

## **CHAPTER I**

### **INTRODUCTION AND LITERATURE REVIEW**

#### **1.1 PURPOSE OF THE STUDY**

This research study set out to determine whether the changes that were introduced into the medical curriculum at the University of the Witwatersrand in 2003 brought about improvement in the medical graduates' self perceived competence and the opinion of others based on observed performance in the planned directions and so see if these graduates were better prepared than the traditionally trained interns. The first phase of the study entailed developing and validating a "benchmark model" of the competent South African intern. A set of instruments was designed based upon measures identified in the model. These instruments were then used in a 360<sup>0</sup> study to compare the competence of graduates from the last group of the "old" traditional medical curriculum with that of the first group of interns from the "new" Graduate Entry Medical Programme (GEMP) from the perspectives of the interns themselves, their supervisors, colleagues and patients.

#### **1.2 BACKGROUND TO THE STUDY**

##### ***1.2.1 The history and status of medical education at Wits prior to the 2003 curriculum change***

The Medical School at the University of the Witwatersrand, Johannesburg (Wits) has a long history of educating doctors for South Africa and the world. It admitted its first students in 1919 and the first four doctors graduated in 1924. The medical school has moved twice since its inception, first to Esselen Street in Hillbrow and then in 1982 to its current location adjacent to the Johannesburg Hospital in Parktown, Johannesburg (SARUA, 2009). Figure 1.1 shows the Johannesburg hospital and the medical school buildings against the urban backdrop of the city of Johannesburg, South Africa.



Figure 1.1 Wits medical school in its current premises adjacent to the Johannesburg Hospital ([www.johannesburghospital.org.za/](http://www.johannesburghospital.org.za/)).

Traditionally, school leavers with matriculation exemption and certain pre-requisite subjects have been admitted to a six-year undergraduate Bachelor of Medicine and Bachelor of Surgery (MBBCh) degree. Most entrants to medicine came directly from school, with a few transferring into the second year of study from a science or allied medical disciplines course (physiotherapy, occupational therapy, pharmacy or nursing) or dentistry. Occasionally a graduate (usually from another medical school) who had completed the required subjects was admitted to the third year of study but this was not common. Undergraduate education was followed by one year of internship and, since 1999, an additional year of compulsory national “community service”. After this, doctors were eligible to register as independent practitioners with the Health Professions Council of South Africa, hereinafter known as the HPCSA, and then had the option of specialising, usually in a further 4-year post-graduate training.

The traditional curriculum at Wits was based upon the British system of a layered curriculum with theoretical subjects being taught in the first three years. Clinical subjects commenced in the fourth year and continued with increasing clinical time through to the sixth year of study (see Table 1) which was spent almost exclusively in the hospitals of the Wits academic complex. However, new medical knowledge was becoming available at an

increasingly rapid pace and information overload in medical curricula was acknowledged worldwide. As a result much international curriculum change was aimed at reducing factual overload by identifying a set of core knowledge, attitudes and skills that medical students must acquire and developing explicit learning outcomes; this also allowed for horizontal and vertical integration of medical curricula as a whole (Bordage, 1987; Winter, Wolf, Nutter and Beaty, 1997; Rolfe, Pearson, Sanson-Fisher, et al, 2002; Williams and Lau, 2004; Maudsley and Strivens, 2000 and Koens, Custers and Ten Cate, 2006). At Wits, departmental autonomy allowed for the development of courses in isolation, further exacerbating the overload as each department wanted to give a very thorough grounding. Innovations within individual departments, such as the introduction of Problem Solving Exercises (PSEs) in the Department of Physiology sought to improve students' problem solving abilities (Mitchell, 1988) but this was not integrated into other subjects.

As early as 1994 the need for change had been identified in the Faculty of Health Sciences at Wits. At this stage the Faculty's response was the modification of the current curriculum to a "core plus selectives" model in line with the HPCSA's requirements (Manning 2008). The main agents for change were the United Kingdom's "Tomorrow's Doctors" (General Medical Council, 1993), the World Summit on Medical Education held in Edinburgh in 1994 (World Federation for Medical Education, 1994) and the changes that were taking place in Australia (Sefton, 1995), Holland (Schmidt, Machiels-Bongaerts, Hermans, *et al*, 1996), Canada (Norman and Schmidt, 1992) and some medical schools in the United States of America (Mann and Kaufmann, 1999, Tosteson, Adelstein and Carver, 1994). In 2001 the World Federation for Medical Education (WFME) International Guidelines for Quality Improvement in Basic Medical Education were published following a meeting at the University of Copenhagen, Denmark (World Federation for Medical Education, 2001) and this document also contributed to the debate.

In the debate around curriculum reform, there was strong support for graduate entry programmes which only accepted students to study Medicine once they had completed a Bachelors degree. This had been the preferred means of access to medical schools in the United States for many decades (Donald, 2000) and several medical schools in Australia had recently undertaken the change to graduate entry. Sefton (1995) reviewed the case for change internationally and both she and Light (1996) reported the educational benefits of graduate entry and enumerated some problems with school leavers that led to the change of

direction in Australian universities. Geffen (1991) argued for a plurality of models for Australian medical education and, in particular, for a four-year graduate entry model while Leggat (1997) emphasized the accreditation of medical schools as part of the catalyst for change. Donald (2000) reviewed Australian developments and addressed the financial implications should New Zealand follow suit. Horton (1998) described the benefits of the Cambridge graduate clinical course in the United Kingdom.

In South Africa the reasons for wishing to introduce a graduate medical degree were the problems associated with making a career decision at too young an age, the declining level of preparedness of students at the matriculation level and the consequent need to take students after they had acquired some university experience, the positive educational reasons for acquiring a formative general Bachelors degree prior to professional education and the need to make it possible for more black students to study medicine.

These views were initially tested qualitatively by Price and Smuts (2002) in a meeting with the principals of the ten schools that provided the majority of Wits medical students as well as two focus group discussions with grade 11 and final year scholars and their parents. The results of this qualitative opinion survey confirmed the initial reasons for preferring graduate entry and also elaborated them with causal hypotheses as to why some applicants were making inappropriate career choices. These included parental and peer pressure for those who do well at school and the realistic fear that it is so competitive to gain entry into Medicine that one cannot afford to turn down an offer. The opinion was also expressed that graduates would have proven ability to cope with university education and a first degree would assist disadvantaged scholars who might not have had good enough matriculation results to be admitted directly into medicine. A broader education would bring a greater variety of non-medical skills, knowledge and experience to the study of medicine which could assist with communication and understanding of patients. Graduates are also likely to be highly motivated and thus less likely to drop out.

The interviews also highlighted the key perceived disadvantage of the proposed graduate entry programme, namely that seven years of university was a long period of study and carried associated costs and loss of income. Finally, concern was expressed that a four-year degree would be seen as inferior to the traditional Wits six-year degree, and to the five- and six-year degrees offered by other medical schools in South Africa. The study

concluded that if offered both options, all other things being equal, there would be equal preference for the new 3+4-year and the traditional six-year medical degree amongst school leavers who would traditionally have applied to study medicine at Wits (Price & Smuts, 2002).

Staff concerns in the Faculty of Health Sciences regarding the change were somewhat different. Manning (2008, p. 31) noted that a major concern voiced in the Faculty of Health Sciences during the discussion phase was that in offering the seven year GEMP curriculum (three plus four-year model) the expense and time taken to qualify as a doctor would be too great for students and that the Faculty might lose quality applicants to other medical schools opting for a five (minimum HPCSA requirement) or six year curriculum. Another concern was expressed (Lawson, 2004) that the “gap” between two such disparate groups as the school leavers and graduate entrants with their lack of anatomy and physiology goes against “the principles of excellent education”. Further faculty concerns included, amongst others, the additional staffing that would be required for a problem based curriculum, possible additional workload and its effect on research and publication and the funding issues brought about by an integrated curriculum where departments no longer ‘owned’ their own courses. Nieuwenhuijzen Kruseman, Kolle and Scherpbier (1997) reported cost concerns at Maastricht and in New Mexico but both schools demonstrated that PBL programmes need not be more expensive than a lecture-based programme. Sefton (1997) did a costing exercise prior to curriculum change at the University of Sydney and found that workloads in scheduled sessions should not increase but that different resources were needed to support a problem-based curriculum and that while planning and introduction require substantial costs, significant benefits accrue. Regarding changes in Australian universities, Overland (2008) quotes Don Markwell as saying, “It is a bit like renovating your house. It is rarely cheap and it is inconvenient. But if you plan it right, you will come out with something substantially better”.

A new Mission Statement in 1993 prepared the way for the thinking and discussion around more comprehensive educational reform in the Faculty of Health Sciences and in 1995 a survey was undertaken to ascertain the attitudes and perceptions of staff, students and graduates to the curriculum (Manning, 2008). This survey resulted in a set of documents laying out the desired attributes (knowledge, skills and attitudes) of newly qualified medical graduates (and graduates of the other Health Science disciplines) of the Faculty as

well as the need for self-directed and life long learning skills. A requirement in 2001 by the South African Qualification Authority (SAQA) to register both specific and critical cross-field outcomes for all educational qualifications on a National Qualifications Framework (University of the Witwatersrand, Johannesburg, 2000) was facilitated by the “Attributes” documents and together these two initiatives paved the way for the planning of extensive medical curriculum reform. During 1997 and 1998 a number of overseas experts from Harvard University and the University of New Mexico in the United States of America, the Universities of Queensland and Sydney in Australia, Mc Master University in Canada and the University of the Transkei in South Africa visited the Faculty to assess the curriculum and to make suggestions for bringing it in line with medical education worldwide. A delegation of seven staff members, led by the Dean, visited five Australian universities to study their curricular models and learn from their experiences in curriculum reform.

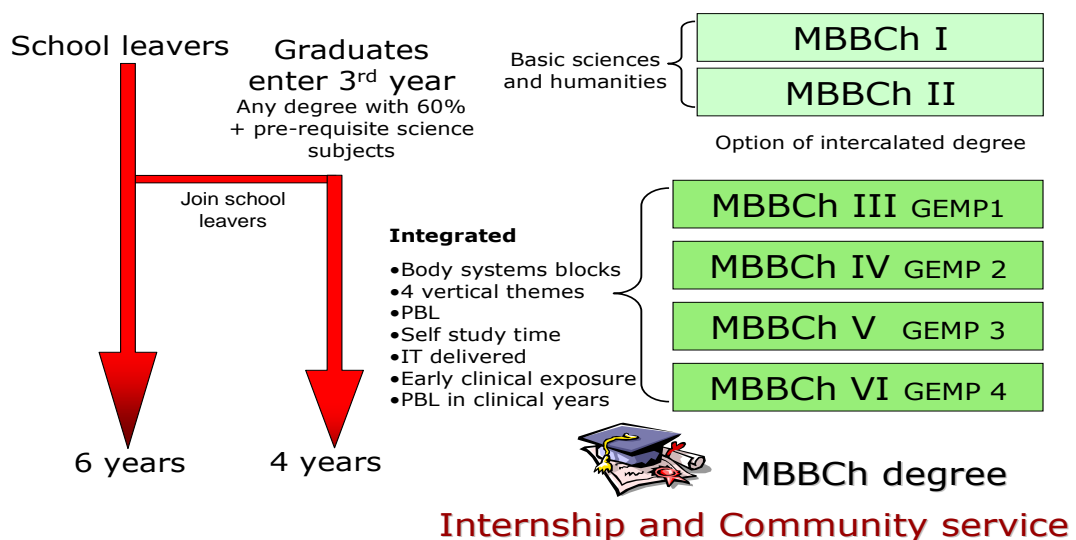
### ***1.2.2 Description of the new curriculum as a means to address the identified deficiencies and required changes***

According to Wilkerson (1997) the essential element leading to revolution rather than quiet evolution in medical curricula in the United States was “the presence of a strong leader, usually the dean, with a vision about how education might be, incredible persistence in selling that vision to others, and the power to marshal financial resources in support of new educational structures”. This was indeed the case at Wits where the Dean was the champion of change. He put into place staff posts dedicated to health sciences education, educational committees, staff retreats and workshops so that all departments were involved in decisions regarding the setting of objectives and core content.

By 1999 the Faculty had opted for a major reform process which would incorporate seven pillars of modern medical educational philosophy, namely a student centred approach, strong emphasis on problem solving, a community orientation, early clinical exposure, vertical and horizontal integration, information technology (IT) enhanced and facilitated delivery and the fostering of life long learning (Faculty of Health Sciences, 2001). These changes necessitated the introduction of increased Ethics teaching, research methods, problem based learning (PBL) in small groups, a course in computer skills and evidence based medicine. Cohesion in the integrated GEMP curriculum was achieved by four ‘vertical’ themes which ran through the four years and are explained in detail further on.

The structure of the new curriculum initially involved some changes in the second year of the MBBCh degree (see Table 1.1) while curriculum structure and methodological changes were introduced from the third year. The third to the sixth year of the medical degree became known as the Graduate Entry Medical Programme (GEMP). The new GEMP created an entry route into medicine for graduates with a suitable university bachelor's degree or a technikon master's degree. Provided that they had completed certain required subjects (matriculation level mathematics and a full course in biology as well as a full or half course in chemistry and physics at first year university level) graduate entrants could now join the mainstream students in the third year of medical study and complete the MBBCh degree in four years instead of six. All students complete internship and community service after graduation. Figure 1.2 summarises the new curriculum structure.

### An outline of the MBBCh curriculum



### Timeline for change from traditional to GEMP curriculum

	MBBCh I	MBBCh II	MBBCh III	MBBCh IV	MBBCh V	MBBCh VI	Intern 1	Com-munity Service		
TRAD										
year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
GEMP		MBBCh I	MBBCh II	GEMP 1	GEMP 2	GEMP 3	GEMP 4	Intern 1	Intern 2	Com Serv

↑ CHSE oversees the new GEMP

Figure 1.2: Diagram depicting the new MBBCh degree at the University of the Witwatersrand Faculty of Health Sciences and timeline for implementation.

The Centre for Health Science Education (CHSE) was created in 1999 to oversee health sciences education matters and is situated centrally in the faculty, close to computer laboratories, library, lecture theatres, faculty offices, canteen and most of the clinical and medical sciences' departmental offices. A director was appointed in December of 2000 at professorial level and the staff complement grew rapidly from an initial three members to around thirty establishment and contract posts. The CHSE took on the responsibility for the introduction of the GEMP and housed the learning centre with its thirty problem based learning discussion rooms, each equipped with a computer and a collection of basic texts, and the clinical skills unit, a large multipurpose area with examination rooms for practising clinical skills on models and simulated patients.

### ***1.2.3 Essential features of the Graduate Entry Medical Programme (GEMP)***

The third to the sixth years of the GEMP reflected the educational philosophy underpinning the new curriculum. This was constructivist in nature, recognising that students, especially graduates, come to the curriculum with knowledge and experience which is valuable in understanding and internalising new medical knowledge as well as enhancing cooperative learning with others in small groups. The problem based learning groups comprised seven to ten students with a member of staff trained in facilitation skills to act as facilitator. The groups were intentionally heterogeneous with regard to gender, culture and graduate or non-graduate students to enrich the learning experience.

The content of GEMP I and II (the third and fourth years) was structured around body system blocks. Short patient problems were presented each week which allowed students to formulate hypotheses, identify gaps in knowledge and raise important learning issues for further research. New information was introduced during the week and lectures, theme sessions and clinical practice supplemented self-study. Each problem was planned to integrate the content horizontally across the various disciplines and vertically across the levels of study which entailed revisiting previously learned materials in more depth in a 'spiral' fashion. Four themes continued as threads throughout the GEMP years and these formed the bases of core knowledge, attitudes and skills underpinning competencies. The outcomes for the Basic and Clinical Sciences (BCS) Theme, the Patient-Doctor (PD) theme, the Community-Doctor (CD) theme and the Personal and Professional



Development (PPD) theme were designed to guide students and teaching staff in their learning and teaching. Clinical skills were introduced early (in the third year/GEMP I) and were taught and practiced in a Clinical Skills Laboratory prior to the students visiting the wards in the teaching hospitals to take histories and examine patients. Although the objectives for each subject and for the themes were determined by the curriculum planners to guide learning and ensure sufficient knowledge for safe practice, the depth and extension of knowledge for individual students was not confined and opportunities and resources for further knowledge were readily available.

Diverse assessment methods ensured that the many aspects of the curriculum were tested in a suitable manner. Computer administered Multiple Choice Questions (MCQs) offered opportunities to use images, graphs, pathology slides and micrographs to test the content in each block while modified essay questions tested the content of some of the themes. Objective Structured Clinical Examinations (OSCEs) assessed clinical skills. Block content was assessed after two blocks in GEMP I and II, with subminima for each block. An end of year examination was required for students who failed to gain a 60% year average. The medical faculty has a longstanding rule which allows for students who achieve an in-course average of at least 60% to not write the end of year examination. An Integrated Examination (IE) at the end of GEMP II, III and IV ensured that students were able to integrate their learning on an ongoing basis. Table 1.1 is included for reference purposes and serves to “operationalise the variable of interest” (Cook, 2009), by comparing the “traditional” and the new “GEMP” medical curricula at Wits.

Table 1.1: A comparison between the traditional MBBCh and the GEMP curricula of the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg (pre- and post-2001 rule change) (Manning 2008; University of the Witwatersrand, 2001&2002)

Curriculum attributes	Traditional Curriculum (MF000 Prior to 2001 Rules)	GEMP Curriculum (MF000 2001 rules including GEMP rules)
<b>1. Educational philosophy</b>	<ul style="list-style-type: none"> <li>Curriculum in line with the 1994 SAMDC requirement by introducing a ‘core plus selectives’ model. SAMDC-approved core courses plus additional credits selected from several options</li> <li>Restructuring directed solely at the syllabus or content</li> <li>Little evidence of discussion around educational philosophy, learning process or other epistemic issues (context of learning, responsibilities of educators and learners or assessment promoting learning (Manning 2007)</li> </ul>	<ul style="list-style-type: none"> <li>Constructivist, Incorporates seven pillars of modern medical educational philosophy – a student centred approach, strong emphasis on problem solving, community orientation, early clinical exposure, vertical and horizontal integration of content, IT enhanced and facilitated delivery and the fostering of life long learning skills.</li> <li>Four vertical themes give continuity (Basic &amp; Clinical sciences, Patient-Doctor, Community-Doctor and Personal &amp; Professional Development)</li> </ul>
<b>2. Content</b> Year 1	<ul style="list-style-type: none"> <li>Biology, Chemistry, Physics (compulsory) and <u>one</u> choice from Zulu for Health Sciences Students, Biomedical Mathematics, Psychology and Human Behavioural Sciences</li> <li>or Biology, Chemistry ½ course, Physics ½ course and two of the above selectives.</li> </ul>	<ul style="list-style-type: none"> <li>Biology, Chemistry, Physics (compulsory) and <u>one</u> choice from Zulu for Health Sciences Students, Biomedical Mathematics, Psychology or Human Behavioural Sciences or</li> <li>Biology, Chemistry (½ course), Physics (½ course) and two of the above selectives</li> </ul>
Year 2	<ul style="list-style-type: none"> <li>Anatomy, Physiology and Medical Biochemistry and Medical Ethics (modular course) or</li> <li>Anatomy (reduced course), Physiology and Medical Biochemistry (reduced course) and Molecular Medicine plus one of the following courses or combinations of courses: <ul style="list-style-type: none"> <li>- Human Behavioural Sciences II, or</li> <li>- Economics I and Medical Ethics (modular course) or</li> <li>- Psychology II and Medical Ethics (modular course) or</li> <li>- Medical Etymology and History of Medicine (modular course) and Society Health and Disease (modular course) and Medical Ethics (modular course).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Anatomy, Physiology and Medical Biochemistry, Molecular Medicine and <u>one</u> ½ course selected from a list of options. The three courses offered in the GEMP were: <ul style="list-style-type: none"> <li>- Health Psychology</li> <li>- Introduction to Economics of Health</li> <li>- The Social and Historical Context of Health and Disease</li> </ul> </li> </ul>
Year 3	<ul style="list-style-type: none"> <li>Anatomical Pathology, Haematology/Human Genetics (½ course), Medical Microbiology,</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary Concepts in Medical Science (PCMS): PCMS A (3 weeks) for graduate entrants only:</li> </ul>

Curriculum attributes	Traditional Curriculum (MF000 Prior to 2001 Rules)	GEMP Curriculum (MF000 2001 rules including GEMP rules)
	<ul style="list-style-type: none"> <li>• and one ½ course selective from: Human Biology and Anatomy or Clinical Pathophysiology A or Community Medicine B</li> <li>• and one ½ course selective from: Clinical Pathophysiology B or Applied Ethics or Molecular and Cell Biology or Zulu for Clinical Students (if not taken in first year and if Zulu is not a home language).</li> <li>• Attendance courses: Community Medicine A Emergency Medicine</li> </ul>	<p>Anatomy, Physiology and Molecular Medicine PCMS B (4 weeks) for all students: Anatomical pathology, Microbiology, Molecular Medicine, Pharmacology, Physiology, Research Methodology/Evidence Based Medicine, Ethics</p> <ul style="list-style-type: none"> <li>• Integrated Basic Medical and Human Sciences A: comprising five “Body System” blocks in which weekly ‘paper-patient’ problems integrate learning in the basic, pathological, chemical and human sciences (as per the four vertical themes) Life on the Street, Haematology, Cardiovascular Respiratory and Renal</li> <li>• Introduction to Clinical Skills A: one day of clinical practice per week</li> </ul>
Year 4	<ul style="list-style-type: none"> <li>• Full Courses: Obstetrics; Pharmacology; Medicine; Surgery</li> <li>• ½ courses: Chemical Pathology, Community Medicine, Forensic Medicine; Otorhinolaryngology; Orthopaedic Surgery</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated Basic Medical and Human Sciences B:</li> <li>• A continuation of the third year curriculum and four themes comprising five integrated blocks as for year 3: Endocrine, Musculoskeletal, GIT and Nutrition, Reproduction and Neurosciences</li> <li>• Introduction to Clinical Skills B: one day of clinical practice per week</li> </ul>
Year 5	<ul style="list-style-type: none"> <li>• Full courses: Medicine; Gynaecology; Paediatrics; Psychiatry, Surgery, Family Medicine</li> <li>• ½ courses: Anaesthesia, Ophthalmology</li> <li>• Clinical rotations in the four main teaching hospitals in the morning, returning to medical school in the afternoon</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated Clinical Medicine A. This is the first of two years with a primarily clinical focus consisting of rotations through a number of clinical disciplines Internal Medicine, Paediatrics, Obstetrics, Surgery, Mixed block I (two weeks each of Psychiatry, Ophthalmology, ENT), Mixed block II (two weeks each of Public Health, Family Medicine and Urology), Acute and Perioperative Care (1 week each of Forensic Medicine and Emergency Medicine, 2 weeks each of Trauma and Anaesthetics)</li> <li>• Continued integration of the basic sciences and psychosocial domains with the clinical sciences through the four themes on one Medical School Day per week</li> </ul>

Curriculum attributes	Traditional Curriculum (MF000 Prior to 2001 Rules)	GEMP Curriculum (MF000 2001 rules including GEMP rules)
Year 6	<ul style="list-style-type: none"> <li>• Full courses: Community Based Medical Practice; Internal Medicine; Obstetrics and Gynaecology; Paediatrics; General Surgery; Psychiatry.</li> <li>• Attendance courses: Orthopaedic Surgery and Clinico-pathological case studies.</li> <li>• Approximately six hours of clinical experience a day including formal ward rounds, tutorials and intake rounds plus self directed clinical time and extra hours at night when on intake</li> </ul>	<ul style="list-style-type: none"> <li>• Integrated Clinical Medicine B. Clinical rotations through the major clinical disciplines, Internal Medicine, Surgery, Psychiatry, Gynaecology, Paediatrics, Orthopaedics and Integrated Primary Care (IPC)</li> <li>• Continued integration of the basic sciences and psychosocial domains with the clinical sciences through the four themes on one Medical School Day per week.</li> </ul>
Elective Studies	<ul style="list-style-type: none"> <li>• At the end of the fourth year students spent four weeks in an elected discipline of their choice within South Africa.</li> <li>• At the end of the fifth year students undertake a further four weeks elective either locally or outside South Africa</li> </ul>	<ul style="list-style-type: none"> <li>• At the end of the third year students spend two weeks in an elected discipline of their choice in South Africa</li> <li>• Between the fifth and sixth years of study students undertake four weeks of elective study which may be taken locally or outside South Africa.</li> </ul>
<b>3. Student Assessment</b>	<ul style="list-style-type: none"> <li>• Years 1 and 2 Written and practical examinations conducted by the respective departments on the Main Campus or Anatomy, Physiology and Molecular Medicine at Medical School.</li> <li>• Years 3 and 4 Discipline based tests throughout year. Examinations held in June and October/November each year If the year average is &lt; 60%, the final year-end examination is taken.</li> <li>• Years 5 and 6 Discipline based examinations held in June and Oct/Nov</li> </ul>	<p>Years 1 and 2</p> <ul style="list-style-type: none"> <li>• Written and practical examinations conducted by the respective departments on the Main Campus or Anatomy, Physiology and Molecular Medicine at Medical School.</li> </ul> <p>Years 3 and 4</p> <ul style="list-style-type: none"> <li>• Integrated assessments are taken in-course with subminima for individual blocks. Computer delivered multiple choice questions (MCQ), modified essay questions (MEQ) and objective structured clinical examination (OSCE) formats used</li> <li>• If the year average is &lt; 60%, the final year-end examination is taken.</li> <li>• A final Integrated Examination (IE) is taken at the end of year 4 - includes all content of years 3 and 4.</li> <li>• A reflective learning portfolio developed over two years and interview, a community project presentation and an Evidence Based Medicine project together contribute to the IE mark</li> </ul> <p>Years 5 and 6</p> <ul style="list-style-type: none"> <li>• Discipline based and practical examinations held after</li> </ul>

Curriculum attributes	Traditional Curriculum (MF000 Prior to 2001 Rules)	GEMP Curriculum (MF000 2001 rules including GEMP rules)
		<p>each clinical rotation with an Integrated Examination at the end of the year.</p> <ul style="list-style-type: none"> <li>• Failure in a rotation is repeated immediately and the Integrated Examination written at the next examination</li> </ul>
<b>4. Supplementary examinations and remediation</b>	<ul style="list-style-type: none"> <li>• Supplementary examinations are offered in the first five years</li> </ul>	<ul style="list-style-type: none"> <li>• Year 1 and 2: supplementary examinations may apply</li> <li>• Year 3 and 4: no supplementary examinations – the end of year examination replaces the supplementary examination</li> <li>• Year 5 and 6: no supplementary examination. The term 'remediation assessment' is applied to the integrated examinations. Students who fail a rotation are examined again at the end of the remedial rotation.</li> </ul>
<b>5. Clinical teaching</b>	<ul style="list-style-type: none"> <li>• Year 4: community visits, 6 week Obstetrics rotation</li> <li>• Year 5: clinical rotations in the morning, lectures at Medical School in the afternoon</li> <li>• Year 6: clinical rotations all day, intakes, sideward tutorials</li> </ul>	<ul style="list-style-type: none"> <li>• Year 3 and 4: clinical skills laboratory and both hospital and community environments introduced from week one of the first organ-system block.</li> <li>• Year 5 and 6: clinical rotations 4 days per week, weekly Medical School Day. One of the rotations is the Integrated Primary Care block at district hospital level.</li> </ul>
<b>6. Teaching and Learning Methods</b>	<ul style="list-style-type: none"> <li>• Years 1 and 2: discipline based lectures, tutorials and practical work</li> <li>• Years 3 and 4: discipline based lectures, tutorials and practical work</li> <li>• Supplemented by tutorials, laboratory sessions, practical work and independent study, supervised clinical work in the wards or clinics and community visits</li> <li>• Years 5 and 6: supervised clinical practice, lectures (in year 5), bedside tutorials</li> </ul>	<ul style="list-style-type: none"> <li>• Years 1 and 2: discipline based lectures, tutorials and practical work</li> <li>• Years 3 and 4: facilitated small group PBL sessions with paper patient cases involving horizontal (subject) and vertical (level) integration</li> <li>• Supplemented by independent study, online resources and materials, discipline based lectures, large or smaller group theme sessions, supervised clinical work in the skills laboratory and in wards or clinics and community visits.</li> <li>• Years 5 and 6: supervised clinical practice, bedside tutorials, weekly lectures or seminars on Medical School Day</li> </ul>
<b>7. Internship</b>	<ul style="list-style-type: none"> <li>• One year internship.</li> <li>• The final group of graduates from the Wits traditional curriculum was the last group to do only one year of internship.</li> </ul>	<ul style="list-style-type: none"> <li>• Two-year internship commenced in 2006 for graduates of medical schools on a 5-year curriculum</li> <li>• Two year internship commenced in 2007 for graduates of medical schools on a 6-year medical curriculum, including the Wits GEMP.</li> </ul>

### 1.3 INTERNSHIP TRAINING IN SOUTH AFRICA

This study focused on the initial months of the internship year and the preparedness of the Wits medical graduates to perform competently in the many situations in which they found themselves. It was essential for the researcher to gain an in-depth knowledge of the system of accredited intern training institutions in South Africa and the changes that were occurring at the time of the study.

Internship in South Africa, as in many countries worldwide, is a postgraduate period of 12-24 months which allows junior doctors to complete their medical training, to gain insight and to perfect their clinical procedural skills under supervision. It is a period of transition from responsibility to themselves to learn to take responsibility for their patients, the health team and the community (HPCSA, 2004). In SA this is followed by a vocational training year known as “the Community Service year”. Interns and Community Service doctors have partial registration with the Health Professions Council of South Africa (HPCSA) but are not registered for independent practice until successful completion of both. A system of Continuing Professional Development (CPD) ensures continuity of professional education for all registered practitioners and specialists using a points system.

Meintjies (2003) has described the history and status of internship in South Africa and the reasons for the change from a single year’s internship to the two year period introduced in 2006. Internship training was begun during the 1950’s and was administered by the then South African Medical and Dental Council (SAMDC), now the HPCSA. The main clinical domains covered during internship are General Medicine, General Surgery, Obstetrics and Gynaecology and Paediatrics while additional domains included subjects such as Anaesthesiology, Dermatology, Ophthalmology, Orthopaedics/Trauma, Mental Health and others. Prior to 2006, interns could choose to complete the following combinations of subject rotations:

- |               |  |
|---------------|--|
| 6 + 6         | six months in two of the main clinical domains   |
| 4 + 4 + 4     | four months in three of the main clinical domains  |
| 6 + 4 + 2     | six and four months in two of the main clinical domains and two months in one of the additional domains              |
| 4 + 4 + 2 + 2 | four months in two of the main clinical domains plus two months in two of the additional domains (HPCSA 2004, p. 6). |

A problem arose where interns who followed the first option could spend six months each in, say, medicine and surgery with no exposure to gynaecology or paediatrics, which are essential in general practice. Although the value of internship was widely accepted, questions were raised in the early 1990s about whether the original goals were being achieved and whether interns were receiving sufficient exposure to the relevant medical disciplines. The sixth year of the MBBCh degree was considered a 'junior internship' year, with the actual internship year extending and complementing it, but at times it seemed to be merely a duplication. A review was conducted to look into the educational versus service aspects of internship, the policies, certification of facilities, conditions of employment and the relationship of internship to community service. Recommendations following this review called for a reduced minimum period of undergraduate curriculum of five years. Individually medical schools could choose to adopt this minimum or retain the six year curriculum. This would be followed by two years of compulsory internship training with an improved programme of rotations including four months in each of Medicine, Obstetrics and Gynaecology, Paediatrics and Surgery, with a Family Medicine or Primary Care component, two months of Anaesthesiology and two months in Orthopaedics and Trauma (Meintjies, 2003).

The internship period was extended to two years in 2005 for graduates from the five year undergraduate medical courses and in 2006 for graduates of the six year university courses. This meant that the first GEMP graduates to graduate from Wits were also part of the initial group of interns required to complete two years of internship. Attempts by the Junior Doctor's Association (JUDASA) to have internship and community service combined were unsuccessful (Bateman 2002).

Internship training facilities are accredited by the HPCSA and may be at national or provincial academic hospitals (Level III), regional hospitals (Level II) or community hospitals (Level I) either singly or as a complex. These facilities undergo inspection from time to time. Intern supervision is the overall responsibility of the hospital head (who, in a large hospital, may appoint an intern curator to assist with this duty) and on a day to day basis rests with the departmental heads. Initial orientation is provided and thereafter interns are oriented to particular domains as they rotate. Teaching is provided during ward rounds and interns should attend departmental meetings and discussions and may be asked to do case presentations. The health care system in South Africa is district based and emphasises Primary Health Care. The Department of Health has developed a National Patient' Rights

Charter to ensure the right of access to health care services as guaranteed in the Constitution of the Republic of South Africa, 1996 (Act No. 109 of 1996) (HPCSA, 2004) and all interns are expected to uphold this charter. Intern responsibilities are dealt with in detail in Chapter 2 on the development of a model of the competent South African intern.

One of the critical differences between internship in South Africa and that in some other countries is that Interns are often the first line of response in resuscitation emergencies in South African public hospitals (Burch, Nash, Zabow, *et al*, 2005) and the expectations of new interns' procedural performance in the workplace is high. The undergraduate clerkship experience often does not prepare them to meet such expectations, adding to intern stress in the workplace. A recent study on stressors during the internship years at three Johannesburg hospitals, published as a letter to the editor (Sun, Saloojee, Jansen van Rensburg and Manning, 2008), found that interns work an average of 70.1 hours per week and care for a mean of 20.4 patients at any one time but reassuringly, these interns felt better prepared than a cohort of interns surveyed in 1986, which perhaps testifies to the better preparation for the rigours of internship by the new curricula currently in place countrywide. The difficult conditions of internship in South Africa were recognised back in 1986 when a professor of medicine (Dubb, 1986) wrote a short piece in praise of interns, debunking the myth that interns had an easier time than their seniors had had as interns. He said "What is even more humbling is the realisation that I am not as capable of performing many of the tasks they take in their stride".

Undergraduate medical programmes in South Africa have to prepare students to work independently in emergency situations and in hospitals where there are fewer more senior doctors on call with them. This is one of the reasons why this study focuses on internship rather than the final weeks of the undergraduate curriculum.

#### **1.4 RATIONALE FOR THE STUDY**

Ferguson, James and Madeley (2000, p. 952.), in their systematic review of the literature on factors associated with success in medical schools, suggested that "reliable, valid and fair models of medical job competence need to be developed" to examine competence after qualification. At the time of commencement of this study, many medical schools in South Africa were also planning or implementing changes to their medical curricula in response to



worldwide trends in improving medical education. Only one medical school in South Africa, the University of Transkei, had implemented problem based learning as early as 1992 (Kwizera, Igumbor and Mazwai, 2005). There was also a need to make changes in line with specific South African circumstances as previously described. The last cohort of students to graduate from the “old” Wits MBChB curriculum commenced their internship in 2006 and this created a window of opportunity for a comparative study of the “products” of the two curricula, but also highlighted the need to develop a uniquely South African model against which intern competence could be measured. The ultimate test of the success of the GEMP would be to examine the “products” of the new curriculum and compare the measurable outcomes with those of the previous traditional curriculum to ascertain whether the changes introduced had produced the type of doctors that they aimed to produce. Such outcomes included cognitive skills (knowledge, reasoning and judgement), practical skills (clinical confidence, psychomotor skills and adaptability) and attitudinal skills (interpersonal, ethical considerations, approach to health promotion, personal growth and coping mechanisms). This involved evaluating the preparedness and suitability (competence) of graduates of the two different curricula early in their first year of internship training, before too many extraneous variables had clouded the picture

The researcher was qualified to undertake this study as she was well acquainted with both the old and the new medical curricula at Wits and had qualifications and experience in higher education in general and health sciences education and curriculum development in particular. Possible biases, and the methods employed to overcome these, are described in detail in Chapter 3.

#### ***1.4.1 The aim of the research***

The main aim of this study was to measure the effects of curriculum change by comparing the outcomes of two different Bachelor of Medicine and Bachelor of Surgery (MBChB) curricula undertaken at the University of the Witwatersrand, Johannesburg.

This aim was twofold. Firstly it involved the development of a model which clearly identified the benchmark (“gold standard”) features of the competent South African intern and secondly this model would be used to develop objective measures of these competencies to use in a

comparative study of graduates of the “traditional” and the “reformed” Wits medical curricula.

#### ***1.4.2 Research objectives***

The detailed research objectives were:

- 1 to identify the elements which contribute to the development of a Model of the Competent South African Intern and to validate this model
- 2 to use the model to develop instruments to be used in a subsequent study to measure these characteristics in Wits interns from two diverse curricula
- 3 to compare graduates of the traditional MBChB curriculum and the GEMP curriculum against the model of intern competence using these instruments
  - Sub-objective 3.1: comparison of overall questionnaire scores
  - Sub-objective 3.2: comparison in terms of hospital level allocation
  - Sub-objective 3.3: comparison in terms of population group
  - Sub-objective 3.4: comparison in terms of categories and items
- 4 to relate intern performance to the content and methods of the relevant MBChB curricula experienced.

#### ***1.4.3 The importance of the study (originality)***

A unique opportunity presented itself for a comparative study of this nature. This is the first study of its kind in the South African medical education context and the results would be of interest to the other seven medical schools in the country, all of which are grappling with curriculum change to a greater or lesser degree. However, the information obtained is crucial to the ongoing improvement of the Wits GEMP.

## **1.5 LITERATURE REVIEW**

The current study will not go into detail regarding the process of curriculum design nor present a detailed study of problem based learning and the polemic surrounding it. Both are well documented in the literature but are beyond the scope of this research project. They will however be addressed in the literature review as far as they relate to the present study.

An extensive study of the available literature was invaluable in ascertaining the work already undertaken in this field in other countries. It also highlighted the fact that there were very few South African studies in the field and supported the need for this type of research locally.

The literature that elucidates current thinking and prevailing scientific knowledge about medical education, curriculum change, measurements of clinical competence and the nature and challenges of the internship year is vast. Many articles informed the thinking around this research but were not directly relevant to the study. These articles are not cited in the references but are listed in a separate bibliography.

Before discussing the major debates relevant to this study it would be helpful to set the scene through a discussion of the research framework in which the study was grounded and which guided the researcher's approach to the literature in the field.

### ***1.5.1 Complexity theory and the rigour versus relevance dilemma***

Cohen, Manion and Morrison (2007) describe three approaches to the study of human behaviour. In the "normative approach", medium to large scale research looks at society and social systems using the model of natural sciences; in the "interpretive approach" small-scale research is employed to study the individual using non-statistical models and the "critical approach" studies societies, groups and individuals using action research methods. The current research fits best into the third category, but its aims go beyond the use of action research to solve a specific educational problem. These authors then offer a fourth emerging paradigm of complexity theory which uses non-linear and holistic approaches rather than seeking simple cause-and-effect models. This theory introduces networks of connection, "emergence over time through feedback and the relationship of the internal and external environments" as well as survival and development through adaptation and change (Cohen *et*

al, 2007, p.33). Complexity theory appears to accommodate the difficulties of finding a framework for the present study.

David Kernick (2006) explains that studies of complexity originated with computer-based network models which were taken up by many different disciplines. He raises certain concerns regarding issues of terminology and metaphor when the theory is used by many different disciplines and explains that complex systems have many elements that interact with, and may be modified by, neighbouring elements. There are feedback loops in these interactions which affect the way that the element behaves in future and small changes in one area may have large effects across the system and vice versa. The system is different from the sum of its parts and the behaviour of complex systems evolves from interactions of agents at a local level rather than from internal control or external direction. Multi-equilibrium is possible in complex systems although it is difficult to determine the boundaries. Also, past influences are important. Kernick (2006) concludes his article with the suggestion that complexity theory complements existing approaches and resonates with the way in which health service members see the world.

Sarah Fraser and Trisha Greenhalgh (Fraser and Greenhalgh, 2001) look at the challenge of complexity in the health care services and introduce the concept of teaching for “capability” which they define as “the ability to adapt to change, generate new knowledge and continuously improve performance” (*ibid*, p.799) and not just for competence in health care education. They describe a zone of complexity where learning for capability takes place, and in which relationships between items of knowledge are not linear, but also not chaotic. Relational learning helps the student to form links between seemingly unrelated areas. Plsek and Greenhalgh (2001) describe the increasing complexity of health care situations and suggest some basic principles for understanding complex systems. They define a complex adaptive system as “a collection of individual agents with freedom to act in ways that are not always totally predictable and whose actions are interconnected so that one agent’s actions changes the context for other agents” (*ibid*, p.625). Charlotte Rees and Lynn Richards (Rees and Richards, 2004) suggest that outcomes based education attempts to “reduce a complex adaptive system to its constituent parts by precisely defining the knowledge skills and attitudes to be acquired by students” (*ibid*, p.1203) and question how this will assist them to cope with complexity in their practice. They propose that complexity theory underpins many educational strategies currently in vogue in medical education such as problem-based

learning, reflection exercises and personal learning portfolios. However, they also suggest that perhaps the educators themselves experience discomfort with uncertainty, complexity and change.

This discussion of complexity sets the scene for this research. One can try to break intern behaviour down into a number of variables and study each independently. However, one cannot ignore the fact that there is an ongoing, dynamic interrelationship between these behaviours and circumstances, events, emotions and abilities so that the unit of analysis required to study such behaviour looks a bit like a web or ecosystem (Cohen *et al*, 2007). Cronbach (1975) wrote of research in psychology, "...Once we attend to interactions, we enter a hall of mirrors that extends to infinity" (*ibid*, p.119) and, as most effects are interactive, established empirical generalisations may no longer be a fruitful strategy for research.

Schön (1983, p. 40) calls for a "change in thinking" and says that "when we set a problem to investigate we select what we will treat as the 'things' of the situation, we set the boundaries of our attention to it, and we impose upon it a coherence which allows us to say what is wrong and in what directions the situation needs to be changed". This naming and framing may be troublesome to the positivist epistemology because rigour is sometimes forsaken for relevance. Figure 1.3 is the researcher's graphical depiction of Schön's rigour versus relevance dilemma. Research into behaviours as complex as medical practice in a real-life setting with myriad variables that need to be taken into account must of necessity lie, at least in part, in the "swampy lowlands".

A result of embracing complexity theory was the recognition and acceptance of the need to approach this study from a 360<sup>0</sup> perspective, taking into account the different views on internship performance from many sources involved in intern training and practice. It also required the use of as many complementary methods as were feasible, given the time and resource constraints. This made for a many-layered and nuanced study, not always as clear cut and tidy as might be desired but which allowed one to capture the fullness of this multifaceted area of research.

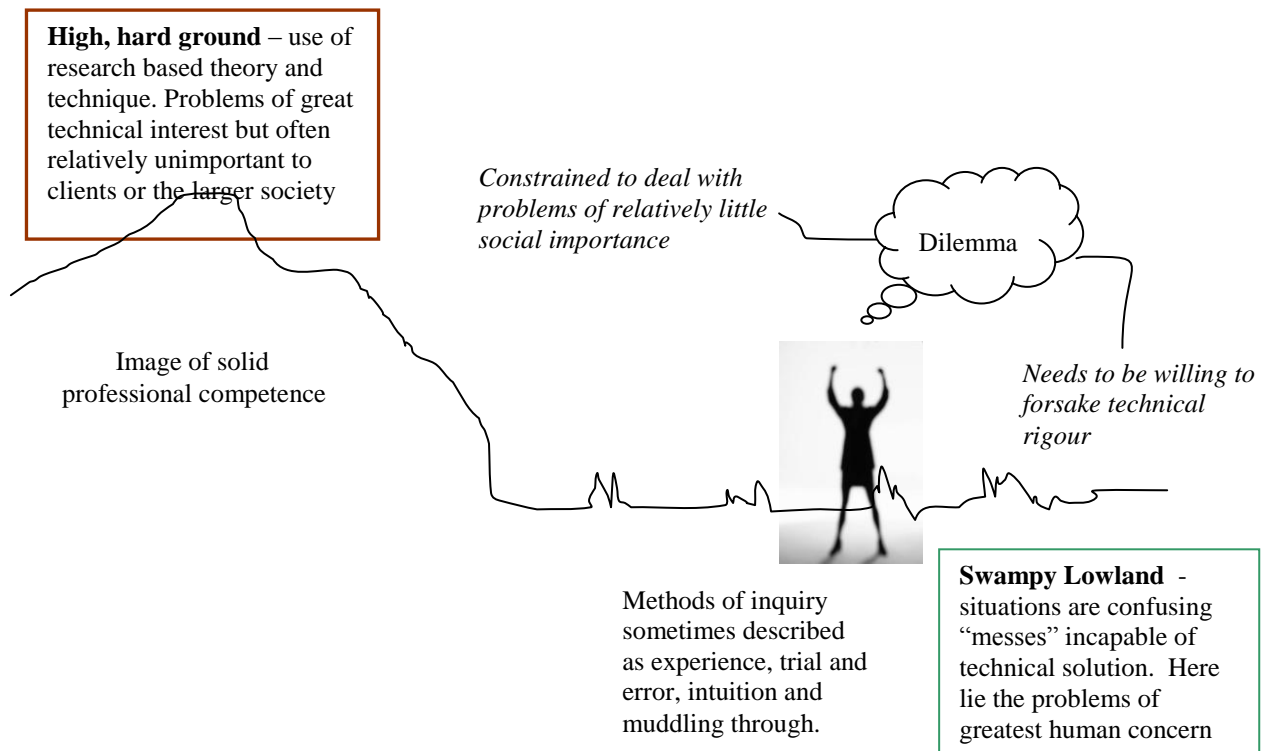


Figure 1.3 A graphic interpretation of Schön's rigour versus relevance dilemma

### 1.5.2 The status of related research in South Africa

At the time of commencement of this study in 2005, it was difficult to find published material on medical curriculum change or internship studies in South Africa, other than a historical description of medical education in the first years of the Republic of South Africa (Gordon, 1962) and the HPCSA materials together with the two articles relating to these that were previously discussed. Two further articles had been published in the South African Medical Journal in the 1980's. The first (Brink, Slabbert and Barnes, 1986) set out to give an overall view of internship training, subjects chosen, time spent on various tasks and how interns were informed about what was expected of them and their attitudes to medicine at the end of the internship year. This paper highlighted several shortcomings in the system with interns being poorly informed, working long hours with little opportunity for reading. Regular teaching was rare and supervision often poor so that disillusionment and negative orientation towards the internship experience was commonly expressed. These authors recommended an urgent and in-depth investigation into internship with revision of regulations governing internship and an organised programme of training and learning. This article was followed in 1998 by a paper (Touyz, Kelly, Tollman and Milne, 1988) which reported the results of a study to assess

aspects of internship such as education, workload and stress at five Johannesburg teaching hospitals. This study confirmed that the difficulties experienced by South African interns were similar to those found elsewhere in the world with fatigue as the most common source of stress due to conditions of cumulative sleep deprivation. Especially worrying in this study was the high percentage of interns reporting a loss of interest in medicine. The changes to intern training introduced as a result of these studies have been reported earlier in this chapter.

The HPCSA's recommendation to government was to reduce the minimum time for the undergraduate education of doctors to five years, to increase the internship period to two years and to introduce a year of compulsory community service prior to full registration. These have been discussed in a previous section. South Africa has eight university medical schools and three of these (the Free State University, University of Natal and the University of Transkei) opted for the five year degree while the other five retained their six year programmes, despite the extended internship. Wits was one of the latter, but was also the only university to be granted permission to admit suitable graduates to a four year medical programme. With the exception of the Walter Sisulu University, which introduced a problem based curriculum in 1992 (Kwizera *et al*, 2005), curriculum change at all of these universities is relatively new and few studies have been published although some important papers have been presented at conferences and should soon become available.

Cilliers (2002) studied the internal validity of the specific learning outcomes for Phase II of the revised medical curriculum at the University of Stellenbosch in South Africa. He determined the degree of congruence between the specific outcomes formulated for Phase II and the exit outcomes for the programme. This study highlighted the difficulties of writing good specific outcomes for each stage of a complex course such as medicine. These outcomes need also to capture the necessary competencies that will guide students towards the final exit outcomes. The resistance of staff members to spend time on this task, which in many instances was imposed upon them, was also a problem. This study has relevance to the present research in that the University of the Witwatersrand Faculty of Health Sciences also spent much time on the writing, reviewing and improving of outcomes but to date these have not been formally researched.

Vanessa Burch and her colleagues (Burch *et al*, 2005) at the University of Cape Town (UCT) recognised that studies of new entrants into internship worldwide all reported that many

practical skills are lacking in new interns and they set out to test objectively, in a seven station Objective Structured Clinical Examination (OSCE), followed by a self report questionnaire, whether this was indeed the case for a group of fifty eight interns from South African universities. They found great variation in the seven practical procedures tested but no overall scores reached the modified Angoff standard that had been set with a cut-off of 85%. Of interest to the current study was the finding that the interns themselves overestimated their abilities. This will be explored further in the discussion of the research results.

A study undertaken at the Walther Sisulu University (Nazareth and Mfenyana, 1999) dealt with the urgent need to train doctors for community practice in a rural setting and described the evolution of their innovative community-based curriculum with its university-community partnership and primary care health centres. Three other articles relating to this university's PBL curriculum were published in 2005. Iputo (2005) reviewed the student ratings of their PBL group facilitators while Iputo and Kwizera (2005) did a retrospective study of the drop-out and graduation rates of students on the traditional and problem based curricula. Kwizera, Igumbor and Mazwai (2005) presented an overview of the achievements, challenges and lessons learnt over twenty years of medical education in a rural environment.

The above articles all helped to set the scene of medical education in South Africa, but only Burch *et al* (2005) provided some empirical evidence of the “products” of medical education and the competence of medical graduates to enter internship.

### ***1.5.3 International perspectives: The key debates in the field of curriculum change and assessment relevant to this study***

#### **1.5.3.1 The type of doctor that people now want**

Worldwide, the public media such as television, the internet and the print media all deal with medical matters so that people are generally better informed than they have been in the past. Medical aid companies advise their clients to question the appropriateness of medical procedures and offer care plans and services to assist with this to ensure that only necessary procedures are carried out in a cost effective manner. Societal expectations of the doctor are changing (Schön, 1983) and the public have come to expect different qualities in their doctors including sharing more information about their conditions, in language that they can



understand and having more input into decisions regarding their treatment plans. In South Africa a National Patients' Rights Charter was developed by the Department of Health (HPCSA, 2004) which supports this approach. This charter is displayed in all public hospitals together with another which lists responsibilities of the patients themselves in using the health care system. Rethans, Norcini, Barón-Maldonado, *et al* (2002) comment on the growth of government and patient influences on medical care, including satisfaction rates and legal rights, while Pritchard (2003) states that not only are the recipients of medical care requesting information but they are also demanding accountability, at least in the United States of America. They "want a visible demonstration that we are graduating competent doctors, they want proof that doctors are competent at the end of their training" (*ibid*, p. 848). These changes have implications for the education of doctors and the planning of curricula.

Over the past decades medical education reform has been widespread throughout the world and much has been written regarding the processes and outcomes of these changes. This review will deal only with those major debates that impact significantly on this study and its results:

- (i) the debate around "what is competence?"
- (ii) curriculum change and change theory, the agents of change and the style of curriculum renewal, and
- (iii) the effects that changes in medical education have had and the evaluation of these effects
- (iv) comparisons of internship performance between graduates of traditional and innovative curricula.

#### **1.5.3.2 "Competence" and "competency based medical education"**

The first research objective requires an understanding of the term competence as it is used in this study. The literature on medical education and the preparation of doctors for clinical practice is constantly seeking methods of assessing the performance of clinicians for a number of purposes (Evans and Wakeford, 1983; Li, 1994; Holmboe and Hawkins, 1998; McKinley, Fraser and Baker, 2001; Evans, Elwyn and Edwards, 2004). Medical education documents and curricula worldwide use terms such as competency, competence, capability, capacity and performance to describe desired end results from which their educational goals, objectives and

outcomes are derived. The competency movement and competency based medical education was an attempt to create a common framework upon which to base the implementation of educational innovations. Govaerts (2008, p. 234) suggested that although the impetus for the competency movement seems obvious (“who would ever aim for incompetence?”) it has led to confusion and some controversies and there remains a lack of consensus over what the term really means. Worldwide debate in the medical literature around what constitutes professional competence has been vigorous and the key issues in the competency debate are examined here in order to come up with a working definition for this study.

Maudsley and Strivens (2000) reported that in medical education there have been moves in most countries to develop competency statements, convert these into outcomes and then use these outcomes to produce competency based examinations which are standardised and reproducible. In this sense “competence is about meeting a standard” which these authors see as controversial and at the core of the General Medical Council’s regulatory role in the United Kingdom (*ibid*, p. 56). The reality is that governments can influence decisions about which competencies are considered important and will allocate resources based on performance (Leung, 2002).

In South Africa the South African Qualifications Authority (SAQA) and the National Qualifications Framework (NQF) (SAQA, 1995) with its structure of discrete unit standards and specific outcomes played a role in accelerating the movement towards the view of “competency based training” in this country. The introduction of compulsory “critical cross-field outcomes” attempted to broaden the scope of competence and create a more holistic approach to learning. These are:

- identifying and solving problems in which responses display that responsible decisions using critical and creative thinking have been made.
- working effectively with others as a member of a team, group, organisation, community.
- organising and managing oneself and one’s activities responsibly and effectively.
- collecting, analysing, organising and critically evaluating information.
- communicating effectively using visual, mathematical and/or language skills in the modes of oral and/or written persuasion.
- using science and technology effectively and critically, showing responsibility towards the environment and health of others.

- demonstrating an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation.
- contributing to the full personal development of each learner and the social and economic development of the society at large, by making it the underlying intention of any programme of learning to make an individual aware of the importance of:
  - reflecting on and exploring a variety of strategies to learn more effectively;
  - participating as responsible citizens in the life of local, national and global communities;
  - being culturally and aesthetically sensitive across a range of social contexts;
  - exploring education and career opportunities; and
  - developing entrepreneurial opportunities” (*ibid*).

However, these critical outcomes did not address the full complexity of clinical reasoning, reflection and decision making in the ever changing and unexpected situations of clinical medical practice. South African universities rejected unit standard system and opted for the registration of “whole qualifications” (at least for the time being) but the movement certainly underpinned the outcomes based nature of current undergraduate medical education in South Africa. (University of the Witwatersrand, 2000). It is worth noting that the outcomes described in the eight whole qualifications for the different South African medical schools differ considerably, if not in spirit then in detail and emphasis (SAQA, 2011).

### Origins in organisational environments

In a competency model, judgements about performance are based on analysing occupational roles, translating these into outcomes and then devising assessments to measure the students’ progress towards attaining these outcomes. Leung (2002) traced the origins and development of the competency approach to parallel developments in vocational training internationally which have strongly political influences intended to produce an internationally competitive workforce. An example in the non-medical field of business is given by Sundberg (2001) who viewed competence as containing ‘knowledge’ (what you learn in education), ‘experience’ (what you gather in the workplace) and ‘abilities’ to use the knowledge and experience. He claimed that we are not able to develop another person’s competence, only the individual can do this, but we can set the scene, provide the tools and act like catalysts. This could apply also to the health care field but neglects the higher order competence required in medical practice which includes reflection, metacognition, judgement and the personal insight to adapt skills to novel situations. Many educators and clinicians have

challenged the trend towards competency based medical education on a number of fronts. Maudsley and Strivens (2000) questioned the relevance and non-university origins of this movement. These authors quote Barnett as arguing that:

*“pushing higher education towards the vocabulary of competence merely replaces one closed ideological view of higher education, i.e. academic competence serving cognitive culture, with another i.e. one-dimensional operational competence serving the economy” (ibid, p.56).*

Talbot (2004) warned that professional education which is based upon an “inappropriate epistemology of competency” will omit the “reflection, intuition, experience and higher order competence necessary for expert, holistic, or well developed practice” (*ibid*, p.587). Benner (1982), writing about nurse education, stated that:

*“competency-based testing seems limited to the less situational, less interactional areas of patient care where the behaviour can be well defined and patient and nurse variation do not alter the performance criteria” (ibid, p.309).*

She suggested that competency-based education is centred around the notion of accountability and the predictive validity of competency-based testing. Leung (2002) maintained that even though the emphasis on a competency model is intended to create transparency and standardisation, if applied inappropriately students may become demotivated by the mechanistic nature of competency based assessment and teaching staff may be frustrated by the increased administrative burden. It also fails to take into account the time needed to gain experience and expertise and the types of knowledge relevant to a particular competency.

Talbot (2004) criticised the competency model as applied to graduate medical education in the United Kingdom and warned against simplifying what is in fact a very complex process. “Such a competency construct is a learning paradigm: it is not the same as competence, which is a step on the road to professional excellence” (*ibid*, p. 588). His arguments might also hold true for ‘undergraduate’ medical education inasmuch as progression through the degree involves increasing clinical experience and application. He expressed the opinion that competency has an important place in the early stages of clinical learning, but should not be a “universal paradigm” and warned that most of the non-technical skills are personal and

implicit. They are carried out intuitively so that they are difficult to identify and measure. Talbot (2004) suggested that competence is not the same as understanding, which brings with it a critical edge essential for evidence based medical practice. Competence is a monolayer and negates dialogue, while understanding is many layered and embraces dialogue. Talbot offers a three dimensional model of medical practice, modified from Barnett (1994), which shows the progression of ten aspects of competence through academic competence to operational competence to life-world becoming. A junior doctor needs the competence to safely perform assigned tasks, and yet is able to “elaborate an intuitive knowing that senses the wider picture” (*ibid*, p.589). It may, however, be difficult to justify the time required to develop the more esoteric reflective and intuitive higher order understandings outlined in Talbot’s modification of Barnett’s model.

#### Attempts to extend and legitimise competency based medical education

Harden, Crosby, Davis and Friedman (1999) warned of the danger of routine or lower level outcomes being reflected in the assessment of competence. These authors developed a three circle model, the Dundee Outcome Model, with twelve outcomes grouped into three concentric circles with skills (doing the right thing) in the centre, the approach used (scientific knowledge, Ethics and judgement) in the middle circle and individual personal attributes in the outer circle. This model was used to specify learning outcomes for reforming and managing medical education which could be judged against the following seven criteria. They:

- reflect the vision and mission of the institution
- are clear and unambiguous
- are specific and address defined areas of competence
- are manageable in terms of the number of outcomes
- are defined at an appropriate level of generality
- assist with development of ‘enabling’ outcomes
- indicate the relationship between different outcomes (*ibid*, pp. 546-547)

Albanese, Mejicano, Mullan, *et al* (2008) sought to differentiate competencies from goals, objectives and outcomes and extended the seven criteria suggested by Harden *et al* (1999) for the specification of outcomes. They included a further five criteria which carried the educational outcomes through to their application the area of medical practice. They did this

by stressing measurable behaviours in patient care (as opposed to guidelines for student learning) which were not dependent upon the performance of other learners and which informed learners (and other stakeholders where feasible) of what was expected of them. Dannefer, Henson, Bierer, *et al* (2005), in the United States, sought to introduce formative peer assessment as a means of assessing those domains of competence such as interpersonal skills, humanism and teamwork skills which are less easily measured by conventional assessment techniques.

Arguments in defence of competency based medical education have come from Diwakar (2002) who criticised Leung's strong opposition to this approach and warned against "throwing the baby out with the bathwater" by taking a narrow view and dismissing work which has attempted to develop the competency concept to reflect the complexity of professional practice. Diwakar suggested a hierarchy (or spectrum) of professional competence. A reductionist approach would be to reduce professional practice to a list of competencies but a more constructivist approach (metacompetence) includes the ability to choose, develop and adapt abilities for different situations. Similarly, Wolf (in Maudsley and Strivens, 2000) argued that competency-based approaches merit consideration as do other educational approaches and defined competence as "a construct involving performance set to a given standard" which is defined by a process that differs between occupational and non-occupationally based disciplines and is tested by collecting evidence on both inputs (knowledge) and outputs (behaviour).

Schön (1983, p. 15-16) suggested new ways of viewing professional knowledge in relation to the changing demands of professional practice and proposed an epistemological approach which he called reflection-in-action. He described roles that "are continuously being reshaped" leading to an "unprecedented requirement for adaptability". Like Sundberg (2001), Schön (*ibid*, p.18) also believed that the art of a profession may not be teachable ("how does one teach making sense of uncertainty ... or choosing among competing professional paradigms?") but for some individuals it is learnable.

McCormick (2000, no page number) offers a rather more practical definition of clinical competence as "the ability to find out what is wrong and to make an appropriate response". He concludes his paper with a summary that states: "Clinical competence depends upon a quantum of knowledge, the ability to listen to the patient, and to elicit physical signs while

recognising their limitations, and the intelligent use of investigations. There are two other essential and relatively neglected preconditions: scepticism and commitment”.

### Competence and Performance

Rethans *et al* (2002, p. 901) were concerned with the relationship between competence and performance when assessing doctors in practice. They looked at the relationship between competence based assessments, defined as “measures of what doctors do in testing situations” and performance based assessments or “what doctors do in practice”. They then developed a model called the Cambridge Model which identified performance as a product of competence as well as certain influences of the individual and of the system. Talbot (2004) states that performance embraces perception and situational understanding and is based upon a capacity for picking out not rules but flexible styles of behaviours which constitute proficiency but not yet expertise. This only comes when decision making and situational understanding become intuitive rather than analytical. Both authors thus place performance at a highly evolved level of clinical practice.

Leung (2002, p. 694) quotes the Royal College of General Practitioners in the United Kingdom as distinguishing between clinical competence (what doctors can do) and clinical performance (what doctors do do). This distinction serves the current study well. The Wits interns who were surveyed responded to the questionnaire from a competence perspective which included aspects that they felt they knew through past practice and experience even if they had not actually performed the procedure during the early weeks of their internship. Their supervisors and colleagues, on the other hand, could only respond from a performance point of view to those items that they had actually seen or experienced.

Manning (2008, p. 3) suggested that clinical competence requires expertise in several different learning domains and that “medical practitioners should not only know what to do, and be able to do it, but they should have insights into when and “how much” to do, while demonstrating appropriate and ethical attitudes to their patients, their fellow health care practitioners, the health care system and society in general”.

### Competence and Confidence

Stewart, O’Halloran, Barton, *et al* (2000) explored the terms competence and confidence as useful measures in a self evaluation scale but warned that the terms should not be used

synonymously. For them, competence represented what individuals knew about their jobs based upon previous experience and included assessing risk. Confidence was described a judgement about whether the individual was willing or not to undertake an activity and was not necessarily based upon known levels of competence. In their small study, there was congruence between positive interview data about confidence and positive scores on the corresponding competence. The current study used the term confident in one of the scale descriptors in the intern version of the questionnaire but it was not a major distinction.

#### The confusion around terminology

Prozesky (2000) investigated the training of health workers and offered a table highlighting the conflicting terminology used to describe “the ability of a person to achieve output” (*ibid*, p.13). This table was expanded (Table 1.2) to gather together, for convenience of comparison, the differing concepts of medical competence, skills, capability, performance, performance in action and metacompetence. This serves as a reminder of the difficulties of studying such complex human behaviours.

Epstein and Hundert (2002) published a review article in the Journal of the American Medical Association which reviewed articles on competence from the MEDLINE database from 1966 to 2001. These researchers proposed a definition which is a “catch-all” and covers all of the categories identified. This was the approach that was finally taken in defining the term competence as applied to this research study. After examining the various definitions in the literature (Table 1.2) the researcher formulated her own composite definition which attempted to capture the fullness and progressive nature of competence.



Table 1.2: The ideas of various authors regarding competency, capability, performance, knowledge in action and metacompetency (adapted from Prozesky 2000 and extended in this literature review)

Author	COMPETENCE / COMPETENCY	SKILL	CAPABILITY	PERFORM- ANCE	KNOWLEDGE IN ACTION	META- COMPETENCY
WHO (in Prozesky 2000 p 15)	The ability to apply knowledge and skills in real-life situations	An ability , not yet applied in practice				
Hamilton (1994) (in Prozesky 2000, p. 15)	Actions guided by algorithms in simple situations or ‘technical rationality’, performed by ‘operatives’	Actions springing from prudent choices among moral alternatives, performed by ‘practitioners’			Considering and solving problems in unique situations	
Schön (1983, pp 19-50; in Prozesky 2000, p. 15)	The application of established techniques to recurrent events. “Knowing, which is implicit in action” thinking on your feet, keeping your wits about you – implicit when all goes well Reflecting-in-action, tacit knowing					
Chambers and Glassman (in Prozesky, 2000, p. 15)	Five stages of competence:1. novice 2. beginner 3. competent (ready for independent practice) 4. proficient (technique oriented professional) 5. expert (person-centred professional)					
Hevey (1993, pp.14-15) (in Prozesky 2000, p. 15)	‘the ingredients’ – combinations of knowledge and skills		“the pudding” - competencies plus higher level attributes (integrity, willpower, commitment, values, self-esteem etc.)			

Author	COMPETENCE / COMPETENCY	SKILL	CAPABILITY	PERFORM- ANCE	KNOWLEDGE IN ACTION	META- COMPETENCY
Eraut and Cole (1993) (in Prozesky 2000)			Knowledge/ Understanding + personal skills/qualities + 'professional thinking'	The ability to transfer capability into real work situations		
Giot (1993) (in Prozesky 2000)	1. 'Competence-as-performance' 2. 'competence-as-psychological construct': integrating knowledge, skills, attitudes at work					
Leung (2002)	Functional analysis of roles, translation into outcomes (competencies) assessment based on reasonably objective judgements of demonstrated performance. Competency approach born of vocational training.					Ability to learn and apply competencies effectively in different aspects of a person's activities
Diwakar (2002)	Competency based approach is a hierarchy (or spectrum) of professional competence. Competency describes what a doctor should be capable of doing. Reductionist approach : is to reduce professional practice to a list of competencies					Constructivist approach : (metacompetence) includes ability to choose, develop and adapt abilities for different situations
Harden <i>et al</i> , (1999)	Competencies are the knowledge and skills that are necessary for adequate performance in the profession.					
Maudsley & Strivens (2000)	There is a need for a broad interpretation of competence	An organised activity that is adaptable with feedback and can become routine			Must draw on knowledge and understanding to apply skills flexibly in new and unfamiliar contexts	Higher order competence develops, selects and adapts other competences for different situations & facilitates change (Fleming, in Maudsley and Strivens, 2000)

Author	COMPETENCE / COMPETENCY	SKILL	CAPABILITY	PERFORM- ANCE	KNOWLEDGE IN ACTION	META- COMPETENCY
Talbot (2004)	Competency construct as “a learning paradigm” is a binary model and not the same as competence - “a step on the road to professional excellence”, a matter of degree”. Academic competence and operational competence			Performance embraces perception and situational understanding; is based upon capacity for picking out not rules, but flexible styles of behaviours which constitute proficiency but not yet expertise		
Sundberg (2001)	Competence contains knowledge (what you learn in education), experience (what you gather in the workplace) and abilities to use your knowledge and experience.					
Benner (1982)	The ability to perform the task with desirable outcomes under the varied circumstances of the real world.	Ability to perform the steps necessary to accomplish a well-defined task or goal under controlled or isolated circumstances				
Wolf (in Maudsley and Striven, 2000)	Competence as “a construct involving performance set to a given standard”, defined by a process that differs between occupational and non-occupationally based disciplines					

Author	COMPETENCE / COMPETENCY	SKILL	CAPABILITY	PERFORM- ANCE	KNOWLEDGE IN ACTION	META- COMPETENCY
McCormick (2000)	Clinical competence is “the ability to find out what is wrong and to make an appropriate response”.					
Albanese et al (2008)	Competency is an individual’s ability to make deliberate choices from a repertoire of behaviours for handling situations and tasks in specific contexts of professional practice					
Govaerts (2008)	Competencies are context-dependent and always imply integration of knowledge, skills, judgements and attitudes.					
Fraser and Greenhalgh (2001)			the ability to adapt to change, generate new knowledge and continuously improve performance			
Manning (2008)				know what to do, be able to do it, have insights into when and how much to do		Demonstrate appropriate and ethical attitudes to their patients, their fellow health care practitioners, the health care system and society in general.
Epstein and Hundert (2002)	Professional competence is the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values and reflection in daily practice for the benefit of the individual and the community being served					

The Wits medical curriculum has set out to produce graduates who are competent in their clinical skills but are also thoughtful clinicians who are able to understand the totality of clinical medicine, reflect on their own practice and that of others and view the patients in their care as whole human beings within the contexts of self, family, community and society in all their varied dimensions. Based upon the many arguments presented above, and especially a quotation from Talbot (2004, p. 588) which suggests that “competence ... is a step on the road to professional excellence”, an appropriate working definition of competence for the current study on early internship was developed by the researcher:

*“Competence is an evolving stage on a continuum, which has at its one extreme the learned knowledge, skills and attitudes that are gradually developed beyond the mechanistic to become thoughtfully integrated in common clinical situations and, with practice, are flexibly applied in unfamiliar situations (metacompetence). Undergraduate medical education at Wits aims to produce increasingly applicable competence but not an expert practitioner”.*

Figure 1.4 shows the continuum of progression from factual knowledge, mechanistic skills and learned attitudes, through competence and its extension of metacompetence, to expertise. The working definition above falls mainly between points B (competence) and C (metacompetence) on the continuum, which is the limit that one might expect of a newly graduated doctor. The level of expertise would only be reached after many years of clinical practice and experience.

A	B	C	D
Factual knowledge and mechanistic skills →	<b>Competence</b> →	<b>(Meta)competence</b> →	Expertise →
	Integrate knowledge, skills and attitudes thoughtfully in different clinical situations	Apply competencies flexibly in unfamiliar situations and start to cope with uncertainty Takes time/reflection	Comes with experience, not expected during internship
<b>Undergraduate</b>	<b>Early internship</b>	<b>Late internship</b>	<b>Expert practitioner</b>

Figure 1.4: A continuum to explain the working definition of the term competency as used in the intern study

### **1.5.3.3 Curriculum change and change theory, the agents of change and the style of curriculum renewal**

Our reasons for change in the medical curriculum at Wits were described earlier in this chapter, in the section on the background to the problem. The move from a traditional or conventional curriculum to a more integrated, student centred and problem based curriculum has been published in the medical education literature for many medical schools around the world. The studies reported in these articles, too numerous to mention here, offer insights on the decision to change, the process of change and the evaluation of the results of such changes. Their experiences have been invaluable in visioning and planning this research which has attempted to incorporate some of the methods and ideas gained through reading, but also to avoid pitfalls and tailor a project that met the needs of Wits and in the unique situation found in South Africa. As most curriculum renewal has involved some form of problem based learning (PBL) the following section reviews some of the literature pertaining to its emergence as one of the most widespread changes experienced in medical education.

#### Relevant learning theories which underpin problem based learning

The traditional curriculum at Wits was generally teacher centred and based largely upon lectures with some problem solving exercises and tutorials. The introduction of the seven pillars of modern education, which were discussed at the beginning of this chapter, required that the GEMP curriculum developers and teaching staff be introduced to new ways of thinking about learning which were more relevant to self directed and team approaches to teaching and learning. Workshops were presented on some of the education theories that support problem based learning such as Bruner's Constructivist theory (Smith, 2002) which was founded on the premise that learning is an active process in which we construct our own understanding of the world through reflecting on our experiences and organising these to form new ideas. Vygotsky's Social Development theory is also one of the foundations of constructivism and its major theme is that social interaction plays a fundamental role in the development of cognition (Vygotsky, undated). John Biggs's Study Process Questionnaire (SPQ) builds on Marton's superficial (rote learning) and deep (wanting to understand) motives and strategies which together make up a student's approach to learning (Biggs, Kember and

Leung, 2001). Bigg's SPQ was introduced at Wits prior to the introduction of the GEMP and annually thereafter to measure any change in approach which might be related to the change in curriculum. Facilitators of PBL groups also needed to understand the principles of group dynamics and their training included a discussion of Tuckman's Model of Group Development (Tuckman, 1965). These workshops were time consuming, but the discussions raised both awareness and a new interest in teaching and assessment in the Faculty that was at times exhilarating.

### Problem based learning

The nature of the team approach and the student-centredness of a problem based learning curriculum was so different from the relative passivity of the lecture theatre that students were obliged to participate and their learning was more personalised. The brief discussion on PBL that follows may help the reader to understand the difference in the intern's questionnaire responses and comments and also to appreciate that the supervisors who were not accustomed to PBL might not recognise how this learning environment could affect some of the aspects of intern competence such as interpersonal and communication skills.

One of the earliest handbooks on PBL was developed by a group of doctors who set out initially to find a better way to teach neurology. Barrows and Tamblyn (1980) defined PBL and described the rationale and thinking behind this educational approach and its application in medical education. They also addressed the advantages and disadvantages, resources required, and the requirements for change to a PBL curriculum. McMaster University's School of Medicine in Canada was one of the first schools of medicine to apply problem based, student centred and self directed learning extensively in its undergraduate medical education in the 1960s. Woodward and Ferrier (1982) reported a study of the perspectives of the first six groups to graduate from their three year PBL curriculum with regard to the strengths and deficiencies of the curriculum. The groups were surveyed either five years or two years after graduation. The strengths noted most often were self-directed learning, early patient contact, independent study and small group tutorials. The most commonly identified deficiencies were a lack of definition of core material, the anxiety level created and the evaluation system used. These authors found strong support for PBL with eighty two percent

saying that they would do the same degree, with some slight changes, if they were given the opportunity to begin their medical school years again. Elizabeth Armstrong (Armstrong, 1991) described the New Pathway curriculum at the Harvard medical School as having a characteristic quality, that of hybridization. This was an attempt to innovate without sacrificing the best of the old, an idea supported by Albanese and Mitchell (1993) at the University of Iowa College of Medicine. These authors reviewed the literature on the rationale for PBL, the features that distinguished it from conventional instruction and from other problem-centred methods such as the case study method, the outcomes and the implementation issues. They identified concerns which they felt required more research and concluded that a curriculum which could capture some of the benefits of both conventional and PBL curricula could prove viable.

The University of Limburg in Maastricht in the Netherlands, the University of New Mexico in the United States of America, Ben Gurion University in Israel and the University of Newcastle in Australia were other schools that demonstrated the feasibility of a change to PBL (Mennin and Friedman, 1992). Many others followed suit and variations of this approach have now been adopted by medical schools worldwide. Much literature has emanated from the University of Newcastle in New South Wales, which was established in the mid-1970's and emphasised areas such as clinical epidemiology, community medicine, interpersonal skills, and self-directed learning (Rolfe and Pearson, 1994). This was one of the first medical schools to introduce problem based learning in Australia (Rolfe and Pearson, 1994; Rolfe and Pearson, 1996; Rolfe, Pearson and Barnsley, 1996; Pearson, Rolfe and Henry, 1998). Wits was late in making the change but this held advantages as it was possible to review the changes made by other medical schools and to learn from them. This led to the decision from the outset to use a modified or hybrid model of problem based learning.

Norman and Schmidt (1992) examined the psychological basis for PBL by reviewing evidence from experimental studies which tested various hypotheses regarding learning and sought to relate these to PBL and its potential advantages. The article gives a detailed description of the PBL process and points out that its goals are to foster clinical reasoning, enhance the retention and use of knowledge, integrate basic science into the solution of



clinical problems and encourage self-directed learning in future practice. The current study set out to test whether these goals were met to a greater degree by the Wits graduates of the new PBL curriculum than those who had completed the traditional curriculum. Norman and Schmidt (1992) found it difficult to demonstrate a general problem solving skill, or inquiry skill, independent of a specific knowledge area. Problem solving is context specific, regardless of the educational programme or curriculum. They also looked at knowledge acquisition in three areas and cite studies which support the PBL process as being helpful in providing these aspects. The first area is “activation of prior knowledge”, which forms a large part of PBL discussion group activities. The second is “elaboration of knowledge” at the time of learning which facilitates later retrieval and the third is “matching of the context” which suggests that knowledge is retrieved more readily in a situation or environment similar to the learning situation (*ibid*, p. 559). The PBL problem is intended to provide the learning context which enhances long term recall. Transfer of problem solving abilities to new fields and even to analogous problems in other disciplines has proved minimal unless the surface features of the problem are also similar. Corrective feedback about incorrect concepts was also found to be necessary for success. These authors concluded that it is likely that future studies will find small or negative differences between the overall knowledge or competence of students from PBL and traditional curricula, but that there will be substantial differences in retention of knowledge that may be attributable to PBL. The learning climate is generally reported to be more satisfying and humane than in conventional curricula.

#### The process of change in medical education

Prozesky (2000) discussed the process of change based upon Lewin’s seminal work on the subject in 1944 and Schein’s extension of this model to include the mechanisms by which change may be effected (Prozesky, 2000, p. 30). The external pressure to change (Lewin’s first step), in the case of the Wits medical curriculum, was discussed in the background to the study earlier in this chapter. The next step, that of actually changing, was a long and sometimes painful process while step three, that of refreezing through the stabilisation and integration of the changes, is currently underway albeit with further and ongoing changes brought about through formal evaluation, feedback from all stakeholders and sometimes trial and error.

Darling-Hammond, Wise and Pease (1986) reviewed the literature on the theory of 'schools as organisations' and their findings could also be applied to the organisational structure of medical schools. General beliefs about how the organisation operates may influence the acceptance and buy-in to change and its implementation will depend on policymakers' implicit theories as well as the realities of the organisational context. These authors discuss just two models of institutional organisation to illustrate how very different assumptions can result in divergent approaches but they also acknowledge that there are many others. A rationalistic organisational model views teaching work as a labour and a craft. It assumes that the processes of teaching and learning rests on an underlying order, with students as essentially passive objects who will react in a similar way when a given a treatment is applied by the teacher. The outcomes are predictable and results are achieved by the deliberate application of rationally conceived practices. Goals are decided upon by external authorities, the administrators set behavioural objectives and teachers teach to those objectives while assessments objectively measure student competencies and give a clear picture of the student. There is a functional division of labour with staff roles defined in hierarchies. By conceiving of teachers as bureaucrats or labourers this model does not allow much room for teachers' or students' individual temperaments, interests and styles.

A more natural systems model would view the teacher as a professional or artist and effective teaching does not depend on deliberate, rational planning but rather the creation of an environment in which the teacher can practice this art. An organisation working from such a belief system suggests a "loose coupling" of the organisational elements. Bureaucratic procedures may be employed but their limits are agreed and context-specific variables are taken into account. The model implies that power is dispersed but this accentuates communication problems with misinterpretations and conflicts of interest.

Bloom (1989) also viewed the medical school as a social organisation and medical education as a process of socialization for the profession. Because medical education is closely linked to the health service system, the problem of meeting the needs of the population depends on the situation, developed and industrialised or developing and poor. Bloom sees the change to

PBL approach as an attempt to address this problem but warns that the proclaimed altruistic goals of such change are often undermined by more quiet, yet powerful, large investments in links with industrial corporations for undertaking scientific research. These incentives speak volumes to the students who do not then enter primary care and preventive or community-oriented medicine, despite their improved preparation through problem based curricula.

General beliefs about how schools as organisations operate may influence the acceptance or otherwise of curriculum change which calls for a major “shake-up” in the way things are done. This is true of the change from a decades-old, ordered and regularised curriculum with entrenched rules and procedures that allow for efficient administration to a student centred, differently structured, differently taught and assessed, problem based and integrated curriculum. Some level of resistance is to be expected and should be included in the planning. This aspect of the change at Wits was described earlier in this chapter. Essential to the whole process is a clear, often repeated message that the education of medical students is central to the mission of the medical school and that it has high priority along with research and clinical service (Winter *et al*, 1997).

Unless carefully managed, the effects of such resistance from the teaching staff and clinicians can be devastating to students on a new and evolving curriculum and they may see themselves either as pioneers or guinea pigs depending upon how the change is managed in the institution. McLean (2004, p. 1014) described these students as “test-driving the curriculum for the designers”, which could be a positive challenge if they feel themselves a part of something new and exciting but very often leads to a great deal of uncertainty as the planners adapt and change things along the way, often in response to student feedback, but sometimes it might seem to students to be at the whim of the Faculty. As important is the danger of neglecting the last group in the outgoing curriculum, which may be perceived as abandonment.

Stewart Mennin and Arthur Kaufman (Mennin and Kaufman, 1989) presented a detailed account of the institutional barriers to innovation and change, the greatest obstacle being the fear of loss of control by traditional educators. They discuss ways to deal with the almost

inevitable conflict that arises during change such as building a broad base of ownership for the change, testing and modifying where necessary, encouraging participation so as to develop understanding and being prepared to compromise. All aspects of the article were relevant for the major curriculum changes that took place at Wits with particular reference to departmental resistance to the loss of control over their fields of study, the threat to individual and departmental autonomy in teaching and assessing students and the perceived threat to personal advancement and financial and academic reward through involvement in educational matters which do not have high status in most universities. Like Mennin and Kaufman, Anne Sefton (1995) described how vigorous debate was stimulated at the Universities of Sydney, Queensland and Flinders in Adelaide in the run-up to their independent decisions to change from six year traditional to four year graduate entry curricula. She too outlined the impetus for change and dealt with the factors that facilitated their change process and the constraints that they encountered. The positive consequences of this process were a sense of energy, intellectual enthusiasm and creativity, with new interdepartmental alliances brought about through the need to integrate the curriculum.

Frederic Hafferty, in an article entitled “Beyond curriculum reform” wrote about the role of the informal curriculum and the hidden curriculum in determining what students learn, as opposed to the formal or taught curriculum (Hafferty, 1998). Like Bloom (1989) he warned that the unspoken medical school culture conveys commonly held “understandings”. These are the customs and rituals which form training institutions into cultural entities and moral communities. Negative role models can be as powerful as positive ones. Thus the ways that institutions talk and write about the educational reforms that they are undertaking, finance them, erect buildings and allocate resources, reward staff and value the changes sends clear messages to the students about their education and can lead to curriculum reform without real change. This aspect was important in the change at Wits where an entire learning centre with more than thirty PBL rooms, a skills centre, online resources and hospital-based learning centres were provided to accommodate the values of the new curriculum for student learning. Christianson, McBride, Vari, *et al* (2007) also addressed the hidden curriculum in their article on the process of curriculum change at their university. They introduced case based teaching in the first two years of their medical curriculum and saw this as an intervention to change the

institutional culture. They reported that attention to those elements of professionalism such as altruism and accountability in the educational process resulted in “a cultural shift towards relationship-centeredness” within the institution (*ibid*, p. 1079).

Almost all the discussions around curriculum change reported in the literature presented here were experienced to a greater or lesser extend during the early stages of the curriculum change at Wits and some of the issues may take many years to be resolved. The constant evaluation and willingness to correct aspects that are not working well are essential to the ongoing improvement of the curriculum.

#### **1.5.3.4 The evaluation of curriculum change in medical education**

There have been many studies that report on medical graduates’ perceptions of their preparedness for internship. Frances Hannon (2000) described the administration a self-report questionnaire and interviewed a random sample of graduates from the five medical schools in Ireland. The aim was to develop profiles of graduate doctors’ competencies, characteristics and experiences in order to evaluate their needs so as to improve the undergraduate curriculum. Useful details of the questionnaire and sequenced interview questions were important sources in the development of the Model of the Competent South African Intern in Phase 1 of this study. Other medical schools have similarly evaluated their curricula and these include the University of New South Wales, Australia (Dally, Ewan and Pitney, 1984), Cambridge University (Clack, 1994) and King’s College School of Medicine (Wakeford, 1981) in the United Kingdom, the University of Aberdeen in Scotland (Walker, Haldane and Alexander, 1981) which looked at the perceptions of final year students and Richardson (1983) who surveyed five cohorts of graduates. Frye, Solomon, Lieberman and Levine, (2000) at The University of Texas, Medical Branch in the USA produced a useful cross tabulation of the many qualitative and quantitative methods for evaluating an undergraduate medical curriculum.

Studies of the results of innovations introduced into curricula have been conducted, going back as far as the early years of problem based education, where graduates were asked to

respond to questionnaires about their undergraduate experience and their preparation for internship. Woodward and Ferrier (1983) surveyed graduates from the first six cohorts of their new PBL curriculum at McMaster University in Canada. This was a new medical school and one of the pioneers in problem based learning in medicine. They commenced a PBL curriculum from the outset in 1965, although with only 19 students in the first group of entrants, increasing to seventy seven in the sixth group. All graduates were sent a postal questionnaire (either five or two years after graduation) and were asked, amongst other things, to rank their own perceptions of preparedness on twenty aspects of their undergraduate medical education and then to rate their preparedness compared to other trainees with whom they were working. The supervisors for only one of the classes were asked to give assessments. The fact that the questionnaires were completed so long after internship holds both advantages and disadvantages. Distance and hindsight would have allowed for more experiences against which the graduates could judge their preparedness and perhaps helped focus attention on the really important areas where they had felt more or less well prepared. However, the influences of internship and subsequent practice might have taken the edge off some of these perceptions. This study assisted in clarify the timing of the present study early in the first internship year but also suggested the importance of following the 2006 and 2007 cohorts' progress into their community service year and even beyond.

Reynolds, Adler, Kanter, *et al*, (1995) described the experience of curriculum change at the University of Pittsburgh, School of Medicine and highlighted what worked and what did not. Their situation mirrored almost exactly the situation at Wits and the authors summarise in a table the advantages and disadvantages of central governance versus a departmentally controlled curriculum. They also address the question of evaluating models of central governance to see if they are more effective than the traditional departmentally organised approaches and look at the cost-benefit issues in meeting the educational goals. They conclude that the advantages of central governance outweigh those of departmental control but the costs seem greater, at least initially. However, they concede that addressing the issue fairly would involve also taking into account the benefits of the long term outcomes of the students' education such as clinical problem solving, lifelong learning and interpersonal skills.

In an article about attempting to introduce a relatively “pure” form of problem based learning into a medical school in Argentina, a developing country with serious financial challenges, Carrera, Tellez and D’Ottavio (2003) cautioned other developing countries of the difficulties which they faced. They suggested very careful consideration of the implications before attempting such drastic curriculum change. Among the obstacles that they encountered, which resonate in many respects with those that were experienced at Wits, were the heterogeneity of their students, the uneven levels of schooling, the large student intakes required of them, staff shortages with staff being attracted away from the poorly paid public sector to private practice and general financial constraints with regard to facilities such as teaching spaces, PBL rooms, skills training units and well-stocked libraries. At Wits it was considered appropriate to accept a more hybrid PBL curriculum than the pure form which they attempted, with additional lectures to suit students’ needs and clear outcomes to guide learning rather than students setting their own outcomes. Wits saw both staff and student diversity in culture, language and academic background not only as a challenge but also as an opportunity to prepare its doctors for professional practice in South Africa’s multicultural society. The programme in Argentina had difficulty finding facilitators and also grappled with the issue of subject experts versus generalists and scientists versus clinicians, problems common to all PBL schools, including Wits. Training was essential for all with refresher courses required at intervals. Financing for the initial capital investment for PBL is indeed expensive and, as with the Argentinian case, Wits University would not have been able to fund this without start-up support from generous donors. The University was then able to phase in the financing of the running of the curriculum. However, the Argentinian story raises warning flags that major curriculum change may not be for everyone. The level of enthusiasm of the developers is difficult to maintain unless all faculty buy in and are prepared to play their part in implementing the curriculum reform.

#### **1.5.3.5 Comparisons of internship performance between graduates of traditional and innovative curricula**

There have been numerous articles emanating from the many medical schools which have introduced innovative curricula over the past thirty or more years. These have mostly

involved a change from a conventional curriculum, as described by Albanese and Mitchell (1993) to a problem based learning curriculum, initially in its purer form but gradually including more hybrid versions and case based educational formats. These studies offer guidelines on measures to determine the outcome differences between graduates from traditional and problem based curricula. Mennin, Friedman, Skipper, *et al* (1993) looked at the comparison of performance on a series of standardised examinations (NBME I, II, and III) for students on the PBL and conventional tracks at the University of New Mexico and Schmidt *et al* (1996) compared the development of diagnostic competence in undergraduate students from a problem-based, an integrated, and a conventional medical curriculum in Maastricht, Holland. In Australia, Hill, Rolfe Pearson and Heathcote (1998) described a study undertaken at the University of Newcastle which compared the responses of interns from a problem based curriculum with those from traditional curricula at other medical schools, while Dean *et al* (2003) reported a similar study at the University of Sydney.

The methods that were used to evaluate the preparedness for internship of graduates of these curricula differed considerably, but most included an intern self-report questionnaire to interns (Dean *et al*, 2003; Mann and Kaufman, 1999; Hill *et al*, 1998) while Rolfe and Pearson (1994), Richards, Ober, Cariaga-Lo, *et al* (1996) and Barnsley *et al* (1994) used multiple supervisor ratings to compare communication skills, clinical skills and clinical competence and personal characteristics respectively. None of these studies included a survey of colleagues' and patients' views of the interns.

All of the studies reviewed were useful in understanding the methods and statistical analyses of the various approaches. They were not replicated as part of this study but played a significant role in informing the research design. It should be noted that many of the more recent studies were published after the first phase of this research had begun, but nevertheless they have been invaluable in guiding the progress of the study. Following this literature review it was decided that to overcome the limited response rates to postal questionnaires, and to obtain a more complete picture, this study would best be served by face to face visits to explain the study, administer the questionnaires and conduct brief interviews with the interns, their supervisors and their colleagues to try to relate scores at the extremes of the rating scales



to aspects of the undergraduate curriculum and also to interview patients. Schmidt *et al* (1996, p. 663) has argued that “trying to attribute a curricular effect to particular elements of the curricula compared is exceedingly difficult”. The interviews played an important role in this respect, helping to clarify the quantitative responses.

A meta-analysis by Colliver (2000) reviewed research studies published between 1992 and 1998 that compared students in PBL and conventional curricula, including both randomized and non-randomised allocation of students to PBL streams. He presented a criticism of the claims for superior outcomes of PBL curricula and argued that the effect sizes seen with PBL have not lived up to expectations and he found little evidence to support an improved knowledge base or clinical performance in PBL curricula. Colliver also criticized the weakness of the links between the underlying educational theory and research (Bligh, 2000). Responses to this article were invited from experts in the field of PBL. Albanese (2000) dealt with effect size (ES), defined and explained the concept and discussed how to interpret it when used in educational research. He agreed with Colliver’s ES calculations but not his interpretation of these numbers and queried what might be considered ‘reasonable expectations’. In response to Colliver’s argument that contextual learning theory was weak, he offered four other theories – information processing theory, cooperative learning, self-determination theory and control theory which might offer better explanations about which parts of PBL are effective. He also suggested that the humane learning environment created in PBL curricula was itself a worthwhile goal. Norman and Schmidt (2000) rejected the idea of further ‘educational trials’ of curricula, claiming that there can be no such thing as a blinded intervention, no such thing as a “pure outcome” and no such thing as a uniform intervention. These authors agreed with Colliver that sizeable effects are unlikely given the numerous intervening variables and the lack of control in educational settings and called for more theory-based research stating that:

*“...only through research which is conducted with careful and systematic exploration of multiple variables, directed at testing and elaboration of theories, can we ever expect to understand enough to achieve practical goals” (ibid, p. 726).*

This call for a sound theoretical basis for research encouraged the quest for a relevant explanatory theory in which to ground this study. The result was an exploration of complexity theory, described earlier in this chapter, which seemed to accommodate both the learning and practice environments of both groups of graduates in this study.

Finally, several studies have looked at other aspects of internship such as a work study on how intern time is spent (Arthurson et al, 1976), a study comparing internship success with undergraduate success (Fincher, Lewis and Kuske, 1993) and stress and anxiety during internship (Firth-Cozens, 1987; Daly & Willcock, 2002; Tanne, 2002; Hayes et al, 2004; and Sweet, 2003). These have all added to an understanding of what the current study might entail. Some of these aspects will be dealt with in more detail in Chapter 5 in the discussion of results.

## **1.6 SUMMARY**

The following is an outline of the organisation of this thesis.

Chapter 1 was the introductory chapter which set the scene for the research and argued for the justification of the study. The framework of complexity theory and a review of the literature were explored to ascertain what studies had already been undertaken in this field. The literature informed the choice of methods used and identified gaps in knowledge or opportunities to complement international studies with research appropriate to the South African situation. The remaining chapters in the thesis deal with the research as follows:

Chapter 2 describes the development of a “Model of the Competent South African Intern”, its refinement and validation so that it could serve as the basis for the construction of valid instruments to be used in the second phase of the research, namely the comparative study of the 2006 medical graduates from the traditional curriculum and the 2007 graduates from the new GEMP curriculum at the University of the Witwatersrand, Johannesburg.

Chapter 3 describes the methods used in the main study including the pilot studies for the instruments and interview schedules, sampling techniques and the visits to the intern training institutions to administer the questionnaires and conduct the interviews related to each intern.

Chapter 4 gives the results, arranged according to the study objects from most general to more detailed. It includes both quantitative data, presented as tables and bar charts, and qualitative data where appropriate.

Chapter 5 discusses these results in relation to each study objective and the literature

Chapter 6 draws conclusions and makes recommendations for improvements to the new GEMP curriculum which will allow for even better preparation of its graduates for internship.

The following organisational charts (Figures 1.5 and 1.6) give a summary of the preparation of the two phases of this research project.

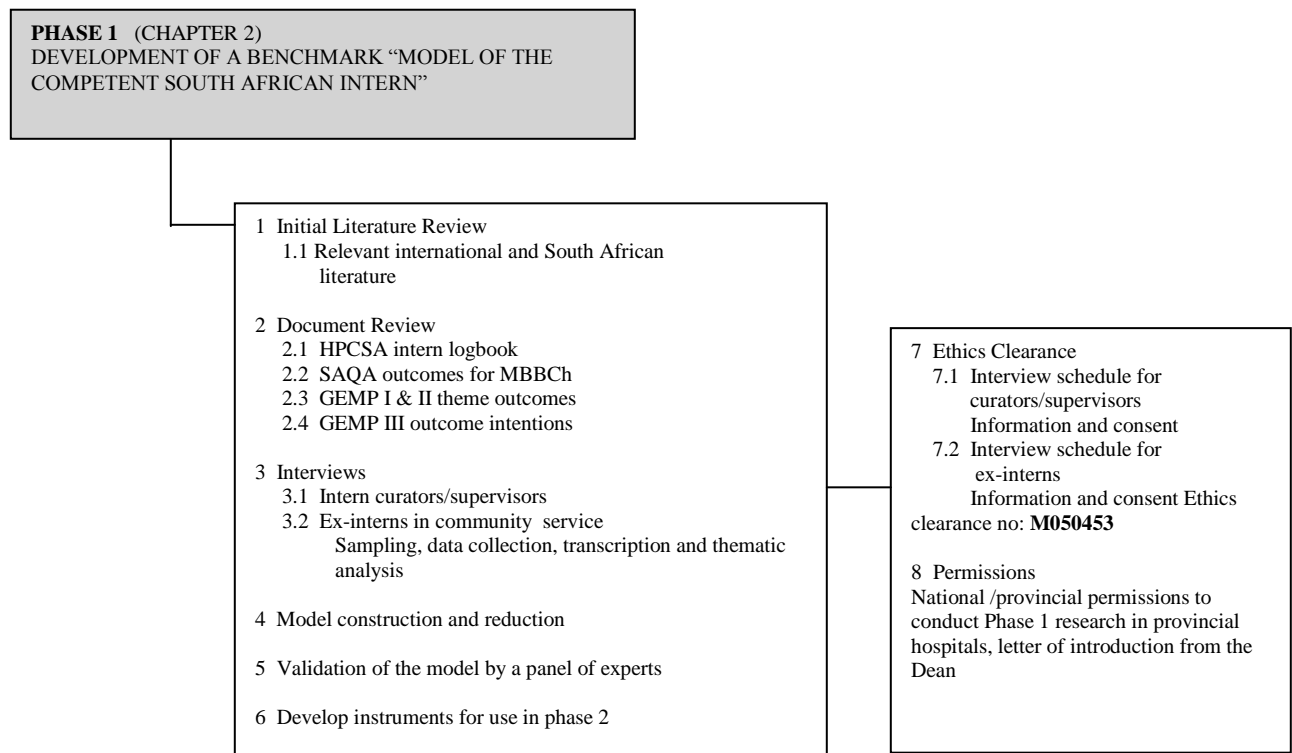


Figure 1.5 Flow chart for Phase 1 of the research process

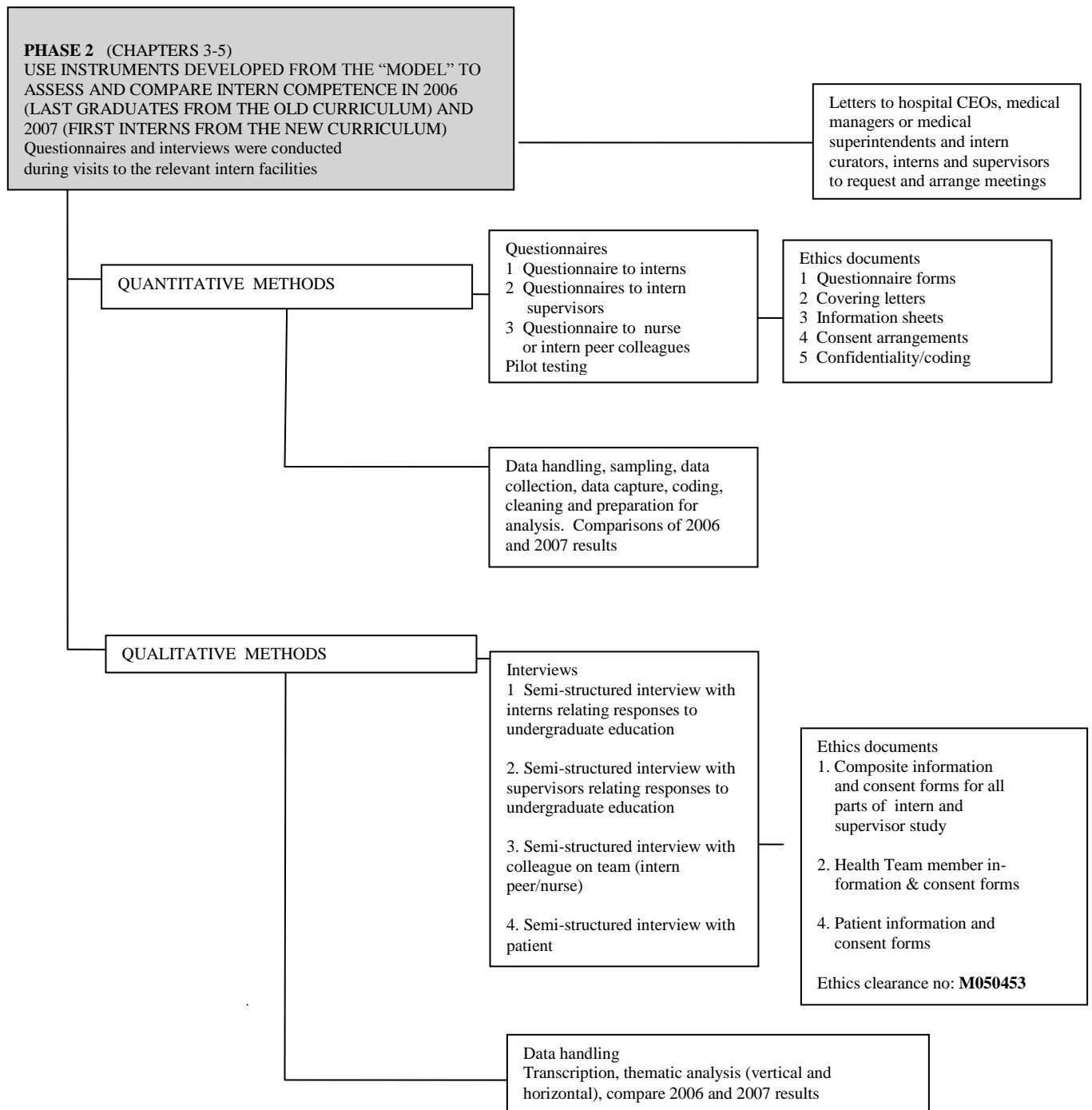


Figure 1.6 Flow chart for Phase 2 of the research process