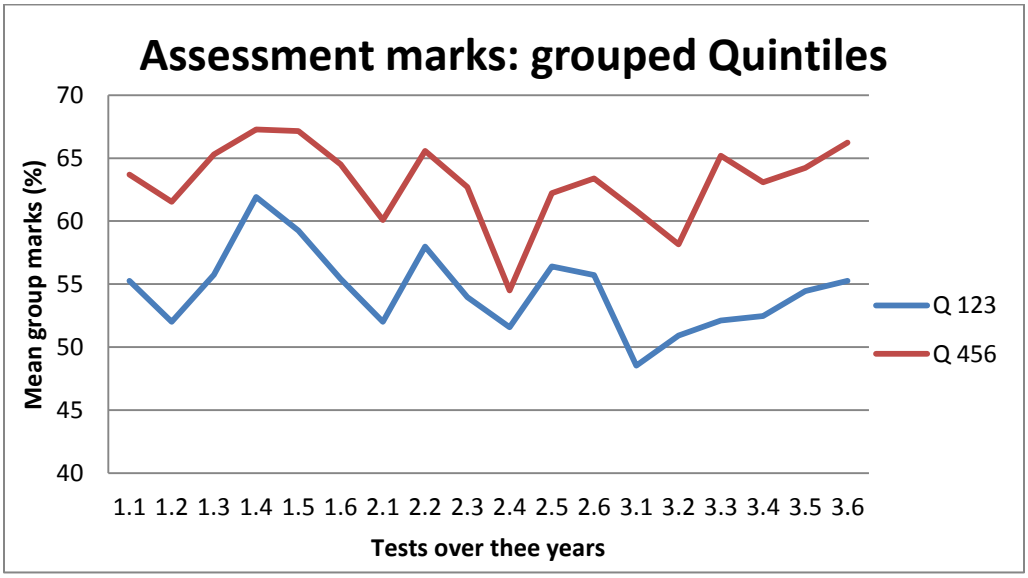

Figure 5.1b Aggregate test marks over three years according to students' high school of origin, grouped by quintile.

The respondents comment on the relative capacities of different kinds of school to produce students with ability. One respondent says:

> ... the HoD[36] schools – I can talk for them – they are generally the ones that are living in the townships. They don't have the money; they go into school and they are very high achievers in terms of academia, because that's the only thing that they have. There's no outside extracurricular activities and no activities to broaden them in schools, so the school concentrates mainly on academics, and there's a lot of competition between schools; there was at that time, because my children came out of those schools.
>
> Dr Pillay 11;533-538 [37]

[36] HoD: House of Delegates – the former legislative body for Indians.

[37] Quotes are identified by way of: Pseudonym Number of interview; Lines in transcript.

Dr Pillay also points out some of the social circumstances that might have a bearing on schools in different areas.

> ... you see, here, when you live in a township, you have a lot of problems in townships, with lifestyle problems: the drug addictions; you really work under very difficult conditions in respect of peer pressure, etc., and I don't think it's the same for rural schools, with this alcoholism, parenting that's not there. Although they may not have parents and they may be migrant labourers, the fact that they're rural: they still have some kind of stability. [Mm] And safety. Dr Pillay 11;545-550

> It's not just the schools; you can put them in the best of schools, but if they don't have the family support, the parenting support, the community support, etc., which <colleagues>[38] are doing in the rural areas. It's a holistic approach to education of the child. That's what it indicates. A lot is family ... Dr Pillay 11;609-612

Dr Pillay's observations refer to the wider issues of culture that underlie the features of race and schooling. Zodwa, comparing two ends of the state school spectrum – namely former 'Model C' schools that charge fees to enable the hiring of extra teachers to reduce class size and increase the number of subjects offered, and rural African schools suffering from a presumed dearth of resources – sees the advantages of attending the former.

> Children that are going to these Model C schools and that do form part of the black community – they have it easier, I guess, and it's not that much of motivation. You know you've got back-up; you know you have your parents that are doing certain things for you and those who are in the rural schools, they really need – they would take any chance to get out and do something with themselves so that they can bring something home. And some of them are really disadvantaged and the best way to – for them forward is to really push hard – and work hard. Zodwa 1;626-632

However, Dr Hlubi observes that there is more to education and learning than the type of school one attended. Despite being able to attend the same schools, external

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[38] I use <substitutions> to preserve the meaning of the sentence while removing references that would reveal the identities of individuals. I use square brackets to indicate interpolations [including *post-hoc* explanations].

circumstances might differ to such an extent as to confer advantages on one group and disadvantages on another group of learners.

> The other problem *here* [*i.e.* at Model C schools] is that – which people have complained about, even in the media – is that students will be given assignments by the school, while they're still at school, before they even come to university. Now *these* [*i.e.* Whites and Indians] will go home and look at the newspapers, look at the internet and look in the library and do their assignments and be better prepared. *These* ones [*i.e.* Blacks] will go back to the township, although they are studying in a Model C school, which is a good school, but they go back to the township; it's not easy to get a newspaper, no computers, no Internet therefore, and no libraries, so *these* [B], it wouldn't be so easy for these to prepare that assignment than this one, therefore *these* [W, I] will be better prepared for university than *these* [B]. Dr Hlubi 13;495-502

Many pros and cons of the various types of schools are advanced by my respondents. The classifications of schools used by the university (and referred to in my previous study from which the graphs were drawn) and that used now by the government are not identical. I surmise that, as seen in both studies, a student from a school perceived to be disadvantaged may excel in those adverse circumstances, and continue to excel when allowed access to tertiary education. This is likely to hold whether the school is disadvantaged in terms of its location (e.g. rural) or in terms of its community's socioeconomic status (e.g. Q2).

The complex factors affecting schooling have been noted (Ball, 2006; Bruner, 2006a; Coleman, 1966; Forde, 2007; Henig, Hula, Orr, & Pedescleaux, 1999; Simkins & Paterson, 2005). Certainly, there are schools in South Africa that have stood out as being effective despite their having the same socioeconomic problems as do other schools with a lower commitment to education (Christie, *et al.*, 2007). It has been said: "...it is likely that the school attended may have more predictive value for post-school educational success than individuals' capabilities and effort" (Christie, *et al.*, 2007, p 9). Simkins and Paterson (2005) ascribed 10 – 30% of the variance that they found in language and mathematics performance of South African high school learners to the schools themselves. Bloch (2009) showed that the effects of poor schooling carry through to

university: he recorded a 45% drop-out rate overall and noted that 67% of black students take longer than expected to complete their degrees. Simkins and Paterson (2005), and Bruner (2006a, p. 182) in America, commented on the tendency for the perceived disadvantages of rural schooling to be aggravated by urbanisation. This tendency may be part of the explanation for the "elusiveness of education reform" noted by Henig *et al.* (1999). Forde (2007) wrote of the struggles of black high school students on the Cape Flats (on the outskirts of Cape Town) to succeed against a home background of hunger, lack of resources, and family responsibilities, and a school environment of rundown buildings, too many pupils, and too few desks, books and teachers. Ball's (2006) book echoed this description. Kohr *et al.* (2007) compared achievement in mathematics in various Pennsylvanian high schools with respect to socioeconomic status, sex and race. They found no differences attributable to sex, that white students generally fared better than black students, and that black students were disproportionately disadvantaged in schools serving low socioeconomic areas. These findings appear to confirm exactly some of the findings of Coleman's (1966) landmark study from forty years previously.

In my GEE comparative analysis, the high school attended appeared as the greatest influence on test marks. In the graph, Q1 students can be distinguished from all the others, but as part of the overall interaction represented by the GEE [Appendix I], all quintiles are highly significant influences (Q2 however still showing the largest effect). It is disconcerting that, so many years after the stratification of schools on a racial basis came to an end and resource allocation was made more equitable, the effect of having attended a particular school is seen to loom over its past pupils for an appreciable amount of time (Haeck, Yeld, Conradie, Robertson, & Shall, 1997; Yeld, 2003). As far as my study is concerned, it may be, despite suggestions of outcomes-based education having failed in South Africa, that teachers in the upper quintile schools were able to inculcate habits of enquiry-driven, self-directed learning that stood their learners in good stead when the latter encountered PBL at tertiary level.

Tertiary education experience

Of the 202 students in 1st year in 2007, 166 were straight out of high school, 19 had a year or more of tertiary education behind them, 10 had previously completed other degrees, and 7 were repeating the year. Students' academic background at tertiary level might be expected to predict their future achievements. Dividing the 1st year class of 2007 into the four groups described above, their marks in successive tests are depicted in Figure 5.2.

GLM analysis confirms what the graph depicts: that students' previous academic status made a significant impact (p = 0.002) on their test marks. The statistic demonstrates that the four groups are not equal; however, because of small numbers in some of the groups, post-hoc tests could not be performed to determine exactly what the nature of that difference was. It can be seen that those seven students who had already failed 1st year and were repeating it in 2007 continued to do poorly (line 2). The exception was the test at the end of Theme 1.5. The greater clinical relevance of this Theme (Reproductive health) may have helped these weak students. However, when they encountered new material in 2nd and 3rd year (ETTs 2.1-3.6), their marks progressively deteriorated.

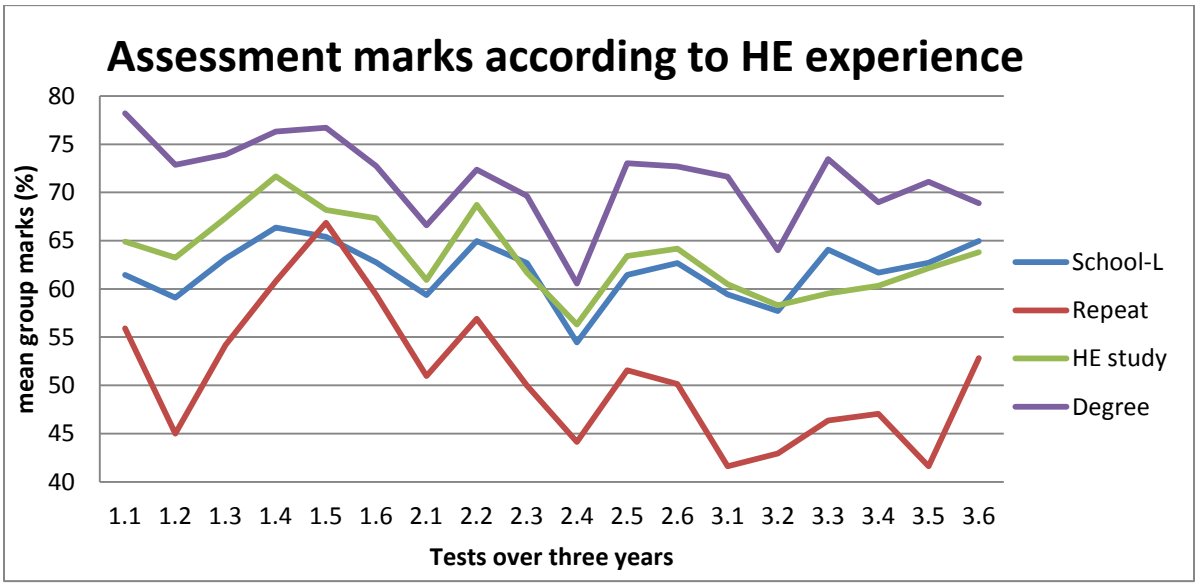

Figure 5.2 Test results over three years according to student status in 1st year.

School-L: School-leavers
Repeat: Students repeating 1st year
HE study: Students who had already commenced some tertiary study

Degree: Students who had previously completed a degree

Students straight out of high school did quite comfortably over the years, and both those with a year or more of tertiary-level study behind them and those who had previously completed degrees excelled. A general pattern of dips at ETT 2.1 (test 7), 2.4 (test 10) and 3.2 (test 14) can be seen (see Figure 5.3 – Year of Study – p. 103). Although the gap between school-leavers and those with prior tertiary experience narrowed over the course of 1st year, degreed students maintained an advantage throughout the period studied.

Those with limited tertiary experience tended in most tests to do slightly better than did the school-leavers. This counters the argument that students who were perhaps not good enough to be selected on the basis of their school-leaving exams had found a 'back door' into medical school. These students, accepted by transfer from other degree programmes, appear to have established by their results that they did in fact have the capacity to cope with medical studies.

Comments on the relative achievements of the four groups of students reflect the expectation that students with some prior tertiary experience would fare better.

> I always have just thought that they would be the upper notch. Even during exam stress time, those that we do stay with around close, they are our friends – they have it all planned out. We're like 'OK, I'm still struggling'. Zodwa 1;519-521

> I was expecting that the mature students would do better, because they are familiar with tertiary learning ... Dr Hlubi 13;408-409

Those, like Lungi, who came to medical school from a background of a prior degree, have their own view of students coming straight from school, namely that the latter are too young and inexperienced.

> I think for, like the students that are coming from high school, it might have been a bit of a shock for them, and a bit of, like 'Wow – what's going on?' because for them, I remember in high school, we used to sit down from 8 to 6, get lectures, and the teacher would be there to solve the solutions and go through everything with you, and you study whatever's

> in the class. There's no – if you do a little extra work – the *cum laude* questions type of thing. So for them I think it might have been a bit of a difficult thing because you also have to remember it's not just about studying; it's about the, the mental maturity of the person. Lungi 3;37-43

There is a general sense that students repeating 1st year are destined to struggle academically.

> The repeats struggle is because they were isolated, or lost souls, or –?
>
> Dr Pillay 11;438-439

> In terms of those that are repeats, this is in keeping with what one observed in practice. [Mm] These repeat students tended to do very badly when they came to the clinical years and it's this group of students that there were a lot of failures and repeats, and even their performance was very poor. Dr Hlubi 13;401-404

Given that my respondents are commenting on a graph[39] that shows less of a distinction between school-leavers and mature students, the smaller number of explanations for the latter's greater success in medical studies is understandable. My judgement, nevertheless, is that the various explanations advanced could well be valid for the groups of students referred to in this section. The literature appears somewhat equivocal as to whether or not previous tertiary education (as distinct from age) is a significant influence on academic performance. An extensive meta-analysis suggested that past academic performance – without separating tertiary from secondary education – was a significant influence on future achievement, as one might expect (Ferguson, James, & Madeley, 2002). A study that looked specifically at medical students with prior degrees concluded that age might be a more weighty influence than having a degree (Wilkinson, Wells, & Bushnell, 2004); however, this study focused on students' approaches to learning, their motivation and attitudes, but not their actual marks. Others have commented on the risk of younger students allowing the mature students to take over

[39] See Appendix E

the group process (Benbow & McMahon, 2001), but again that would not necessarily be reflected in the students' marks.

Students' tertiary education background (StuStatus in Appendix I) is the second most influential parameter in the GEE. Having already completed a degree or having spent *any* time successfully in tertiary studies confers an advantage – the latter having half the impact of the former. Not surprisingly, repeating 1st year has a negative effect compared to coming straight from high school. Relating this to PBL, I suggest that any university programme entails becoming accustomed to a way of thinking for oneself and organising one's activities, rather than passively absorbing other people's thoughts and ideas. The change to PBL for students with prior tertiary experience is thus likely to be more successful than for those coming straight from school. Students who have had a year's unsuccessful experience of PBL have evidently failed to make an effective transition from school to university. The seven repeating students in the cohort included two from the same rural school (Q1); the rest were from Q5 and Q6 schools, implying that having attended such does not guarantee an advantage.

'Year of study' (sequence of assessments)

Of the 202 students who began 1st year medical studies in 2007, 10 failed or dropped out in 1st year, another 10 in 2nd year, and 23 in 3rd year, leaving 159 of the original cohort at the end of 3rd year, which meant an overall pass rate of 78.7% (95%, 94.8% and 87.4% in successive years). The 159 successful students who started their medical studies in 2007 scored an average of 62.2% over the first three years. This score varied from test to test.

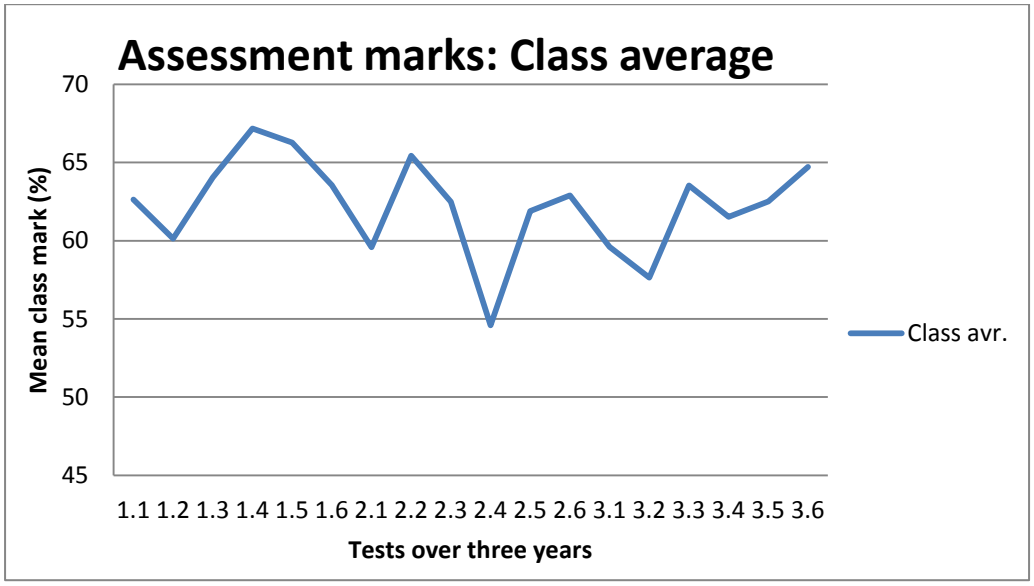

Figure 5.3 Class average test marks over three years.

Over the three years, a greater than 10% difference is evident between the highest (1.4) and the lowest (2.4) class average. Theme 2.4 ('Body in motion') is known to be a difficult theme, as are the others with relatively low marks: 2.1 ('Cardiorespiratory') and 3.2 ('Cell dysfunction'), all of which contain content and concepts that students tend to find difficult.

As seen in the graph, students' marks were worse in 2nd year (year average: 61.1%) than in 1st year (year average: 64.0%). They improved again in 3rd year (year average: 61.6%). This movement – particularly in the light of the smaller contribution of 'matric points' as a factor (see the following section) – suggests that the transition from high school to university may have been less momentous than the increased difficulty of the 2nd year syllabus. The failure rates in the three years (based on end-of-semester exam results combined with end-of-Theme tests results) reinforce this perception: there were 8 failures in 1st year (plus two who left for other reasons), 9 (plus one) in 2nd year, and 22 (plus one) in 3rd year[40]. Of the student interviewees, only Krish and Marcus remark on

[40] 2009 was a bad year for 3rd year students: the proportion of time allocated to Themes compared to ward work was significantly reduced, and in the same year the types of assessment questions were changed at short notice during the first semester. These combined occurrences may have added to the failure rate of that particular 3rd year cohort.

the fact that the 2nd year marks were lower than those of 1st year, but offer no explanation for this. Drs Pillay and Hlubi wonder whether there might have been problems with the content of particular Themes, while Dr Patel focuses on the fact that the marks generally increased again after 2nd year, implying that the students took two years to become accustomed to the programme.

> Then you can look at what the theme was and what could be the problem if there was a difference. Dr Pillay 11;353-354

> I can only postulate as they went into 2nd year they were more – there was more information they needed to put in, together with the prior knowledge that they had been getting, and also possibly with the confusion – when you learn about the cardiovascular system here and you think you've mastered it and then someone comes with the urogenital system and confuses you further and says the control of the blood pressure also has to do with the kidney and other things – could be; it's just a postulation.
>
> Dr Hlubi 13;370-375

> OK, so we reckon that this thing goes up from 2nd year because the students are more *au fait* with what's going on and the mechanisms of assessment and so on.
>
> Dr Patel 12;870-871

'Year of study' (representing the sequence of Theme tests over the three years studied) did not feature as a variable in GLM analysis. However, it is revealed by the GEE to be the third most weighty factor analysed. The variation between Theme test marks raises the question of whether Themes' content and/or the assessment thereof were appropriately aligned. The degree of difficulty of concepts in the different Themes may have varied significantly. A third possible source of variation may have been the lack of standardisation of each assessment. Since the university has set the pass mark for all assessments at 50%, variation in the difficulty of questions from one assessment to the next is not calculated and then made allowance for. These considerations inevitably lead to the question of whether it is appropriate to alter the pedagogy of a programme – whether to PBL or any other type – without overhauling its assessment practices.

'Matric points'

The 187 students who wrote a South African school-leaving examination had a median matric point[41] score of 44.5, with a range of 25 – 50. While the spread of scores was treated by SPSS as a scalar quantity, I have compared those above and below the median score in an attempt to show the influence of that parameter. (Since the data are highly skewed, the statistical validity of a direct comparison on this basis must be suspect.)

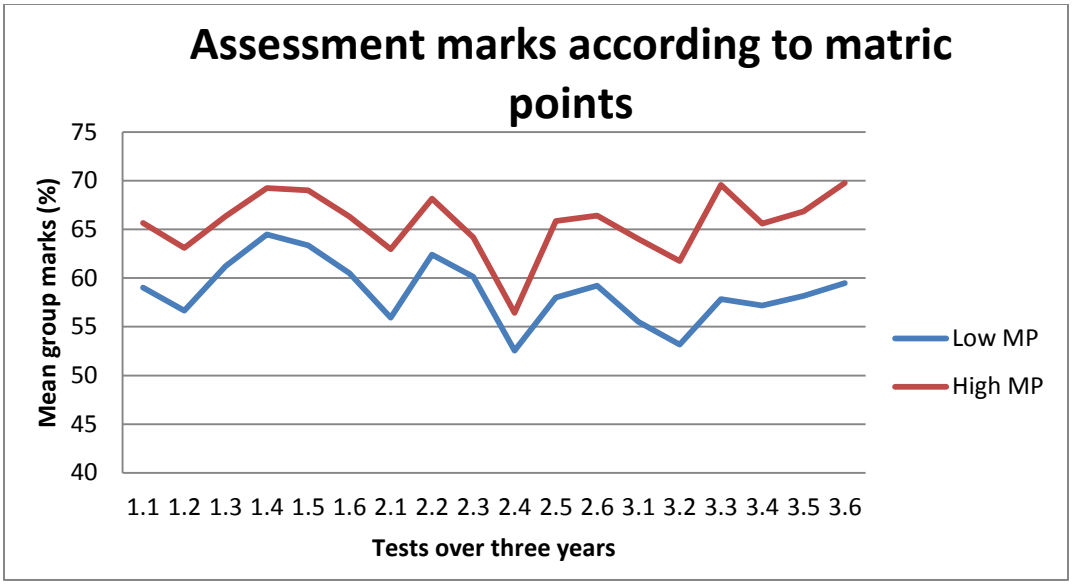

Figure 5.4 Test results according to matric point score
Low MP: Lower half of class
High MP: Upper half of class

Although highly significant ($p < 0.001$) in the GEE comparison, the actual effect of a student's matric point score was small compared to other parameters. It remains a truism that past academic achievement accurately predicts future academic achievement (Ferguson, *et al.*, 2002); however, once in the post-matric academic world, school achievements are evidently of less importance. This serves as a reminder that not all of the outcomes of PBL are cognitive: collaborative learning, tolerance and altruism

[41] For reasons of simplicity and transparency, the medical school grants admission to prospective students primarily according to a 'race'-based quota, and secondarily on a point system based upon their school-leaving examination marks (with extra weight being allocated to mathematics, science and biology marks).

(Singaram & Sommerville, 2011) do not spring from the same source as school-leaving exam marks.

[Respondents were not asked to comment on this relationship, since the previous study did not include it, thus there was no graph to stimulate discussion.]

Age

The age range of the 1st year class in 2007 was 17 to 33, the median value being 19.4. As in the case of matric points, age was treated statistically as a scalar quantity, but I have grouped the class on either side of the median for the purpose of representation (Figure 5.5).

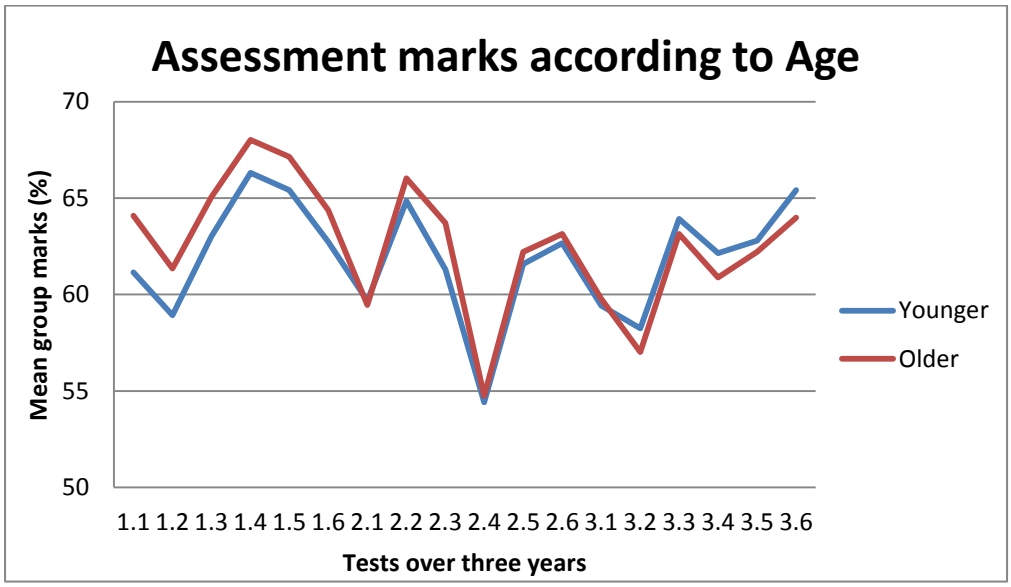

Figure 5.5 Test results over three years according to age in 1st year (2007)
Younger: Lower half of age group
Older: Upper half of age group

One might expect age to be a positive influence; indeed, it is just beyond the limit of significance (p = 0.051) (GLM). Interestingly, while older students appear to start off

with an advantage in 1st year, during 2nd year they are overtaken by the younger students.

[Respondents were not asked to comment on the effect of age, since I had no corresponding graph from the prior study.]

In a study of students prior to entering university, Yong (2010) found that older students had a greater expectation of academic success than did their younger counterparts, and Kusurkar *et al.* (2010) found that age was the greatest predictor of motivation in medical students. Truemen and Hartley (1996) noted that, while older students appeared to have superior study skills, age was only a 'modest' predictor of academic performance. There may be a more marked disjunction in South Africa. When questioning why the four students from quintile 2 schools performed so much better than the nine students from quintile 1, I note that in each case, their average ages were above that of the class. However, in the case of Q2, this was partly because half (two) had been in tertiary education already, whereas in Q1, only two of nine had some tertiary experience – the rest were older because they had taken longer to finish secondary school. Age and prior experience in tertiary education tend to go together in the developed world, but the GEE analysis indicates here that it is not older students' greater maturity, but their greater experience at university, that is the important influence in terms of academic success.

Finance

Another factor that may affect students' academic performance is lack of financial resources. Fleisch (2008), exploring the background to South African schoolchildren's underachievement in reading and mathematics, devoted one of his seven chapters to poverty. I analysed data of students who in their 1st year (2007) received financial

assistance of some sort[42]; 85 students were funded by scholarships or bursaries on the basis of academic merit and 19 received NSFAS[43] loans on the basis of financial need alone.

Statistically, the difference between those students without financial support or who received support based on academic merit and those receiving an NSFAS loan is significant (p = 0.001) (GLM analysis).

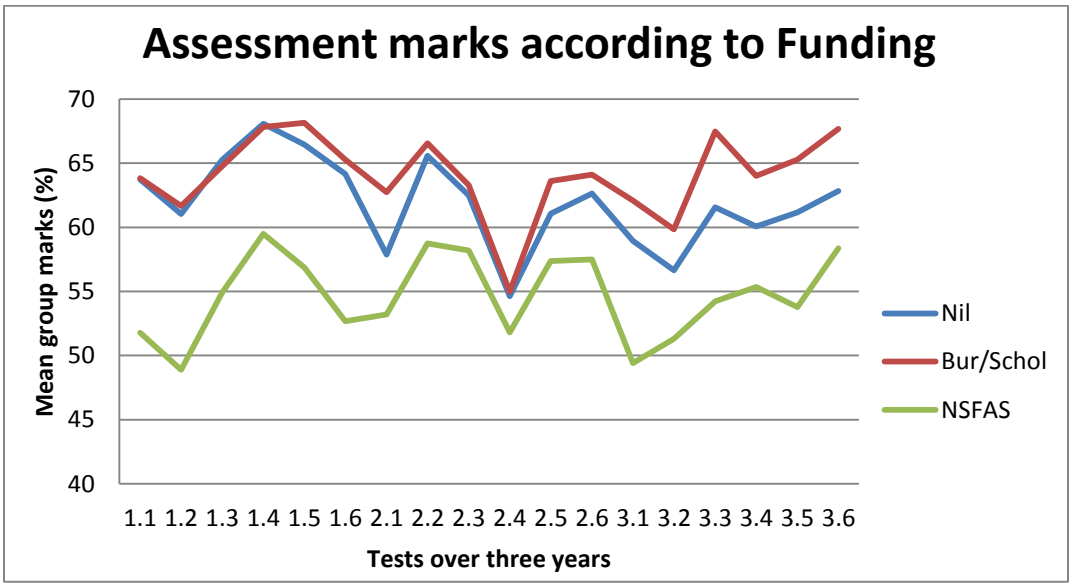

Figure 5.6 Test marks over three years according to level of financial support

Nil:	No financial support
Bur/Schol:	Academic bursary or scholarship
NSFAS:	NSFAS loan

Those receiving bursaries or scholarships on academic grounds did better, on the whole, than those financed by their families. One might have expected family wealth, family resources and family pressure to excel to have encouraged and enabled the latter to do

[42] This information was provided by Mr L Wood of UKZN's office of Management Information. Mr M Davids of the Student Funding Office clarified the distinctions between the awarding of bursaries, scholarships and NSFAS loans.

[43] The National Student Financial Aid Scheme of South Africa was established by act of parliament in 1999 "to ensure that students, who have the potential, but cannot afford to fund their own studies, will have access to funding for tertiary education" (https://www.nsfas.org.za/web/view/students/student_home/studenthome).

better. As Krish explains, students living at home, under the watchful eye of their parents, might produce improved results in consequence.

> Uh – the majority of the higher groups live at home with their parents [I'm thinking the same thing] and living at home tends to have – *I* find – a better effect on your learning and studying, as opposed to living away from home. Krish [& Marcus] 5; 535-537

Source of finance turns out to be an insignificant influence on students' academic performance when analysed in the GEE. In retrospect, the measures used are more likely to be surrogates for (previous) academic performance rather than for socio-economic status. Those awarded bursaries or scholarships are not necessarily less well-off than those who were not financed externally, and those reliant on NSFAS support are less secure both financially and academically. One might expect those who have both academic ability and the drive to seek bursary funding to excel. Conversely, although not voiced by my respondents, I am aware that the low achievers without financial backing spend much of their valuable time standing in queues to beg for a loan. Expecting them to make sense for themselves of PBL pedagogy is perhaps expecting too much.

[Respondents were not asked specifically to comment on this relationship, since I had no corresponding graph from the prior study.]

'Race'

In terms of race[44], there were 112 Black Africans, 70 Indians, 11 Whites and 9 Coloureds in the cohort I analysed. These proportions are the deliberate result of the Medical

[44] The word and concept of 'race' are still contested in South Africa. Imposed by the apartheid government in order to provide differential amenities to different sections of the population, the classification is now being used in attempts to redress these inequities. Black/African is used to refer to the indigenous peoples of Africa, Indian to descendants of the labourers brought from India to the then Natal in 1860 and immigrants who followed them, White to those of European origin, and 'Coloured' to those of mixed race.

Faculty's selection of prospective students according to a quota system that seeks primarily to represent the demographics of the community, rather than being based entirely on academic performance in high school. Students' race makes a significant difference to their test results – when viewed in isolation in GLM analysis.

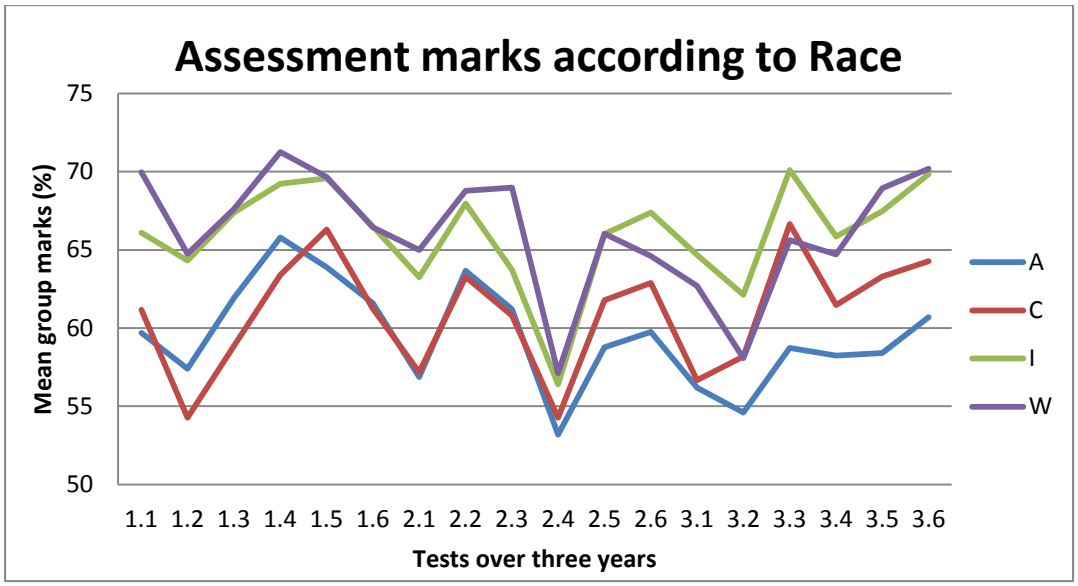

Figure 5.7 Test results over three years according to the race of the students
A: Black African
C: Coloured
I: Indian
W: White

The graph does not show a clear distinction, but statistical comparison shows significant differences ($p < 0.001$) amongst the four races, principally between the African and Indian groups. Other than seeing that Indian and White students' marks tend to be higher than those of African and Coloured students, the graph does not clearly show features other than the test-to-test variations previously remarked upon. Adding details of students' respective high schools to the GEE obliterates the influence of race. I surmise that this effect is the legacy of the racially discriminative policies of the apartheid era: by providing different qualities of schools for different groups of learners, the then government guaranteed that those groups with inferior schooling would have inferior academic achievements. Since children were assigned schools according to their race, the results of that schooling are easily seen in terms of race. (The statistics support

this reasoning: cross-tabulation and application of the χ^2 test shows a highly significant [$p = 0.001$] correlation between race and school quintile.)

As one might anticipate, my respondents make numerous comments about the apparent racial differences in students' test results, the differences also being evident in the corresponding graph of a previous cohort's results (see Appendix E). These race-based differences are commonly ascribed to South Africa's disparate allocation of primary and secondary educational resources.

> Well – who were the people most affected by apartheid? *Those* two groups. [African and Coloured?] Definitely. They were the most dispossessed(?). [So you think this is a wash-over effect still?] Definitely. [After all those years?] Absolutely. Kevin 7;436-438

> Ethnic origin. I'm not surprised. I think that reflects the background in schooling. I'll tell you another thing. [Mm] Indian children: education is important. Grandma will sit and make sure the kids go to school. And you *had* to go to school and you *had* to achieve. School was very important. Dr Kathrodia 10;446-8

Dr Kathrodia introduces a further distinction in terms of schooling: not only were the facilities different, but communities' engagement with schooling was different. Dr Patel is able to shed more light on Indian students' scholastic achievements.

> Indians – and please note this statement very carefully what I'm saying – the Indians lived in the shadow and the shade of apartheid. The Indian community was actually protected by apartheid. [Yes?] That surprised you. [In what way were they protected?] They were protected by apartheid – in terms of maintaining their culture, their independence, their self-development, academic development. [Right] Internal mechanisms were there, so they kind of used that opportunity to excel ... Dr Patel 12;894-899

There is a general rejection of the idea that race itself was responsible for the differences seen in the stimulus graphs that I used. Osane in fact thinks that her class is completely mixed as to its achievements and that their achievements cannot be separated out on a racial basis.

> 'Cause seriously, I think if you looked at the class of 2009 – well, our class I'm just trying to say – you'd find a totally different picture to what you have here [in the graph]. 'Cause I

> think there's – you have such a mixed group of people, you know, and, um – *ja*, mixed group of people from different backgrounds, with different ambitions in life, and we're like twenty-first century now, thinking modern I think, and – I don't know – I just don't see what I see here being reflected in the class that we have. Osane 6; 957-961

Dr Hlubi rejects the idea of 'disadvantage'; he ascribes different levels of achievement to different amounts of academic effort, although he does concede that African students may have more socioeconomic problems than other students.

> I think – um – it is to do with perhaps motivation, or hard work – um – I don't think it has to do with disadvantage. This is the word that has been used: disadvantage; that they've been disadvantaged and all that. I don't think that is the situation, because – [Mm?] – the reason I'm saying that is that when you are looking after students – either you take them in a tutorial or you follow them up in the ward – you can pick up a good student. There are African students and Coloured students that have done well – and if they read, they actually do well, and some of them have picked up prizes. ... I know that there are students who have issues: financial issues; they've got problems at home, family problems at home and all that, and that tends to happen [more] with African students – [Mm] – than White and Indian students. Dr Hlubi 13;428- -442

Susan raises similar issues.

> Indian families and Whites tend to have less responsibilities because they're more well off, and other students might have a lot more on their plates than anyone in those other two lines. Susan 1;599-601

Taking another approach, Ahmed points out, very sensibly, that the medical school selects students according to a racial quota system. Those race groups represented by relatively few students, chosen from the top of the academic rankings, automatically tend to achieve better academically. Those race groups represented by larger numbers are also selected from the top but necessarily reach further down the rankings ("allowed more variability"), resulting, on average, in a likelihood of lower achievement.

> One is how are they selected, because my impression is that it's more tightly controlled among the Indians and the Whites. There's only a handful of Whites in my class, so when they qualified from matric – and I know you're going to show me that other graph just now – but as a general rule, when they qualified from matric – what was their – what was their

> category of pass? Did they get an A+ pass and come here say … and did that guy, because he was allowed more variability, he came with a B pass. So they're not challenging on the same level. Ahmed 2;427-432

Having pointed out the effect of the quota system as an important confounder of the effect of race, Ahmed suggests that there may also be effects arising from students' childhood backgrounds. Susan and Zodwa suggest that one's background influences the way one thinks.

> I think like everyone has that ability to develop normally – you know, like – this, it's rather, rather than it's because of the race that you're getting these graphs, it's because of how you're influenced from small. Maybe there's some environmental factors.
>
> Ahmed 2;509-601

> It's not the schooling; it's even from back home – how you're taught how to think – [OK] and how to see things. Susan 1;584-585

> I've been around white families and they let their children really think abstract and not just think [gesture] box – this is the box and this is how far the box goes; you can't open the box; it can't be flat – it's just a box; it's made to carry stuff; you can't do anything more than with a box. You're not taught to think beyond what the box can do for you.
>
> Zodwa 1;576-580

Lungi reveals something of these issues in her experience of a relatively well-resourced school but a resource-poor home.

> And in terms of socioeconomic – *ja*, we were all staying in Durban North, we could all afford the Model C school, we were all dressing the same, but when you go back home, we weren't living the same lifestyle. It still goes back to that. Even though I could afford that, but my parents still didn't know anything and couldn't assist me with anything, even though they somehow had a job that managed to pay for the Model C school, so I still went back home and I was by myself to figure out everything. So I think that actually, that to me explains that. Lungi 3;786-791

The range of opinions on the effect of learners' race is interesting: from those who deny that race itself is an influence on academic performance to those who think that certain groups have material advantages that account for their superior achievements. From

respondents' accounts, it does appear that, for instance, Indian families have a particular appreciation of the benefits of education and a corresponding drive to succeed. The logic is unassailable that a quota system with unequal numbers virtually guarantees that those groups that are numerically larger will automatically include a wider range of abilities and thus a wider range of marks. Osane is not alone in the hope that, as schooling improves and education becomes more available to successive generations, the differences between races will diminish.

Race – however it is defined in the literature – is usually conflated with class and socioeconomic status (Alexander, Entwisle, & Bedinger, 2007; Apple, 2001; Landry, 2007). Henig *et al.* (1999) documented racial inequalities in both educational provision and educational achievement in the USA, as well as the perception that these were racially based and economically driven. Interestingly, Gillborn and Misra (2000) noted that Indian children living in Britain tended to outdo all other groups. For various reasons, studies in other countries may not be applicable here, not least because white students form the minority in this country and at this medical school, and yet, in contrast to minorities elsewhere, are high achievers. Mwamwenda (1995, p. 130) described African children achieving Piagetian milestones a couple of years behind their European counterparts. He ascribed this to the assertion that Africans interact more socially and emotionally while Europeans interact more with objects, and pointed out that under comparable conditions no differences were found. The area in which Mwamwenda (1995, pp. 421-432) did in fact document a difference between Africans and Europeans was in terms of conceptions of the self, Africans being more conscious of themselves as part of a wider community.

Ahmed and Susan hint at different ways of thinking, and Zodwa graphically describes her astonishment at the diverse thought processes that she witnessed in her White schoolmates. Zodwa grew up in a substantial town, and her parents are both professionals, but it is tempting to see in her description an echo of Bernstein's distinction between the restricted code of conversation amongst working-class people and the elaborated code he ascribed to middle-class folk.

Ogbu's (1992) socio-historical theory of 'voluntary' (immigrant) versus 'involuntary' (conquered or enslaved) minorities is helpful in understanding the dynamics of South African minorities and their optimistic or pessimistic interaction with the dominant educational system (Gibson, 1991; Ogbu, 1991). Although Whites represent a minority, Ogbu would regard them as a voluntary minority (and of course it was *their* educational system that was imposed on South Africa for so many years). Africans would be regarded as an involuntary minority (that is to say in terms of power, not numbers). Coloureds would be another involuntary minority. Indians, although initially brought into the country as indentured labourers, have certainly transformed themselves into a voluntary minority. This classification helps to explain the academic ascendancy of Indian and White students.

GEE analysis does *not* highlight race as a significant factor relative to others, although, as noted above, high schools, which were previously racially allocated and differentially resourced, may still be showing some of the effects of that racial bias. A study (Singaram & Sommerville, 2011) on the dynamics of small-group collaborative learning was able to document beneficial interactions in terms of some of the diverse demographic features for which race may stand as a surrogate.

Sex

In the cohort studied, female students predominate numerically (112), while there are only 90 males. Over the 18 tests, female students appear to dominate academically, except in four tests. However, the difference between the two sexes is not statistically significant, even on GLM analysis. GEE analysis does not show sex as a significant variable ($p = 0.139$). The small difference between the sexes may be due to the influence of other parameters; the female students may happen to have attended better schools than the males, for instance.

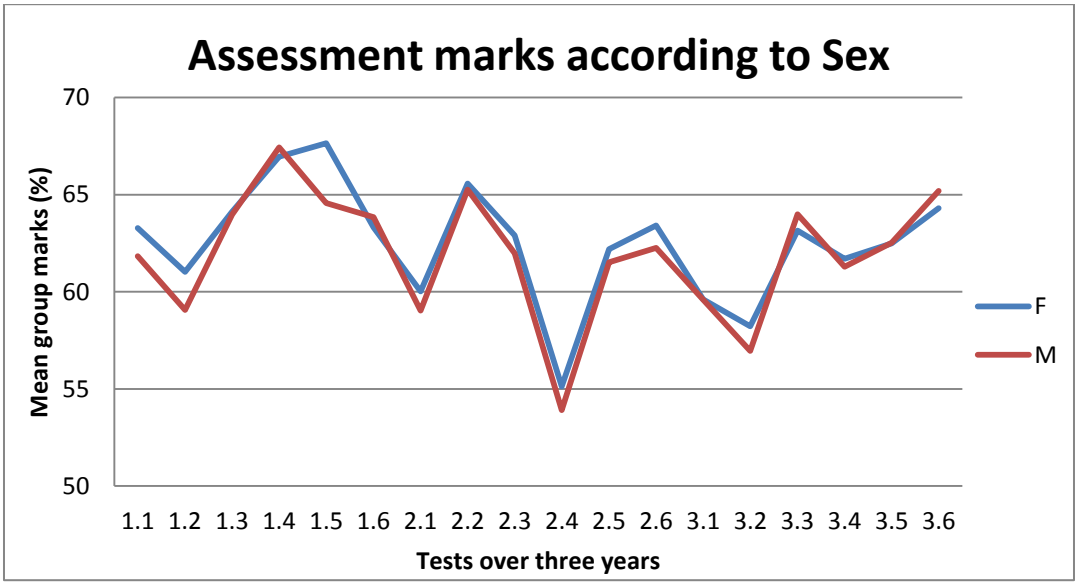

Figure 5.8 Test results over three years according to students' sex
F: Female
M: Male

When asked about possible differences between the sexes, staff respondents generally speak about females' application when it comes to their studies.

> I've seen in the clinical years that women tend to be a little better at preparing for a tutorial and there seems to be a better organisation; and also I've noticed that more and more female students are group representatives. ... In terms of answering questions – displaying that you have read – females are a little bit better ... Dr Hlubi 13;378- -384

Dr Hlubi notes the planning abilities and sense of responsibility that women usually possess. Student respondents tend to confirm the idea that females are more diligent with regard to their studies, and suggest a range of reasons for this, such as: maturity, less risk-taking, better organisation of their lives, and an outlook more suited to a caring profession.

> No, they are more diligent, that's true … They're more mature, isn't it? But then you'd expect that the mature students should do better, but females are generally three to four years ahead of their male counterparts. Kevin 7;421-424

> Guys drink more. I don't know if that's ... or not. Risky behaviour. Krish 5;502

> …but medicine is quite a touchy-feel endeavour(?). Ah – ladies are very vulnerable and stuff like that, and I think if one relates to the field with passion and the intellect, then you care about the kids and helping people, then the person could be dying. I'm not saying all guys, but guys just have outside interests(?) Imbali 6;688-690

Despite the fact that the difference in marks between the sexes is not significant in this cohort, none of the respondents was more than momentarily surprised that females tend to have higher marks, and all recognise that there may be valid reasons for females doing better than males in tests. This is consistent with the trend elsewhere in the world. Ferguson *et al.* (2002) and others (Haist, Wilson, Elam, Blue, & Fosson, 2000; McDonough, Horgan, Codd, & Casey, 2000) have found that female students, in the main, performed better than males. A longstanding trend has been noted, namely that girls in general perform better than boys in school (Arnot & Mac an Ghaill, 2006; Gillborn & Mizra, 2000), and Gibbs (2008) commented on boys' relative under-achievement in school having effects on enrolment for higher education in the USA.

Language

The students in this class speak a total of 15 languages between them. The highest number (91) speak English as their first language, while Zulu (65) is the next most common mother tongue. When looking at all 15 languages, no clear pattern emerges. This is confirmed by statistical analysis ($p = 0.145$ on ANOVA) (GLM). As in the case of students' academic status, post-hoc tests, if indicated, would not be feasible because several languages are spoken by only one or two students.

Comparing the marks of first-language English-speaking students with those of second-language English speakers as a group does, however, show a significant difference ($p < 0.001$)(GLM).

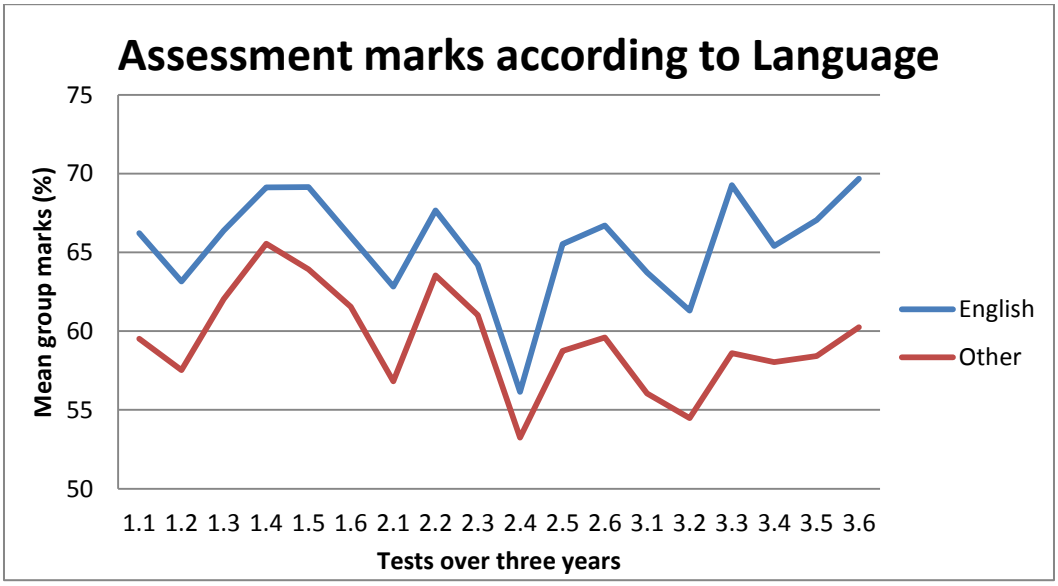

Figure 5.9 Test results according to students' first language.
English: English first-language speakers
Other: English second-language speakers

When grouped and compared in this way, the difference between English- and non-English-speakers is evident. Despite this, in the GEE analysis this difference is not a significant influence when combined with other parameters, although intuitively one would expect it to remain important. It may have been submerged by other parameters.

When the language of instruction and the first language of the student coincide, a significant benefit is to be expected. Those who are *not* first-language English speakers are aware of their handicap – but do not consider it to be insurmountable.

> Look, we all understand English but – um – I think for someone coming from a more rural area, who's just grasped the concepts of English, to do medicine, which is like another language itself – there's no way you don't experience difficulty. Lungi 3;585-588

> Yes I think there is [a language barrier] because people who're not from the urban areas – they're not – they're taught in Zulu, or their native language, and that's what they know, and when they go to varsity and stuff, they struggle with understanding certain words and statements and stuff, and learning the concepts is difficult, because the textbooks they're reading now are English instead of what they were used to reading from this school or something. Imbali 6;734-738

> I don't think that is a problem. [Mm?] I think the students have been conversing in this language from high school. Most of them – *all* of them have been learning in English, although it may not have been their first language. Dr Hlubi 13;71-72

Given that grasp of a second language is itself difficult, and grasp of new concepts expressed in a second language is an added layer of complexity, nonetheless, respondents react negatively to the suggestion of delivering the programme in Zulu.

> It's not that they don't understand the English – they do – but when it comes to medicine there're certain things that they'll take longer to grasp. So putting it in Zulu – it actually takes you two steps back, because they're going to learn it in Zulu; now what are you going to do because we're not going to write our papers in Zulu [Why not?] and explain to consultants in Zulu. ... I honestly wouldn't write a paper in Zulu. Zulu is a very difficult – it's easy to talk but difficult to write. English is a lot simpler, honestly speaking.
>
> Lungi 3;599-608

> But it will help, I think, receiving lectures and notes in Zulu, because it would make it better. [*Ja*] But like, I've got this point: at the same time it would take us back to the whole '94 apartheid thingie – and then we – I don't think it's going to help much.
>
> Imbali 6;761-763

In the literature on learning in a second language, I find both support for and contradiction of the intuitively obvious idea that learning in a second language is disadvantageous. In South African schools, Simkins and Paterson (2005) found that where the language of instruction was the same as the home language, children's test results were better. Howie *et al.* (2006) reported that the low literacy rates in South African primary schools was considerably exacerbated in the case of second-language learners. Heugh *et al.* (2007, p. 118) wrote: "...teaching, learning and assessment in languages other than home language may have negatively affected learner performance in *all* learning areas" [my emphasis]. In recognition of the "structural disadvantage" of being taught and assessed in a second language, there is a 5% positive adjustment of marks for second-language English-speakers who sit the South African national school-leaving examinations (Christie, *et al.*, 2007, p. 9). This is likely to explain the relatively poorer performance at tertiary level of learners given this artificial boost.

A publication on primary school science teaching in the USA mentioned the poorer performance of second-language English speakers (Stoddart, Solis, Tolbert, & Bravo, 2010). In a USA medical school, it was found that Asian Americans, who generally had good academic records, fared worse in the clinical years; it was suggested that this could possibly be related to their slightly inferior ability to read English texts (Xu, Veloski, Hojat, Gonnella, & Bacharach, 1993). In contrast, Canadian primary school learners of mathematics and science in their second language were described as scoring as well as first-language learners in assessments in those subjects (Genesee, 1995). The same author (Genesee, 1994) suggested that second-language learners may in fact bring to bear on their studies a wider range of views and experiences than do monolingual learners. Certainly, the second-language students at UKZN are conscious that not only must they surmount the language/terminology barrier but that they must also be able to negotiate it on behalf of their patients. These students, who have school-leaving proficiency in the language of instruction, are conscious of the difficulty in learning subject content.

My respondents advance many reasons for not using Zulu as the medium of instruction: the difficulty of translating concepts, the unavailability of textbooks, the fact that learners are accustomed to English as a medium of instruction and aware of its role as an international language, the fact that many students from other parts of the country or continent are unable to understand Zulu, the fact that many Zulu speakers would struggle to speak and write 'correct' Zulu, and the thought that mother-tongue instruction smacks of the apartheid era. Similar findings in the literature confirm these perceptions. Obanya (1995, pp. 322-323) mentioned the perception in West Africa that African languages are not suited to scientific discourse, and Heugh (2009, p. 104) described a similar suspicion that Xhosa was "old-fashioned and used simultaneously by intellectuals and rural people."

One might expect success in PBL to relate to language skills, both oral – in small group discussion – and written – in deciphering textbooks. In striking – and counter-intuitive – contrast to the comparison between English first-language and second-language

speakers portrayed and discussed above, the GEE multifactorial analysis showed that language as a factor was *not* significant when compared to other factors. I ascribe this to the fact that these students, as remarked upon earlier, have survived a selection process (in order to be admitted into the programme), are determined to succeed, and feel, as they claim, that the language barrier is not as difficult to overcome as is the barrier of technical terminology.

Facilitator background

I have constructed a graphical representation of the relationship of test marks to facilitators' background training. For the purpose of comparison, I divide facilitators into: medical doctors – those who qualified with an MBChB or equivalent degree, medical scientists – e.g. anatomists, pharmacologists and pathologists, and postgraduate students – those studying towards a Masters or PhD in a branch of medical science. Bearing in mind that small-group members and facilitators change with each theme, I portray the average marks of all those who had each kind of facilitator for each test as an attempt to indicate the effect of a particular type of facilitator. This necessarily combines different students – each with individual characteristics – for each test, which may well confound the effect of the facilitator's background. As an indication of how test marks aggregated when divided according to facilitator background, the means for the 18 tests over the three years were: 62.5 % (postgraduate students), 62.1 % (scientists) and 62.1 % (medical doctors). From these means and in the graph no difference is evident (Figure 5.10). This is reflected in a non-significant *p* value on GLM analysis.

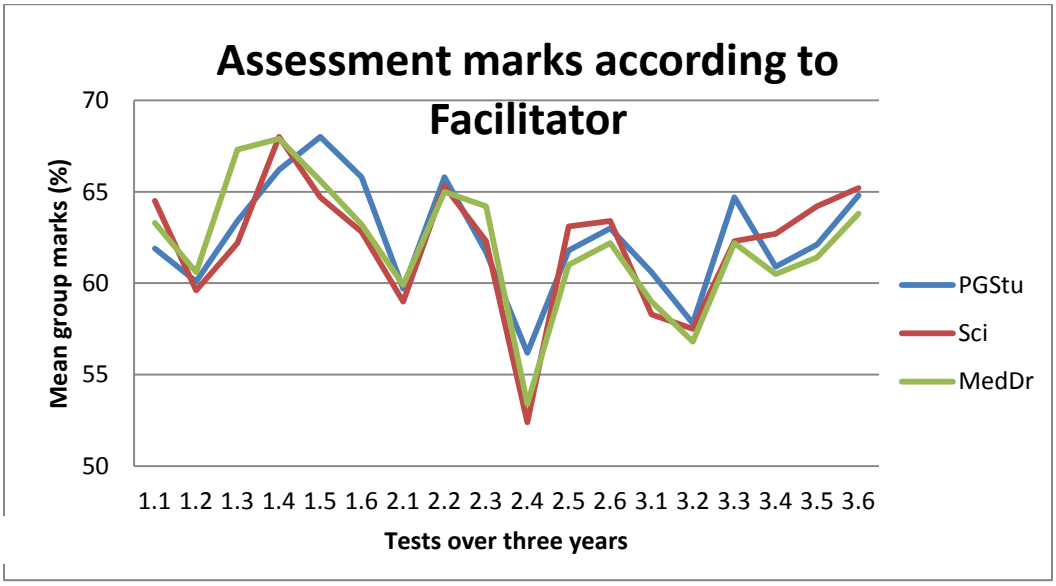

Figure 5.10 Test results over three years according to facilitator background

PGStu: Postgraduate (Masters/Doctoral) students
Sci: Scientists
MedDr: Medical doctors

All the students – and one member of staff – feel strongly that facilitators should be medical personnel.

> From my experience in the past, I've really enjoyed and participated and quite felt I should really do my work for the tuts because these are doctors that ideally we're talking about. Most of the time they give an approach, and then in the tutorials they normally have the 'Why?' question – "Why would you say that?" – d'you understand? But those who are not doctors tend to just come and they listen to you. They come and they just "Say out whatever you know" – it's more about – to us – to most of us students, we find that we end up knowing things but nobody understands them. Matlodi 4;130-135

> The lectures and the facilitators should be medical clinicians. I've had brilliant clinicians, and our tuts are ten times more rewarding, as compared to a basic science facilitator – 'cause they just don't have the whole over-picture. Kevin 7;163-165

> That is where the general approach comes in – the intra-disciplinary general approach comes in; and that can only be done by a clinically qualified person.
>
> Dr Patel 12;226-228

The reasons advanced for preferring medical rather than non-medical facilitators are not always well articulated. In the main, medically qualified staff members are thought to

have a greater understanding of the subject and thus be more capable of effectively guiding and stimulating the students. Dr Patel, on seeing a graph that shows no difference in test results between those who had medical or non-medical facilitators, concedes that the graph does not support the idea that only doctors can train doctors.

> So these results indicate that they're kind of parallel to the performance results, first of all, but, more importantly, they don't indicate any difference at all in a medical or a non-medical facilitator. I find that highly surprising. [So do I!] Because it destroys my whole hypothesis! Dr Patel 12;1068-1070

A number of responses indicate a possible reason for the equally good marks of those students who had non-medical facilitators: the fact that students have to make sure that they themselves understand the subject matter since they feel they cannot rely on their facilitators to help them achieve that understanding.

> I'm at stake here. This person's not going to be writing the ETT so in the process, personally, I work extra hard to achieve a good mark if I don't have a good facilitator. Zodwa 1;655-656

> I still think it's student-dependent. It doesn't matter who the facilitator is. But that includes students and staff – you don't need a medical degree to do that. Krish 5;699-700

Zodwa and Krish state a truism of PBL, namely that learners have to drive their own learning and that the facilitator should be of less importance. Dr Kathrodia agrees that maybe the facilitator's background does not make a difference.

> ... if you've got your facilitators trained as you've already done before they become facilitators then I think there won't be much of a difference. I think there won't be much of a difference, because they've got a good grasp of the situation, so I don't think there will be much of a difference. [Despite the fact that some of them are likely to understand the medical material –] – better than others; yes; a lot of facilitation is just general aspects of learning, and if they get that right, it's OK. Dr Kathrodia 10;385-9

Some respondents pointed out that having a medical facilitator could be a *dis*advantage, inasmuch as he/she might be tempted to teach the group and thereby short-circuit the

process whereby the students search for knowledge on their own and reason it out for themselves.

> …it may in fact be that these facilitators who are not medical, the students will have to go to the library and find out for themselves because they are not actually being taught, and it may be that the medical facilitators maybe may find themselves helping the students a little bit. Dr Hlubi 13;566-569

> The doctor will tutor. We are used to tutoring, and that's what students love. They sit back, even in small groups, and it's very difficult, when you've learnt in a didactic background, and you come from a training like we've had, where I'm an expert in my field, that I cannot stay away – that is the kind of learning I've had, and that is the kind of learning I will instill. Dr Pillay 11;319-323

Some respondents, exemplified by Dr Milner, think more laterally about the implications of the test results, making the sensible point that numerical test marks do not necessarily provide information about the process by which the marks were generated.

> ... is it saying that they were more dependent on their non-small-group activities? [That's – yes] You know, what is actually – is the PBL process actually reflecting in the test results, or is it the lecture attendance and the prac attendance that is reflected? [*Ja*] So it doesn't – is it actually then a big deal that they've got medical or non-medical facilitators? Dr Milner 8;703-706

So, despite medical students' desire to be educated by medical doctors, the strongly-expressed feelings about non-medical facilitators received no backing from the marks. Indeed, there may be good reasons for doctors *not* being better facilitators. Zodwa's comment – "I work extra hard to achieve a good mark if I don't have a good facilitator" – makes the point exactly. Facilitators who know enough to *teach* their groups may be doing the latter a disservice by short-circuiting those students' active search for knowledge and meaning. Alternatively, as I stated at the beginning of this chapter, using test marks as a surrogate indicator of learners' engagement with the pedagogy may not have strong validity. The understanding and information manipulation skills learned from facilitators may not be appraised by the formats used in this faculty's

assessments. One would like to think that, because assessment material does not reflect only what was covered in lectures, students' assessment marks do indirectly reflect the intellectual activities engendered by all aspects of PBL. The fact of the matter remains that no definite conclusion can be drawn from the studies conducted to date as to what quantity or quality of expert knowledge a facilitator should ideally have. Certainly, this study is unable to settle the debate. Learners' strongly-held opinions notwithstanding, facilitator background was not significant when inserted in the GEE.

Summation

Numerical analysis of possible influences on learners' performance in assessments through the first three years of the MBChB programme shows some congruence and some surprising contrasts with the literature. The type of high school attended, learners' previous tertiary education experience, year of study, and school-leaving exam results were significant factors, while sex, facilitator background, 'race', language, age and financial need were not, despite general perceptions to the contrary. It is intriguing that, compared to so many demographic variables that have been shown to be influential in various settings (chiefly in primary and secondary education in South Africa and elsewhere), the majority of the variables turn out *not* to be independently influential on the performance of this select group of tertiary-level students.

I have indicated that it is not surprising that the small number of demographic characteristics studied has, when analysed in terms of their mutual interaction, condensed down to even fewer, probably because of their interdependence. Thus Ahmed pointed out (p. 112-3) that, in the circumstances prevailing at present, the racial quotas aimed at redressing past inequities of access to higher education may themselves result in racial inequities due to the need to dip deeper down the pool of applicants in those race groups requiring larger quotas. A little thought reveals that in fact this stems from inequalities in schooling. If every race group in the country had access to the same

quality of schooling, their academic achievements would be broadly equal. In other words, the different pools of applicants from which to select different racial quotas would vary in width, not depth. Selecting numbers of students proportionate to their representation in the general population would then yield students of equal academic ability in each race group (see Figure 5.11).

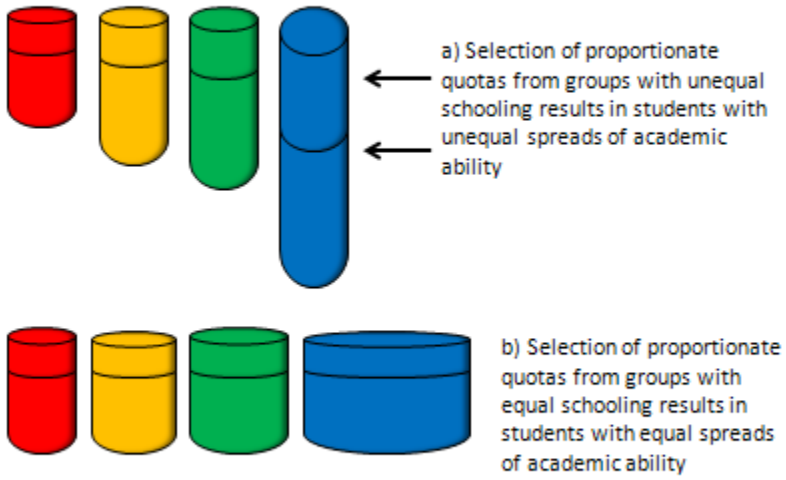

Figure 5.11 Illustration of the influence of racially-based school inequality (a) or equality (b) on academic prowess of students selected according to proportionate racial quotas

This serves as one example of the interaction of students' demographic characteristics (and of the importance of qualitative findings to help explain quantitative data). With this numerical appraisal of influences on the academic performance of the whole cohort of students as background, I now turn to constructing accounts of my selected respondents' perceptions and experiences of PBL.

6

Student

This is the first of three chapters describing the three '*personae*' at the medical school: the student, the teacher and the institution[45]. I draw descriptions from interviews with representatives of the first two and documents emanating from the third. I combine, in this and the two chapters to follow, role-players' accounts of their own and the other two roles. While perception and experience are not synonymous, they are closely linked; one's perception of something is likely to influence one's experience of it and, conversely, experience shapes perception. Rather than maintain what may seem an arbitrary distinction between the two, I merge them to depict the *personae* that are my primary interest.

I divide the themes[46], (as captured in NVivo®) that emerged from the interviews and documents into three broad areas: engagement, learning process, and students' growth into the learning process. I describe these areas in terms of the themes that aggregate under each heading, comparing and contrasting students', staff members' and institutional viewpoints, and relating them to the literature on PBL.

Learner engagement

The role of the student in PBL is alluded to by students and staff in all thirteen interviews. Their responses express a range of intellectual engagement from active to passive (albeit that students consistently portray the effort that they put into learning as

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[45] This organisational *schema* arose from Giroux' (1988) description of the three 'voices' in education: the school voice, the teacher voice and the student voice; it seemed that the voices might express three corresponding persons.

[46] The list of themes ('nodes') is given in Appendix F

substantial) and a variety of internal and external motivating factors come to light. The opinions expressed by staff and student respondents contrast to a degree with the expectation of active engagement by students as suggested by the institution and the literature.

Student initiative

Ahmed typifies student responses, which reflect a spectrum of intellectual engagement from dynamic to inert. He also expresses a spread of opinions about the purpose of their efforts – whether they should be learning how to learn or whether they should be aiming merely to pass the assessments. He points out one way of learning actively.

> Um, what happens is, we get, we get maybe like three groups sitting here. Some people, they take a very keen interest in trying to understand what's happening; the second group will just listen; and the third just couldn't be bothered, you know. ... Some people say this method here doesn't work, because your role as a medical student is not to develop a technique of learning that's trying to be – not imposed upon you but, you know – but, um, it's to pass. ... What, what this method does do is that, it tells you that to learn, teach others. Ahmed 2;35-38, 66-68 72-73

Lungi, an active learner herself, and Dr Hlubi share the feeling that their expectations of PBL are not being met by the majority of students.

> Again, that's a personal thing, whether they want to study or not, um, and do their work, but I feel that, if there could be some way to make sure that with these problem-based groups everyone participates and – yeah I know, it's like trying to give everyone money and making everyone a millionaire – but I think that's the only sad part about it for me that not everyone is gaining as much as they could from it. Lungi 3;75-79

> The students prefer to be spoon-fed, and even if you try to be interactive in a lecture, they just look at you, and when you try to find out why this is happening – ah – they don't have that enthusiasm that we expected that problem-based learning would give them.
>
> Dr Hlubi 13;215-217

Vusi points out why some students might appear not to be engaged, and recognises that verbalising material is a useful part of learning.

> …you find that people hide not only because they didn't do their work; because they're shy. So you find that someone went and read their Guyton[47] and for the sake of themselves couldn't understand anything, but if they were to be challenged in the tut, it would actually teach them to say out loud, and possibly that's when the penny would drop. Vusi 6;66-69

Drs Patel and Milner both imply that students ought merely to follow the lead of staff members, who have disciplinary and/or teaching expertise.

> So there's a general knowledge, which is common, and then there's a highly specific body of knowledge which is unique to each discipline, and for that you need an expert to first of all gather the knowledge, and secondly to disseminate it to a student who's kind of trained to receive that knowledge and then that student will assimilate that knowledge together with the common area of knowledge from that discipline.
>
> Dr Patel 12;160-164

> Because my one problem with the approach is that 'OK guys, you've identified these various different questions, then off you go and do them and come back with all the nice answers' – um – but how much direction are we actually giving them in terms of what really are the important things here? Dr Milner 8;139-142

Dr Pillay alone among the staff is convinced that students are actively engaged in seeking knowledge.

> And I think, the way the teaching goes, it is making them go into the library, go to the Net, ask and learn. Dr Pillay 11;74-75

Faculty documents indicate that active engagement by students is expected.

> Approaches to the learning that are based on curiosity and the exploration of knowledge rather than on its passive acquisition… Proposed Faculty policy statement
> regarding the design
> of the undergraduate medical curriculum
> University of Natal Medical School (*ca.* 1997)

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[47] Guyton & Hall - Textbook of medical physiology – a standard text in medical science.

> The methodology of the programme is student-centred, self-directed and occurs primarily within the format of problem-based learning within small groups.
>
> Faculty Rules for the Undergraduate Programme
> FMED1 Bachelor of Medicine and Bachelor of Surgery (MBChB)
> NRMMS Faculty Handbook 2009, p. 44

A gamut of student engagement is not unexpected, although the literature on PBL leads one to expect more enthusiasm and enjoyment on the part of students. Staff members perceive a range of student activity, and think that students should follow their lead – but yet think that students do not take sufficient initiative. These opinions do not reproduce the student-centred, self-directed ethos propounded by PBL literature and by Faculty documents. Do students see themselves as passive recipients of teaching?

The labour of learning

Vusi (a low achiever) and Kevin (a high achiever) both reflect on the effort that has to be put into securing medical knowledge. While Vusi swots at his desk, Kevin pursues various avenues.

> And more interestingly, you have to go out there and search for it, so it's not something that passively osmoses[48] into your brain. Yes, you're going to have to sit there at a desk, swot it up; … it makes it harder to – because we literally pursuing it; we're actually out there to go find it. Vusi 6;164- -167

> So, if you're a good student, PBL works – works fine; works well. If you are a good student PBL definitely works well. Because you go and research things – I mean I email Prof <D>, I ask him stuff about <his discipline>; I'll happily email you and ask you stuff; I'll email the physiologists. I'm an active learner… Kevin 7;262-265

Mandla speaks for many second-language English-speakers when he describes surmounting the barrier of medical terminology in order to learn. He articulates the

[48] A common metaphor for learning, from the noun osmosis, which refers to the movement of water drawn passively across a semi-permeable membrane by the osmotic pressure of a solution on the other side.

uncertainty of a number of students as to whether or not they have adequately grasped what they have read.

> So maybe, maybe it's our background but for, for me it was a lot of, a lot of hard work that I had to do, to start understanding these things. Because I remember I also struggled with reading medical books; I couldn't understand anything. Mandla 4;277-279

Keketso uses an interesting metaphor to distinguish between the information under the control of the teaching staff and that which students gather themselves.

> I think the content we would have to be divided into two: fixed, fixed content and dynamic content. And the fixed content is the large group resources – something like that; and we all know that you have to get to your tut. You have to get to the lecture and you have to get to the tut and do your learning goals. But then the dynamic would be – you know from the – from the lecture, when one leaves – that's when a consultant delivers the concept – after leaving the lecture, after having learned what clubbing[49] is, do you then go back and sit down and consider(?) clubbing ... Keketso 4;411-416

Despite teachers' accusations of passivity, students evidently do apply themselves to their learning. There is a significant reliance on lectures but also a sense of grappling with material beyond what is taught. Active engagement of students with course material is a claimed benefit of PBL, although in fact medical students have always been faced with ingesting and regurgitating – without necessarily digesting – large amounts of brain fodder.

These two sections ('Student initiative' and 'The labour of learning') are very similar. The question arises: is there a difference between (a) intellectually searching for and grappling with concepts and their application in the construction of knowledge, and (b) the mental busy-ness of processing and memorising material presented by other people? I suggest that proponents of PBL would argue that there is indeed a distinction[50], and

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[49] Clubbing: a swelling of the nail-bed, giving the fingers a 'drumstick' appearance: a clinical sign in a number of disease conditions

[50] The South African Survey of Student Engagement (SASSE, 2011) appears to concur, judging by its five benchmarks for effective education practices: level of academic challenge, *active and collaborative learning,*

that present satisfaction and future retention of knowledge are greater in the former case than the latter. What then moves students to engage actively or passively with learning?

Motivation

Self-starters

A number of students are able to articulate their own drive to learn. Apart from her own sense of satisfaction at having come to understand the material by herself, Lungi is evidently stimulated by the intellectual atmosphere of the medical school.

> I think it's very good in that aspect because you get to a point where students become very lazy when you are fed lectures and you're fed this. There has to be a point where you take the initiative and you go read up on your own and get your own understanding. So I actually like the idea behind problem-based learning. I really do. Lungi 3;12-15

Krish realised early on that for his own self-respect he needed to take control of his own learning, but notes that other students might have different motivations to succeed.

> I mean just as an example, in 1st year I did badly in this exam – it didn't count; it was a mock exam – and I was shattered, because I had never done as badly in my life; and then I realised that the only way I'd be able to do well was to, well, structure my own learning and not live from day to day as other people were. So, *ja*, that's what I think. It also depends how – what kind of a student you want to be at the end of the day. If you want to pass the exam just because your parents are good enough to pay for your medical – [Studies] studies, career; as opposed to some other student who's working very hard just to get his bursary at the end of the year. Krish 5;322-328

Dr Hlubi notes that motivation might arise from the desire to explore further.

> In the clinical years, on occasions – I'll say it's an exception rather than the rule – the student will come to you and say 'Can we discuss this a little further?' and that will be an

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student-staff interaction, enriching education experiences and supportive campus environment. Strydom (2011) provides details that corroborate the extent of the activity expected – considerably more than just responses to lecturer's inputs.

exception, and I find that this occurs also again with good students.

Dr Hlubi 13;252-254

Push-starters

In contrast to those who experience motivation from within, Keketso represents those students who rely on outside stimuli for motivation (and tend to cram just before an assessment).

> I work best on line – with a deadline. So if I know that every Wednesday I have that – that deadline that was specified(?) – it means that each and every week I'm always, you know, given adrenaline[51] by making work; that part at least we don't work; we tend to laze around for the whole Theme and then, the week before exams, learning things out of books and reading. Keketso 4;703-707

Dr Milner agrees that appropriate incentives to learn are not forthcoming, putting this down to a dearth of external stimuli of the right kind, and excessive focus on assessment.

> I don't think there's enough encouragement to the students to actually go and find out – um – material that they actually are interested in – over and above what the actual core is. There's too much assessment-driven learning – meaning the very next test that they're writing. [Mm] Not meaning assessment as in 'What I need to know at the end of five or six years'. They're learning for the 'now', and they're not learning for the 'why'; 'Why do I need to learn?' They're seeing it – 'The only reason I need to learn something is the next test. If it's not in the next test, I'm not going to bother.' Dr Milner 8;345-351

Sipho is one of the students who experience the positive effect of a forceful facilitator in motivating him to keep up with the PBL process.

> I think it depends in [*sic*] the facilitators, as Imbali said. You, you get yourself, you know, in the advantage where you get some good facilitators and others are not doing that, … We know that there's such as <one of the facilitators> – I know even myself, if I can pass them I will know my job exactly, 'cause he will motivate you – she will motivate you from first day you met her until the last day of your Theme Sipho 6;83- -89

[51] Adrenaline: a natural stimulant that the body produces at times of stress.

So, as regards motivation, students and teachers are aware of a spectrum of incentives (both internal and external) to learn. The internal incentives include: own initiative to understand (Lungi), desire to achieve (Krish), expectations of parents or funders (Krish) and interest in discovery (Dr Hlubi). The external incentives include: assessment deadlines (Keketso), short-term goals (and lack of a long-term direction) (Dr Milner) and encouraging facilitators (Sipho). The nature and extent of each incentive varies from person to person; the tendency is for those whose level of academic engagement and performance is relatively high (*e.g.* Lungi, Krish) to be motivated from within rather than from without.

Learning process

The themes in this section include reflections on large- and small-group dynamics, and also a range of activity from cramming for assessments to preparing for the long-term needs of medical practice. Linked to these often-conflicting activities are observations on understanding and memory of material, and the benefits and problems of the clinical relevance of the material.

Procedural aspects

Under this rubric I include comparisons between the two main ways in which curricular material is handled. Keketso draws a distinction between the social dynamics of lectures and those of small-group sessions, and the differences in the nature of the engagement that result.

> [W]ith the large group resource, you know, I'm sitting way at the top and doctor <N> is sitting in front; she's saying 'I want to, we want to –'. She's explaining everything but she's not engaging with me; she's not sometimes looking at me, you know, to see if I'm(?) paying attention – so it's very important to have, you know, sitting people around the table discussing things and one person is speaking(?), you know – unlike me sitting at the back and listening but not, you know, giving my side of the story – giving my own

> answers so I can know if I'm right or wrong. So yes, it's important to have small group sessions. Keketso 4;182-188

Marcus contrasts the understanding he obtains in the small-group sessions with the purveying of information by lecturers.

> The small group sessions; those definitely are one of the high points of the PBL. I think it's like the main route of understanding which is what we need; and I find the large group resource sessions to be not so helpful. It's just basically getting information that if we weren't exposed to in lecture form we'd get it in the textbook. Marcus 5;19-22

Ahmed exemplifies the dilemma facing these students: long-term retention of material processed in the small group *versus* the short-term need to pass the next assessment in order to progress in the degree programme, perceiving assessments to be based on lecture material that does not accord with the problem cases discussed in small-group sessions.

> …you remember from that point things that happened around that tut, so it's like sort of a focal point. It doesn't help you much in the exams but it helps your long-term memory. … If tuts are to be more effective, then it needs to come out in the ETTs. That's the way it's going to work. [Mm-hm] The learning goals, if you work around it, it's not in your lecture – because the lecturer will ask from his lecture, around his lecture. He's not going to worry about the tut cases. 'Cause that's – what's your goal in life? Your goal is to pass the ETT or an exam – any exam coming along. Ahmed 2; 22-23, 85-88

Zodwa speaks of learning from others in a small group, and knows that there are other opportunities to garner information.

> We *are* given a certain direction which way to go, but it gives us more – I guess you get more freedom when you get to your small group venues when you don't – there are the definite learning goals but then you also have your questions, and sometimes, even people in the group that have more insight – maybe people that have degrees in pharmacology can answer your questions and it kind of broadens the view, so if you have certain questions you can still answer that, so – and they are also given opportunity to hand in questions to the head of Theme or whoever is responsible for the week to give in questions for question and answer sessions, so it's not limited – if it is limited, we limit ourselves, if we don't want to learn more. Zodwa 1;200-207

The webpage of UKZN's School of Undergraduate Medical Education implies that large-group teaching may in fact be perceived as the primary pedagogy of the Faculty. The Faculty's report to the HPCSA in 2010 also suggested that lecturing had become more prominent.

> Although the School's *main task* within the undergraduate medical curriculum is *facilitation of teaching by staff* from other schools, academic staff of the School is also actively involved in teaching. This includes small group facilitation, some large group sessions and teaching of skills. One section of the School has teaching of emergency care as well as clinical skills as its main task. Postgraduate teaching involves mainly facilitator training. [my emphasis] Teaching and learning, SUME[52] webpage (2009)

> …over the years the programme has evolved from being a pure PBL programme to a more supported PBL programme, in that there is now a *heavy load of didactic lecture-based teaching* which has been introduced to support and augment student learning. This has been done in acknowledgement of the diverse student population and the varied educational background; in order to provide greater clarity to the students of the core curriculum and also as a result of the request from the students themselves.
>
> [my emphasis] The place of self-directed learning, Self-assessment questionnaire 2010

This section aggregates the different kinds of learning stimulated by small-group and large-group (lecture) sessions, the feeling being that lectures convey information and provide material for assessments, but allow for no interaction, whereas in the small groups there is interaction, individuals can express their ideas, verbalise their thoughts and develop their understanding of the material.

Understanding and memory

In the interviews, students frequently mention aspects of their immediate and longer-term grasp of the material presented. Osane observes insightfully that the expansion of

[52] The School of Undergraduate Medical Education – the educational entity that coordinates the implementation of multidisciplinary teaching in the first three years of the MBChB curriculum.

medical knowledge implies that practitioners have to be able not only to keep on learning throughout their careers but also to lay down a firm foundation of knowledge in the present upon which to base their future learning.

> …the problem lies with the fact that it's a science, but like it's a growing science as well, and some people are still battling to come to terms with the whole, um, life-long learning transition. 'Cause, um, you know, we write a test and, well, we learn for that test and we study and we pass and then we – um, like in high school we tend to forget what we learnt and – but now here, what we're learning is for the future; it's for our career; we're trying to build some solid background of information and I think some people just don't grasp that aspect as yet, so they tend to just, you know, go on studying just to get by – just to pass and get that 45 or 50% and – um – *ja*, they're not really understanding that they need to – um – obtain some sort of deeper knowledge in order for them to have a solid background for the future. Osane 6;186-193

Dr Milner voices a concern that material is being memorised and reproduced without it having been understood.

> …did they actually have an understanding of the terminology that they were reading, and this – the medical-speak that they were speaking? They were using terms, but they were using terms that they'd read and heard; were they using terms that they actually understood? Dr Milner 8;151-154

In similar vein, Dr Kathrodia picks up on what members of staff have noted over the past few years: that students are failing to retain knowledge.

> I'm sure at the time – I'm sure at the time they're doing it they benefit. I'm sure of that. What bothers me is, Ted, a while down – and this <another medical school> also told us – somewhere down the line, they lose it, and they don't remember any more, or they say no-one's taught them. Dr Kathrodia 10;70-72

Intriguingly, students at both the bottom and top ends of the class describe the same sort of isolation of information that may lead to the non-retention that worries Dr Kathrodia.

> – thing is, we learn something and we box it in, so we never quite – when we face a question where a person comes with all of those problems mashed together, we see 'Oh

> that's anatomy, that's physiology, that's – what's wrong,' but we never quite know how to look at the bigger picture, and actually come to a conclusion by ourselves. It makes sense when a lecturer comes by and says 'Oh this is what happens, and this is why it happens,' but when you sit there by yourself it's like 'OK I can see all the individual problems but I can't make it mash into one nice idea', because at the end of the day, we do not learn systems, we don't learn sciences; we actually learn – everything, and that integration of the different parts just isn't coming together very well. Vusi 6;218-225

> 'Cause it seems for some reason that we learn with things in compartments – makes it a little bit easier, and I know students have this classical way, including myself, of keeping things in boxes. [Mm] And when you want to study CVS[53], you don't want to have to swot off five causes of hepatomegaly; you want to study CVS. But in the long run, in terms of reality, I don't think it's helpful at all, because that's what reality is. Otherwise the job is left up to you to integrate the information, when you hit your 3rd and 4th year.
>
> Kevin 7;138-145

Learning strategy is a recurring theme. Marcus, with help from Krish, captures the two ends of the spectrum: cramming to pass an assessment (with almost inevitable lack of retention thereafter) or working through material more thoroughly.

> There's no understanding there [*Ja.* I try to make …] so it's just basically you're going to swot this information for the test, and after that ... [It dissipates] Marcus [& Krish] 5;34-9

> There're some students who decide to just learn for the end of Theme test and then – that's it; and then I know I prefer to learn with the cases and tut cases individually and then go over the work again for the ETT. So it depends on the students.
>
> Marcus 5;274-276

Faculty documents specifically encourage understanding instead of learning without comprehending.

> The course is planned to ensure the highest possible standard of education and training by stimulating and encouraging understanding rather than rote learning.
>
> General information for the undergraduate degree,
> NRMMS Faculty Handbook (2009, p. 2)

[53] Cardiovascular system.

Students affirm the need to understand and retain material – in line with Faculty policy and PBL theory – but they feel the tension of having to cram for a test that does not relate directly to the way the small-group system encourages them to learn for long-term retention. One might expect intuitively that understanding information would make it easier to retain and then retrieve when needed. What then aids understanding?

Mental organisation of material

Students describe the bringing together of knowledge from different sources and, in different senses, 'integrating' it. Marcus expresses the aspect of linking the clinical and basic science features of the problem cases dealt with in small-group sessions.

> [The small-group meeting] basically just promotes our understanding of what's going on. 'Cause the cases, they – um – the signs and symptoms and the conditions, you see the link between the two; it's not just: this happens, and then this. You have to understand it; put the information together. And it's not basically just sitting there getting information. You're also talking about it and getting an understanding about what's going on.
>
> Marcus 5;97-100

One of the areas in which differing opinions are expressed is the extent to which content arrangement helps learning. Lungi's view contrasts with that of the friend Keketso describes.

> For my learning – um, I think it – for learning purposes it's a lot easier if there's a distinction: GIT[54] physiology; rest of physiology; but at the end of it all, you know that most of the systems are linked at the end of it. But in terms of studying and learning and understanding, I need to look at each entity on its own and understand it on its own [Mm] before I can look at it [Mm] holistically within one person. So that's why I like to a certain extent – not to a certain extent, to a good extent – the Theme thing, because it makes me focus on *that* system, and I'll do everything on *that* system. And then later on when I find that I'm doing CVS I might find that there's a link, but I still understood everything on the GIT, got to CVS, understood everything about it and then found out from there that there

[54] Gastro-intestinal tract.

> is a link. So I need to get my basics first and then start becoming complicated and linking things and [Mm] intertwining them. Lungi 3;201-209

> …you can go to a lecture and listen about physiology and anatomy and you can come back and rearrange the notes the way you want them to be like; stack them. I have a friend who does that. I like the approach of SUME – I've liked it for two years, three years. But when she comes, she – she'll pile her notebook into anatomy, physiology – I think that's how she's controlling it, the way that she's learning – although the things have been presented to her, she's in control of how she's processing the information …
>
> Keketso 4;434-439

Susan speaks of integrating material from different activities; S'bu of integrating content from different Themes and from different disciplines.

> I think I should have paid more – interest or emphasis on what I was doing in the small group sessions – 'cause it kind of really integrates what you get from the lecturers, and what you learnt at Skills Susan 1;62-64

> That's one of the, the pros I see with the problem-based learning, is that as you, as you progress, Themes they come together; you know they become integrated; the different disciplines become integrated. Like in terms of the different disciplines of medicine, maybe the approach in terms of management and care is different, but in terms of, *ja*, learning, they – if they are becoming integrated. S'bu 4;330-333

Krish points out that, as a strategy, integration does not help him achieve the short-term goal of doing well in assessments, capturing again the tension between learning for assessment and learning for understanding.

> You've got a point there, because the lecturers set questions [*Ja*] and our entire learning of the lectures is based on trying to do well with the questions, not on trying to integrate.
>
> Krish 5;31-32

Vusi, in trying to convey how difficult he finds it to make sense of the material in his own mind and then recall it when needed, makes an abject contrast with those who are able to draw material together and better cope with it.

> I mean, think of it figuratively: we get given a whole lot of information that we just kinda chuck on our floors in our minds, and when it actually comes to recalling it, we don't quite

> know where it is – opposed to us being taught how to learn, if that makes sense. So if we were taught 'OK, make a folder, put that folder in a cabinet and put that cabinet in a certain room, so when there comes a point to know –', so when it comes to recalling that information, you know 'Oh no, that's on the second floor, which room' type thing. So information's not really a problem, but it's about recalling that information in a systematic order which then integrates everything we're trying to learn. Vusi 6;277-284

Vusi's distinction between being taught how to arrange material in his memory, in contrast to being taught how to learn, could form the basis of an investigation into the psychology of learning, in terms of: Can one speak of having 'learnt' information if it is not retrievable? Vusi evidently feels that 'integration' means 'systematic ordering' of material. The other students do not directly indicate how they organise/learn, but 'integration' is a common concept. Krish's comment on assessment, together with his interjection ('It dissipates') into Marcus's remark about swotting for a test (*v.s.* p. 138) implies that he sees the sort of mental activities associated with short-term retention as being antithetical to those associated with integration.

Clinical application of knowledge

The literature on PBL observed that clinically relevant teaching and learning add to students' interest, aid their retention of non-clinical information, and keep their eventual patients at the back of their minds. Complementing this, student respondents relate their understanding and retention of information to its having some sort of link to a clinical situation, whether in the hospital or outside. Ahmed, for example, is able to recall a topic from two years previously because of the clinical context in which it was set.

> …you remember from that point things that happened around that tut, so it's like sort of a focal point. It doesn't help you much in the exams but it helps your long-term memory. I can still remember that first case, a long time ago – we did it in first year, where that fellow was playing soccer and he hurt his foot, and you gave him aspirin and you put an ice pack. I never thought about this before but I'm telling you – I remember the management of pain was discussed – see, see what I mean? Ahmed 2;22-26

Krish is able to relate a number of clinical scenarios to an aspect of basic medical science common to them all.

> I think that's what allows you to, to learn and understand and link up whatever's being taught to what you have to learn. So for example physiology when you learn about, um, acid-base balances, GIT secretions, and then you learn about vomiting, diarrhoea and you learn about all the states that can occur – acid-base disturbances that can occur – and then you learn about the vomiting in gastroenterology for example [Mm] or diarrhoea in gastroenterology, so that's an example .. Krish 5;198-203

S'bu and Imbali note that having a relative with a particular illness helps make learning easier.

> I know one of my uncle [*sic*] has diabetes type 2, and you know he, he had a thing, he had DKA[55] before I came to medical school. So – he was in a diabetic coma – so when I came to medical school I was able to understand, like the pathogenesis of that. So I, I think it goes further than just knowing basic knowledge like you know generally what people know – what other non-medical or non – er – scientific people know. It just adds on to what you know – what you used to know about or what you should probably see.
>
> S'bu 4;239-244

> I know for example, in learning for something at varsity and you're learning about a particular subject, and you know someone at home has that, then everything else becomes much better and much clearer, because a person who doesn't know anything, because they don't have a granny or an aunt or whatever, so they don't know what exactly it is. Imbali 6;151-154

As a teacher, Dr Pillay feels that the Selectives[56] periods, because of their requirement for patient contact, helps students make real-life, not just hospital-based, clinical links.

> Then the other good about the problem-based: it was community-orientated, and especially from a <discipline> point of view, I found that the Selectives addressed a

[55] Diabetic keto-acidosis (a severe complication of diabetes mellitus).

[56] Four-week periods in 2nd and 3rd year of community-based practical experience.

> hands-on programme which allowed students to face the real world quite early in the programme. Dr Pillay 11;23-25

The converse of retaining knowledge with the help of clinical links is struggling to retain information when no clinical link is apparent. Zodwa expresses her frustration when trying to make sense of a complex topic without knowing how it might relate to a clinical need, or struggling to know how to relate information from other countries to the local health care context.

> To research something in Guyton in, maybe, respiration, those many many chapters, and they can give you different types of graphs and you're not sure which graph you should know and why and how – and if it's really on just a physiological basis or is it something that you need to know into – how to integrate it with your patient or whatever it is that you'll be doing for your patient like understanding the condition of your patient ... Initially you think you're satisfied with what you have learnt, but come to when you really want to implement what you have learnt and what you have read, it's different because most of the books that we're reading are American or British, and it's not really what is being done in the wards, and that tends to be quite a problem.
>
> Zodwa 1; 293-298, 334-337

S'bu refers to the apparent disconnection between lecture content on one hand and the clinical bias of the weekly problems (and subsequent ward-based learning) on the other.

> OK what I understand about the Themes – the Themes are system-based – like renal, cardiac, pulmonary system – but then in terms of being ready for those kind of lectures – the lectures are more about those pathological processes than what you need to understand in clinical work, but there's no basic grounding for us to understand the clinical work – there's no basic sciences for you to understand. S'bu 4;39-43

Bala, striving to make links for his knowledge, finds that certain subjects do not have obvious clinical associations, and so are difficult to commit to memory.

> I think you have to have – integrate everything, because that's what medicine is; it's not one or the other bit. Also, even with psychology and all these things that, you know, people throw around, but, all in all, a person is a whole, and you have to look at every aspect of that. And I think that one of the biggest problems actually in learning is anatomy and radiology, and the problem is that there's no clinical correlation. And I know Imbali

> was saying that it would be better to learn it separately, but I think even at this point when it's not separated, we have such a battle just to retain the knowledge from anatomy – and that's because we are given this whole textbook to learn; "OK read this section for this Theme" and you have to know it. There's no guidance whatsoever as to the clinical outcomes of what we're learning. I know for [Theme] 2.5, we have to learn pretty much every muscle in the body, and in actual fact we realise in 3rd year that you have such a different perspective after being in the wards that you don't need to know every single muscle in the forearm; it's not going to help you clinically; you're not studying to become an anatomist, you're becoming clinicians. So what needs to happen is that there needs to be more clinical correlation with our work in the lectures so that we're able to more easily retain the knowledge. Bala 6;304-316

From the point of view of the medical science teacher, Dr Milner makes the point that he has found it difficult to find obvious clinical relevance for some of the material that students have to learn.

> Part of the difficulty there is how do you 'PBL' the cell? This is something that I've absolutely grappled with, because how do you – [Chuckle] You know, how do you put PBL and the cell and the tissue and the organ system concept and – ah – what's the link between the physiology and the biochemistry and the pathology and everything else? How do you 'PBL' that, using clinical examples? Dr Milner 8;405-409

One of the characteristics of PBL is that content material relates to students' ultimate clinical practice, so the emphasis placed by respondents on finding – or striving to find – clinical correlates for basic medical science information is appropriate. That is not to say that all basic information has obvious, direct, clinical relevance, nor should the budding doctor's quest for clinical application distract from the necessity for teacher and learner to make logical links between cognate areas of information. The risk of striving for clinical relevance in everything is that the clinical aspects – 'What's the diagnosis?', 'What's the management?' – may distract students' attention from the basic sciences – hence perhaps Dr Kathrodia's plaint (*v.s.* p. 137) that clinicians find their students have forgotten what they were taught in the 'pre-clinical' years. It does seem that discordance between lecture content and the more clinical content of small-group cases is seen by students as more of a hindrance to learning than the inclusion of clinical applications in the cases.

Students' development

An aspect that relates to the student role is the extent to which students feel that they grow into their role as learners in medicine. Zodwa notes the change in teaching and learning styles between high school and medical school.

> I've always been used to having the teacher in front of the blackboard teaching and if you don't understand you put up your hand and they come and assist you and they give you extra problems if you need any, and they – that's how it would work, and sometimes you'd get help from your friends and that's as far as you would go, but not really to sit down and discuss around a certain topic or going back to research. Zodwa 1;46-50

Mandla feels that he and his peers have grown into the PBL methodology over time.

> …overall I think the PBL is a good thing for students to solve questions and things like that. I don't think it's a good thing at the beginning. I think for 3rd years it's a good thing. At the beginning it's confusing, trying to solve a question without any background, without any knowledge of anything that you can use. Mandla 4;70-73

Kevin (a 'mature' student with a prior degree) thinks that, initially, the division of students' time amongst the various activities and between different subjects should be stipulated for them, and that they would then later on be capable of apportioning their own time.

> I don't think it's a good thing to organise your own time. [That's interesting. *Ja*?] Let me just rephrase that: as an eighteen-year-old 1st year, it's not a good thing. That self-autonomy will come. Kevin 7;235-236

Dr Pillay has felt the need to change the attitudes and approaches of students to their studies, although she feels she cannot assert that PBL can necessarily be credited for the change she has observed.

> I felt we needed to actually make the students more assertive and give them the leeway to learn in terms of problems in medicine, because that is what they would encounter later on in their lives. … Well in terms of assertiveness I know – whether it's a general

> South African trend or whether it's our medical school, I am not quite sure – but students are definitely more assertive, more vocal; they talk up when we meet with them. So there I've seen – it wasn't the backing away of students to say 'I'm scared to talk'.
>
> Dr Pillay 11; 15-16, 49-52

Krish notes a development in himself that he ascribes to exposure to the small-group process.

> So – *ja* – so it does work. Because when I reflect back on my 1st year days, I was far different than I am to now, because, I know , I think I've matured a little bit more when it comes to learning and studying and understanding. So, also when you get here, you're quite the individual, but once you get integrated into the group you become less shy, more used to everybody else; more used to talking to lots of people – so it does help you develop, medically and socially. Krish 5;151-156

Faculty documents support the idea of development of personal and interpersonal skills from the 1st year onwards.

> Students also learn how to function as a member of a team, gain experience in working with groups, observe, question, reason clinically and solve problems by using resources from a wide range of sources and show proficiency in undertaking self-directed learning tasks and effective time management.
>
> Theme 1.1 FOUNDATION
>
> NRMMS Faculty Handbook (2009, p. 54)

Students grow, both in the transition from high school to medical school, and in the transition from shy, inarticulate neophytes to more communicative students with a greater ability to take charge of their own lives and learning.

Summation – Student roles

To place our local participants' perceptions of the student's role in PBL in context, I recap the features of PBL that are generally cited in the literature:

- Foregrounding of student learning rather than faculty teaching

- The student determines the scope of her own study
- Students collaborate in discussion, meaning-making and knowledge-building, guided by a facilitator
- A practice-based 'problem' is provided as stimulus for learning

The primary focus of PBL on small-group learning implies that lectures are the servant, rather than the master, of the learning process. The pronouncements of the institution under study, the students' appreciation for the learning and understanding that occurs in small groups, and the willingness of some to take the initiative, generally support the standard view of PBL. The Faculty officially emphasises student *learning*, but the majority of student and staff respondents reflect a reliance on faculty *teaching*. The students do exert themselves and do explore – but this generally takes second place to the lecturers' input. There is a sense from both sides that the students are reliant on the teachers for direction and meaning-making. This calls into question whether the pedagogy under scrutiny is in fact problem-based learning, or lecture-based teaching. I shall address the second characteristic of PBL – students' determination of the scope of their studies – in chapter 9. As regards the last two characteristics: the collaborative building of meaning and knowledge does seem to be something that students appreciate, but, while the practical problem is a stimulus for greater understanding, the more immediate stimulus for learning (in the short term) is the imminence of the next assessment.

The students' experiences of the effort of learning do not necessarily contradict the teachers' perceptions of needing to take the lead. However, I should expect that, in a more learner-centred curriculum, students who bestirred themselves would find active learning more satisfying and possibly *less* effortful than trying to follow somebody else's programme. A range of incentives – internal and external – motivates the students I interviewed, but here again, the interest evoked by an example drawn from their chosen career is not as prominent a motivation as the PBL literature would lead one to expect.

While the aspect of collaborative learning is not explicitly addressed by respondents, Ahmed speaks of learning by teaching, Zodwa of learning from others in the small group, and Krish of the way in which his social skills have developed over time, while Dr Pillay implies that group work helps those who struggle to express themselves. Other writers have described some specific advantages of collaborative learning in NRMSM's setting of student diversity (McLean, van Wyk, Peters-Futre, & Higgins-Opitz, 2006; Singaram, Dolmans, Lachman, & van der Vleuten, 2008; Singaram, V. S., Sommerville, T. E., van der Vleuten, C. P. M., & Dolmans, D. H. J. M., 2011; Singaram, van der Vleuten, van Berkel, & Dolmans, 2010). These studies support my student respondents' perception that their growth (both personal and academic) is generally linked to their participation in small groups.

The common perception amongst my respondents is that participation in small-group meetings promotes understanding, which leads to retention, of information. They distinguish between learning for assessments and learning for the future. They speak of integration in various forms, one of which is the so-called vertical integration of pre-clinical and clinical material so as to give contextual relevance to the former.

In respondents' accounts, contrasts are apparent between intellectual engagement and mental busy-ness; between self-motivation and external motivation; between learning for the long term and for assessments; between large-group lectures as a source of information for passing assessments and small-group discussions as a means of understanding material; between the quantity of lecture material and the need to make sense of it; between clinical context as instance of practical application and clinical context as distraction from the rudiments of basic science; and lastly between PBL as an enabling learning system and PBL as a system that students adapt to with difficulty. There is a tension between the active role expected of students by the institution and the passive role assumed by them in some respects. Correspondingly, both staff and students envisage a more active role for staff. I am struck by the students' lesser awareness of their expected active engagement in PBL, and the disappointment of staff members (with the exception of Dr Pillay) that students are less active than anticipated. I

wonder whether staff members have unrealistic expectations of PBL as a pedagogic system, given that teachers and learners fashion pedagogy between them. I wonder further whether the assumption by both parties that students should be led by staff arises from staff disappointment with student initiative – or whether the momentum of past practice, whereby staff members teach and students learn, has left no space for student initiative.

The 'boxing' of knowledge into sealed compartments that seem not to be opened – or even to be openable – at a later stage appears to be a major problem. This can probably be explained by the need to cram knowledge for assessments; in turn, it would explain the observation by clinicians that students do not remember – to the extent of denying that they have ever been taught – material from the pre-clinical PBL years. This lack of long-term retention, as noted by Dr Kathrodia (and others in the faculty) is disconcerting, since one of the stated purposes of introducing PBL was to combat the forgetting of basic science knowledge (Barrows & Tamblyn, 1980). Ausubel (1968, p. 156), at the time when PBL was being initiated, commented that "compartmentalization may be considered a common defense against forgetting". This compartmentalisation Ausubel related to rote learning of ill-understood material. In my study, both staff and students (high and low achievers alike) describe the strategy of the student as primarily short-term cramming for assessments, with subsequent forgetting as an inevitable consequence. The strategy of cramming material only to forget it later on is a long-standing problem in medical education, as a result of there being such a vast amount of material to be covered (Osler, 1913). While assessment is a recurring issue, my colleague Dr Jacky van Wyk (2009) has extensively explored the topic in this context, and I shall therefore not pursue it further.

Another recurring feature in this chapter is the use of the term 'integration'. My respondents speak of integration of information about different organ systems (Lungi), integration of material in individual disciplines (Keketso's friend), integration of disciplines with one another (S'bu) integration of lectures and clinical skills (Susan), integration of basic science and clinical material (Marcus), and – tellingly – integration

of information in the learner's memory (Vusi). This I shall take further when I come to answer my third research question, namely: Why do students and staff experience the problem-based pedagogy the ways they do? Meantime, the teachers and the institution must be examined.

7

Teacher

This chapter compares and contrasts students' and staff members' perceptions and experiences in order to obtain a full picture of the teacher's role in PBL in the local context. This chapter encounters issues that are similar or complementary to those encountered when I was describing students. As I look at the issues with reference to the teacher, the second *persona* at medical school, I discern participants' responses falling into three groups, which I categorise as: general concepts of teaching, lecturing to large groups, and facilitating small groups.

Teaching in general

Dr Kathrodia finds that observing students and eliciting a reaction to establish their knowledge base assists her to pitch her teaching at the appropriate level. She establishes the principle of encouraging student engagement with her and the content she is covering, finding that students respond well to this.

> And so that's one aspect; the other is to watch the students' response and to see which student appears to be absorbing and which student looks lost. The lost student, you must pull that student in and say 'OK, you look a little bit confused, or you look unsure; what is it?' Because so often the question they ask you gives you a very good platform to start explaining things further to the student. Dr Kathrodia 10;34-38

> I think it's the way you interact, right at the beginning. And say to them 'Look, it doesn't matter if you ask a question that's silly, or you *think* it's silly; so often many others don't understand it.' [The silly questions are often the good questions] They are the good questions, yes. And then I had one student in one lecture – and sometimes it gets like that; the same people ask all the questions – and the others said 'You know, we're tired of your questions' and I said 'No. Listen to the question. Let's go back; so why haven't *you* got questions; you should also have a question for me. [Mm] And then we can meet

> and talk about it. Right now; we can put our minds together and resolve the issues.' Then they laugh and they come back and they talk. Dr Kathrodia 10;47-55

Dr Patel emphasises the importance of useful general medical knowledge, but has found that the wide spread of academic ability among the medical students requires that he adopt a particular approach to his teaching.

> …the challenge there, as I see it – and we haven't been successful in that – is how to disseminate this general body of knowledge, this highly specific body of knowledge, to a bimodal class. It's operator-dependent, but I would feel that it's better to disseminate general knowledge so that the commonality is then applicable, because we are training generalised medical practitioners who will be of service to the whole community and most of them will end up in primary care Dr Patel 12;176-181

From the students' side, Osane wishes that teachers would address the challenge she experiences in making sense of information, while Zodwa is frustrated by the variety of texts that different teachers prefer.

> But the problem lies in, you know, making sense of the bigger picture that is, and maybe that's because we're a bit inexperienced at that, and that's why we need these lecturers to come and tell us, and explain to us 'OK this is why this happens and that's why that whole process happens' because – *ja*, without the experience and the knowledge that they have, it's – and they've actually seen those pictures before – they're the ones with the experience that have, you know, put those things together. We haven't really.
>
> Osane 6;357-262

> …every <specialist> has an opinion about the textbook that they think is best, and we can't all get those textbooks, so – the satisfaction in the end goes down the drain.
>
> Zodwa 1;340-341

Lungi (a 'mature' student) – has found that not all teachers are in fact *able* to make sense of information for the students.

> See, you find some lecturers really adequately prepare the lectures; you don't end up wanting to hear a little bit more about this and a little bit more about that; and then you get lecturers – I, I – honestly I'd like to know the criteria you use for your lecturers because everyone can be a doctor but not everyone can be a lecturer. Guys have that misconception. [I know] *Ja*. So you get the others that will come and they'll just have a

> few slides and you'll be left thinking 'I actually didn't understand the physiology; could you go back?' And then you'll get others that will just put the whole story out on the floor and you'll see it and you'll understand it. Lungi 3;230-236

Dr Pandit finds problematic lecturers' failure to relate their subject content to other cognate material ('horizontal integration').

> From old curriculum to new, they kind of maintained that – that ring-fencing of their particular discipline and medicine, and I think that just reinforces the view that students get from society of not being able to see things in an integrated way. Dr Pandit 9;131-133

Dr Hlubi observes what is perhaps the same trend amongst his colleagues, namely that at the same time as trying to confirm students' foundational knowledge (possibly a reaction to students' 'compartmentalising' their knowledge – see previous chapter), lecturers are pitching their teaching at too advanced a level.

> And what happens in the clinical years is that some of the tutors, when you [students] ask questions, not all of them [tutors] will just give you the answer. They will give you the answer in the form of a question, to see 'Do you really understand the basics before I can tell you this?' So they will ask you about the basics first, to see if you understand that, and then add the knowledge. Dr Hlubi 13;265-268

> And it's a problem because, as we've previously spoken before, we want to train a generalist, but you get people teaching them as if they're teaching specialists, and it's a problem [*Ja*] which I think needs to be addressed. Dr Hlubi 13;330-332

Zodwa feels that clinicians express an ethos of multidisciplinary patient care, to the extent that she is taken aback when faced with an exception to this.

> …the lecturers, when they're talking about a certain topic, they're not hesitant to say that you could be working together with – um – occupational therapists, paediatricians and surgeons and everything – so everyone I think somehow acknowledges everyone's role in the management of the patient. ... So it's kind of broadened your view.
>
> Zodwa 1;149-153, 158

> I have sensed that – we had a case whereby the surgeon or the gastroenterologist wouldn't see the patient because 'It's the medical people's problem' and that for me was a bit – on a not so good point, so that's when I saw 'Oh, OK, this is how they do things.

> Right'. For me it was not the right way – we all work in the best interests of the patient.
>
> Zodwa 1;171-174

In terms of active engagement of staff members with the pedagogy of PBL, there are differing opinions. Dr Patel's experience is that teachers have, in the main, not become involved; Dr Pandit's perception is that the decision to implement PBL was taken because sufficient staff members *had* become interested. An unidentified staff member made the practical point that teaching is not as well rewarded as is research.

> The other problem was – and this I'm talking in general – that there wasn't significant staff buy-in to support the changes, simply because the staff were either indifferent, the staff were too busy with their clinical work, the Faculty was not really appraised [*sic*] of what was going on, and the Faculty saw the merits of the graduates coming out at that time which were excellent, and they said 'Well look, the graduates are excellent now; why change something to result in graduates who we don't know what the outcome is going to be'. So for those reasons, I think the Faculty didn't buy in. Dr Patel 12;51-56

> I think after a while, what happened was that, as we started the buy-in – getting people involved and asked them to make presentations, what they would like in the curriculum, all of that – what happened is, we started to get more and more buy-in into the curriculum until we had a critical mass of people that were interested in the curriculum. It looked like actually now we could have a new curriculum; at that stage we decided 'OK, we should go for it'. Dr Pandit 9;238-242

> At the end of the day, the longer your list of publications is, the more impressive your CV. Involvement in curriculum reform does not bring in research money, and does not get you sabbatical leave. Until the Faculty can provide an adequate 'reward' for involvement in teaching, it will have greater difficulty in attracting staff to participate.
>
> Anonymous
>
> Inter-office memo (1996)

In the quotes above, teachers talk about teaching – the core activity of teachers: some want to interact with their students rather than disseminate information unidirectionally, others express ambivalence about the nature and methodology of teaching, while clinging to their body of knowledge and sometimes talking over students' heads. Students hope that teachers would help them make sense of the subject matter, but find that some teachers are unable to do so. Just as the students are

ambivalent about whether they are here to acquire long-lasting understanding or to cram for the next assessment (see previous chapter), so too staff members are ambivalent about their role as teachers.

Lecturing

Students express what it is they actually obtain from the content, the organisation and the thought processes delivered in the form of lectures. Susan and Marcus acquire a sense of focus.

> I mean, you have to sort of get a sense of what to learn from the lecturers because there's no way you can learn everything and as much as you might read around it it's not going to – um – you never know which ones are the big – the important bits to like make sure you remember, until the lecturer sort of reiterates it. Susan 1;288-291

> You know what the focus is standing on. Instead of going on learning the broad topic. Because the lecturer won't test on every single thing. They set on what they taught you in the lecture – and it's obviously going to be to your advantage to study less stuff; to cover less content than to have to go over the whole Theme. Marcus 5;88-91

Susan, like Dr Hlubi (*v.s.* p. 153), enunciates the problem of having lecturers pitch material at an inappropriate level for a particular class.

> But in terms of the lectures, the departments sort of set what they decide that they want to teach us, and sometimes it can be way over our heads, sometimes it seems to be far too simple, but, um, I don't think they always get it right in terms of lectures.
>
> Susan 1;192-194

Zodwa and Lungi add the problem of material being presented with a focus or in an order different from what was expected.

> Sometimes it does happen that when you do read and you're more clued up than everyone else and you're feeling 'Hm! Give me more, I can go to the next level, I want to know more.' But then, like Susan said, it, it happens that at other times you do read something and maybe the lecturer is going to focus on a different aspect, or change the

> topic, and then look at it in another way. So the topic that might have been listed is not the topic they will cover. *Ja*. So that needs to be – changed. Zodwa 1;260-264

> No, it works to a certain – first of all, what happens half the time is that the lectures don't even go in sequence – not new. You get the anatomy and then you get a pathology lecture, then the physiology lecture will come in the last week. And then that kind of messes up the systematic approach to it. Lungi 3;149-151

Dr Milner cautions that part of the problem with lectures could be that the lecturers are simply overwhelming the students with information and are thus failing to make sense of a body of knowledge for them.

> And how do we prevent the one thing being repeated too much; how do we actually prevent overload, because, you know, you've still got subject specialists teaching it, and if you – what's happened with the PowerPoint[57] advent is: you give them two lectures, that they don't put all twenty lectures' information in one PowerPoint and give the students the PowerPoint and the whole idea has been thrown down the toilet. Dr Milner 8;418-422

Marcus (a high achiever) comments trenchantly from the students' point of view on the overloading of content without discrimination on the part of the lecturers, which is to the detriment of the students' endurance and without adding to their understanding.

> But the thing is, the lectures would be more helpful if they showed us concepts that were more difficult to understand rather than just boring us out with – ah – hundred-slide lectures which no-one can really pay attention to. Marcus 5;27-29

Ahmed reflects on the overloading of the timetable as a whole with lectures.

> And what happened in 3.5 was that there were many lectures – one hour, one hour – and it piled up. I think it worked out to over – [Sorry – 3.5, you say? 3.4?] 3.4, 3.4 – the Lifestyles Theme. So the lectures just piled up; it worked out to over 50-something lectures, and for a Theme – even though it was, say, seven weeks or whatever, it actually

[57] PowerPoint® is the most commonly used vehicle for preparing slides for lectures. Its electronic format makes it easy firstly to transfer the presentation to the lecture theatre and then after the lecture to provide access to it on the Faculty's computer network.

was two Themes long. Sometimes you do a Theme with only twenty lectures.

Ahmed 2;272-276

Mandla (an average student) finds it difficult to cope with the number of lectures delivered over a period of time.

I also think it depends on lecturers; especially me, because it was hard for me first of all to be able to follow each and every lecture – like we have four lectures in the middle of the day; you have to make sure that you read those notes and then you read other things.

Mandla 4;496-498

While lectures are seen by students as a source of information and a guide to assessment content, frustration is evident about lecture topics not dovetailing neatly – if at all – with other Theme content, and also about the volume of material being presented.

Small-group facilitation

Vusi's experience is that facilitators who probe students' knowledge and understanding – even in as simple a way as asking one student to repeat in his own words what another has said – are helpful.

I really, really do think that the facilitator has a pivotal role to play, in the sense that – I mean, we could wrestle out what we know from rote learning, but it's up to them to actually like pursue that knowledge and actually see if we do understand it, and do we actually know what it is we're talking about; because a group may be keen, in the sense that we've come there, we've done all our learning goals, but then actually going deeper into, 'OK, do you actually understand the pathophysiology of what you're actually talking about, or are you just dictating from a Wikipedia print-out?' So, if the facilitator(?) is willing to actually be like: 'Oh no, Specific Person, just kind of reiterate what that Other Person said', then you might actually get some learning done. Vusi 6;44-50

Ahmed is frustrated by facilitators who stick rigidly to their own way of guiding small-group meetings with the result that time is wasted.

> The facilitator must give you those learning goals or help you a lot with the learning goals. What happens is – it depends who's your facilitator again – the learning goals become a puzzle. For fifteen minutes you'll be sitting – OK, one learning goal will be five minutes – you'll be sitting and, um, 'OK so what's the learning goal?' and then the facilitator will say 'No, no, you're going up the wrong pole' and there's like a fight – not a real fight, *like* a fight – because you're trying to figure out what's the learning goal. And then that's just a puzzle, wasting your time; you're not getting anything out of it. Ahmed 2;52-58

Lungi observes trenchantly that some facilitators without a medical background do not understand the material being dealt with in small-group sessions. They are thus unable to direct the group towards aspects that are being overlooked, whereas doctors are able to guide small-group discussions more effectively.

> …you get facilitators who don't even know what's being spoken about, so how they're supposed to drive me and sharpen me towards the right direction when they don't even know what is being spoken about? That's my main problem. And then you do get some correct facilitators like now I have <Dr Q>; but we need – our facilitators should be people with a medical background of some sort. Because the whole point of a facilitator so that we – we are teaching ourselves but she – that person needs to be there to say 'OK hang on, but you haven't looked at this aspect' or 'You need to draw more towards this', etc, etc. Lungi 3;449-455

An opinion universally expressed is that facilitators should have a medical background. Matlodi explains this in terms of the facilitator needing to understand the material, and Kevin in terms of the facilitator needing to have a broad understanding of the field.

> I'd like to say I also agree with Mandla and Vijay, in the sense that we should have doctors – doctor facilitators. From my experience in the past, I've really enjoyed and participated and quite felt I should really do my work for the tuts because these are doctors that ideally we're talking about. Most of the time they give an approach, and then in the tutorials they normally have the 'Why?' question – 'Why would you say that? D'you understand?' But those who are not doctors tend to just come and they listen to you. They come and they just 'Say out whatever you know' – it's more about – to us; to most of us students – we find that we end up knowing things but nobody understands them.
>
> Matlodi 4;129-135

> The lectures and the facilitators should be medical clinicians. I've had brilliant clinicians, and our tuts are ten times more rewarding, as compared to a basic science facilitator –

> 'cause they just don't have the whole over-picture. Even the physiology should be taught by clinicians – if they've got the time. Kevin 7;163-165

Facilitation is seen as an important teaching function by students, whose frustration with the shortcomings they have experienced perhaps stems from misunderstandings on both sides as to the nature of facilitation. Vusi, like others, assumes that it is the facilitator's responsibility to drive the learning process.

Summation – Teacher roles

The quality of teaching is of prime importance to students, and while some staff members acknowledge this, it is apparent that not all are able to teach to the students' satisfaction. The number of lectures, the quantity of material covered in each session, and whether or not the level of interaction is relevant to the stage that students have reached is evidently of concern. It appears that staff members are not all committed to PBL, and, although students invariably say that they could not do without the small-group sessions, the impression conveyed is that these are seen as an adjunct to lectures rather than as the primary locus of learning.

The twin needs to understand material and to be guided by facilitators are important enough for students to insist that facilitators should be medically qualified. (This despite the fact, as noted in Chapter 5, that those students who did have medical facilitators fared no better in assessments than the rest.) Non-medical facilitators are thought to be unable (a) to correct students' misapprehensions and (b) to draw out the clinical significance of the problem cases. Matlodi's remark "we end up knowing things but nobody understands them" is a sad commentary on the teaching-learning process as perceived by those who rely on an expert to complete the process for them.

One might expect the language of teaching and learning to arise as an issue; students having said that medical terminology is difficult to grasp, the way in which lecturers

and small-group facilitators express themselves could be problematic. Language, however, was not mentioned in regards to teaching. Possibly, language use underlies the statements that lectures are difficult to follow and that small-group meetings aid understanding. The first step in the small group process is definition of terms, so technical language is explicitly dealt with in that setting, whereas lectures' desire to cram in as much material as possible might mean that terminology is not adequately defined.

Students' comments about teachers and their teaching seem to express a general consensus, without stratification in terms of prior school or tertiary experience. This implies that previous knowledge and ways of thinking are perhaps less important than grappling with the new material of medicine. I shall return to this idea when, in Bernstein's terms, I discuss respondents' perceptions of the distinction between medical and non-medical realms of knowledge.

I note that staff members make comments about their lecturing experience but have relatively little to say about their experience as facilitators, despite this being for many teachers perhaps the greatest change from their traditional role. The lack of comment may be a reflection of the fact that, after ten years, facilitation is now less of a novelty, or it may merely be a numerical matter: only two of the staff respondents have been actively serving as facilitators recently.

Having looked in this chapter at the second of the two main protagonists in medical education, I now turn to the third '*persona*' involved in PBL, namely the institution, which one might expect to oversee and regulate the roles of student and teacher.

8

Institution[58]

The medical school has its own *persona* – a collective personality – a compound of the various individuals, past and present, who have contributed to its values, its ethos, its policy, its rules. Although its personnel is structured hierarchically, and is represented within the university and before the public by the Dean, the individual who holds that office for a period of time would not claim to present the *persona* of the medical school organism.

In this chapter the institution speaks, and is spoken of, through its official pronouncements and the collective and several voices of its teaching staff[59] and students. This is one of the shortest chapters, since, despite the fact that the institution is the custodian of the *curriculum*, as an entity it is not directly involved with the teaching and learning interaction – the *pedagogy* – that is the focus of this study. However, the overseeing functions and the memory of the institution are more than the sum of individuals' insights and experiences. I attest to this by including here overarching roles – enacted, indeed, by individuals, but as representatives of the collective – such as planning, implementation, assessment and evaluation.

Perhaps because most of the initial discussion and planning of the PBL curriculum took place in the Curriculum Development Task Force (CDTF), 1997-2004, official Faculty records do not reflect the debates around the issues cited in this chapter. I rely on institutional and individual memories to portray the roles that I ascribe to the Faculty.

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[58] I use this slightly more cumbersome and impersonal term, rather than 'Faculty', to avoid confusion with 'faculty' used in the sense of members of the teaching staff, who were described in the previous chapter.

[59] Support staff members have their own roles and their own opinions; I have not included them in this study of the institution's pedagogy since they are not directly involved in the teaching-learning interaction.

Planning

As in the case of day-to-day engagement, the feeling among both staff and students is that students are not closely involved in curriculum development and feel that planning is better left to the staff. Staff members differ in their perceptions of student involvement.

> But you see, with the problem-based [*sic*] that we had initially, students were very part of that programme; students are not part of any programme now with the curriculum. Remember we used to sit and students always gave us input on where the problems were and how we should do things in those days. Students were part and parcel of the team that made decisions on the programme. … I'm not sure what's happening. [I don't know] What feedback the students are giving, what input they are giving; and I think it's very important that you get students' input; it's their education. Dr Pillay 11;157- -168

> *Ja*, they had a presence; they largely used to give us a rubber stamp to things, but really they were not – they were not really active participants in it. Dr Pandit 9;263-264

Dr Patel evidently feels that his department has lost control to faculty structures and/or students. This sentiment contrasts with the perception amongst staff generally, as exemplified by Dr Hlubi.

> So who is controlling? We are forced, pressurised, coerced into dispensing a curriculum which we know as specialists in our relative subjects that is appropriate for them, but the situation is reversed that the students are controlling academics, disregarding their years of experience … With the result that the various disciplines are compromised in terms of teaching what they *ought* to be teaching; they are now teaching what the students want them to teach, ... Dr Patel 12;322- -330

> It's in the control of the teachers. [Right. Why do you think that is?] I think it's convention: this is how it was taught and it has continued; secondly, also, the person who gives the knowledge is the one most likely to know what you need to learn at the current status. Dr Hlubi 13;201-203

Students, exemplified by Imbali and Lungi, feel that they are not able to contribute much to planning, but can, however, identify poor planning.

> So, um, truth of the matter is, we don't really know, until we've gone through it, what really helps, 'cause we haven't been through it; we don't much; we're still learning. So teachers I think should organise … Imbali 6;410-411

> …if I look at this year – I can have a say in saying that, um, given what we've done so far, it would have been easier if they'd started with this, or if they were doing this system now. But beforehand I honestly cannot say that [Mm] if I'd come at the beginning of the year not even knowing what orthopaedics is and I'd said 'Can we start with orthopaedics?' I don't know how that would have helped me or made my life easier. [Mm] 'Cause I don't know what it's all about. But there are times when you realise, in fact not even with disciplines *per se*, with the lectures, where you realise that it would've helped if we'd had this lecture last week and not three weeks into the theme. Lungi 3;263-269

S'bu repeats a trope heard before, emphasising planning with a view to assessment.

> …we are having a structured, a structured thing – a structured curriculum, like a structured course. There's no major and minor subjects; so the way that SUME or the departments should structure the learning is in such a way that we are ready for the assessments. S'bu 4;472-474

Dr Milner (a scientist) makes a number of points about planning. His opinion is that the preliminary planning may have been influenced by ulterior motives, and that shaping teaching and learning around the basic sciences would have made for greater coherence of those subjects.

> First of all in the initial planning stages – um – I got the feeling that – um – there were these power-plays, right at the very start, and you had people that were perhaps doing, or championing curriculum change because they could get research mileage out of it. That's not necessarily a bad thing, but that has to be – you know, [It's not a good reason ...] It's not a good reason for changing curriculum. Dr Milner 8;63-66

> …one of the good things about the curriculum initially is that they had these sessions available for proper structured question and answers and what-have-you. How that fell flat was because of the way the – um – you see, there wasn't a basic science cognisance in terms of the way that the themes were actually structured, so you got into a question

> and answer session, and the students just didn't have enough of the basics to actually be able to formulate a question properly. Dr Milner 8;544-548

> I think that the way it needs to be organised, the way it needs to be planned is, it really needs to follow – um – a scheme that would make sense in terms of the basic sciences. In other words, a sequence that is something that anatomy and physiology and biochemistry can actually make sense of. Dr Milner 8;393-395

Dr Milner feels that his particular discipline has not been well integrated with cognate material and Dr Kathrodia thinks that an important early example of good planning has been unwisely jettisoned.

> And I think there wasn't enough planning specifically around my discipline, how it fits in. Dr Milner 8;20-21

> I think things have improved, but I think initially the planning was more around Themes rather than around – in terms of sequencing – rather than around the big picture sequencing ... Dr Milner 8;415-417

> That's why I was so excited about this curriculum; that you're matching this, you know; and then we started with diabetes mellitus and they just took the whole diabetes mellitus Theme away and said 'It belongs to different areas; they can do hypertension here, they can do renal –' that's not the point of the Theme; the Theme was a holistic Theme and this Faculty missed the point themselves. Dr Kathrodia 10;131-135

Respondents (with the exception of Dr Patel) express their belief that staff predominate in planning teaching and learning episodes. Relative student passivity, a focus on assessment, and flawed arrangements with reference to the place of basic science are articulated. Are these due to defective planning or are they shaped by ineffective implementation?

Implementation

Several staff members speak of hitches that they have found in the implementation of the programme. Dr Pandit feels that promised resources have not been forthcoming and that unwise decisions were taken about student numbers.

> And then I think also, if I look back, I think we were promised resources by the institution; they never delivered on that. The fact of the matter is that we didn't really get what we were told; other than creating SUME, which really largely fulfill an administrative function, we didn't get *all* the other things we were supposed to get … Dr Pandit 9;93-96

> The other big problem we had: we were asked to increase our student intake, and many of us said it was not advisable(?) – it was not appropriate for PBL to have such large groups and that we needed to get PBL settled and everything fine, and then think about it, but there was pressure, and the institution said they could provide all that was required to meet with the increased numbers of students; that never materialised.
>
> Dr Pandit 9;103-107

Dr Patel feels that his department's teaching is compromised by a lack of individuals with expertise in particular areas of that discipline.

> …each discipline, including <respondent's> is constrained by the expertise available in the academic to deliver a particular specialty within a discipline. For example, at <another campus> they've got problems, because they don't have individuals who are sufficiently experienced in, for example, <a particular area> or for example in <another area> so they have curtailed the dispensation of these sub-disciplines to the students because the man who was there emigrated and the other person who used to do that is ill, and for those two reasons – they are staff-constrained reasons – the amount of spacing or allocated time is constrained. Dr Patel 12;465-471

Dr Kathrodia thinks that too much material is being offered to students.

> So there's something, Ted, that we need to go back – the Dean is not listening to what I say, because I – and you know he's got the concentration of these basic sciences; are these *lectures* going to help these kids? And we had these dreadful arguments – people want to give 60 lectures in <a medical science discipline> and 40 lectures in something else. Dr Kathrodia 10;118-121

S'bu reports his sense of the fullness of his timetable in a programme that emphasises self-study.

> So if someone told us the, the thing – the spectrum of how much reading we should do – like I remember when we came to 1st year they said that we should – it's self-directed learning; you get the lectures and then you do your own research. When it comes to looking at the time you're spending at the school: you come in here at 8 o'clock until 4 o'clock; you know, by the time the day ends you're exhausted. And each lecture is two hours. Plus you have to go over each two-hour lecture, and then after that you have to read, make up your own notes and still do your own research. And looking at that, some of us can't really cope with that kind of graft(?) – that kind of load. And on top of that you have to learn and understand it. S'bu 4;82-89

Marcus's plaint about the lack of provision of lecture notes reflects not only his view of the facilities but also his perception of his own role as a passive rather than active learner, and of lecturers as purveyors of pre-processed information rather than assistants in his learning.

> It still – OK and thing – but they never continue with – because you know the notes; after 1st year you never get them on OLS[60]. There's – nothing comes on OLS; you just hope that the class rep goes up to the lecturer and gets the notes for you, 'cause if he doesn't, there's no – you can check on OLS; there's nothing. Most of the years are like that.
>
> Marcus 5;57-60

Dr Milner's experience allows him to point out some weak points in the curriculum, and to make suggestions as to how to maintain the integrity of the programme.

> I think what's missing in the – there's been a gap between the basic science concepts and the clinical entity, and that gap is basically something that I call signs and symptoms; you know, your common – what is jaundice, what is oedema, what is this; and there seems to be some sort of – I think focussing perhaps on – at some stage focussing on that, I think might link the general public – um – idea of medicine, which is mainly symptoms, to what the actual *thing* of medicine is about, which is actually diagnosing those symptoms, obviously using signs that the general public might not be aware about,

[60] OLS: The university's computer-based on-line learning system.

> and – um – linking all of that together, so I think there's possibly a missing link in there as well, so case design needs to have some aspect of basic science in it and it needs to have some aspect of well-known symptoms in it and then it needs to have some sort of clinical entity to it. Dr Milner 8;454-463

Among the students there are various opinions about the sequencing of entities within the programme. Ahmed makes a practical point about clinical skills teaching.

> And clinical – clinical teaching – I think they introduce it to us a bit late. Not in hospitals – just the skills – just the skills, because to do an abdominal exam of a pregnant woman[61] is very out of context if you don't know how to do a general abdominal exam, which you only do in 2nd year. That's my thinking about that – why isn't it done up way ahead? Ahmed 2;237-240

Lungi implies that she would like to be able to ask for some flexibility around the duration of lecturers' inputs.

> I think we have different ways of learning and we all go at different paces so sometimes you do find that you might, you might be thinking 'I wish that that had actually been an hour' – like with some lectures you find that 'OK I really wish that they'd given this guy two hours [Mm] as opposed to the one hour that they gave him' or 'I wish they'd given him ten minutes as opposed to the two minutes they gave him'. Lungi 3;305-309

Mandla (in speaking of Keketso's friend rearranging her material according to disciplines [*v.s.* p. 140]) says he is content to rely on the Faculty (represented by the department of medical education) to arrange matters appropriately.

> No, because it's, it's like you are organising something that has already been organised. You know SUME's there to organise how it's going to be presented to us. Then you don't have to take time to organise how you're going to read it. *You're* supposed to present it to us in the way that is going to be easier to grip and to accommodate the knowledge. So I believe that it takes a lot of time rearranging stuff; ... Mandla 4;445-449

[61] In the Reproductive Health Theme, towards the end of 1st year.

Respondents speak about the practicalities of implementing the PBL programme, and how these have – or might have – influenced students' learning. Resources (both physical and human), the volume of material, the design of problem cases, and the arrangement of the programme are all seen as problematic. Although Dr Kathrodia particularly highlights overcrowding of the curriculum, and other respondents mention it in specific contexts, content overload is not a prominent feature of student complaints. It is as if they *expect* the study of medicine to involve a great weight of material and are resigned to it in principle – yet they find it at times an insurmountable burden in the day-to-day, week-by-week outworking of the programme. This then relates to the end-point of each phase of the programme – the assessment.

Assessment

Assessment in its various types and formats is a topic that crops up frequently (in all 13 interviews), presumably because of the crucial role it plays in determining students' progression through the programme. Most students, like Ahmed, are strategic in their approach to it, divining that it is predominantly from lecture material and not small-group 'tuts' that assessment topics are drawn.

> I don't know; this is my experience. I've answered ETTs for the past three years, right, and I can tell you – guaranteed – if I didn't even look at my tuts, right, I would have passed, nicely. Ahmed 2;76-79

Others have different strategies to prepare for assessments.

> ... previous papers, obtained through devious means. [I don't want to know!] And spotting. [For an MCQ?] For the major areas. Also the tut topics, and the front of the tut books. [The overall outcomes in the Theme manuals?] Yes. Marcus 5;332-334

In contrast, other students – at both the upper (Vijay) and lower (Imbali) ends of the class – are less sure about the content of assessments.

> I don't think it was actually too clear, especially in the first two – in 1st year. It was easy to go off on a tangent. Vijay 4;602-603

> I have an idea but then what I get doesn't measure up. I study but it doesn't come up in the paper. .. I look at everything. .. This year is much the same as last year. The senior years advise us what to study but then SUME changes the paper, so it doesn't help. Imbali 6;539- -549

Students' uncertainty about the criteria by which they will be judged is something of which teaching staff members are aware.

> Students never really seem to understand what assessments are about, for each assessment they're getting. … We should be encouraging individual members of staff to explain and to be more explicit about the assessment tools they are using. Dr Milner 8;626- -628

> Outcomes they have to know, and you assess in terms of the outcomes. Whether it's mainly content or whether it's looking at how they address people in terms of their attitude, behaviour – which is important in our field; I think just give the young students some guidelines as well; otherwise it becomes very wishy-washy, you know; they don't know in which direction to go and how to focus. Dr Pillay 11;271-274

Dr Hlubi thinks that it is not in fact possible to be explicit about assessment criteria in the field of medical education – although he is aware of the calculated nature of students' preparation for assessment.

> I don't think so. Medicine is so vast that it's very difficult to do that. Dr Hlubi 13;305

> The other problem that I've picked up is that the students are strategic: they'll decide 'If this counts – if this is weighted 5%, even if I don't read it, it's OK, I won't fail'. Dr Hlubi 13;223-224

Dr Patel feels that his department has modified its assessment criteria, to the detriment of the quality of the assessments.

> …we have been pressurised by student demands and student strikes and student protestations of various degrees to say 'Look, we're not going to ask third level questions now; we're going to ask level one or level two questions in our assessments', and that is

> reflected in these *wonderful* exam pass rates of 94% and 95% [Mm] which are really – it's like Zimbabwean dollars, if I may say so. Dr Patel 12;569-572

Kevin voices a concern that students with lesser ability are able to slip through, only to struggle when they reach the clinical years.

> …if you're a good student then PBL suffices and works fine; if you're not a good student, you're in trouble. However, if you are not a good student at <other universities>, you'll be *forced* into doing things and learning [Mm] So not-good students get a higher education there than good students – well, than not-good students here, because what happens is that the not-good student arrives in 4th year in *serious* trouble, but a not-good student there would never arrive in 4th year if they hadn't gone through a certain amount of things. You see, you can wangle the system in PBL; you *can* wangle the system. You get to learn how to learn. Kevin 7;270-276

Vusi, a struggler like Imbali, seems also to have trouble relating his vividly, but imprecisely, expressed sense of the assessment criteria to his learning strategy.

> With the teachers: they do set a bar, which we are to fulfill, and then what goes beyond that is what the individual sets for themselves. So I mean the curriculum comes down to a very important integral part that is going to be tested. So that bar is set, just before or just after or just where that knowledge is being tested. So if I know that if I need to learn this book, I'm going to go *learn that book*. [My emphasis] Vusi 6;363-365

Fikile raises the issue of the format of assessment questions, explaining that the majority of the type of questions used in this faculty's assessment of PBL learning do not allow the student to explain the logic of her answer.

> My concern is with the, the way we're assessed by the True and False questions – I feel like it's not really testing how much we know and it doesn't really give you like time like give you a choice to explain why you're saying True. Maybe now you know like ... it's limiting; say now you say it's True or False – it doesn't give you – you know you don't get time to explain how it happens till you come to a point you say it's True.
>
> Fikile 4;535-539

The matter of language crops up again, this time with regard to assessment questions.

> …with the questioning, sometimes the terminology and, you know, the wording of the questions, they are – like for some of us who don't like, er, we don't come from the same educational background in terms of our English; sometimes the English they use in the questions, like they – ah – they, they don't really see for some of us it's difficult to understand the question. You find that you know the answer but you don't understand how the phrasing of the question is ... S'bu 4;566-571

The institution affirms its control over assessment.

> Faculty Board makes on behalf of Senate decisions with respect to all academic affairs. This includes changes to the undergraduate programme, changes in assessment methodology and approval of assessment outcome. The function of Faculty Board
>
> Self-assessment questionnaire (2010)

This section expands on a topic that arose in Chapter 6, namely assessment as a driver for learning. Students' perceptions of the areas and activities from which assessment material is drawn impel them to concentrate on the content of the lectures rather than of the problem cases (although the two should be coherent). Staff members display a spread of attitudes to assessment. Kevin, giving some credence to Dr Patel's feeling that students have the upper hand as to setting and marking questions, interprets one of the vaunted benefits of PBL – learning how to learn – as learning how to "wangle the system".

The institution's inability to specify the criteria for success in assessments – or unwillingness to give out information that might distract students from certain areas and focus their attention on others – makes for uncertainty that spills over into students' study techniques. Imbali, for example, evidently relies on past papers (with less success than Marcus), only to find, when questions are presented in different ways, that she can not successfully interpret the rephrased questions. Vusi visualises a bar to be jumped over but seems unable to gauge the height of the bar or the quality of learning needed to succeed in passing over it. His learning a whole book without discrimination (which may well have been what he was told to do) may have added quantity to his store of information, but not quality to his knowledge.

Fikile raises the contentious matter of question formats. As student numbers increase, so too does the pressure to use easily-marked assessment formats. The tension between the reliability of easily-repeated formats and the validity of more realistic but more time-consuming formats is enormous – and not susceptible to simple solutions (van Wyk, 2009).

Evaluation

Both students and staff members comment on evaluation of the PBL programme. Dr Milner and Lungi each propound the idea that the students involved in a programme are those best able to evaluate it, rather than the teachers who set it up but are not subjected to it.

> But I do think in terms of assessment that your best – um – quality assurance – and this is lacking all over the place in the university – but your best quality assurance is the students themselves. Dr Milner 8;573-575

> …you guys are sitting in your big offices when we have the lectures and deal with rude lecturers who think they're everything because they're doctors, and give inadequate information, don't teach us properly. So we would be the ones at a better point of view of saying "You know what, if you're going to carry on with this, can you get another lecturer because he's not adequately doing [Mm] what he's supposed to be doing. [Mm] So there's no way that you guys can honestly evaluate that because you're not there.
>
> Lungi 3;362-366

Osane makes the practical point that students' evaluations are taken into account each year when Themes are planned for the next year's cohort of students.

> *Ja*, the feedback thing. So that's some sort of – I don't know – show of student – it just shows you students are having some sort of say in how they go about setting up Themes and such. 'Cause I know how some people complain, and they do take it up – I hope – when it comes to reorganising the Themes. Osane 6;433-435

Dr Kathrodia mentions a number of examples of items that students have brought to her department's attention, and the importance that she places on student feedback.

> …that's where you pick up the little problems they have; the niggly issues, and you know, you cannot dismiss what they are saying. So that's how we picked up a lot of problems at <a teaching site> for example. We then picked up issues at <another teaching site> where the staff were trying to do the work but there wasn't a proper seminar room. And also then they tell us that they don't have senior people teaching them but only junior people teaching, and sometimes the juniors can't answer all the questions, and we need to go back and say 'What's going on?' And also they tell us which parts are difficult, which parts are easy, and then they talk about – even the exams, they give us feedback. We can get it from them. I think it's very crucial … Dr Kathrodia 10;318-326

Dr Patel describes how computerised evaluation of assessment instruments identifies problematic questions and can improve the quality of the assessment.

> But today, by the nature of the mechanism of assessment, in terms of MCQs and the Facility Index and the Discriminative Index of these assessments, it gives you a guidance or an input as to say 'Look, our question X wasn't clear enough and question Y wasn't(?) good, and therefore they can be discarded from the analysis of the results as such'. Now I think that's a wonderful innovation. So today the questions are more explicit and more clearly defined as to what's required, firstly because there's an objective mechanism to give us a feedback, and secondly we don't want to trap the students.
>
> Dr Patel 12;594-600

Dr Pandit describes how student evaluation provides information to complement the computerised evaluation in terms of clarifying how problem questions have been understood by students.

> I don't think they have input into the assessment, and clearly, that's not – they never have had. And I think that is more – very literally it's a feedback; I don't think it serves more than that, and for some of them, they clearly illustrate to us how it is they interpret a question or an answer ... Dr Pandit 9;325-327

Kevin, who has previously taken courses in other faculties, comments favourably on assessors' willingness to debate questions and answers.

> I must say, in 1st year and 2nd year – not so much 3rd year because we have more clinicians in 3rd year and they don't really listen to any arguing – but in 1st year and 2nd year the physiologists and the non-basic science guys would be very open to arguments in ETT feedbacks … Kevin 7;286-289

Evaluation, in the sense of feedback and critically examining a programme and commenting on its strong and weak points, is an important part of the faculty's activities. It should complement assessment of student performance, which is very often reduced to a numerical mark, whereas effective evaluation explains qualitatively the reasons behind the numbers: why a class did well or badly in a particular area.

The points are well made that those who experience the pedagogy are best placed to evaluate it, and that evaluation must be fed back into redesigning the elements of the programme: lectures, problem cases and assessments.

Summation – Institutional roles

The Faculty, as overseer of teaching and learning, engages in planning, supposedly bringing staff and students together, although the relative contributions of each constituency may be debatable. Both students and staff members have fairly definite views about how they would have liked some aspects to be planned. Implementation is bedevilled by constrained resources on one hand and unfettered content load on the other, and the suggestion has been made that a different grouping of Themes' material might have been more helpful.

Assessment, and its relation to lectures but not to small-group sessions, draws a great deal of comment. Rigorous standards are felt to have slipped, and at the same time assessment criteria are unclear, leaving students unsure as to what study strategy to follow. This lack of clarity from the institutional side, I suggest, relates to the wide variation of successive assessment marks which is sufficient to constitute an independent influence on students' marks in the GEE analysis. It is possible that

students from the higher quintile schools, and those with tertiary experience, may have acquired effective strategies for coping with assessments. These strategies may be standing them in better stead than reading a whole book at a time, or studying past assessment papers, only to stumble when the phrasing of the questions is changed. Evaluation, the other side of the assessment coin, is thought by both students and staff to be important, and is actively made use of in the UKZN programme.

Where staff and students, embroiled as they are in the day-to-day encounters of the pedagogic act, notice discordances, the institution might be expected to deal with these. Faculty documents express the philosophy of PBL clearly, in recognised terminology, but are less clear as to the institution's attitude to on-the-ground planning and implementation.

In this chapter I have described how the Faculty as a body plays its part in and relates to learning and teaching at this medical school. In the two preceding chapters I set out descriptions of how students and teachers experience learning and teaching in PBL pedagogy. I shall address in Chapter 10 the question of why their perceptions and experiences are shaped as they are. Role-players' actions and attitudes in the enactment of PBL theory and philosophy are matters to be explained.

In terms of the definitions contemplated in Chapter 3, I see 'pedagogy' more as a verb than an abstract noun. Learners and teachers both enact pedagogy, and in so doing they interact (either in a large- [lecture] or small-group setting); thus, the sociological aspects of pedagogy may be expected to be relevant. In order to approach the question of why my respondents experience PBL in the ways they do, I turn in the next chapter to an analysis of my participants' responses in sociological terms.

9

PBL pedagogy analysed through Bernstein's Classification and Framing

This chapter examines the interview data from a different viewpoint and thus pulls out items and builds concepts in different ways from the foregoing three chapters. As the main themes of analysis, I have used Bernstein's eight categories of classification and framing of pedagogy:

> Boundary between general and specialised knowledge
> Boundary between disciplines within the specialised realm
> Boundary between areas of knowledge within disciplines
> Control over content selection
> Control over organisation of teaching and learning
> Control over pacing of teaching and learning
> Control over evaluation[62]
> Hierarchy of relationships in the pedagogic environment
>
> (Bernstein, 1971)

I use this analytical framework to cut across the themes[63] that arose from interrogating the data from the perspectives of my first two research questions, in order to theorise about concepts emerging from the data.

I show that students and teachers hold similar views in most of these eight categories; specifically, they agree that medical knowledge is strongly separated from lay knowledge, that teachers hold control over content selection, organisation, pacing and

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[62] From the context, Bernstein evidently intended 'evaluation' primarily in the sense of assessment of learners by teachers for purposes of rating or advancement in a programme, rather than that of evaluation of a programme by learners and teachers.

[63] The themes that I drew out of this analysis (see Appendix G) may be compared with those from the more general analysis (see Appendix F).

assessment, and that a hierarchy is maintained between teachers and students. These two constituencies do, however, hold differing views on the significance of their observations. They also have contradictory views of the boundaries between knowledge from different disciplines, and the boundaries between areas of knowledge within particular disciplines.

The boundary between 'everyday knowledge' and medical knowledge.

This is the first of the eight areas mentioned by Bernstein, and is one of three delineations of boundaries between different realms of knowledge. This first demarcation is between the undifferentiated knowledge that is supposedly possessed in common by a community (as exemplified by 'the man in the street') and the more esoteric knowledge of the realm under examination – in this case, medical knowledge as a whole. (The other two boundaries to be distinguished are between disciplines within the broad ambit of medical knowledge and between subject areas within disciplines.)

Descriptions of this first boundary by my respondents fall into three broad groups:

Differences between medical and non-medical knowledge
Points of contact between medical and non-medical knowledge
Practical applications of medical knowledge in everyday settings

Differences between the two domains of knowledge

The respondents predominantly recognise a strong boundary between these two areas of knowledge.

> …there's a clear distinction. There definitely is; that's why we're medical students and we're studying to be doctors. Osane 6;184-185

One obvious distinction is the terminology of these different realms.

> In terms of the words we use, I think that was like the main change from common knowledge to just getting used to all the Latin terminology and everything …
>
> Susan 1;116-117

> You read and you come across a word there, you know three words later there's another word you don't understand, and you don't get anywhere, you know what's frustrating, but you know it's – as, as you go on, you continue; you learn about the terms and you, you start to understand some of the things Mandla 4;279-282

S'bu and Dr Hlubi demonstrate that the terminology of medicine and the language of communication are distinct concepts that help define this boundary. When they converse with patients in their own language (*i.e.* Zulu), they are aware at the same time that they have to bridge the divide between technical and everyday discourse.

> *We* have a problem when we go to the wards when we're taking history. First of all, like when you're having a patient who's speaking Zulu and they don't even understand English, to, to get knowledge from them – to ask their history, you have to use general terms – terminology; the way people talk. S'bu 4;310-312

> My impression is that we look at medical knowledge as different [Mm-hm] and to such an extent that if you have to explain to the patient, you have to – I have to make an effort to say 'Now I'm explaining to the patient, I must use a different language'. … the general public do not understand, because we work with medical knowledge as opposed to general knowledge. Dr Hlubi 13;45- -50

The quantity and quality of medical knowledge are also seen as distinguishing features of this boundary.

> Everyday knowledge when it comes to medicine, maybe they know about that amount [Hand ~ 30 cm off the floor] ... but we know about that amount [Hand ~ 1 m off the floor] ... you do know a lot more, and you know a lot more about a lot more.
>
> Krish 5;175-6,193

> Sickness, so to speak, is a specialised part that the public will not perhaps necessarily always understand. Dr Kathrodia 10;153-154

Dr Patel avers that medical knowledge is actively transmitted rather than unconsciously acquired, and he conveys his view of the high status of medical knowledge compared to knowledge outside its boundary.

> I look upon it as a sacred body of knowledge which needs to be bequeathed to your students, so therefore it's a highly specialised packet of knowledge which can't be just dispelled or dissipated [Mm-hm] by a process of diffusion; it has to be an active process where you as a teacher or an educator need to have certain qualities to do so, number one. Number two: the student needs to be ready to receive that. Dr Patel 12;132-136

The following quote may be seen as exemplifying a particular subdivision of the difference between medical and everyday knowledge. Traditional medicine, which is part of some students' backgrounds, is seen as part of everyday knowledge as distinct from (European) medical knowledge.

> …one time when we were doing surgery, a patient had obstructive jaundice and then they had pain in the umbilicus which was radiating to the back, and then they went to a traditional healer, and the traditional healer folk, like they call – I don't know what you call it in English but some people call it *umcabo* – you know, traditional scars. [Scarify. Yes.] Scarify – *ja*, that part of the abdomen which was painful was like scarified by *umcabo* – by *umcabo*. So it's kind of like, you know – for me it was like OK, some, some of the things that traditional medicine has taught me as I was growing up are in conflict with what western medicine says, you know. So to some areas it adds to general knowledge and to some areas it brings conflict you know. But since western medicine has a more scientific proof, it's easier to adapt to using western medicine from what we learned in school because it has scientific proof. S'bu 4;257-265

Contact between medical and everyday knowledge

In this group of responses a tacitly acknowledged boundary appears to be negotiated by way of the respondents assuming or suggesting actual or potential ways of linking the two realms of knowledge.

> I think sometimes the lecturers fail to show it in a way that is sort of common-sense and helps us – that anyone could understand; they tend to just see it from their specialist perspective. We might be missing in the sort of, um, bridge between being just a person in the normal population and then medical students. Susan 1;119-121

A number of respondents argue the importance of establishing a sense of continuity that bridges the divide between the two realms of knowledge. Each respondent seems to recognise that there is a boundary at the cognitive level, but that there are overarching considerations that necessitate medical students and practitioners having a more continuous view of life and of health and disease.

> I try to show them that medicine's a part of the whole; it's part of everyday knowledge that is part of life, and you have to have a life-view on health and disease.
>
> Dr Pandit 9;116-118

> There's a lot of things of lifestyle, health – ah – and normal things like pregnancy, small babies, young children going to school and developing – all that is in general life ... there is a general aspect to medical knowledge and then I think there are the specialised areas of medical knowledge; so there is a lay section of medical knowledge so to speak ... it is a broader picture; it's not just a narrow field of it ... I think it can be a continuum.
>
> Dr Kathrodia 10;150-2,4-6,64-5

> Some people that are diabetic may know as much as I know about diabetes because they can go to the Net and search about it. Refiloe 4;220-222

> Maybe integrating the way we learn medically [Mm] with general knowledge [OK] could help in terms of understanding; understanding just the basic concepts.
>
> S'bu 4;312-314

Practical application of medical knowledge in everyday settings

This may represent a subdivision of contacts between the two kinds of knowledge. Some students express the ways in which they personally are able to relate their medical knowledge to everyday knowledge.

> You have to reduce the medical words to such an extent that a seventy-year-old can understand and will relate to them. You feel you can mention their weight and the kidney damage, you know, *ja*. So to give that message you're able to mix terminology.
>
> Keketso 4;322-324

Staff members also reflect the need for medical knowledge to be applicable in the everyday world.

> People say 'In an ideal world ...' and I ask them 'Which world do you live in? There's only one world, there's no ideal world, there's the world; this is the world we live in. We can make it into something, but then we have to actually create that; it's our job to create it, but there's no "ideal world".' Dr Pandit 9;122-125

In the responses listed above, students mention terminology as representing part at least of the boundary between everyday and medical knowledge. The language of teaching and learning in the medical school is not the first language of the majority of students (and patients). Nonetheless, students are willing to surmount that obstacle, seeing it as less of a barrier than the discourse of medicine. I surmise that this determination accounts, at least in part, for the fact that students' language did not emerge as an independent influence on assessment marks in overall (GEE) analysis.

A boundary is evident between the everyday knowledge that respondents bring with them to medical school and the knowledge that they handle within the medical school. A number of respondents are at pains to explain how the two realms of knowledge should or could be smoothly integrated, presumably in tacit recognition that new knowledge is constructed on the foundation of prior knowledge. Further incentives to bridge the boundary can be seen in the public's growing access to medical knowledge, and the need to be able to talk to patients at their level of understanding in order to bridge the gap on behalf of the community between the technical discourse of medicine and the language of everyday life. Dr Kathrodia's explicit acknowledgement of a continuum between everyday and medical knowledge accords with Maton's (2009) and Erickson's proposed (2009) relaxations (*v.s.* p. 53) of Bernstein's dichotomous description.

As discussed above (p. 175) under assessment, and for similar reasons, one would expect students from the upper school quintiles, and more especially those who have transferred from other tertiary programmes, to surmount this non-medical / medical boundary with greater ease.

Interdisciplinary boundaries

Within the realm of medical knowledge, student respondents see the various disciplines as integrated in terms of pedagogy, although staff respondents are aware that the Faculty's departmental[64] structure maintains separation between disciplines.

Susan experiences weak boundaries between disciplinary knowledge both in the pedagogy of the programme and in her own thinking.

> I think, to me, my understanding is that this sort of commonplace learning *is* to sort of blur the boundaries between all the different disciplines because, with the Themes that we do, you get lectures from each different department straight after each other, and I've never – as opposed to other people that learn, you know, from certain departments – I've never had clear boundaries between, you know, all the different – *ja* – the different ways.
>
> Susan 1;141-144

Lungi agrees that integrating material within Themes works well for her.

> So the way – actually that way it's done with the Themes I think works very nicely. Because I'm tackling a particular system or topic and I'm going to get all the different aspects: the anatomy, the physiology, the surgery, everything on it, so at least, although we shouldn't put things into a box, but I know 'OK, this is my liver; this is what goes on with the liver; I can put it aside. So I think the way the Themes have been set up [Mm] is actually a very good idea. Lungi 3;154-158

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[64] When the rest of the university discarded departments in favour of schools as organisational units, the medical school retained the nomenclature because it corresponded with the Department of Health's organisation of health care delivery via specialist departments.

Other students, while not decrying the presentation of material in an integrated fashion, evidently experience difficulty in making use of such material. Vusi expresses his struggle to see the overall pattern.

> …thing is, we learn something and we box it in, so we never quite – when we face a question where a person comes with all of those problems mashed together, we see 'Oh that's anatomy, that's physiology, that's – what's wrong', but we never quite know how to look at the bigger picture, and actually come to a conclusion by ourselves.
>
> Vusi 6;218-221

Bala insists that integration helps him to think more coherently.

> Everything needs to be integrated together. That's how you can be ready to really come out of all of this with an idea of what you're talking about. For example, if you're looking – if you doing anatomy and you do anatomy of the median nerve, and then, you know, you just learn OK this is the nerve and that's what it does, but if you learn it with all your other disciplines, then you'll know, OK with rheumatoid[65] you might well get a median nerve palsy, in fact you'll know that even thyroid problems can cause median nerve palsies, or the problems from another discipline can cause median nerve palsy, you know; it's all interrelated into one. Bala 6;338-344

Dr Kathrodia, speaking from the teacher's point of view, emphasises that PBL's integration of material is an important learning tool. Integration prepares for the doctor's need at the bedside to be able to combine and compare information from different disciplines. Dr Milner maintains that integration is inherent in the shared scientific basis of medical disciplines.

> I think some aspects they are definitely connected, and what we need to recognise is where that – for example: abdominal pain: when is it medical and when is it surgical? So one needs to have that perspective. When are swollen legs just cardiac, and when is it a DVT[66]? And it's that sort of aspect that divides it up, but recognising – that's why

[65] Rheumatoid arthritis: a connective tissue disease with widespread effects.

[66] Deep venous thrombosis, which obstructs blood returning from the leg and thus causes swelling.

> problem-based learning is so important: because it doesn't compartmentalise.
>
> Dr Kathrodia 10;174-178

> Obviously, politically, the different specialists will tell you that their realms are completely sacred and completely different, but – um – they're all based on a large amount of foundation work, so that there's very clearly a common thread, you know, running sort of between them. Dr Milner 8;252-254

Dr Patel voices exactly the idea that Dr Milner has just noted: that disciplinary knowledge should unquestionably be kept separate in thinking and in teaching. Dr Pandit feels that, despite the apparent integration of material in PBL teaching, disciplinary allegiances militate against conveying a sense of holism to students.

> So therefore there is an area of commonality, but certain areas are sort of sacred and endogenous to that particular discipline, and it can't be taught, neither can it be explained to the students by somebody else who is not in that area. Dr Patel 12;153-156

> I think that just reinforces the view that students get from society of not being able to see things in an integrated way. [*Ja*] So even though we've tried to integrate, we haven't really successfully integrated. On paper things are together but in reality they're not.
>
> Dr Pandit 9;133-135

This section introduces further facets of integration in addition to those noted in preceding chapters. Students generally perceive the integration of multidisciplinary teaching that is part of PBL while teachers are aware of the separation of disciplines both structurally and cognitively. These differing perceptions relate to the on-going debate about whether small-group facilitators should be subject experts, or at least doctors, or non-experts. At this point, an argument can be made for employing non-expert facilitators, who have no choice but to treat the various disciplinary knowledges as part of an overall spectrum to be handled and absorbed holistically by students. I argue that the identical average assessment marks achieved by students regardless of what kind of facilitator they had for a Theme supports this reasoning. The tension between pedagogic integration and organisational separation also raises the question of whether interspersing lectures delivered by different disciplines actually constitutes integrated teaching.

Intra-disciplinary boundaries

Considering divisions of knowledge within disciplines, students and staff have different perceptions again. Students generally feel that different areas within a discipline are kept distinct from one another, while staff members feel that there is no separation at that level.

Lungi explains that she can cope better if she considers organ systems separately, although she recognises the need for a holistic view of her patients as comprising a number of integrated systems. Osane makes the practical point that one cannot hold everything in one's mind simultaneously – one must concentrate on one part at a time.

> …but at the end of it all, you know that most of the systems are linked at the end of it. But in terms of studying and learning and understanding, I need to look at each entity on its own and understand it on its own [Mm] before I can look at it [Mm] holistically within one person. Lungi 3;202-204

> I think for learning's sake it's easier to keep things separately, 'cause you can only go through so much at a time. So you have to break it down in order for you to be able to have like teachable focused learning, 'cause – *ja* – at least within the discipline; you have to have some sort of time for focussed learning. It's a bit hard to learn everything at once. Osane 6;350-353

In contrast to the students, Dr Milner feels that as a teacher one should maintain an integrated concept of the whole of one's discipline. Dr Hlubi's opinion is that within his discipline information is not bounded.

> Now the good teachers and researchers – just to give you an idea – would always keep an open mind about the general principles in play, because in order to actually answer the difficult questions, you need to think out of the box, and actually link it to the discipline as the subject as a whole, ... Dr Milner 8;265-267

> …but there are no boundaries, and even the way we teach it to the undergraduate student, we don't give the impression that these are separate subspecialities; we teach them as falling under <the discipline>, so there are no boundaries. Dr Hlubi 13;185-188

The contrasts between students' and teachers' perceptions in this and the previous section are marked, and are, at first glance, paradoxical. I think that the current organisation of the curriculum is responsible for these observations. The curricular Themes were conceived and constructed so as to combine cognate material from different disciplines; that students view disciplinary material as integrated, is an indication of the success of this plan. Each Theme is based largely on an organ-system[67], and has its own assessment. That being so, I am not surprised that students, when looking at specific disciplines, are acutely aware of the boundaries between knowledge areas based on different organ-systems. (I surmise that students in a traditional discipline-based curriculum perceive the disciplines to be completely separate from one another, yet perceive areas within each discipline to be integrated.)

Control over curriculum content

Moving from considerations of the autonomy of knowledge areas at three successive levels of specialisation, I now turn to Bernstein's five categories of control over various aspects of pedagogy.

There is consensus among the respondents that it is teachers who control the selection of items from the realm of medical knowledge for inclusion in the medical school's syllabus. Lungi argues that teachers, because of their knowledge and experience, *ought* to control content selection.

> It should be the teachers. It *is* the teachers. Because – no but quite honestly I, I'm – compared to a teacher I'm quite ignorant. I don't know how much content and to what

[67] *e.g.* the cardiovascular system, the liver, the immune system, the locomotor system, etc.

> depth and you know whatever; that's why I say the guidance has to come from you guys – from the lecturers, and then if I want to go and read then at least I know that I must read as far as this. … I don't know what I need to know. Lungi 3;217- -224

Dr Pandit's description of the reasoned process by which the curriculum content was decided upon provides some support for the view that medical teachers are better placed than students to make such decisions.

> When we designed the original – the first group that came, and we designed that group curriculum – we used content to be driven by the EDL[68] process, so we then – that had already established 80 % of the problem conditions in South Africa – and we then designed to make sure that we covered those. There were some other areas: staff also gave their needs; there was a need and a wish list; and these were accommodated to establish content, so staff gave input for that. Students gave very little; ...
>
> Dr Pandit 9;179-183

Dr Pillay agrees with Dr Pandit that the majority of the content is determined by teachers, but she also indicates indirectly that there is a proportion of content that is less strictly controlled.

> …in <respondent's discipline> we have a core content, and then there's nice-to-know knowledge, which is part of that broader knowledge beyond your discipline that students could know about. [Mm-hm] But the core content – the absolute essentials – is what we normally record; to say these are something that is not negotiable in terms of our discipline; ... Dr Pillay 11;150-153

Vusi, in describing self-discovered knowledge as "really really important", signifies the value he ascribes to content knowledge gathered to supplement core knowledge conveyed by scheduled activities.

> …there's a percentage of core knowledge which we get taught and then the remainder we then have to go find out, and we then find that – I mean if someone is brilliant, they will remember quite a bit of that core knowledge and I think that what you then go find out is really really important to actually then kind of seal the deal *per se*, ... I mean,

[68] The list of common medical conditions that was used to draw up the Essential Drug List for the country.

> realistically speaking, I think curriculum depends on the individual, on the first aspect, in the sense that you will go out and learn what you learn. Vusi 6; 9-12, 360-1

Dr Kathrodia voices the recurring thought that students are not sure of the extent to which they should explore content knowledge.

> …they often ask us 'How far do I go?' and then we try to put that into perspective for them, and to get the depth – to indicate to the student the depth that you wish to go is very difficult, I think. Dr Kathrodia 10;218-220

Dr Patel feels that students, far from relying on teachers to set a basic syllabus and then to guide them further, are actually dictating what content is put into the programme.

> *Ja*, look, today we have reached an extraordinary situation where we are pressurised by students to tell them – to tell *us* rather – what to teach, what to examine, and what is not necessary for them. Dr Patel 12;313-314

I give the last word on this topic to Sipho, who expresses the interplay of student activity and teacher guidance.

> I think it is – depends on the students how hard you do your work. At the same time I think teachers will help to guide you as a person how much do you – how much work do you need to know for how long. Sipho 6;382-383

These quotes indicate the spectrum of perceptions of control over the content that provides substrate for the pedagogy. While overall control is seen to rest with teachers, the capacity for students to explore content material for themselves is evident.

Dr Patel's perception of student demands as to content (and other attributes of the programme) implies that students are a lot more actively engaged with the programme than is suggested by other teachers and students. The contradiction may be less than it initially appears: students simultaneously want a curtailment of the volume presented to them by Dr Patel's discipline *and* more guidance as to how to engage with it.

Lungi is a degreed student who is confident in her own intellectual ability and is able to critique aspects of the pedagogy and the broader curriculum. Nonetheless, her reliance

on the teaching staff to determine the content to be taught belies any suggestion that prior tertiary experience conveys a greater ability to establish one's own syllabus. The question "How far do I go?" reflects the anxiety generic to PBL pedagogy (Das, Mpofu, Hasan, & Stewart, 2002). Students may be enthusiastic to study further for their own satisfaction, or they may strategically gauge the minimum that they can learn in order to pass. Either way, it does seem that guidance is often sought as to the depth and breadth to which each topic can practically be pursued (Miflin, *et al.*, 1999).

If outcomes-based education were a success in schools, one might perhaps expect students to show more initiative with regard to content selection. As things stand, it is less surprising that, although students from schools in more socioeconomically sound areas tend to score better marks, they show no evidence of wanting more control over their course content.

Sipho's summary of the balance between student agency and teacher guidance contains an important message about students' degree of engagement with content matter: "... how much work do you need to know *for how long*" [my italics]. Despite attempts to pare down the syllabus to core content and to define that core clearly, there is still so much material that students generally cram it in for only as long as the next assessment requires.

Organisational control

In this category a similar pattern of responses is seen to that revealed in the preceding section. Dr Patel's view is the most definite, but others agree that the teachers take primary responsibility for the sequencing of content.

> Well look, I look upon teaching any body of knowledge as a set menu. There's a set menu, like when you go to a restaurant; there's a set menu which, whether you like it or not, you've got to eat it. Dr Patel 12;360-361

> I think that you guys being professionals and knowing which systems are important and which systems link into each other, you would know that 'OK if we start the students off with chest; the chest sometimes leads into the abdomen; the abdomen sometimes leads into the genitourinary –' You guys have the idea, honestly speaking. I'm just going to take whatever you say. Lungi 4;250-253

Dr Milner and Osane are both of the opinion that a variety of inputs are needed if the content is to be appropriately arranged.

> I don't think it's something the faculty can just do on its own. Dr Milner 8;432

> *Ja*, the feedback thing. So that's some sort of – I don't know – show of student – it just shows you students are having some sort of say in how they go about setting up Themes and such. Osane 6;433-434

Here too, students and teachers agree that the latter – with some input from the former – are in control of the organisation of the content. While acknowledging their need of direction, students expect to be consulted before a Theme is re-run. Chapter 5's findings notwithstanding, students' immediate experience of a Theme is seen as sufficient to influence the optimal organisation of its content; the circumstances of their backgrounds do not appear to exert significant traction in this area. The freedom that students have during the small-group meetings to organise their own learning is evidently not felt to be significant, since none of the respondents mention it as an example of student control over organisation.

Control over pacing

This term refers to the timing of successive parts of the curriculum; the duration of each of the many parts that have been arranged in a certain sequence. A spectrum of opinions between reliance and non-reliance on teachers is expressed by respondents. Ahmed feels that teachers, not students, should control pacing, and Keketso explains why.

> *Ja*, that should not be controlled by students. It should be controlled by you all. Ahmed 2;258

> We kids – some of us, if not the majority of us, are young, so – and mischievous. [Chuckle] There needs to be a set date when you have put a deadline, when you are going to work, if you deliberately look forward then I know that at this point I need to be ready by that point so that whatever happens … I think you're giving us too much control these days – it's dangerous. Keketso 4;513-516

Krish and Lungi, in contrast to Keketso's reliance on an external timekeeper, argue for the need to plan for themselves how they use their time.

> You – you'd in the end be the person making the decision, not the person who's deciding what goes into your Theme book for the six-week period that you have to cover the Theme, or not. Krish 5;304-306

> I find that, um, irrespective of how as lecturers you may control our time: that we're going to do *this* for this hour and *this* for that hour, my control is after that, as in deciding 'OK when I'm done, this is what I've got from the day. I'm going to do *this* today and do *that* today and for *this* long, etc, etc'. Lungi 3;310-313

Mandla ascribes students' differences in pacing to practicalities. He speaks of how he keeps up – or fails to keep up – with the tempo of the lectures and how he copes with accumulating lecture notes.

> Sometimes I just – em – just collect the notes, put them somewhere, read what you have to read, come back to them when you are – you're trying to, to summarise everything and put them together. Sometimes really it's hard to follow the pace that the lectures are given. It's more easy to make your own – for me. Mandla 4;498-501

Teachers also express a variety of points of view on control over pacing. Drs Pandit and Pillay feel that students are able to take control of their own time, but Dr Hlubi thinks that students in the PBL section of the curriculum have little latitude with regard to pacing.

> I think students – from the experience I've had with them is that they choose how they use the week. Even when it came to things like – well, we called lectures LGRSs[69] at that time – many of them would choose not to attend those, despite the fact that we would spend a lot of time designing it as a resource for them to learn, and largely they would not attend. Dr Pandit 9;281-284

> I think the students do have enough time, because a lot of them still go and do the – especially the mature students; they work outside, and they do other things as well, so they have time; I don't think time is a factor. Dr Pillay 11;206-208

> In the preclinical years, as you know, it's really fixed; I don't think they can influence it. Dr Hlubi 13;251-252

I expected that pacing would be one of the aspects over which students would feel most control in a PBL programme. Each week's problem case, once discussed at the beginning of the week, supposedly propels students into the week to research and discover *at their own pace* the information needed to make sense of the case when they meet again at the end of the week. Some of my student respondents do express the need to regulate the pace of their own learning, but to do so only within the limitations imposed by the sequencing of the teacher-controlled timetable and the sheer number of lectures. Again, a small-group session should be the one occasion when students could control the pace of their discussions, but this is not mentioned by any of the students.

Surprisingly, Ahmed and Kevin (two high-achieving students) feel that control over pacing should *not* be given to students. Keketso spells out the reason most explicitly: students need deadlines to work towards. Students evidently feel that they cannot trust their own judgement in managing their time. In the face of lecturers' control over so many aspects of the pedagogy, one might expect students reactively to exert their autonomy at least over the time they spend on various learning activities. PBL's emphasis on self-directed learning and the reduction of didactic teaching should be an encouragement in the same direction. The fact that high achievers and degreed students

[69] Large Group Resource Sessions – a name change to indicate that lectures should be a resource for students to be able to interact with the lecturer, rather than a unidirectional exposition.

also abdicate their self-determination in this regard is yet another anomaly. It appears that, despite the rhetoric of PBL theory and Faculty pronouncements, the implementation of 'PBL' is so strongly framed that students do not recognise their opportunities in a more weakly-framed area.

Control over evaluation

This heading encompasses: assessment of students' progress, students' awareness of the criteria for success, and evaluation of the programme's quality.

Summative assessment

There is no disagreement among the respondents about the significance of assessment and who controls it.

> …the pressure of assessment is the only motivating force for students to learn anything and for teachers to teach and learning to take place. There's no other force greater than that. Dr Patel 12;505-506

> The classical example is, straight after the lecture: "Where's the lecture notes?" not "Where's the textbooks I've to refer to, getting the answer?" What the lecturer says, that's what comes out in the paper, that's what people want to go to. Teachers are controlling the paper(?). Ahmed 2;208-210

Assessment criteria

As regards guidance on the criteria for assessment, students feel – as noted already in Chapters 6 and 8 – that lecture material contributes to the bulk of assessment content, but that they are not always able to apply their knowledge to the questions asked. Dr Kathrodia is quite clear that students and teachers have to work towards certain goals.

> …the point is about the assessment, it must match what we've been teaching them; otherwise we would fail, and the student would fail. So what you teach, and what they

have to learn, will determine how well they'll do in assessment I think.

Dr Kathrodia 10;301-303

Dr Patel agrees with Dr Milner (see Chapter 8) that teachers should clarify the nature and expectations of upcoming assessments for the benefit of students.

I spend a whole lecture – part of a lecture – on orientation of the programme, a learner guide overview, the mechanisms of assessment, the types of questions that will be asked, ... Dr Patel 12;636-638

Notwithstanding the two statements above, students are not always aware of the criteria for success in assessments.

Because the way you have your lectures, sometimes you don't even know what to study, because, you see, you learn the lectures and sometimes you don't get – like the questions that come from the lectures are not like the same thing that you learned; they're like application questions – sort of applying the knowledge. S'bu 4;79-82

Formative assessment

Although she suggests that it should contribute to the module mark, Matlodi's suggestion of a short weekly assessment is made in the context of providing feedback to students on their understanding of the week's problem case.

I'm suggesting if maybe students could have like a weekly assessment – not as a true assessment but at the end of the tutorial, have one case scenario and five true or false questions on what you had learned in the tutorial, and get an assessment on that, and that could contribute a certain percentage on to your end – final mark.

Matlodi 4;684-688

Krish views every assessment as a formative experience.

…the examiner would set the questions and then you'd answer them and then you'd have to live with whatever your mark would come back as. And whether you choose to – I don't know – pull up your socks for the next Theme and learn from your mistakes which you've encountered from this Theme, or not, is your decision entirely yet again.

Krish 5;315-318

Evaluation

Dr Milner makes the point that evaluation by students of the assessments improves assessment quality. Kevin notes that willingness by staff to receive feedback and engage in discussion around problematic assessment questions allows some degree of control by students.

> …your best quality assurance is the students themselves. Dr Milner 8;575

> …we had a couple of questions in assessments changed because of our feedback; you present a good logical argument and you can get the question dropped. So there is some control by students ... Kevin 7;289-291

While Lungi does think that by providing feedback after the fact she could contribute to future planning of the programme, she does not feel that she can control programme content prospectively.

> I can have a say in saying that, um, given what we've done so far, it would have been easier if they'd started with this, or if they were doing this system now. But beforehand I honestly cannot say ... Lungi 3;264-265

Assessment and evaluation are essential elements of pedagogy; many would say central elements. Neither student nor staff respondents have any expectation that the former should exert any control over assessment, but the importance of programme evaluation by students is affirmed. Students do not generally complain about being unsure of the criteria by which they are judged. However, I note again that, rather than rely on the published learning outcomes to provide the assessment criteria, students speak of lecture content as providing the clearest guide.

It is in terms of the results of assessments – students' marks – that the analyses reported in Chapter 5 were performed. The fact that there is little direct concordance between the analyses – and respondents' comments on them – and this aspect of Bernstein's *schema* is due to the fact that Bernstein is concerned with who controls the assessment, rather than who does best in the assessment. All of the students assessed over the three years

analysed are accustomed to assessments scheduled, compiled, administered and marked by teaching staff. That the students have succeeded in school and at medical school is related more to their intrinsic ability and motivation – and perhaps their strategies for learning and passing exams – than to the extent of their control over the various aspects of assessment. One could argue that, in a 'progressive' form of pedagogy such as PBL, students ought to have more input into how, when, and for what purpose, they are assessed. One could ask, counter to that idea, whether control over assessment of a medical programme should in fact rest with national and societal bodies beyond the students, the teachers and the institution.

Hierarchical relationships

Bernstein wrote of the relationships between learners and teachers as the eighth – but not the least noteworthy – facet of pedagogy. My respondents portray varied perceptions of this concept.

Hierarchy of knowledge

There is general agreement that a hierarchy does indeed exist within the medical school. Students see it as a matter of the relative quantity or quality of an individual's knowledge.

> Teachers always find respect. [Why?] 'Cause information: as a student I need to learn from the teacher. Sipho 6;556-557

> The hierarchy kind of needs to be there in order for you to trust the source that you're getting your information from. Like, 'cause it would be nice to know that, you know, fifth – well, a certain person in the medical department has got this certain PhD in this – ah – topic, so you can trust anything he has to say about that topic because you know that he's researched it so much. Osane 6;608-611

Lungi makes the point that a relationship based on gradations of knowledge can be very positive.

> There're certain lecturers that come in and I feel really stupid after their lecture – I feel *so stupid*. But, I mean it's fine. For me it's an inspiration ... Lungi 3;416-417

Mutual respect

Teachers see the hierarchy as being weaker than it previously was, and as being mediated by an attitude of reciprocal respect.

> …there has to be a demarcation of what their roles are and what our roles are; but we have to respect them, and they have to respect us. You've got to respect them, there's got to be empathy, there's got to be understanding, and there must be a manner in which we can facilitate their learning. So, I think – I think it's just basic attitude, nothing else …
>
> Dr Kathrodia 10;334-338

> I just feel that if there's a way that there's a decent interaction between staff and students, and that that probably would make the students more comfortable to 1) approach staff, 2) have an idea 'Well this guy knows what they're talking about' and 3) sort of respect – what's the saying? Respect is never – you can't demand respect; you *co*mmand respect. [Mm] Basically, you have to essentially earn it. Dr Milner 8;651-655

Camaraderie

Drs Milner and Pillay also express a sense of fellow-feeling with students, and the fact that good relationships are a help on both personal and academic levels.

> …obviously academics has to be the priority for the students, but it's not *just* – they're not just academic building blocks that sort of arrive, you know, these are people with feelings, these are people with problems, these are people with a need – that need some sort of guidance, and you can't – even in a facilitator session, there's a limit to the sort of guidance you can do. If you see them in the caff and you sit down and have a sandwich together, that can probably do a lot more good than being the best facilitator on the planet, in terms of getting various different things from them; so there is that sort of interaction. Dr Milner 8;676-682

> But that's a big advantage of the problem-based learning as well, because they develop skills in the process, where they are not afraid, and also I think we have broken down the barriers as lecturers, and made the situations more approachable ...
>
> Dr Pillay 11;291-293

Students acknowledge the willingness of staff members to interact with them as fellow scholars.

> I think there has to be some equilibrium there, because I find, even in the wards, we have quite nice consultants in that they weren't all high and mighty above us, that they were willing to learn with us in some aspects, and I think that's really important because medicine is such a vast community and there's such vast knowledge – a vast knowledge base, that not one person can know everything, and it's important that, like Osane said before, that we're learning all the time and just as students don't ever stop learning, teachers don't ever stop learning. Bala 6;57-582

Negative aspects of hierarchy

Beyond a mere difficulty in approaching certain members of staff as a result of the hierarchical nature of relationships at medical school, a number of students reveal their perceptions of an adverse side of student-staff relationships.

> And also some consultants have very personal ideas on how it should be done – it should be done *their* way. And then, too, when you're standing there in front of someone and they're not even saying anything, you're like 'Well, someone did teach me this, obviously; that's how I'm doing it, but I don't know if you're happy with it at all' and, *ja*, it's quite difficult. Susan 1;436-439

> Um – maybe on the – another view of dynamic – at the hospitals – when you get there, it's like there is – you need to *know* – it's like there's that thing that you need to *know* that there's – you need to *know* that [You're small] that you need to *know* that you're a medical student; you need to *know* that I'm a consultant. Keketso 4;648-651

> Even when you're clerking your patients, you do read your books, but you do need the assistance from the – from the consultants and the facilitators who they do have. So those kind of responses really make you become that turtle and you want to go like into your shell and you just don't – you don't even want to learn anymore because whatever you do is wrong – in a sense. Zodwa 1;426-430

To have a regard of mutual respect for one another is generally supported by students and teachers. Students describe the superior knowledge of teachers and their own inferior status as learners. Teachers recognise students as future colleagues deserving respect and encouragement. Quite obviously, though, the stereotype of the overbearing consultant who expects everybody to kow-tow to him is still to be found, despite conscious efforts on the part of at least some staff members.

In this aspect, as in others, students acknowledge – and in some ways welcome – teachers' superior status. It provides reassurance of the quality of teaching and sets a goal to which to aspire. However, students are able to differentiate between individual teachers and are impressed negatively by the efforts of some teachers to elevate themselves by denigrating students. Some aspects of the uneasy relationships that exist at the clinical level have been explored previously at this medical school (Reddy, 2010). Easily apparent demographic aspects, such as race, language, and the relative socio-economic status of student and staff member may make for an adverse relationship, but Reddy documented denigrating comments made on the basis of the different pedagogies in which teacher and student had been or were being trained. Here again, the fact that students had overcome a range of adverse factors in their academic careers meant that they were able to progress despite occasional unpleasant forms of hierarchy.

Discussion

This chapter has approached respondents' contributions from a different viewpoint to that of the previous three chapters, and has drawn out themes on a different basis. Themes that seem to generate most comment are: the boundary between everyday and medical knowledge, control of curriculum content (particularly with reference to the recurring concept of integration), and hierarchical relationships. I find the contradictory views of staff and student respondents regarding inter- and intra-disciplinary boundaries intriguing, although a little thought reveals the likely causes for these.

Boundaries

As a sociologist, Bernstein regarded teaching and learning as social actions, and pedagogy as a social instrument. He postulated that the three aspects of classification of spheres of knowledge in his *schema* were related to relations of power around and within those spheres (Bernstein, 1996c). This medical school has been a site of political contestation for much of its existence (during the apartheid era), by virtue of its undergraduates consisting of black students within an officially 'white' university (Noble, 2004; University of Natal Medical School, 1997). This contestation was generally directed at the regime of the day, but also, by the nature of student concerns, encompassed academic matters. Despite this history, issues of power and communication did not loom large in my respondents' accounts, although, as noted above (and by Reddy (2010), these issues did crop up in the comments of some.

Everyday-medical

Morais and her colleagues in Lisbon have done a great deal of research using Bernstein's theories in the context of education in schools. They pointed out that, while a strong boundary is maintained in this context between specialised and lay knowledge, some weakening of this may help "...to make knowledge more meaningful, more understandable and applicable..." (Morais, 2002, p. 561). This, I judge, is the thrust of those of my respondents who argue for, and give examples of, linkages between medical and everyday knowledge. Pursuers of medical knowledge have – not uniquely, but especially – the dual need to make meaning for themselves and at the same time maintain contact with and memory of the community outside the boundary. As part of their learning to elicit a history and explain diagnosis and management, doctors must continually interpret knowledge inside the boundary to and for the community outside it. Bernstein described the discourses of everyday and specialised knowledge as antithetical to one another (Bernstein, 1999). The voices of my student and teacher respondents argue that in the realm of medicine it is vital to maintain continuity between the two. The students seem to see themselves as interlocutors (both figuratively

and literally) between medical knowledge and patient or community knowledge. Those staff members who argue for continuity between professional and lay knowledge do so in more abstract terms: "Medicine's a part of the whole … you have to have a life-view on health and disease" (Dr Pandit, p. 180), and "it is a broader picture" (Dr Kathrodia, p. 180). There is currently a growing interest in traditional and alternative approaches to health care; the university has a NRF[70]-funded chair of traditional medicine research. This increase in prominence of the subject, and the increasing involvement of traditional healers as collaborators in health care, is not, however, reflected by the respondent who raises the subject. Under other circumstances, traditional medicine might have been expressed as a point of contact between differing types of health-care knowledge.

Language as part of the boundary between medical and lay knowledge appears on the surface to be similar to what one might expect to find at the border of any profession. The discourse of medicine's specialised knowledge must be assimilated as part of induction into that profession (Shulman, 2004). Conducting the discourse in a particular language – English – means that second-language English speakers have a twofold barrier to cross in order to enter the medical profession.

Inter- and intra-disciplinary boundaries

The students and teachers have contrasting views of the boundaries *between* different disciplines' knowledge, also of the boundaries between areas of knowledge *within* disciplines. My appraisal of these contradictions is that they arise from the organisation of content to which each of the two constituencies has been accustomed. The members of staff at the medical school belong to the generations that were subject to traditional discipline-based teaching, in which intra-disciplinary material was integrated and there were strong interdisciplinary boundaries. This contrasts with the current programme, which students perceive to have weaker interdisciplinary boundaries and stronger (Theme-based) intra-disciplinary boundaries. The source of the difference of opinion is

[70] The National Research Foundation provides funding for research in South Africa.

thus not hard to find. Pragmatically, the subject content that provides material for the pedagogic process must be divided up in some way. As Osane says, "It's a bit hard to learn everything at once." Any basis for division of content material is likely to colour the opinion of the viewer.

Bernstein, when PBL was in its infancy, described the 'collection code' and 'integrated code' models of pedagogy (Bernstein, 1971, pp. 204-205). The latter, which PBL resembles in its ideal – but seldom-realised – form, is characterised by weak classification between disciplines' knowledges within the realm of medicine, and correspondingly weak hierarchies between students and teachers (and between teachers at different levels). I have explained above why it is that our students perceive the classification of disciplinary and intra-disciplinary knowledges to be different. It may be sufficient to ascribe teachers' contrasting perceptions to their own past experiences. Bernstein (1996c) made the point that 'classification', in his use of the word, does not so much define categories as describe boundaries as issues of power. He argued that "...A can only be A if it can effectively insulate itself from B." I argue by analogy that disciplines within the medical school, while teaching in a combined manner, still define themselves and their knowledge bases by separation from other disciplines.

Control

Framing, in Bernstein's (1996c) *schema*, relates to how meanings are formed, announced and socially handled. He explained that strong framing implies that the teacher has explicit control over the following five aspects: content selection, sequencing, pacing, evaluation criteria, and teacher-learner relationships. Weak framing implies merely that the learner has more *apparent* control than the teacher; the teacher wields ultimate control, but can choose to cede it to the learner to a limited degree or for a limited time. Given this perception, our students' reluctance to exercise control over pedagogic content, organisation, or timing may be seen as pragmatic, rather than as abdicating responsibility. Similarly, our teachers' perception of their own control over the same elements may be seen as sensible rather than cynical.

Content

Since its founding in 1975, Aalborg University has based all its courses on PBL, and has what I judge to be the weakest classification and framing that I have encountered. Nonetheless, its draft standards for PBL enumerate "...appropriate progression with regard to depth and breadth of content..." and "An appropriate cluster of required study courses..." (Barge, 2009, p. 3). This suggests that, even in a weakly-framed pedagogy, teachers maintain some control over content. Content is cited as a consideration that arises during an institution's change to PBL (De Graaf & Kolmos, 2007b). The balance of control between teachers and students in various disciplines could potentially be quite weak – I have been told of humanities courses in which students have a great deal of leeway over the material they choose to learn. However, in such a regulated sphere as medicine, one is not surprised that control should be largely in the hands of teachers on behalf of the regulatory bodies.

Pacing

Given that, in practical terms, the content and organisation of pedagogy in medical study is likely to be stronger than in other disciplines that use PBL as a methodology, pacing remains problematical. Bernstein, in his theorising (Bernstein, 1975, 2003b), and others, on the basis of their empirical research (Morais & Neves, 2001; Morais, 2002), have written about the importance of weakening pacing, particularly for the benefit of disadvantaged learners. PBL characteristically shows weak pacing, inasmuch as learners are free for much of the time to research and compile information on their own. Against a background of a student body that has diverse educational backgrounds, and of an ostensibly PBL pedagogy, my interviewees' responses fly in the face of what one might have expected from reading the literature. The combination of the well-known overload of medical information and an extensive lecture programme makes for a timetable in which pacing is strongly framed. The perception of a lack of student control even over the pacing of small-group meetings may be due to a misunderstanding of the roles of the (student) chair and/or the (staff) facilitator, and inadvertently strong control by the latter.

Evaluation

Morais (2002) explained that the concept of evaluation may include by implication several different aspects. The aspect of assessment embraces the explication of assessment criteria prior to assessment episodes, and of correct answers and the logic thereof in feedback afterwards. Evaluation also connotes the learner's appraisal of the rules of engagement with the pedagogy: the instructional discourse that relates to the material to be learned and has to do with cognitive skills, and the regulative discourse that relates to the behaviours, attitudes and values in which the instructional discourse is embedded. Our students indicate that they do – in various ways – pick up (prior to assessment) criteria that, in the main, work for them. They appreciate the post-assessment feedback discussions and the chance to debate the correctness of facts or of logic. I have not attempted to gauge students' evaluation of the regulative discourse – the 'hidden curriculum' (Hafferty, 1998) of medical education – since such aspects are notoriously difficult to measure.

I have noted the dissonance between teachers' and students' perceptions of pre-assessment criteria for success. This dissonance may have arisen from students failing to understand the nature of the learning objectives listed in every Theme manual. It may, at the same time, be a pragmatic strategy for students faced with a large number of outcomes in each Theme (an average of four per week, or about 24 in a six-week Theme). In other words, rather than attempt to ensure that they have achieved all the learning outcomes, they may concentrate instead on lecture content, reasoning that lecturers are likely to cover the major areas of the Themes. Whatever its source, uncertainty about assessment may be at the root of some students' lack of success.

Hierarchy

The eighth of Bernstein's aspects of pedagogy is that relating to the relationships between teachers and learners. All my respondents acknowledge the hierarchical nature of the teacher-student interface, which varies in its gradient, depending on whom one asks. In small-group meetings, interaction is easier and more casual; students feel able to

speak out, think aloud and question one another and their facilitator without the formality of the lecture environment. On the other end of the scale are those encounters that take place during ward-based teaching; in the hospitals, students are aware of a much steeper, and at times unpleasant, hierarchical gradient between themselves and their teachers. This may relate to the generally more hierarchical structure in the hospital system, or to pressures of clinical work. Nonetheless, since a number of clinicians are involved in lecturing and facilitating in the PBL portion, the influence of the non-PBL clinical ambience may affect the PBL portion, just as PBL's philosophy may affect clinical teaching. Bernstein (1971) described the strong hierarchy associated with the strongly classified collection code of pedagogy. The persistence of a rather strong hierarchy in PBL portion of the programme might be due to the influence of the hospital hierarchy, as suggested above; it might, however, be the persistence of elements of a collection code pedagogy within that of PBL. Relationships between the two main protagonists in teaching and learning vary from cordial – if unequal – in the early, PBL years of the programme, to wary – sometimes positive, sometimes negative – in the later, clinical years. Despite this being an academic institution and students of medicine being taught predominantly by practitioners of medicine, a sense of collegiality between students and teachers is not the general impression conveyed by my respondents, for all the efforts to engender it. Doctors are not generally seen as co-learners with trainees. This is perhaps both the result of the bilateral perception of staff as dispensers and students as receivers of information; it may also be a significant reaction to (adverse) role-modelling, related to the unpleasant attitudes of some doctors as experienced by students.

Summation

I describe the PBL pedagogy at this medical school as having strong classification of medical knowledge compared to everyday knowledge, weak classification of disciplinary knowledge, and strong classification of knowledge areas within disciplines.

(Note that this is the students' point of view, and that teachers have contrary views of the second and third points.) Framing is relatively strong in all of these five aspects: content selection, organisation, pacing, evaluation, and hierarchical relations. I now move on to propound a theory as to why problem-based pedagogy in this setting is perceived and experienced in sometimes paradoxical ways.

10

Theorising

In this final chapter, I bring together various strands of meaning arising out of the data. I argue that medicine has a horizontal knowledge structure rather than the hierarchical structure of a traditional pure science. I explain, in terms of the horizontal knowledge structure of medicine, the points at which respondents' opinions differ, namely aspects of classification of areas of knowledge, and different conceptions of integration. I recognise that there is more to the enactment of PBL than the knowledge structure with which it interacts. I describe aspects of power, of the paradigm through which role-players view teaching and learning, and of the nature of the pedagogic act itself, which all influence the pedagogy that is constructed by the people in this medical school at this time. Finally, acknowledging that I have raised more questions than I have answers for, I suggest directions for further research.

Green's (1976, p. 1) aphorism is appealing: "The way to do research is to attack the facts at the point of greatest astonishment". The unexpected findings amongst my data are the most interesting. I do not, therefore, try to incorporate every iota of data in this chapter. I do, however, strive to explain the broad sweep of what the data appear to be expressing about the way in which students and staff members engage with PBL in the setting under study. I am aware that my application of Bernstein's theory of knowledge structures arises from my insider view of the field of medicine; a view that others might contest. I plead only that I am following Bernstein himself, who illustrated his concept of knowledge structures by categorising his own field (sociology) implying that the insider can appropriately assay his own area of expertise.

Synopsis of data

The statistical analysis in Chapter 5 of factors related to students' academic performance makes for interesting and paradoxical inferences. I grant that test results are not a direct measure of pedagogic activity (although they are a measure of one of its major outcomes). A number of demographic features shown in the literature to be significant influences on schoolchildren's performance in South Africa and/or elsewhere in the world show trivial effects at tertiary level in this analysis, while factors that do not apply to primary or secondary education are influential here. The home languages and 'races' of students, when viewed separately, each show significant effects when comparing different language backgrounds or different races *within* those groupings. These factors however wane into insignificance when compared with the students' high schools categorised in socioeconomic terms (although a parameter indicative of students' personal socioeconomic circumstances is not of great weight). While secondary schools loom out of the students' past as an influence on their performance at medical school, any intervening tertiary educational experience contributes to academic success. School-leaving marks are a statistically significant but numerically less important influence.

The role of the student as portrayed in Chapter 6 is that of follower of the teacher; of a hard worker memorising lecture notes diligently in order to pass the assessments. Those students who have to study in their second (or third) language struggle to make sense of the terminology. Many students struggle to comprehend the information with which they are working in terms of each section's combination with the others and its application to patients they have not yet encountered. They feel themselves growing into the way of teaching and learning at medical school and that PBL helps them to understand the material. Staff members are depicted (Chapter 7) as leaders of students by means of lectures and small-group sessions. Staff members express ambivalence towards both PBL and their multiple roles as teachers; students express ambivalence about staff members' ability to teach. The institution's role (Chapter 8) is seen as that of planning, implementation, assessment and evaluation.

The three voices of students, staff, and institution are sometimes clear and distinct, sometimes in harmony, sometimes discordant, and sometimes obscure, as they portray their own and the others' roles, each in counterpoint with the literature on PBL. The Faculty's declared stance is in favour of student-centred self-directed learning. Despite this (perhaps because so little detail is spelled out explicitly in official documents) there is an audible refrain of uncertainty about the extent to which PBL pedagogy is student-centred and self-directed, about the various roles of student and lecturer in active learning, and about inputs and responses to small-group tutorials and large-group lectures. A spread of opinions about students' capacity for self-directed learning and a corresponding sense that the pedagogy should be staff-directed can be heard. No resolution appears with regard to role dilemmas, namely students as meaning makers or assessment passers, and teachers as learning facilitators or information stuffers.

In short, the role-players' understanding of their roles is not entirely clear. (It might be more true to say that they have clear ideas about unclear roles.) The 'problems' characteristic of PBL are present in the pedagogy under study, but student-driven collaborative learning does not play a central role in students' scholarly activities, generally taking second place to single-minded cramming. Emphasis on clinical application may help or hinder basic science learning, and while the Faculty organises multidisciplinary teaching, the understanding and extent of 'integration' in the minds of the role-players' is questionable.

In Chapter 9, examination of the pedagogy in terms of Bernstein's concept of 'classification' reveals discrepancies between student and staff perceptions of inter- and intra-disciplinary boundaries. The discrepancies are explicable according to the intersection of a new pedagogy with a traditional department-based structure. The major boundary – between medical and everyday knowledge – is hedged about by the school-university transition and the everyday-medical terminology difference. This boundary is under siege by students, as border-crossers themselves and as

representatives of the everyday people who will be patients at some point. In terms of 'framing', the pedagogy largely has a strong teacher-controlled bent, notwithstanding the Faculty's adoption of a pedagogy having weaker framing than in the past. The theory behind PBL would lead one to expect more apparent control by students. Students and staff are in agreement as to the strength of the framing. It is the classification that is contentious, as there is disagreement over the nature of the boundaries between different areas of knowledge.

Chapters 6, 7 and 8 described analytical themes derived inductively (*à la* grounded theory), and Chapter 9 themes derived deductively according to Bernstein's *schema* of classification and framing. Although the analyses are based on the same interview data, the patterns emerging are necessarily different. Nonetheless, one can see that respondents' expectations that students would follow lecturers' lead corresponds to the strong framing of the pedagogy, that integration and its reverse, knowledge boundaries, show up in both analyses as contested conceptualisations, and that both analyses contradict the orthodox portrayal of PBL in institutional documents. These similarities and differences are not in opposition to one another; they illustrate the variety of views that can be gained from the technique of 'crystallisation' (p. 76), so as to illuminate complementary features of the same object of study regarded through different 'facets'.

Integration is the converse of the concept of boundaries as separations. 'Integration' is a notion that recurs in various contexts. Vusi (pp. 138 & 141), finds himself unable to integrate different pieces of information in his own mind, and links to that lack of integration his failure to recall material, while Kevin (p. 138) thinks that integration occurs only in the later years of study. Marcus (p. 139) speaks of the links that he is able to make between basic medical science and clinical facts, but Zodwa (p. 143) expresses the difficulty of correlating what she reads in the textbook with what she needs to understand about her patient. Lungi (p. 139), in trying to make sense of disciplinary knowledge relating to an organ system, evidently has a different way of drawing knowledge together from Keketso's friend (p. 140), who disaggregates her notes and re-integrates them in terms of the relevant disciplines. Susan (p. 140) speaks of integrating

information acquired from different activities, and S'bu (p. 140) integrates content from different Themes. S'bu and Krish (p. 140) integrate knowledge from different disciplines. Bala (pp. 143-4) maintains that it is vital to integrate all the relevant information into a holistic view of the patient. Krish (p. 140) contrasts learning for the purpose of passing assessments with integrating knowledge and, in a different sense (p. 146), speaks of his becoming integrated socially into his small group. Dr Pandit (p. 153) and Drs Milner and Kathrodia (p. 164) note the failure of some of their colleagues to integrate the content of their respective disciplines with that of others. I alluded in the preceding paragraph to the sense recorded in Chapter 9 of a desire to integrate medical and general knowledge. Drawing from these examples of the use of the term 'integration', relationships between areas of content – in the mind of the Faculty, the mind of the teacher or the mind of the student – show eight different facets:

Linkage between everyday and medical knowledge
Integrated teaching of cognate disciplines (horizontal[71] integration)
Combination of basic science and clinical aspects (vertical[71] integration)
Logical sequencing of disciplinary material
Integrating structure and function, health and disease of the whole body
Clinicians integrating basic science, diagnostic and other skills
Teachers linking their lectures with those of their colleagues
Students making links within their own minds

The variety of conceptions of the term 'integration' may merely be a reflection of the word's common, and loose, usage; they may alternatively indicate a shared vocabulary without a shared understanding.

[71] These uses of 'horizontal' and 'vertical' are not Bernstein's; they are used by writers on PBL to denote integration of, say, a number of basic science disciplines (horizontal) or integration of basic science and clinical disciplines (vertical).

Theorising the data

I argue in this chapter that the perceptions expressed by the study's participants, and their interaction with PBL pedagogy (as reflected by numerical analysis) are related to the structure of medical knowledge. This in turn influences the pedagogy of medicine in general and PBL in particular, as it intersects with the nature of the individual medical school studied, as serving a specific population undergoing rapid social and educational change. Medicine's knowledge structure is by no means the only determinant of student and staff interaction with PBL. Other factors, such as the prevailing educational paradigm, and institutional politics, also combine to shape the perceptions and experiences articulated in this study.

Bernstein revisited

I noted in Chapter 3 (p. 42) that Bernstein (1996a) described two contrasting modes of discourse, which he named *horizontal'* and *vertical*[72]. The former he described as containing common-sense, context-dependent information that has tacit meanings, and the latter as containing coherent, explicit and systematically organised information. In Chapter 9 we encountered a difference in discourses (everyday speech vs medical terminology) as an element of the boundary between everyday knowledge and medical knowledge. At the same time, a difference in languages (English vs local and regional vernaculars) occurred as a linked, but separate, issue. I suggest that language difficulties are different from difficulties with medical terminology because language relates to different segments of *horizontal'* discourse – different repertoires of expression – while medical terminology constitutes a separate *vertical* discourse. In *horizontal*' discourse, everyday idioms are part of separate segments of knowledge and are meaningless to members of different communities who do not share the same expressive repertoire.

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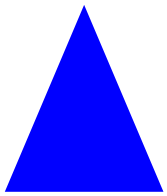
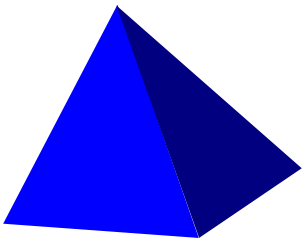
[72] I remind the reader of my typographic distinction between Bernstein's two uses of *horizontal'* and *horizontal"* in order to differentiate them from each other as well as from the conventional sense of horizontal.

Bernstein (1999, p. 160) might have been describing education under apartheid when he wrote: "Clearly, the more members are isolated or excluded from each other, the weaker the social base for the development of either repertoire or reservoir." Medical students may correctly perceive phrases like 'the mainstay of treatment' or 'constitutional predisposition' as idiomatic English rather than medical terminology, but their different repertoires, stemming from isolated reservoirs of *horizontal'* discourse, effectively obscure access to the *vertical* discourse. (In a similar sense, and with similar force, Cummings (2000, p. 3) distinguished between "basic interpersonal communicative skills (BICS) and cognitive academic language proficiency (CALP)".) Ability in basic communication (= *horizontal'* discourse) does not guarantee proficiency in academic language (= *vertical* discourse), but inability in the former may be expected to impede proficiency in the latter.

Bernstein further distinguished two knowledge structures within *vertical* discourse. *Hierarchical* knowledge structures are those in which the discourse is tightly coherent and structured so that each block of knowledge fits neatly into place, building on previously acquired blocks and in turn providing the foundation for subsequent pieces. Bernstein (1996a, p. 173) visualised a *hierarchical* knowledge structure as a triangle:

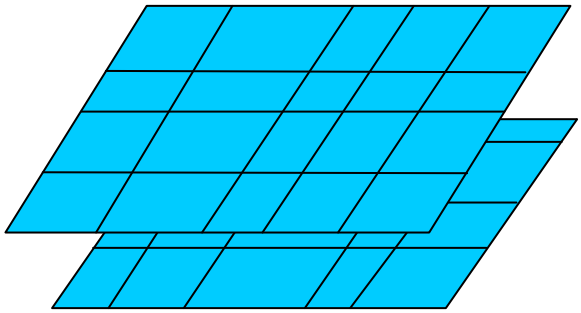


(Considering the multifaceted nature of hierarchical knowledge structures, a pyramid



might have been a more apposite form.)

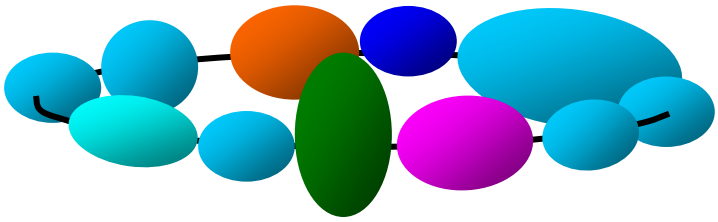
The intellectual aim of a hierarchical knowledge structure is to broaden its base by subsuming new knowledge while sharpening its apex to a finer and better-honed point of application of its overall theory (which thereby becomes more generalised and able to encompass observations of what superficially appear to be disparate phenomena). Bernstein gave natural sciences (such as physics) as examples of *hierarchical* knowledge structures. The other kind of knowledge structure he designated as *horizontal"*. He gave the humanities and his own discipline (sociology) as examples of this sort of knowledge structure, in which a number of areas aggregate to cover the field, but do not cumulate to build up an overarching theoretical structure. Indeed, the structure of some areas may directly or indirectly contradict others. (Different schools of psychology have their distinctive theories; algebra and geometry do not share identical axioms or ways of thinking.) From his experience of sociology, Bernstein (1996a, p. 173) suggested a visual metaphor for a *horizontal"* knowledge structure, namely two interacting planes:



On one plane, (several) meta-languages serve a similar role to that of the highly abstract tip of the hierarchical structure's triangle; the other plane is that on which practical problems are studied empirically. The planes are evidently parallel (non-intersecting) but areas on one do not necessarily correspond to particular areas on the other[73].

[73] Bernstein provided a verbal description only, so I have attempted to depict visually what he described. He later (1999, p. 162) described a *horizontal"* knowledge structure purely in terms of a series of "languages", which he portrayed as a row: L^1 L^2 L^3 L^4 ...

I imagine that a more concrete metaphor might be that of a string of beads[74]:



Each distinct element is part of the whole; contact between the different elements is small, but the string linking the beads describes a plane at the level of which common understandings are maintained and developed. The beads are not identical in size, shape or colour; some are more extensive, some more prominent, some more (or less) aesthetically pleasing.

The knowledge structure of Medicine

I suggest that, according to Bernstein's terminology, the discourse of medicine is *vertical* (as are all recontextualised fields of knowledge). As to its knowledge structure: for at least the last century medicine has modelled itself on the natural sciences, and thus might be expected to form a *hierarchical* knowledge structure. I argue that the proliferation of disciplines within the field of medicine, the recognition by staff respondents that the various disciplines are quite distinct ('strongly classified' in Bernstein's terms), and the diverse lexicons, theories and narratives of wellness and illness of different disciplines all combine to portray a *horizontal"* knowledge structure. It *can* be asserted that medicine espouses, to an extent, a metanarrative understanding of its field, for example: 'The human body', or 'Health and disease', or 'Normal and abnormal structure and function, and restoration of the latter to the former', or 'The bio-psycho-social model of disease'. Such a metanarrative would suggest a *hierarchical*

[74] One (or more) of the beads could be triangular, if the corresponding individual component(s) were *hierarchical* in structure.

structure. On closer scrutiny, however, the medical sciences are *not* seen to contribute to a common theoretical *corpus*. One might envisage a two-tier structure: the basic sciences and the clinical disciplines – but then neither constitutes a *hierarchical* structure in Bernstein's terms, rising to a single point of abstraction that is able to account for all the phenomena that fall within its ambit. Pharmacology finds roots in chemistry and physiology, and physiology relates directly to anatomy; but pharmacology and anatomy have little in common, using different terminologies, different concepts, and different ways of thinking. The distinctions between clinical disciplines are, if anything, greater; surgery and psychiatry do not share much common ground, nor do public health and anaesthetics, nor do forensic medicine and paediatrics.

Medicine is more a *horizontal"* than a *hierarchical* knowledge structure. It is largely an aggregation of empirical discoveries from a number of areas, giving rise to theoretical insights and hypothesis-driven research in those separate areas rather than contributing to an overall unifying theoretical framework. New fields of discovery tend to generate their own terminologies and theories, rather than being subsumed into previously existing frameworks. In visual terms, beads on the string of medicine represent disciplines of differing type, size and importance. They pursue, build and disseminate knowledge in different ways; a new field, even when (as is usual) it arises from an existing field, is represented by a new bead; more space must therefore be found on the string. The insertion of a new bead does in turn have implications for the amount of content to be taught and learnt in medicine; I suggest that the addition of new beads accounts for the continuous reports (scattered over a hundred years) that the amount of knowledge that medicine encompasses, and that students are expected to master, is too great. The volume of knowledge in physics (Bernstein's example of a hierarchical knowledge structure) has also expanded enormously over the last century, but its greater theoretical coherence means that even completely new areas (*e.g.* quantum physics) share axioms and concepts with better-known areas, and are thus more easily understood and learnt.

Taking the description of medicine's knowledge structure further, I argue that it not only has a *horizontal"* structure, but also exhibits a "weak grammar" (Bernstein, 1996a, p. 174). This is to say that its theoretical languages do not easily predict or encompass new empirical findings. The variety of human nature and of individuals' particular reactions to disease pathogens and processes guarantees that the empirical and the theoretical do not invariably – or indeed, often – correspond. Here again, the amount of effort to understand new findings and to integrate them into the body of medical knowledge is greater than would be the case if the medical field were subsumed under a single meta-theory.

Singh (2002) pointed out four challenges for educators: the increasing complexity of the symbolism used to encode knowledge, the increased cost of access to these esoteric domains, the widening gap between available knowledge and individuals' ability to grasp it, and a loss of public trust in esoteric knowledge together with paradoxical demands for ever more knowledge to mitigate the community's uncertainty. The last three challenges are common to all knowledge structures (particularly those in which the community has a strong interest – e.g. medicine, engineering, economics), and do not particularly contribute to our understanding the nature of medical knowledge and its pedagogy. As regards the first challenge, in a truly *hierarchical* knowledge structure the symbolic representation of knowledge could be expected to become more abstract as knowledge grows, but medical terminology, although growing in quantity through the addition of new fields, has not notably grown in theoretical abstraction. In this context, one might question the efficacy of medical teachers' recontextualisation (the reworking for the purpose of teaching and learning) of medical discourse for the purpose of teaching. Students (*e.g.* Zodwa, p. 152) consult a plethora of textbooks, a high proportion of which are specialised tomes. The existence of such a quantity of texts on various subjects is further evidence of a *horizontal"* knowledge structure that encompasses a large number of distinct fields. The Faculty continues to wrestle with the problem of

finding a limited number of student-friendly texts that help to induct the neophyte into the discourse[75].

If the point is conceded that medical knowledge is structured *horizontally"* rather than *hierarchically*, several **corollaries** flow from this.

1. Integration

As a *horizontal"* knowledge structure, several nuances of 'integration' are plausible, not merely as instances of sloppy thinking, but as subconscious recognition that integration is not part of a *hierarchical* theory pulling its components together into an overarching structure but may instead refer only to the coherence of different domains within themselves. My respondents reveal several different facets of integration (*v.s.* p. 210-1), which I combine and re-order into six aspects relating variously to the institution, the teacher and the student:

- **Planning the educational experience so that cognate material is drawn together from separate disciplines and made available in a logical sequence.** The linkage of disparate subjects is possible only to the extent that medicine is a *vertical* discourse, and thus shares a basic vocabulary, as several students noted. However, as the students observed, no one logical way of teaching and learning medicine has (as yet) presented itself as self-evident. Seeking for an overarching 'meta-discourse', as one would expect from a *hierarchical* structure, strains the structure, as it does the intellects of those who seek to teach and learn within that structure. The best that one can aim for is to present material as coherently and logically as possible.

[75] See, for example, Ebooks and their favourable influence on assessment problems and curriculum overload. Appendix A, Assessment & Monitoring Committee minutes, 11July 2011

- **Building an awareness of the structure and function of the whole body.** This is a similar enterprise to the first, although perhaps at a different level. A *hierarchical* meta-discourse of The Human is more easily conceivable than is one of Health & Disease, but such a discourse would still strain to encompass the biological, psychological, sociological and spiritual aspects of human life[76].

These first two gradations arising from respondents' conceptions of 'integration' could be envisaged as two horizontal rings of beads, the clinical resting on the basic sciences. Neither corresponds to "an explicit, coherent, systematically principled and *hierarchical* organisation of knowledge" (Bernstein, 1996a, p. 172). By encouraging vertical integration of basic science concepts with clinical applications and also horizontal integration of cognate disciplines so as to bolster one another, PBL attempts to expand points of contact to provide as many cognitive linkages as possible.

The other aspects of integration are:

- **Clinical disciplines working together to make best use of basic science and clinical diagnostic, investigative and therapeutic skills.** This aspect perhaps comes closest to combining the horizontal and vertical integration mentioned above. It represents the ideal in medical thinking and practice. As noted by students, the ideal, which they find inspiring, does not always occur. The default for a doctor's reasoning is often his own field and its resources. Medicine has grown too large; its cognitive field too extensive. Bernstein's (1996a, p. 173) description of "a series of expanding, non-translatable, specialised languages with non-comparable principles

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[76] Family Medicine aims to pull together all the strands of knowledge that a general family practitioner calls on as the patient's primary contact with the medical profession, and who interacts with the patient as a member of a family and a community. Family Medicine perhaps is the discipline that most nearly approaches an integration of biological, psychological, sociological and spiritual aspects ("patient centred care, holistic medicine, central role of the generalist in health care delivery"[Department of Family Medicine web page, 2009]). In medical schools in some parts of the world, Family Medicine has taken undergraduate training under its wing. However, Family Medicine's approach has not appeared as the overarching meta-discourse of medicine, but only as another area of medical knowledge; one could say that another *horizontal"* language of description has been added to the string of beads.

of description based on different, often opposed, assumptions" depicted a *horizontal"* knowledge structure. It could equally depict the many areas that doctors are expected to be able to synthesise in the practice of their profession.

- **Individual teachers making explicit the links between their lecture material and that of other teachers and of the weekly problem cases.** If medicine were a *hierarchical* knowledge structure, it would be far easier to make links between allied concepts and to build up to the generalised integrating propositions that would assimilate subordinate and cognate levels of knowledge. Using the analogy of the string of beads, points of contact between fields in a *horizontal"* knowledge structure are limited and conceptual links harder to find. Hence, perhaps, the dissonance noted by students between different lectures, and also between the content of lectures and that of problem cases.

- **Students exercising their minds to combine information to make sense of an organ-system's structure and function, its disease states and their management.** This is at the heart of learning as a cognitive (as distinct from a mnemonic) exercise. To be retained, knowledge must be meaningful, and in order for it to be meaningful it must be related in the learner's mind to prior and cognate learning. If the assumption is made (incorrectly, I maintain) that all medical knowledge dovetails together automatically because it is all part of the same coherent, systematic structure, then less effort may be expended on making explicit links between what has gone before and what is to follow. The result is that information, rather than being logically stored where it can be retrieved, is lost in the disarray of the learner's mind. As Vusi (*v.s.* p. 141) graphically describes: "we just kinda chuck on our floors in our minds, and when it actually comes to recalling it, we don't quite know where it is".

- **Making meaning of interaction with, and care of, patients, compared to the needs and challenges of community and society.** This is the completion of the sequence from the institution's planning, through the teachers' modelling of integrated

practice, to the tyro doctor effectively using her hard-won knowledge for the benefit of individual patients, bearing in mind the background from which the patients come and to which they return. Once again, individual health care and community health or health advocacy are not automatically part of the same monolithic knowledge; they are distinct beads in the circle of knowledge. (Here again, the efforts of Family medicine to inculcate a holistic approach to the patient and her setting are exemplary – but not overarching; but one of several approaches.)

Integration is not an explicit feature of PBL. A search through some texts on PBL revealed a relatively small number of references to integration in one form or other. Of these few references, the majority alluded to vertical integration (between basic medical science and clinical disciplines). Horizontal integration (more than one preclinical discipline presented in conjunction, for example) was however also mentioned. Frequently, 'integration' was mentioned in an unspecified way; a few texts referred to integration of new and prior knowledge in the mind of the student. It is not surprising that vertical integration was the most common form mentioned with reference to PBL: presenting preclinical material as relevant to clinical practice necessarily invokes some measure of vertical integration. Integration, however, is not unique to PBL: references from the 1960s and 70s (the pre-PBL era) variously documented vertical, horizontal, and non-specific integration of content, and mental integration by the student.

Both my interviewees' responses and the majority of the references that I found imply that integration in some sense is desirable; indeed, one feels intuitively that it should be educationally helpful. I take it – and I trust that I am not alone in this assumption – that the educational aim of all the forms of integration mentioned above is to achieve a greater understanding of the subject in the mind of the student. The ultimate purpose of this understanding I take to be the laying down of useful – *i.e.* retrievable – memory. I found only two texts (Caughey, 1956; Harden, *et al.*, 1984) that attempted to make explicit the advantages of integration of subject matter vertically and/or horizontally; neither however adduced supportive empirical evidence. Bruner (1960/1977, p. 24) might have lent support to the idea that integration of new information with prior

learning helps the memory: "Perhaps the most basic thing that can be said about human memory, after a century of intensive research, is that unless detail is placed into a structured pattern it is rapidly forgotten." I argue that the use of horizontal and vertical integration in PBL adds two further dimensions in addition to that of the source discipline itself: it allows for a more structured pattern into which information can be meaningfully placed, and it provides contextual links to cognate information on the same level and to clinical application at a higher level.

I conclude that medical (and other) educationalists have assumed that 'integration', in the sense of bringing information together and imparting structure so as to help build knowledge, is beneficial, and that use of the term in an affirmative way may have had the unexpected result that staff and students engaged in teaching and learning have shared the same word without sharing the same concept. Assumptions about the hierarchical nature of the knowledge structure of medicine have made 'integration' unproblematic (because automatic). I suggest that more attention should be paid to the several senses in which the word is used, and how each sense enhances or detracts from the manner in which teachers and learners approach the pedagogy employed.

2. Medical discourse

In a *horizontal"* knowledge structure, far from engaging with overarching theory in order to understand the tenets of medicine, students would need to engage with a multitude of knowledge domains, each using terms and concepts that might be regarded as arbitrary by the next domain. When a physician speaks of a patient's adherence to a therapeutic regimen and an anaesthetist describes the change in a patient's lung volume per unit change in pressure, they both use the term 'compliance', but signify entirely different concepts. When a pulmonologist describes the airflow restriction that causes the difficulty in breathing of an asthmatic patient, or a microbiologist describes the inability of an antibiotic to kill a bacterium, they use the term 'resistance' completely differently. The rationale for medicine being taught by a series of disciplines is that each adds their distinctive habits of thought. Horizontal

integration should consciously seek to facilitate the finding and making of links between different disciplinary thought processes.

In a *horizontal"* knowledge structure, discourse – and the subtleties of the terminology in which the discourse is conducted – is more of an issue, since each *horizontal"* field generates its own discourse, which does not necessarily match those of other fields. Different patterns of thought are reflected in different patterns of dialogue. Learning these various patterns constitutes what Shulman (2005) called the signature pedagogy of medicine. As in a 'total immersion' language course, being exposed constantly to the vocabulary and idiom of medical communication gradually conveys fluency in that discourse. The similarity of the *horizontal"* knowledge structure of medicine to the *horizontal'* discourse of everyday life is illustrated by the lack of consensus among my respondents about whether medicine and everyday knowledge are, or should be, separate from one another. The practice of medicine is extremely context- or patient-sensitive, which is similar to a *horizontal'* discourse. Teaching and learning may also be context-sensitive: student respondents (*e.g.* Susan, p. 198) find that clinical skills learnt in one ward under one teacher are sometimes decried by another teacher in another ward.

3. Sequencing

In a horizontal rather than a *hierarchical* knowledge structure, sequential layering of knowledge becomes less necessary, and cognate material can be taught simultaneously (as happens in PBL) rather than in chronological steps (as in traditional layered teaching). Describing a *horizontal"* knowledge structure as serial does not imply that the student's mastery of content must be sequential. Thus, one might learn the anatomy, physiology, pathology, clinical features, special investigations and management of lung conditions so that knowledge of the lung is built up over a period of weeks. This might be at least as valid as learning *all* of one discipline before moving on to the next, so that knowledge of the lung in its different aspects is built up in separate encounters over a period of years. This integration is the most obvious change from the traditional layered curriculum to the 'integrated' PBL curriculum, and it is the aspect that most appeals to

my student respondents. They gain a feeling of completeness of knowledge of each organ system, and a sense of how each functions, may malfunction, and may be dealt with, rather than trying to hold information in suspension until another layer is added years hence. It is equally the aspect that makes lecture-based teaching most difficult, since teachers must relate their inputs to those of other disciplines with different viewpoints, rather than to that of disciplinary colleagues with a similar understanding of the discipline. Medical teachers have, over the years, recognised the dilemma that Dr Milner expresses: how to contribute to an integrated programme while trying to maintain the integrity and internal sequencing of their own disciplinary knowledge.

4. Hierarchy

If medicine were *not* regarded by its teachers as being a *hierarchical* knowledge structure, they might be less inclined to teach it as if it were a natural science. The natural sciences fall into the positivist sphere (as described in Chapter 4: Table 3.1), implying that knowledge is value-neutral, and can be conveyed without regard for the circumstances surrounding either teacher or learner. A positivist view of medical knowledge and consequently of medical pedagogy (D. Taylor & Miflin, 2008) implies that individuals are mere repositories for information. Abandoning a *hierarchical* view of knowledge might encourage those lower down the social and cognitive hierarchy. Those lower down tend to regard those higher up with awe, which can become tinged with distaste on closer acquaintance with the relative disdain on offer from above. ("As Zodwa says: …those kind of responses really make you become that turtle and you want to go like into your shell.") Granted, there may be a number of reasons for the adverse expressions of the hierarchy experienced in hospitals; however, the positivist mindset does not obviously lend itself to consideration of the personal concerns of teachers and learners.

Power

It must be recognised that points 3 and 4 above cannot just be shoe-horned into a *hierarchical / horizontal"* dichotomy. The complexity of medical pedagogy is more than that of opposing knowledge structures, and these are areas where the 'politics' that Dr Milner (*v.s.* p. 184) refers to become apparent. Bernstein (1996c) pointed out that classification of knowledge entails issues of power. The distinctiveness of the boundaries between disciplines relates to the firmness of their power bases as well as to their proponents' relations with colleagues and students. Blurring of disciplinary boundaries weakens those power bases – and thus might be perceived to diminish the standing of disciplines' members in the (medical) community (if indeed that is the basis on which individuals construct their professional identity). Maintaining a strict hierarchy (in the conventional sense) in relations with other staff and students may be a part of one's view of the *hierarchy* of the knowledge that one imparts; it may also be part of an assertion of power and of standing. It must be acknowledged that in South Africa, while a new egalitarianism sweeps through society as a whole, health care personnel are more hierarchically related than they are in other countries, and my student respondents finding themselves at the bottom of the pecking order is partly a reflection of that hierarchy. Being aware of issues of power in South African terms, it is hardly surprising that Kevin, a White student with a prior degree and a professional family background, feels sufficiently empowered to contact staff members at his convenience (p. 130), whereas other students in the same PBL environment might not have the temerity to do so.

Looking broadly at the field of medicine, it is clearly an applied rather than a pure science; in Bernstein's (1996c, p. 23) terms, a "region" (a collection of disciplines), not a "singular" (a single science discipline). This implies that medicine turns its face "outwards towards external fields of practice" (Bernstein, 2000, p. 55). A number of disciplines – particularly the basic sciences – contribute to other degree programmes in the sciences and have strong research interests, and thus may see themselves as singulars, since their identity is self-defined. Dr Milner's plaint that the integrity of his

discipline has not been well maintained (*v.s.* p. 164) and Dr Patel's feeling that forces outside his discipline are exerting undue influence on it (*v.s.* pp. 162, 165, 169-70, 188) may indicate a sense of singularity, or, in other words, of inward- rather than outward-looking identity. This reflects, in a negative sense, Bernstein's description: "Regionalisation necessarily weakens both the autonomous discursive base and the political base of singulars and so facilitates changes in organisational structures of institutions towards greater central administrative control" (Bernstein, 2000, p. 52). The sense that Drs Milner and Patel convey of autonomy under strain does not necessarily argue for or against the *horizontal"* knowledge structure of medicine. The point does however indicate some of the 'political' tensions that a diverse pedagogic programme must face.

Facilitator expertise

One of the factors demonstrated (to everyone's surprise) to have *no* effect on academic achievement is that of facilitator background. I make the assumption that non-medics would be less likely to *teach* their groups, and thus that their groups might be expected to have fared worse in assessments than those who might have been taught by their doctor-facilitators *if teaching by facilitators were important*. As a proponent of PBL, I take the equal performance of students in groups with medical and non-medical facilitators as heartening evidence that students can *learn* in small groups without necessarily being *taught* by their facilitators. The literature on the possible disadvantages of facilitator expertise warns me about my own impatience as a medic-facilitator wanting to teach my group rather than watch them pick their unsteady way through the relevant (and irrelevant) information. I can well understand that postgraduate science students (who are less likely to be able to teach medical knowledge) might be as able as I am to facilitate students' learning. I think that this (negative) finding has little to do with the structure of medical knowledge, and that facilitating small-group collaborative learning would be very similar in either a *hierarchical* or a *horizontal"* knowledge structure. (An argument can be made for improving the effects of small-group learning by making the underlying knowledge structure and links between cognate material more explicit; this

would be the case for either structural form.) I suggest that the surprise that greeted the inability of medically-facilitated group members to out-perform others relates to the sense that 'doctors should be educated by doctors'. This in turn perhaps relates to doctors' sense of the sanctity (*e.g.* Dr Patel, pp. 179, 184) of their knowledge and thus of their calling. I regard this as an aspect of the power/politics of medical education.

I grant that swotting to pass an assessment and the sort of learning that occurs in small-group interaction are likely to be different. It may well be that groups who have doctors as facilitators gain all sorts of knowledge that other groups do not – the 'hidden curriculum' of professional attributes that are not explicitly taught is well described (Hafferty, 1998). Students and staff members who so enthusiastically assert that doctors make better facilitators argue in terms of their better understanding of how new knowledge fits in the greater scheme of things, rather than in terms of less tangible benefits. The fact remains that whatever advantages may accrue from spending time with a more senior member of one's chosen profession are not assessed in the programme under scrutiny. This, along with the standardisation of assessments, might be worthy of further consideration.

Pedagogy

The pedagogic device

This is the mechanism by which knowledge is converted into material suitable for teaching and learning. Bernstein (1996d, p. 41) made the point that "the device is not neutral", being a site "for appropriation, conflict and control" (1996d, p. 42). I described in Chapter 3 the distributive rules (regulating what knowledge is considered part of the field under consideration), the recontextualising rules (governing the way this knowledge is made available for teaching), and the evaluative rules (directing the way in which acquisition of knowledge is recognised). Since recontextualisation abstracts knowledge into pedagogic discourse for the purpose of teaching the esoteric (= *vertical*)

discourse, it follows that the closer the learner comes to the practical application of this knowledge, the closer the pedagogic discourse should be to reality. In a traditional medical curriculum, the transition from more recontextualised to more realistic is the abrupt step between the preclinical and the clinical disciplines. Part of the power of vertical integration in PBL is that practical clinical application makes its appearance in the very early years, and then increases gradually, while the more abstracted (recontextualised) medical science correspondingly diminishes. "When a discourse moves, through recontextualizing, from its original site to a pedagogic site the original discourse is abstracted from its social base, position and power relations" (1996d, p. 53). Regarded in Bernstein's terms, PBL attempts to restore the social base, position and power relations of the (medical) discourse by progressively moving it back towards its original (clinical) site. Thus, discipline-bound knowledge is related more explicitly to the clinical context in which it is used, and the social process whereby students explore that knowledge prepares them for the interactions that will form so much of their clinical practice.

Rules of transmission/acquisition

Akin to the 'rules' governing pedagogy are the 'rules' that more directly relate to learners' pedagogic encounters. Bernstein (1996c) described recognition rules that regulate what meanings in a field are relevant (in accordance with the distributive rules of that field), as well as realisation rules that regulate how those meanings are combined so as to generate legitimate knowledge (in terms of the evaluative rules of the respective field). It is noteworthy that the high-achieving students interviewed evidently recognise ("from his lecture" – Ahmed, p. 135) and are able to realise what knowledge is cogent. Less able students fail to recognise what information to select ("I'm going to go learn that book" – Vusi, p. 170) and thus cannot realise useful knowledge. The strategic learning of the high-flyers and the indiscriminate learning of the underachievers both relate to an 'invisible' pedagogy such as PBL. I propose that a *horizontal"* knowledge structure, with multiple competing specialised fields, in combination with a loosely framed pedagogic structure, needs explicit distributive and recognition rules (with

regard to content) *as well as* clear evaluative and realisation rules (with regard to assessment) to guide its students.

Schools' influence

If schools, by and large, inculcate a *hierarchical* view of knowledge fields, conveyed through a positivist-style pedagogy with rigid control by teachers (strong framing), that view might partly account for the persistent effect of high school on medical school performance. This effect would however be mitigated by any contact with tertiary education and thus possibly with pedagogy having weaker framing. The various factors (referred to in Chapter 5) that have been noted to affect performance in schools – race, sex, family background, etc. – are less prominent at medical school. The school population is unselected, representing in the aggregate all the variability of the population at large, whereas tertiary students are highly selected, and might be expected to have surmounted factors that are known to confer disadvantage at school.

The findings of my demographic analysis are of interest largely because of the *negative* findings in the Generalised Estimating Equation analysis – namely that so many factors well known to influence academic performance in schools are *not* of themselves active in this medical school population. Of the few factors that the GEE does bring out, the most prominent is students' high schools. It may be that, because of their physical location in certain communities, schools still represent racial, linguistic and cultural stratification, even seventeen years after the official abolition of discriminatory practices. The fact remains that the GEE did not indicate race or language *per se* as significant factors.

The classification and framing of subjects in most schools is likely to be different from that of the medical school; this is seen most obviously in the strong boundaries between school subjects compared with attempts to weaken interdisciplinary boundaries in PBL curricula. One can argue neither that school subjects are subsumed under one overarching *hierarchical* knowledge structure's meta-discourse, nor that they are different cognate facets of a *horizontal"* knowledge structure. Indeed, Maton and Muller

(2006) stated that school curricula cannot be described in terms of hierarchical or horizontal knowledge structures. However, I suggest that the way in which school knowledge is built up is that of a number of separate *hierarchical* knowledge structures, which are taught with varying strengths of classification and framing in different schools. My students show an overall gradation (with the exception of Q2) from higher to lower quintiles of effects on medical school performance [See Appendix I]. I surmise that the gradation may be accounted for by a tendency towards weaker classification and framing at the upper end of the scale[77]. This in turn may have conferred some advantage on students from the higher quintiles when they encountered a PBL curriculum. Alternatively, students from higher quintiles may have acquired a better grasp of the rules of the pedagogic device, and thus be better able to recognise and realise valid knowledge.

Intellectual activity and knowledge structure

What might be regarded as the operational aspects of PBL include the question of whether it is primarily teacher-centred and lecture-based, or student-centred and based on group learning. Theoretical pedagogic concerns include lecturers' appropriately recontextualising material and students apprehending the rules of engagement. In addition to these, there are cognitive issues to address. In Chapter 6 I noted the distinction between engagement with a field of knowledge (in terms of applying one's intellect to firstly grasping its concepts and secondly using them to construct one's own knowledge) and cerebral activity that amounts to little more than packing mental baggage into one's memory to be delivered when called for. Memorising large quantities of facts in order to succeed in assessments, only to find later that the major part of the fodder has passed through one's system undigested and irretrievable, is the sort of busy-ness that has characterised the medical student of the past century or so. It

[77] Since the quintile system of classification is based on the socio-economic status of the schools' surrounding communities, it may just be, as Bernstein (1975, 2003b) and Coleman (1966) noted so long ago, that academic achievement is still related to a learner's class of origin.

was this inability to retain material that PBL's originators sought to avoid by providing contextual links that would aid understanding and assist recall in the clinical realm for which the material supposedly was preparing students. My student respondents' reliance on cramming, and my staff respondents' identification of the former's inability to recall information at a later stage, suggest that the busy-ness described by the students is not the active engagement with concepts and their interrelations that PBL is supposed to produce. Teachers and learners of a *hierarchical* knowledge structure could, I suggest, afford to be more relaxed about the amount of content presented for mental digestion, since a relatively small number of examples could illustrate the theory that binds the structure together. Information that is presented subsequently could then be fitted easily into the theory established in learners' minds. A *horizontal"* knowledge structure, by contrast, combines many disparate subject areas, and requires numerous examples to demonstrate as many of its serial components as possible, which leads to content overload, mental indigestion, cramming and forgetting. The choice of content and the nature of its recontextualisation become at the same time more difficult and more important if anxiety to cover every aspect of every area leads to loss of a logical pedagogic scheme as well as to content overload.

PBL in Medicine

As is inevitable when a hybrid[78] of old and new is implemented, the balance between the two may be more critical than initially realised. Student passivity and lecturer over-

[78] The literature shows that there are many variations of 'problem-based learning'. It could be said that 'pure' PBL represents learning that is *entirely* based on the small-group process, and that a greater or lesser combination with didactic lectures represents a hybrid form of pedagogy. There are few institutions that do not make use of traditional lectures at all; the relative proportions of lectures (with the implied teacher-centred dynamic) and small-group learning then determine the position of that particular combination on the scale from small-group-based, student-centred learning to lecture-based, teacher-centred instruction.

activity may combine to negate some of the hoped-for effects of the new system. Du Plooy and Killian (1980, pp. 20-21) stated:

> There can be no talk of self-education when the self-image of the educand has been injured in the education situation. This can happen when the educator continuously humiliates the educand in his efforts to achieve something; when the educator is dissatisfied with what [he] has done without telling him to go about it successfully and properly; when he is not really interested in [his] point of view; when he reinforces his requests and leaves no scope for exploration and a measure of freedom; when he is scared to entrust to the [educand] responsible tasks in proportion to his level of becoming a proper human being; when he keeps on making decisions for the [educand] who could have made them all on his own, or at least, some of them. [my underlining]

Carl Rogers (1969, p. 114), from a vastly different standpoint, wrote: "If I distrust the human being then I *must* cram him with information of my own choosing, lest he go his own mistaken way. But if I trust the capacity of the human individual for developing his own potentiality, then I can provide him with many opportunities and permit him to choose his own way and his own direction in his learning" [original italics] Leach and Moon (2008, p. 148), quoting Paulo Freire, wrote: "He believed there were six essentials for successful educational dialogue: love, humility, faith, mutual trust, hope, and critical thinking." Each of these writers made valid points about the interaction between teacher and learner; I draw out the common aspect: trust. If I do not trust students to learn, I must inevitably teach as much as possible. If I am accustomed to being taught, I invariably continue in that mode. The student respondents uniformly declare a preference for small-group work but do not trust themselves to learn effectively from that alone. As in learning to ride a bicycle, who asserts the learner's autonomy? Is it the learner, by taking control and pulling away from the source of support, or the teacher, by releasing control and trusting to the learner's momentum to keep her going? As mentioned previously, the Faculty's self-assessment in 2010, in response to a question on the role of self-directed learning, recorded "a heavy load of didactic lecture-based

teaching … introduced to support and augment student learning ... and also as a result of the request from the students themselves" (Nelson R Mandela School of Medicine, 2010, p. 29).

While PBL is one method of empowering the learner to assert her autonomy, the interaction of teacher, student, institution and knowledge structure is enormously intricate and not readily susceptible to simple application of a complex solution.

From Bernstein's description (1996a), a traditional discipline-based curriculum (collection code) would be expected to have a more *horizontal"* structure, with strong framing of its pedagogy. A PBL curriculum (integrated code) would tend towards a more *hierarchical* structure, with loose framing. My data show the paradoxically strong framing that exists at this medical school. This strong framing I ascribe to the momentum of the tradition of lecture-based teaching in schools and this university. The history of PBL's introduction – almost under sufferance, and without wholehearted support – must have contributed to this. The Faculty's sense of responsibility to wider society and its oversight by the HPCSA are also factors tending to produce a strongly-controlled programme.

I propose another paradox – *pace* Bernstein – that PBL, with its attendant integration of disciplinary knowledge, may be better suited to drawing together the separate entities of a hierarchical knowledge structure such as medicine. Under what constraints might PBL operate? My aim in this study has not been to perform an audit of PBL at UKZN, but I note that in this setting a number of Ausubel's (1968) twelve strictures on discovery learning (which is one of PBL's antecedents) are valid.

- "Discovery enthusiasts tend to confuse the act of discovery with the act of under-standing" (Ausubel, 1968, p. 476). All too often, student respondents report that they memorise information without understanding it (although they have found that the small-group discussions help them to understand material better). This seems to relate to a failure to carry through the recognition – realisation sequence.

- "[V]erbalization does more than just encode subverbal insight into words. … It … makes possible a qualitatively higher level of understanding with greatly enhanced transfer power" (Ausubel, 1968, p. 477). Another advantage of the small-group process, according to my respondents, is the opportunity it provides to students to put ideas into words and to express them to other people – to exercise the *vertical* discourse of medicine.

- "Grand strategies of discovery, like scientific method, do not seem to be transferable across disciplinary lines – either when acquired within a given discipline, or when learned in a more general form apart from specific subject-content matter" (Ausubel, 1968, p. 488). Certainly, Norman and Schmidt (1992) were able to confirm this stricture some twenty years ago. PBL aims to inculcate a pattern of thought rather than a universally applicable problem-solving technique. However, it is not clear that any particular cognitive ability other than memorisation is being developed by the students interviewed. One would like them to develop a feel for the discourse and to grasp the recognition and realisation rules that would stand them in good stead in future.

- "Would it not be more realistic to strive first to have each [student] respond meaningfully, actively, and critically to good expository teaching before we endeavour to make him a creative thinker or even a good critical thinker and problem solver?" (Ausubel, 1968, p. 490). As regards responses to teaching, far from becoming creative or critical thinkers, this study suggests an uncritical acceptance by students of what is presented to them. Perhaps the key word here is "expository" ("sets forth in *detail*" (Little, *et al.*, 1973, p. 708)[my emphasis]). Students comment repeatedly on the overload of information. I suggest that a more critical choice of content – more attention by teachers to recontextualising their material – would enhance understanding and retention.

- "The most efficacious type of guidance (guided discovery) is actually a variant of expository teaching that is very similar to Socratic questioning. It demands the

learner's active participation and requires him to formulate his own generalizations and integrate his knowledge in response to carefully programmed leading questions; and it is obviously much more highly structured than most discovery methods" (Ausubel, 1968, p. 504). PBL is already a highly structured method. My point is that, in dealing with a complex *horizontal"* knowledge structure rather than a monolithic *hierarchical* structure, the pedagogy must be yet more highly structured and explicit if students are not to lose their way in the undergrowth of detail and fail to perceive the wood as a whole while scrutinising each individual tree. Here again, the recontextualisation of knowledge needs to be done with great care.

Avenues for further research

I recognise that this study does not have a neat end-point at which the pedagogy inherent in PBL is tidily expounded, nor is the optimal classification and framing for this pedagogy in this setting precisely delineated. The study raises a number of questions that warrant further exploration:

- Given that the structure of medical knowledge appears not to have hitherto been thought of in Bernsteinian terms, what conception do medical practitioners – particularly staff at this medical school – actually have of medicine? Is it *hierarchical* or *horizontal"*?
- Is there a minimum quantity of subject matter that must be learned in a *horizontal"* knowledge structure in order to enable students to add further learning in the future? Can one trim down the amount of subject matter to the point where students can properly understand it *and* be able to progress successfully through the programme?
- Can creative and critical thinking be inculcated in a *horizontal"* knowledge structure, or is the nature of that knowledge just too complex? Is content overload a necessary

part of a *horizontal"* knowledge structure? Does quantity of content militate against creative/critical thinking?

- Is it the inherent knowledge structure of medicine, content overload, or the organisation of the curriculum that contributes to compartmentalisation of knowledge?
- How much common discourse (vocabulary *and* thought processes) is there between the different areas in medicine to help students move between areas with the expectation of understanding at least part of each new 'language' as they encounter it?
- Despite students' assertions that translating the discourse of medicine into the language of Zulu would not help them, might first-language learning indeed help them master the technical discourse?
- Would shaping a medical training programme around the discipline of Family medicine facilitate the building of a more homogenous conceptual framework that would better serve students in their learning?
- Given the complexity of the medical knowledge structure, of its teaching and learning, and of the diversity of the South African student population (although, judging by the findings in Chapter 5, the effects of student diversity may be less than anticipated), is there an optimal way to classify and frame medical pedagogy?

Summation

My research questions have led me to the conclusion that demographic factors have less effect at tertiary than at school level. Students' and staff members' perceptions and experiences of PBL revealed that, while students perceived benefits to accrue from small-group meetings, much of the teaching and learning was conventional in nature, being based on large-group lectures. The pedagogy reflected this, with both students and staff members describing it as strongly framed. The two constituencies differ on the topic of classification. I have linked to these differing views of classification to the

variety of my respondents' conceptions of integration, and argued that they could be explained by viewing medical knowledge as a *horizontal"* rather than a *hierarchical* structure. I have made some observations on PBL as a vehicle for a horizontal knowledge structure and noted that people's perceptions as regards issues of power, pedagogy, and the paradigm to which they are accustomed make complex intersections with PBL. I suggested lines of further research.

I agree with Mennin (2007) that PBL represents a complex adaptive system (CAS). Mennin noted that a CAS may nest within other CASs – this is certainly so in the case studied here. PBL is nested within interactions between students, lecturers and Faculty; these in turn are nested within the rules of the university and the regulatory apparatus of the national Department of Education, the Council for Higher Education and the Health Professions Council of South Africa. Students' engagement with PBL and their resultant achievements are influenced by their circumstances. Staff members' involvement and commitment are shaped by the power base of their various disciplines and the educational paradigm to which they are accustomed. Both constituencies contribute and respond to PBL according to their perceptions of it. The institution is constrained by its history and its resources. The pedagogy of PBL is modified by all these factors and by the nature of the medical knowledge that it seeks to recontextualise for the purpose of teaching and learning.

PBL is perceived and experienced in this setting as a consequence of the complex interactions of these several factors. I argue that chief among them is the nature of medical knowledge – the chief but not the sole factor. I suggest that a more visibly (or explicitly) integrative pedagogy is required in the teaching and learning of *horizontal"* knowledge structures, which are significantly more complex than are hierarchical structures; it has not hitherto been clear that medicine belongs in the former category.

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Appendix A
Ethics clearance certificate

RESEARCH OFFICE (GOVAN MBEKI CENTRE)
WESTVILLE CAMPUS
TELEPHONE NO.: 031 – 2603587
EMAIL : ximbap@ukzn.ac.za

7 OCTOBER 2009

PROF. TE SOMMERVILLE (981209158)
EDUCATION STUDIES

Dear Prof. Sommerville

EXPEDITED APPLICATION
ETHICAL CLEARANCE APPROVAL NUMBER: HSS/0673/09D

I wish to inform you that your application for ethical clearance has been granted full approval for the following project:

> **"People and pedagogy – the relationship between biographical and pedagogic factors in the MBChB curriculum at UKZN"**

PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....
PROFESSOR STEVEN COLLINGS (CHAIR)
HUMANITIES & SOCIAL SCIENCES ETHICS COMMITTEE

cc. Supervisor (Dr. W Hugo)
cc. Ms. R Govender

Change of title

UNIVERSITY OF
KWAZULU-NATAL

15 September 2011

Professor TE Sommerville
School of Undergraduate Medical Education
NRMSM

Dear Professor Sommerville

CHANGE OF TITLE: DOCTOR OF PHILOSOPHY

The Faculty Higher Degrees Committee at its meeting held on 05 September 2011 approved the change of title as follows:

.1	Sommerville TE	981209158	PhD
	Supervisor:	Professor W Hugo	
	Old Title:	*People and pedagogy: The relationship between biographical and pedagogical factors in the MBChB curriculum at University of KwaZulu-Natal Medical School*	
	New Title:	*People and pedagogy: Problem-based learning in the MBChB curriculum at University of KwaZulu-Natal Medical School*	

Yours sincerely,

Nomsa Ndlovu
Postgraduate Studies and Research

cc: Professor W Hugo, SED, PMB Campus

Faculty of Education
Deputy Dean (Postgraduate Studies and Research)

Postal Address: Private Bag X03, Ashwood 3605, South Africa

Telephone: +27 (0)31 260 1169 **Facsimile:** +27 (0)31 260 7594 **Email:** bhanad1@ukzn.ac.za **Website:** www.ukzn.ac.za

Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

Turnitin Originality Report

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- Word Count: 69526
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Thesis 11-11-11 by Thomas Sommerville

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Similarity by Source

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Publications:	2%
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Appendix B
Information sheet and consent form – student interviews

Dear Colleague

This interview is being conducted as part of a doctoral study, entitled:

People and pedagogy – the relationship between biographical and pedagogic factors in the MBChB curriculum at the UKZN Medical School.

The study is being conducted by Ted Sommerville (’phone 4409), under the supervision of Dr Wayne Hugo (’phone 5535) of the School of Education, PMB. Ethics approval number: 8SS/0673/2009

The purpose of the study as a whole is to examine the interactions between biographical characteristics of medical students and the way we teach and learn in problem-based education at NRMSM, with a view to describing and understanding the way PBL plays itself out in a diverse student population.

This particular interview is to explore the nature of the problem-based teaching and learning that we experience at the medical school, and the way that you perceive that process.

You have been selected as being representative of the student body as a whole.

No immediate benefit is likely to accrue to you individually as a result of participating (apart from pizza and juice to make up for missing lunch!). It is hoped that one of the outcomes of the study will be a better matching of our teaching (whether PBL or some other type) to our students. I am asking for an hour of your time now, plus reading over the transcript of this session, plus another half an hour later to round off any other thoughts that you may have had about the issues in the meantime.

This is an ‘anonymous’ interview. Although the discussion will be recorded to enable me to remember what was said without having to take notes, no names or other ways of identifying individuals will be recorded. You are asked to sign consent for the interview, the recording and its use in the study. The forms will be kept securely and no link with the recording of this session will be made. Your participation is voluntary and you can withdraw *at any stage* without penalty. The consent forms and the anonymised transcripts will be kept securely for five years.

Thank you in anticipation of your help.

Ted Sommerville

I, ……, hereby confirm that I understand the contents of this document concerning and the nature of the research being undertaken by T E Sommerville: **People and pedagogy – the relationship between biographical and pedagogic factors in the MBChB curriculum at the UKZN Medical School**. I hereby consent to participate in this research.

I understand that I am free to withdraw at any time.

Signature: ……Date: ……

Information sheet and consent form – staff interviews

Dear Colleague

This interview is being conducted as part of a doctoral study, entitled:

People and pedagogy – the relationship between biographical and pedagogic factors in the MBChB curriculum at the UKZN Medical School.

The study is being conducted by Ted Sommerville (‘phone 4409), under the supervision of Dr Wayne Hugo (‘phone 5535) of the school of education, PMB. Ethics approval number: 8SS/0673/2009

The purpose of the study as a whole is to examine the interactions between biographical characteristics of medical students and the pedagogy of problem-based education as practised at NRMSM, with a view to describing and understanding the way PBL plays itself out in a diverse student population.

This particular interview is to explore the nature of the (problem-based) teaching and learning that we offer at the medical school and in the wards, and the way that you perceive that process.

You have been selected as being representative of the staff of the medical school.

No immediate benefit is likely to accrue to you individually as a result of participating. It is hoped that one of the outcomes of the study will be a better matching of our teaching (whether PBL or some other type) to our students. I am asking for an hour of your time now, plus reading over the transcript of this session.

This is an ‘anonymous’ interview. Although the discussion will be recorded to enable me to remember what was said without having to take notes, your name or other way of identifying you will not be recorded. You are asked to sign consent for the interview, the recording and its use in the study. The forms will be kept securely and no link with the recording of this session will be made. Your participation is voluntary and you can withdraw *at any stage* without penalty. The consent forms and the anonymised transcripts will be kept securely for five years.

Thank you in anticipation of your help.

Ted Sommerville

I, ……, hereby confirm that I understand the contents of this document and the nature of the research being undertaken by T E Sommerville: **People and pedagogy – the relationship between biographical and pedagogic factors in the MBChB curriculum at the UKZN Medical School**.. I hereby consent to participate in this research.

I understand that I am free to withdraw at any time.

Signature: ……Date: …….

Appendix C
Interview respondents

Table C.1 Student interviewees

Int. no.	Resp. no.	Pseudo-nym	'Race'	Sex	Matric/ Mature	Academic achievement	First language	Home area	Parents' occupations	Financ. support	School quintile	Apartheid schl.type
1	1	Susan	White	F	Matric	Avr	English	City	Doctor/Bookkeeper	1	5	1
	2	Zodwa	Black	F	Matric	Avr	Zulu	Town	Engineer/Healthcare	-	-	-
2	3	Ahmed	Indian	M	Matric	High	English	City	Business/Teacher	1	6	2
3	4	Lungi	Black	F	Mature	AboveAvr	Zulu	City	Police/Shop assistant	-	5	1
4	5	Fikile	Black	F	Matric	Poor	Zulu	Rural	Labourer/Housewife	1	5	
	6	Keketso	Black	F	Matric	Good	Pedi	Town	Engineer/Teacher	1	-	-
	(7)											
	9	S'bu	Black	M	Matric	SubAvr	Zulu	City	Pastor/Comm.worker	2	5	3
	10	Mandla	Black	M	Matric	Avr	Swati	Town	Taxi driver/Domestic	1	1	5
	14	Matlodi	Black	F	Matric	Avr	Tswana	Town	— /Teacher	-	-	-
	15	Refiloe	Black	F	Matric	AboveAvr	Sotho	Town	Teacher/Teacher	-	-	-
	16	Vijay	Indian	F	Matric	AboveAvr	English	City	Doctor/Artist	1	5	1
5	7	Marcus	Coloured	M	Matric	High	English	City	Teacher/Teacher	-	5	3
	17	Krish	Indian	M	Matric	High	English	City	Accountant/Teacher	1	5	2
6	18	Imbali	Black	F	Matric	Poor	Zulu	Town	Teacher/Healthcare	-	-	-
	19	Vusi	Black	M	Matric	Poor	Ndebele	City	Healthcare/Teacher	-	5	1
	20	Sipho	Black	M	Matric	Poor	Zulu	Rural	Labourer/Domestic	2	1	5
	21	Osane	Black	F	Matric	High	Lingala	City	Healthcare/Healthcare	1	5	1
	22	Bala	Indian	M	Matric	High	English	City	Artist/Banker	1	5	1
7	23	Kevin	White	M	Mature	High	English	City	Engineer/Bank clerk	1	5	1

Int. no.: Number of interview

Resp. no.: Number assigned to respondent to ensure anonymity in interview recording

Matric: Student entered medical school directly from high school. Mature: Student had previously part/completed degree

Financ. support: 1: Student's fees paid by family. 2: Student granted scholarship/bursary on academic merit

School quintile: 1 – 5 indicates increasing socioeconomic status of surrounding community. 6 = Independent (private) schools

Apartheid school type: 1: White 2: Indian 3: Coloured 4: African township 5: African rural

NB Some details of first language, home area and parents' occupations amended to maintain anonymity

Table C.2 Staff interviewees

Interview no.	Resp. no.	Pseudonym	'Race'	Sex	Background	Teaching role(s)
8	51	Dr Milner	White	Male	Medical scientist	Lecturer, Facilitator
9	52	Dr Pandit	Indian	Male	Physician	Lecturer, Facilitator, Clinician
10	53	Dr Kathrodia	Indian	Female	Physician	Lecturer, Clinician
11	54	Dr Pillay	Indian	Female	Physician	Lecturer
12	55	Dr Patel	Indian	Male	Physician	Lecturer
13	56	Dr Hlubi	African	Male	Physician	Lecturer, Clinician

Appendix D
Interview schedule

1. First please give me your impressions of problem-based learning generally; the way that teaching and learning happen, the arrangement of the small groups and the lectures, what helps students learn and what is problematic.

2. Please tell me how you see medical knowledge as compared to everyday knowledge: are they one and the same, or are they different; if so, how do you see the differences?

   What about the different disciplines within medicine? Do they all merge together or are they all quite separate?

   Do you see the areas within a discipline as being separate from one another or blending together?

   Who controls the content that is taught and learnt; the staff or the students? To what extent?

   Which of these two controls the way the content is organised in the MBChB programme?

   Who largely controls the time that is spent of the different parts of the content material? How does this work for students?

   Who controls the assessment of students' knowledge, and to what extent? How clear are the criteria according to which students are assessed?

   Is there a hierarchy between teachers and learners – a difference in status? If so, which way does the hierarchy work – which is higher and which is lower? Why?

3. This is a series of graphs [See Appendix E] of a previous class's ETT marks over four years. (At that time, PBL extended for four years; then we cut it back to three.) Please comment on each graph and the relationships that it shows between students' various demographic characteristics and their ETT marks.

[ETT marks v. students' previous education experience: matriculants, those repeating the 1st year, 'mature' students with prior tertiary experience]

[ETT marks v. students' sex: male, female]

[ETT marks v. 'race': Black, Indian, 'Coloured', White]

[ETT marks v. high school attended: previous Model C (government- and self-funded), HoD (Indian legislative body), HoR (Coloured legislative body), DET (in charge of Black education), either township (peri-urban) or rural, 'non-feeder' schools (not previously supplying students to UKZN)]

[ETT marks v. race and school: combining the two previous categories]

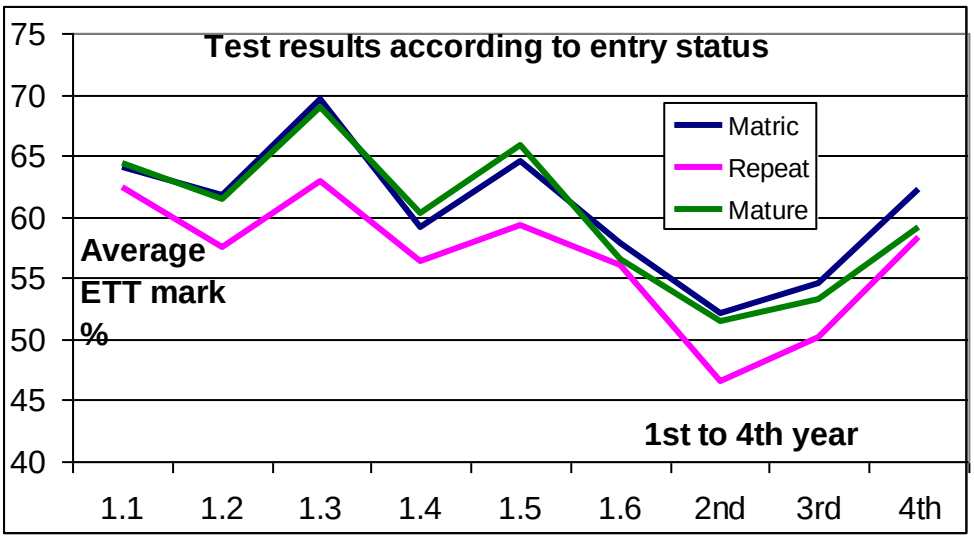
[ETT marks v. facilitator background: medical doctor, non-medical]

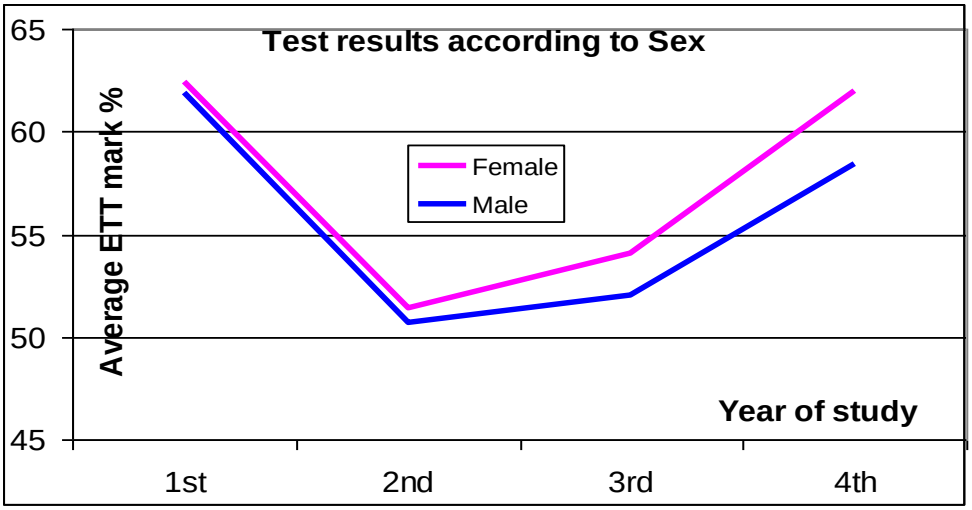
4. Are there any other comments you would like to make about PBL? Anything that has come to mind during the interview? Anything that I have not specifically asked about but that has a bearing on teaching and learning?

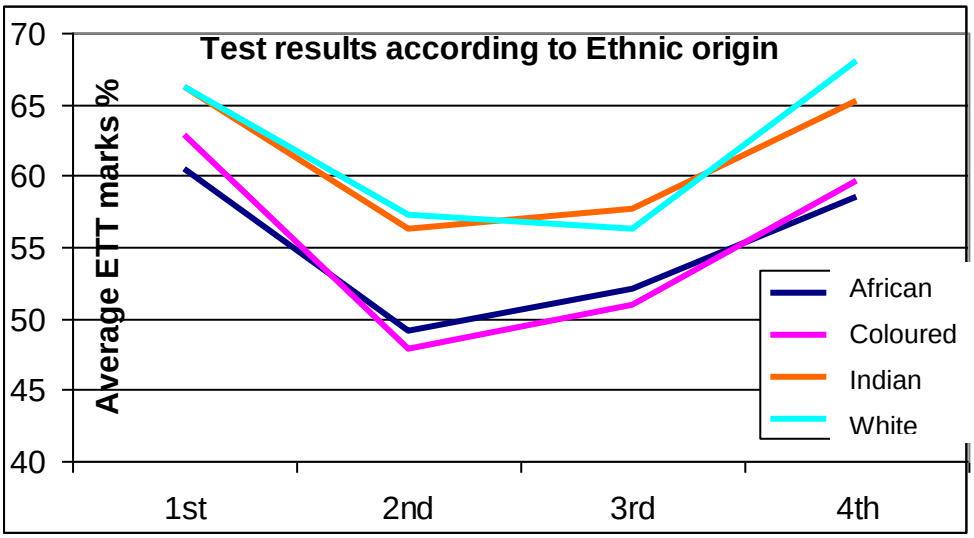
Thank you very much for your time. I shall transcode the interview and send you a copy so that you can check that I have correctly recorded what was said. Please let me know if anything further comes to mind on the topic of teaching and learning in PBL.

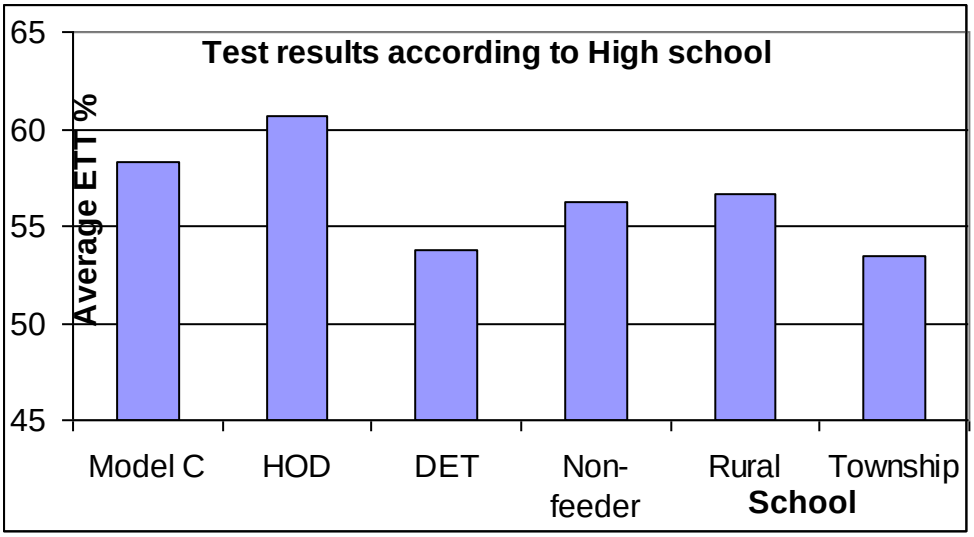
Appendix E

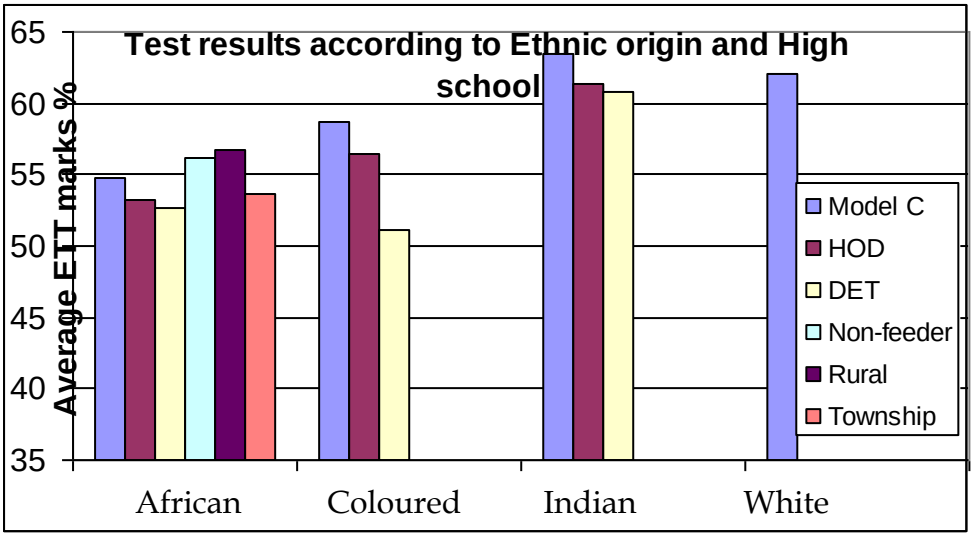
Graphs used as stimuli for discussion [See Appendix D section 3]

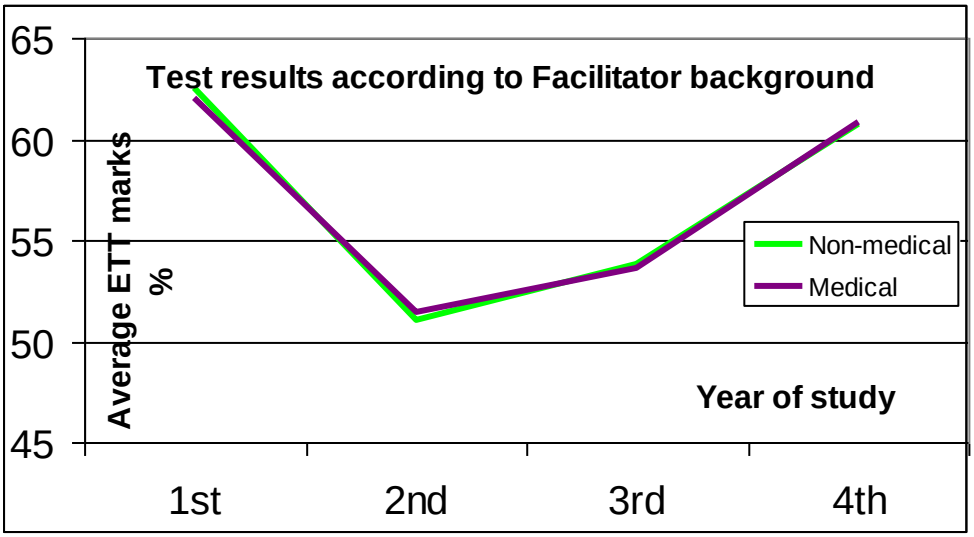







Test results according to High school
Average ETT %
65
60
55
50
45
Model C
HOD
DET
Non-feeder
Rural
Township
School


Test results according to Ethnic origin and High school
Average ETT marks %
65
60
55
50
45
40
35
African
Coloured
Indian
White
Model C
HOD
DET
Non-feeder
Rural
Township


Test results according to Facilitator background
Average ETT marks %
65
60
55
50
45
1st
2nd
3rd
4th
Year of study
Non-medical
Medical

Appendix F
'Nodes' recorded in NVivo arising from thematic analysis of interview responses

Table F.1 Number of 'nodes' and references arising from interview questions about perceptions and experiences of PBL teaching and learning

Source	Perceptions		Experiences	
	Nodes	References	Nodes	References
Transcode Interview 01	13	19	14	43
Transcode Interview 02	14	25	14	28
Transcode Interview 03	9	20	16	38
Transcode Interview 04	18	74	16	77
Transcode Interview 05	14	43	13	58
Transcode Interview 06	11	28	17	90
Transcode Interview 07	8	9	15	43
Transcode Interview 08	11	23	17	81
Transcode Interview 09	10	30	17	46
Transcode Interview 10	14	35	15	53
Transcode Interview 11	10	18	13	34
Transcode Interview 12	13	35	13	48
Transcode Interview 13	5	5	13	38

Table F.2 'Nodes' into which I categorised perceptions and experiences of teaching and learning, and the number of sources and references that gave rise to each

Perceptions			Experiences		
'Node' (theme)	Sources	References	'Node' (theme)	Sources	References
Student role	13	53	Learning	12	100
Bad	12	40	Integration	13	74
Lecturer role	8	30	Assessment	13	59
Good	12	24	Planning	12	55
Understanding	6	22	Control	12	44
Facilitator role	7	20	Involvement	11	42
Med School role	12	19	Clinical application	13	41
Clinical application	7	18	Relationships	12	39
Assessment	7	17	Teaching	10	37
Change	8	16	Lecture	9	29
Integration	7	16	Motivation	11	23
Planning	6	15	Direction	8	22
Direction	7	11	Evaluation	9	21
Power	5	9	Terminology	7	20
Stimulation	4	8	Facilitator	9	17
Peers	5	7	Small-gp session	4	12
Memory	4	7	Workload	6	11
Involvement	4	7	Good	5	9
Process	3	7	Conflict	7	9
Maturity	4	5	Help	5	6
Opposition	2	5	Uncertainty	3	5
External to self	3	3	Freedom	2	2
Freedom	2	3			
Remember story	1	1			
Community	1	1			

Appendix G
'Nodes' recorded in NVivo arising from analysis of interview responses according to Bernstein's classification and framing

Table G.1 Number of 'nodes' and references arising from interview questions about classification and framing of PBL teaching and learning

Source	Nodes	References
Transcode Interview 01	23	112
Transcode Interview 02	27	80
Transcode Interview 03	25	78
Transcode Interview 04	23	99
Transcode Interview 05	24	116
Transcode Interview 06	25	128
Transcode Interview 07	17	28
Transcode Interview 08	18	36
Transcode Interview 09	17	30
Transcode Interview 10	16	22
Transcode Interview 11	17	39
Transcode Interview 12	19	65
Transcode Interview 13	25	52

Table G.2 'Nodes' into which I categorised responses on classification and framing of PBL, and the number of sources and references that gave rise to each

'Node' (theme)	Sources	References
Race	12	67
Integration	12	58
Organisation control	13	45
Motivation	11	45
Hierarchy	13	44
Understanding	7	43
Interdisciplinary	13	41
Pacing control	13	40
Content control	13	38
Evaluation control	13	38
Facilitator	13	37
Language	8	37
Everyday-Medical	13	35
Information	6	34
Assessment	9	32
Matric-Mature	12	31
Engagement	7	28
Intra-disciplinary	13	26
Sex	10	26
School type	10	26
Med-Nonmed facilitator	13	24
External factors	5	15
Lack of clarity	5	12
Teacher access	5	11
Social – Class	4	10
Matric subjects	3	8
Workload	5	7
Insight	2	6
Stimulation	2	4
Finance	2	4
Lifelong learning	2	4
Long-term recall	2	4
Recreation	2	2
Consistency	2	2
Routine	1	1

Appendix H
Students′ and lecturers′ perceptions of reasons for success and failure at two South African universities offering contact tuition.

Table H.1 Ten most common reasons for success, University of Pretoria & University of Zululand	
Students	Lecturers
Self-discipline	Self-discipline
Interest in course	Self-motivation
Self-confidence	Effective study methods
Self-motivation	Interest in course
Timely, regular exam preparation	Timely, regular exam preparation
Appropriate course of study	Appropriate course of study
Family support	Ability to work independently
Dedication to a career goal	Understanding what lecturers expect
Effective study methods	Ability to reason logically
Appropriate balance between academic & social life	Willingness to ask for help

Combined from Fraser & Killen, 2005 and Ngidi, 2007

Table H.2 Ten most common reasons for failure, University of Pretoria & University of Zululand	
Students	Lecturers
Too many demands on students' time	Poor exam. preparation
Insufficient effort	Insufficient effort
Inability to perform well in exam.	Lack of self-motivation
Lack of self-discipline	Lack of self-discipline
Lecturers do not understand students' needs	Inefficient time management
Poor exam. preparation	Inability to persevere
Lack of bridge between theory and practice	Poor study techniques
Lecturers' unrealistically high expectations	Failure to reach required depth of understanding
Inability to distinguish between important and unimportant information	Laziness / apathy
Inability to balance study and social commitments	Inability to use higher order thinking skills

Combined from Fraser & Killen, 2005 and Ngidi, 2007

Appendix I
Output from generalised estimating equation (GEE)

Table I.1 Aggregation of all the demographic parameters available to me and their influences on students' marks. The first column lists the parameters put into the model. The second column (β) indicates the relative influence on the marks. (Within groups of parameters, the item to which the others were compared was automatically set to zero. The others differed from it by the differences in students' test marks as indicated. Thus students who had attended a Quintile 2 high school had, on average, test marks that were 11.3% higher than those who had attended a Quintile 1 school.) The final column (Sig.) indicates whether the influence of the parameter concerned is significant or not (taking < 0.05 as being significant).

Parameter			95% Wald C I		Hypothesis Test		
	β	Std. Error	Lower	Upper	Wald χ^2	df	Sig.
(Intercept)	5.576	11.2757	-16.524	27.676	.245	1	.621
[QUINTILE=6]	9.257	2.8866	3.599	14.915	10.284	1	.001
[QUINTILE=5]	9.219	2.4162	4.483	13.954	14.557	1	.000
[QUINTILE=4]	5.967	3.2573	-.417	12.351	3.356	1	.067
[QUINTILE=3]	5.195	3.0875	-.856	11.246	2.831	1	.092
[QUINTILE=2]	11.301	3.2781	4.876	17.726	11.884	1	.001
[QUINTILE=1]	0[a]	.	.	.	.	.	.
[StuStatus=4]	7.612	2.3696	2.967	12.256	10.318	1	.001
[StuStatus=3]	3.388	1.8280	-.195	6.971	3.435	1	.064
[StuStatus=2]	-7.892	2.2270	-12.257	-3.527	12.559	1	.000
[StuStatus=1]	0[a]	.	.	.	.	.	.
MatPts	.908	.1668	.581	1.235	29.620	1	.000
[Year=3]	-2.277	.6178	-3.488	-1.066	13.588	1	.000
[Year=2]	-3.240	.4359	-4.095	-2.386	55.258	1	.000
[Year=1]	0[a]	.	.	.	.	.	.
[Sex=M]	-1.886	1.2761	-4.387	.615	2.184	1	.139
[Sex=F]	0[a]	.	.	.	.	.	.
[LangB=2]	.246	2.5142	-4.682	5.174	.010	1	.922
[LangB=1]	0[a]	.	.	.	.	.	.
[FacType=3]	.199	.3981	-.581	.979	.250	1	.617
[FacType=2]	-.336	.4412	-1.201	.528	.581	1	.446
[FacType=1]	0[a]	.	.	.	.	.	.
Age	.622	.3186	-.003	1.246	3.810	1	.051
[NSFASBSNil=2]	-3.865	2.9612	-9.669	1.938	1.704	1	.192
[NSFASBSNil=1]	-1.209	1.9541	-5.039	2.621	.383	1	.536
[NSFASBSNil=0]	0[a]	.	.	.	.	.	.
[RACE=W]	-1.012	2.7477	-6.398	4.373	.136	1	.713
[RACE=I]	-1.697	2.4810	-6.559	3.166	.468	1	.494
[RACE=C]	-2.252	2.5438	-7.238	2.733	.784	1	.376
[RACE=A]	0[a]	.	.	.	.	.	.
(Scale)	94.866						

Dependent Variable: Marks

[a] Set to zero because this parameter is redundant

Model: (Intercept), QUINTILE, StuStatus, MatPts, Year, Sex, LangB, FacType, Age, NSFASBSNil, RACE

Parameters entered into GEE:

QUINTILE: Socioeconomic status of community in which school is situated, divided into five equal groups, ranked from 1 [lowest] to 5 [highest]. For the purpose of comparison, I coded a number of independent schools as 'quintile 6'

StuStatus: Previous educational experience:
1 = matriculants
2 = repeating 1st year
3 = one or more year of tertiary education
4 = completed degree

MatPts: Matric points: A numerical representation of school-leaving exam results

Year: Year of study: 1st year
2nd year
3rd year

Sex: M = male
F = female

LangB: First language: 2 = English
1 = Other than English

Factype: Facilitator background:
0 = postgrad student
1 = established scientist
3 = medical doctor

Age: Student's age in 1st year

NSFASBSNil: Financial support:
0 = fees paid by family
1 = bursary/scholarship on grounds of academic merit
2 = support from NSFAS

Race: W = white
I = Indian
C = Coloured
A = African

[If my primary concern were the development of an accurate mathematical model of the interplay of the significant factors, I should re-run the GEE, excluding the factors that are not significant. I leave them in the table to illustrate the fact that they do have an influence, albeit not reaching statistical significance.]