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HOW STUDENTS DEVELOP THE ABILITY TO INTEGRATE LEARNING – A PHENOMENOGRAPHIC STUDY

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STUDENT NUMBER: 392175

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the degree of
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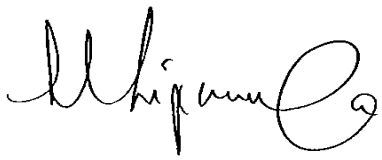
October 2015

DECLARATION

I, Shalote Rudo Chipamaunga, declare that the thesis

"HOW STUDENTS DEVELOP THE ABILITY TO INTEGRATE LEARNING – A PHENOMENOGRAPHIC STUDY"

is my own work. It is being submitted for the degree of Doctor of Philosophy at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination at this or any other University.



:……..
SHALOTE RUDO CHIPAMAUNGA

23 October 2015

To my daughter, son-in-law and grandson

Busisiwe, Simukai and Simukai Jr (Siyanda)

To my twin sons – Takura and Tanaka

To my sisters, brothers, brother-in-law, nieces and nephews

May this thesis fill you with inspiration to follow suit.
Learning is a life-long journey,
from cradle to grave.
The pinnacle of academia has no age limit.
I implore you to make reading and inquiry
a habit for enlightenment, empowerment and success.

and

To my ailing mother,
who has endured long periods of isolation from me,
as I dedicated time to this study.

ABSTRACT

This study investigated students' experiences of integration of learning in the undergraduate medical programme at the University of the Witwatersrand. There is evidence that integration of learning, also referred to as "integrative learning", assists students to assimilate and apply what they have learnt more effectively, and thus enhances the goal of achieving professional competence. From 2003, Years 3 and 4 of the undergraduate programme were redesigned to be presented as integrated system-based blocks, using problem-based learning as the main learning strategy. From 2005, Years 5 and 6 were also redesigned. Although clinical rotations in specific disciplines still formed the main learning strategy, a number of integrating activities – and even rotations – were included in the new programme in these years. From 2006 Years 1 and 2 of the programme (which were still discipline-based) were reviewed in terms of course content and integration of learning, and new courses were added to those years to facilitate integration of learning.

As a result of the reforms outlined above, the six years of the undergraduate medical programme at the University of the Witwatersrand now contain a rich variety of features designed to advance integration of learning. However, the ways in which students and teachers experience these kinds of integration are not known, neither is the effect that they are having on student learning.

Investigating student and teacher experiences of a variety of events designed to promote integration of learning deepens the understanding of the many and varied effects of such integration activities, and contributes to the body of knowledge on integration of curricula in medical education. This study also contributes to a generic understanding of the phenomenon of integration in the process of learning, potentially enhancing knowledge and practice in the field of medical education.

This is a qualitative study which used phenomenography, a research approach with an educational interest. The phenomenon of integration of learning is one which exists in the understanding of persons involved in the learning process, as teachers or students and, for this reason, an approach which clarifies that understanding was followed.

The principal sampling approach was purposive. Data collection spanned 27 months (March 2012 to June 2014) and a total sample of 25 students and 10 teachers were the

respondents, providing information through in-depth interviews and small focus group discussions. The semi-structured interviews were conducted using a tool that introduced an entry question such as "*What is your understanding of ……?*" Subsequent dialogue followed on angles of responses, leading to the development of different categories of how the phenomenon is experienced. Interviews were recorded using a voice recorder. Focus group discussions and further individual interviews were used to refine ideas and not necessarily to increase the size of the original sample. For analysis, the researcher used qualitative data analysis software, MAXQDA11. Excerpts that conveyed the most significant information were selected, de-contextualised and compared, followed by grouping and re-grouping of them until the outcome space was formulated.

Three categories of description made up the outcome space. The categories that emerged represent the qualitatively different experiences of the students and teachers who were interviewed: *conceptions of meaning and processes of integration of learning*; *conceptions of how to integrate learning and development of integration ability*; and *conceptions of the links between integration ability and educational experiences*. The outcome space was constituted using as a guide the framework of the anatomy of awareness and the structure of experience as espoused by Marton and Booth (1997).

The lowest level of conception is that integration of learning is a vague and abstract concept which happens passively while an ability to integrate learning is conceived of as an atomistic acquisition of fragmented facts. The respective act of learning is experienced as knowledge increase. A conception of increasing appreciation of the phenomenon is that it is important to consciously link concepts through identifying essential detail. This is a perception of higher value as it includes the ability to remember everything. A conception of higher value is that subjects are related as they contribute to each other. Understanding one leads to the understanding of another. The concept of integrative learning is introduced and this happens during studying. The most sophisticated conception is that integration of learning happens automatically as students accumulate knowledge and experience. Integration of learning, therefore, becomes a way of thinking, an unconscious competence for life in an integrated career. Students adopt strategies that enable learning for meaning while drawing on all knowledge and skills.

When the outcome space is translated graphically, a model of how students develop the ability to integrate learning is revealed. From the model, it was apparent that students embark on a journey of integration of learning through taking steps that increase in complexity and hierarchical inclusivity. The integration of learning takes a relatively long time to develop, occurring from the first year to the sixth year, but starting from minimal to highly complex acts of learning, to be able to cope in a complex career in a complex world. The affective constructs towards the phenomenon also change over the years from negative to positive. All this happens in an environment that is regulated by affective constructs and motivation factors. The acquisition of the ability to integrate learning is conceived to take long depending on the effects of affective constructs and the external horizon.

From the model, four factors emerge that are critical for integration of learning in that they either promote it or prevent it from occurring effectively. The factors can be grouped according to whether they involve the *teacher*, *curriculum*, *student* and *studying*. Recommendations for application of the model were drawn around interventions that impact on improvements specific to each of the factors identified. This is a proposed developmental model which is a logical presentation of integration of learning. The proposed model requires additional research to provide further empirical justification. Gibbs (1994) refers to a proposition that research on student learning has something substantial to feed back into the context within which it is undertaken. The researcher makes specific reference to Harden's (2000) integration ladder as a benchmark for curriculum integration strategies that strengthen integration of learning in institutions of Higher Education.

KEYWORDS

Integration of learning

Integrative learning

Curriculum integration

Phenomenographic research into integrative learning

Learning approaches

21st century learning theories

Learning according to phenomenography

Pedagogies of integration of learning

Anatomy of awareness

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ABBREVIATIONS AND ACRONYMS

GEMP	Graduate Entry Medical Programme
IT	Information Technology
MBBCh	Bachelor of Medicine and Bachelor of Surgery Degree

CHAPTER 1:
INTRODUCTION AND CONCEPTUALISATION OF THE STUDY

1.1 BACKGROUND TO THE STUDY

One of the cornerstones of current medical programme reform in the world is "integration": the horizontal and vertical integration of content from relevant basic science and pathological, humanistic and clinical disciplines. There is evidence that this assists students to assimilate and apply what they have learnt more effectively, and thus enhances the goal of achieving professional competence (Harden, Snowden & Dunn, 1984; Shriner, Schlee & Libler, 2010).

The period from the 20th to the 21st century has seen many reforms in programme and curriculum development in medical education. Many of these reforms have suggested approaches or models that share some commonalities, particularly in the features which relate to beliefs and orientations that shape the curriculum. Jones, Higgs, Angelis and Prideaux (2001:699) reported in *The Lancet* that:

> The WHO [World Health Organisation] regional office for Europe has recently done a review of medical curricula in European countries and has identified ways in which changes in health care need to be addressed by changes in medical education. Although many of the details will differ outside Europe, the message is likely to be the same – that the changing role of medicine and our expectations of physicians have major implications for the design and delivery of undergraduate medical training.

The changes referred to above include an emphasis on providing material to be learnt in an integrated way. One of the key concepts underpinning the reformed MBBCh undergraduate programme of the University of the Witwatersrand has, therefore, been to apply the principles of integration as a strategy to enhance learning.

1.2 INTEGRATION OF LEARNING – BRIEF INTRODUCTION

This is a brief introduction of the key phenomenon under investigation in this study. The phenomenon "integration of learning" will be discussed in detail in the ensuing chapter. In education there are various ways of viewing integration of learning. "Integration of learning", also called "integrative learning": is "the ability to make, recognise, and evaluate connections among different concepts and contexts" (Huber, Hutchings, Gale, Miller & Breen, 2007:46). In this study, "integration of learning" means the ability to link concepts horizontally and vertically. "Horizontal integration" refers to the ability to relate content in subjects taught in the same year or within a block or rotation; while "vertical integration" refers to the ability to apply learning from earlier years to content in later years.

Harden and Stamper (1999:141) view integration of learning from a curriculum perspective and promote:

> …a spiral curriculum – an iterative revisiting of topics, subjects or themes throughout the course.

A spiral curriculum enables students to build on previous learning and integrate learning as they proceed. Pearson and Hubball (2012) liken integration to putting together a jigsaw puzzle which gives a picture to guide students. An integrated curriculum enables iterative revisiting of topics throughout the course and relating new learning to previous learning. The model promotes integration of learning. This integration is a process which may take several years to accomplish as supported by Harden (2000).

Albert (2004), Albert, Hodges and Regehr (2007), and Cook, Bordage and Schmidt (2008), questioned the degree to which medical education research informs practice and advances the science of medical education. It is hoped that the understanding of integration of learning that this study has gained will complement existing definitions, theories and practices, enriching and expanding them in the process.

1.3 RATIONALE FOR CURRICULUM CHANGE IN SOUTH AFRICA

In order to understand the rationale for curricula change in South Africa, it is important to reflect briefly on the triggers to medical education transformation at

national and institutional levels. There have been several challenges in improvements in health and achievement of the Millenium Development Goals in South Africa (Chopra *et al*., 2009). According to van Heerden (2013:21):

> The causes of the poor health status of the South African population are probably multifactorial, but to be socially accountable we must ensure that the education and training of health professionals continue to be aligned with the population's health needs.

The approach to curricula and teaching internationally and in South Africa has been traditional, discipline based. With research and development in education, the ability of this traditional approach to prepare graduates for real life problems in a complex world has been questioned (Winberg, 2006). Seggie (2010) attributes the driving force behind curriculum reform to the Health Professions Council of South Africa, in order to modernise medical curricula. The Health Professions Council of South Africa is responsible for accreditation of medical schools. Accreditation is a process whereby officially appointed external regulatory bodies, accountable at government level, evaluate educational institutions using established criteria, standards and procedures (Cueto Jr *et al*., 2006:208). Continued accreditation is dependent on schools abiding with the stipulated requirements of the accreditation body.

According to Seggie (2010:8) in 1999, the Health Professions Council of South Africa stipulated curriculum changes with the following main imperatives:

- to mitigate the 'ills' of existing curricula which had come to characterise the established programmes (all of which mirrored the so-called 'Flexnerian' model)
- to acknowledge the realities of so-called adult learning
- to produce a graduate fit-for-service in post-apartheid South Africa… .

The last reform was meant to lead to provide a "five-star" doctor who would deliver health care that met the needs of the communities (Boelen, 1996:6). A "five-star" doctor possesses:

> …a mix of aptitudes to carry out the range of services that health settings must deliver to meet the requirements of relevance, quality, cost-effectiveness and equity in health.

One of the attributes of a "five-star" doctor is being a care giver, that is a doctor who takes into account the total needs of the patient and this requires delivery of

complementary, integrated and continuous care. In order to produce this skilled "five-star" doctor who is "fit for purpose" there is need to:

> …employ an integrated, systems-based approach to the study of the sciences basic to medicine, incorporating early clinical contact in the form of clinical scenarios and patients as the focus of learning (Seggie, 2010:11).

In response to the call for these curriculum reforms, medical schools in South Africa have embarked on curriculum transformations. An example is the Nelson R Mandela School of Medicine which changed to a problem-based learning curriculum to replace the traditional lecture-based curriculum in 2001 (van Wyk & Madiba, 2006). The University of the Witwatersrand also introduced transformations in its undergraduate medical curriculum that are described below.

1.4 THE UNIVERSITY OF THE WITWATERSRAND MBBCH PROGRAMME

1.4.1 Overall Description

The current six-year undergraduate medical programme at the University of the Witwatersrand has two distinct routes of entry (Figure 1.1):

- Direct admission after matriculation from high school followed by two years of basic medical sciences, or
- Admission into the third year of study, with a prior degree and certain prerequisites. From this point onwards, the MBBCh programme is also referred to as the Graduate Entry Medical Programme (GEMP). Therefore, MBBCh 3 becomes GEMP 1; similarly MBBCh 4, 5 and 6 become GEMP 2, 3 and 4, respectively.

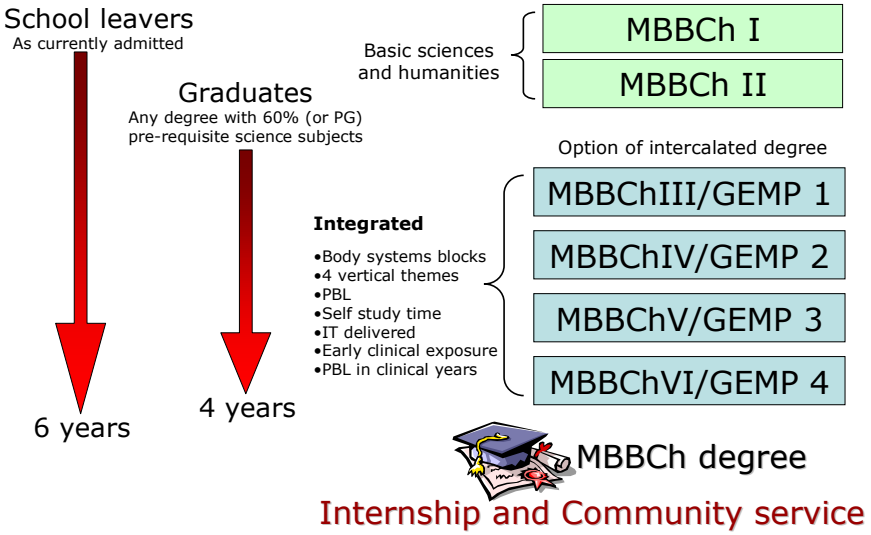


Figure 1.1: Schematic representation of the MBBCh programme

From 2003, Years 3 and 4 of the programme were redesigned to be presented as integrated system-based blocks, using problem-based learning as the main learning strategy. From 2005, Years 5 and 6 were also redesigned. Although clinical rotations in specific disciplines still formed the main learning strategy, a number of integrating activities and even rotations were included in the new programme in these years. From 2006, following an accreditation visit by the Health Professions Council of South Africa, Years 1 and 2 of the programme (which were still discipline-based) were reviewed in terms of course content and integration of learning. In 2010 a new course was introduced to promote horizontal and vertical integration in these first two years of the programme. The course contains several integrative components including Health Systems Dynamics which is designed to impart integrative skills that transcend the medical training and beyond (Rubin *et al*., 2012).

Activities designed to promote integration of learning in the six-year MBBCh programme are summarised in Table 1.1 and are discussed further below:

Table 1.1: Summary of activities designed to promote integration of learning in the programme

Years 1 and 2	▪ For **horizontal integration** the new Medical Thought and Practice course includes: - A course in Health Systems Dynamics - Lectures linking subject matter from different disciplines - Student projects linking content from different disciplines. ▪ For **vertical integration**: - The Medical Thought and Practice course carries over from Year 1 to Year 2 - Courses in Physics, Chemistry and Biology content link with later Anatomy, Physiology and Pharmacology content - Psychology and Sociology courses link with the patient-doctor theme in the later years.
Years 3 and 4	▪ Problem-based learning as the principal learning strategy. ▪ Eleven systems-based blocks fully integrate content from four longitudinal themes in teaching / learning and assessment. ▪ Final integrated written and clinical examinations at the end of Year 4 assess all learning from the two years.
Year 5	▪ Two-week rotations each in Family Medicine and Public Health. ▪ One day per week spent on a programme in which common cross-disciplinary clinical topics serve as integrators. ▪ An integrated year-end examination.
Year 6	▪ An “Integrated Primary Care” rotation is fully integrated. ▪ A final integrated year-end examination assesses all learning from the last five years of the programme.

1.4.2 Summary of Integrative Learning Strategies and Assessments

A variety of learning strategies that are used in the undergraduate programme is presented below:

1.4.2.1 Reducing factual overload

Reducing learning of unnecessary information was a premise of the new MBBCh programme at the University of the Witwatersrand. In the 2008/2009 review of MBBCh 1 discussions focused on the identification of content that was necessary for learning in later years (MBBCh 2 and further on). There was difficulty experienced in achieving a working agreement on “core content” and this was

attributed to the complexity of the reasoning process required in trying to link basic science (for example, Physics) with the realities of clinical practice (concepts of which in any case vary considerably). Another factor is the tradition of basic medical science disciplines: a feeling that any diminution in volume means lowering of standards and "dumbing down".

From MBBCh 3 onwards the pass mark was set at 60 % with the rationale that only "core content" would be assessed. Identifying "core content" was considered relatively easy in the MBBCh 5 and 6 years using a classification which was based on the Faculty's perception of common pathology in South Africa and the role of the doctor in preventing illness and promoting health. The basic method for deciding on "core content" (for different levels of learning objectives) was to establish multi-disciplinary teams of basic scientists, public health physicians and clinicians (generalist and generalist-specialist) who work together to arrive at a decision, using the guidelines that were agreed upon.

1.4.2.2 Problem-based learning

The principal learning strategy of the MBBCh 3 and 4 years is problem-based learning, based on 63 weekly clinical cases. The case is presented to small groups of six to eight students at the start of the week. Students explore each case, carefully define the problem it poses and hypothesise about possible causes. They then determine what they need to learn to understand the case fully – their learning objectives – and allocate learning tasks to each member of the group. Midway through the week the students receive more information about the case, work out the mechanisms underlying each abnormality and refine their hypotheses. At the end of the week group members report back on what they have learnt, teaching the other group members. Each group is guided and assisted by a staff member who facilitates the process but does not teach content.

The clinical cases have been carefully selected so that students will cover the required core content of the basic science and pathology disciplines. Problem-based learning continues into the MBBCh 5 and 6 years, where the problems presented are real clinical ones.

1.4.2.3 Portfolios to practise reflection

Students in the MBBCh 5 and 6 years are required to submit five reflective portfolios every year. In each of these they reflect on a personal experience of the recent past from which they learnt something important about themselves and their calling as doctors. The aim is twofold: to encourage active reflection and learning from experience, and to sharpen students' written language skills.

1.4.2.4 Service learning

An important set of learning objectives for the programme concerns the need to understand different South African communities and their health services, as well as the role of the doctor in promoting health and improving the health services. In contrast to previous "*health tourism"* where students simply visited community health projects to observe, Graduate Entry Medical Programme students in groups of about eight engage with communities and health units to study them and implement improvements in them (in cooperation with local staff). In the process they both learn and provide a small, but useful, service. This happens on four occasions in the programme and, in each case, students compile reports on the work they have done.

1.4.2.5 Self-directed learning

Throughout the six-year undergraduate programme students are given opportunities for self-directed learning. These are activities during which students work out for themselves what they are supposed to learn and then set about learning it either individually or in small groups. Some of the activities are integral components of formative assessments.

1.4.2.6 Reflection and self-study

It is expected that reflection and self-study is time in the normal timetable which is not allocated to a particular learning activity, but which students are nonetheless expected to use to achieve some course objectives.

1.4.2.7 Innovations in assessment

All assessment is linked to objectives. Since the objectives for the entire programme have been set out, it is possible to ensure that every portion of an examination is linked to an objective. In MBBCh 1 and 2, assessments are in the form of written tests and assignments that contribute to the year mark. There are two written examinations – one in each semester – that also contribute to the final year mark. Each discipline sets its own tests and examinations.

In the MBBCh 3 to 6 years, material from up to twelve departments is assessed in every examination. Much of the assessment is horizontally and / or vertically integrated. A particular style of modified essay question has been developed in which for example applied basic and Pathological science, Epidemiology and Ethics, for example, are examined in relation to a clinical scenario. At the end of the MBBCh 5 year a single integrated examination assesses material from all the clinical disciplines. In the final examination at the end of the MBBCh 6 year all the material from all the years of the programme is assessed together in relation to clinical scenarios.

Assessments are “blueprinted”. Since the integrated assessments are composites of many disciplines, blueprinting assures the due proportional representation of each discipline. The number of modalities of assessment used in exams has been expanded, particularly in the MBBCh 5 and 6 years. A single discipline typically uses five modalities: for example a written paper with multiple choice questions and short answer questions, one or more case studies, an objective structured practical examination, a number of clinical cases and an assessment of professional behaviour. This has increased examination validity considerably.

The above outlines the integrative efforts that are to be found in the MBBCh undergraduate programme.

1.5 STATEMENT OF THE PROBLEM

As a result of the reforms outlined above, the six years of the MBBCh programme now contain a rich variety of features designed to advance integration of learning. However, the ways in which students and teachers experience these kinds of

integration are not known, nor is the effect that they are having on student learning. Knowledge of this will contribute towards better understanding of integration and development of effective models in educational practice.

1.6 SIGNIFICANCE OF THE STUDY

Investigating students' and teachers' experiences of a variety of events designed to promote integration of learning deepens the understanding of the many and varied effects of such integration activities, and contributes to the body of knowledge on integration of curricula in medical education. The study also contributes to a generic understanding of the phenomenon of integration in the process of learning, potentially enhancing knowledge and practice in the field of medical education.

1.7 OBJECTIVES OF THE STUDY

The four objectives of the study are:

1. To explore undergraduate medical students' experiences of integration of learning and their views on their ability to integrate concepts within and across disciplines from the first year to the sixth year of their studies; and how this ability develops.

2. To gain insight into what the teachers know about integration of learning, and how they view their roles in the implementation of integration in the programme; and their experiences as they implement activities designed to integrate learning.

3. To clarify students' conceptions of the links between their ability to integrate learning and their educational experiences in the MBBCh programme.

4. To contribute students' and teachers' experiences to the debate on current theories regarding integration of learning.

1.8 INFORMATION COLLECTED

To achieve the objectives of this study the information as set out in Table 1.2 was collected.

Table 1.2: Information collected for the study objectives

Study objectives	Information collected
1. To explore undergraduate medical students' experiences of integration of learning and their views on their ability to integrate concepts within and across disciplines from the first year to the sixth year of their studies; and how this ability develops.	▪ Students' perceptions concerning integration of learning ▪ Students' experiences of their own ability to integrate concepts ▪ Students' experiences of how their integration ability develops
2. To gain insight into what the teachers know about integration of learning, and how they view their roles in the implementation of integration in the programme; and their experiences as they implement activities designed to integrate learning	▪ Teachers' understanding of the meaning of and need for integration of learning in an educational setting ▪ Teachers' perception of their own potential and actual roles in promoting such integration of learning ▪ Teachers' reports of experiences in activities designed to promote integration of learning, including successes and problems experienced
3. To clarify students' conceptions of the links between their ability to integrate learning and their educational experiences in the MBBCh programme	▪ Student reports of their educational experiences which promoted or hindered their ability to integrate concepts
4. To contribute students' and teachers' experiences to the debate on current theories regarding integration of learning	▪ Current theories regarding the role of integration of learning ▪ Elements of MBBCh student and teacher understanding of, attitudes towards and experience of activities and processes which relate to current theories in integration of learning

1.9 THE ROLE OF THE RESEARCHER

The researcher was employed by the University of the Witwatersrand in 2008 to facilitate the review of the undergraduate medical curriculum with a view to strengthen vertical and horizontal integration in MBBCh 1 and 2. At this time, the university had already reviewed years 3 to 6 and was in the second year of reviewing years 1 and 2 to reduce content overload and strengthen integration. Holding Nursing Education and Adult Education tertiary qualifications, the researcher took on the role of coordination of these two years and the curriculum review process. The researcher facilitated the finalisation and introduction in 2010 of an integrative course entitled Medical Thought and Practice for MBBCh 1 and 2. The course (Figure 1.2) is composed of two modules, Health Systems Dynamics and Integrating

Skills. While the researcher was the overall course coordinator, she also took on teaching responsibilities in Module 2.

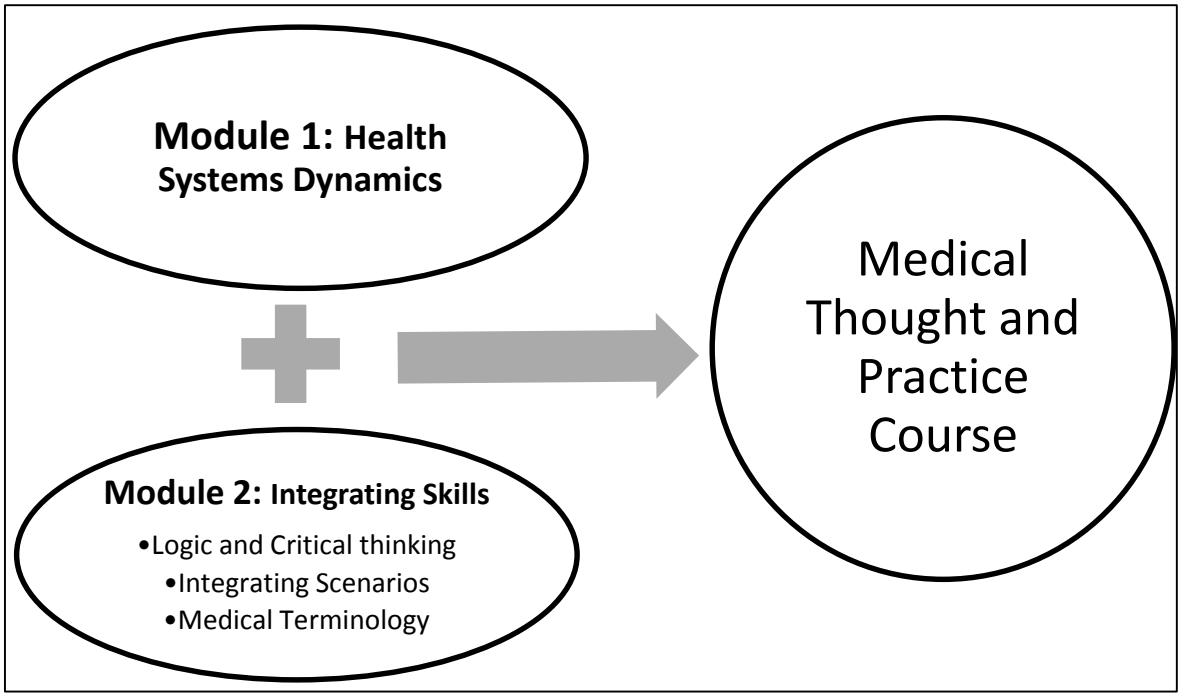


Figure 1.2: Medical Thought and Practice Course Components

Given the above, the researcher was directly involved with the review of the curriculum, particularly the introduction of the new course for MBBCh 1 and 2 in the later years of this curriculum transformation. This involvement raised the researcher's curiosity in how students constructed integrated meanings out of all the subjects they encountered. With this passion to better understand integrative learning from students' perspective, the researcher was conscious of the bias this passion might bear on the research findings. With this consciousness, the researcher bracketed or set aside prior assumptions about the nature of the thing being studied as espoused by Ashworth and Lucas (1998). Working in the Centre for Health Science Education where the whole MBBCh programme is coordinated, and also participating in MBBCh undergraduate committee meetings, the researcher acquired intimate knowledge about the programme as a whole and this further fuelled the curiosity on integration of learning. To attempt to minimise bias, the researcher detailed the scientific, methodological rigour that was followed throughout the research process.

1.10 TERMINOLOGICAL CONVENTIONS

Some key terms that are used in this study are defined below:

***Concept*:** "A concept is a symbol that represents a class or group of objects or events with common properties" (Klein, 1991:296). A concept is the result of conceptualisation. "Conceptualisation" is the process of coming to an agreement with the meanings of the different things we see and/or encounter in our world (Babbie & Mouton, 2001). In the MBBCh programme, students encounter different concepts in the subjects that are taught.

Discipline: "Discipline" here refers to the different subject areas that make up each year of study, as well as the longitudinal themes that are introduced in Years 3 to 6.

Educational experiences: In this study, "educational experiences" refer to those internal factors that are described by the students themselves, as well as those described by the teachers.

***Undergraduate medical programme*:** This study focused on the six years of the MBBCh programme, taking into account that some students join the programme only in Year 3.

***Programme and curriculum*:** According to Dent, Harden and Hallock (2009:194):

> The curriculum of a basic medical education course must be designed to ensure that appropriate learning opportunities are provided to enable the student to achieve the predefined learning outcomes for the programme as a whole.

This view implies that the "programme" is *broader* than the "curriculum".

1.11 STRUCTURE OF THE THESIS

This thesis has six chapters.

Chapter 1 provides an introduction and conceptualisation to give the reader an overview of the study and the MBBCh undergraduate programme of the University of the Witwatersrand. **Chapter 2** contains a literature review on curriculum integration and integration of learning – meanings and approaches; and developments in selected medical curricula; epistemologies and theories of learning

focusing on the ones that the researcher considered pertinent to this study. Chapter 2 culminates in a discussion on the instructional designs and learning experiences that promote integration of learning. **Chapter 3** is an in-depth discussion of the methods used for understanding students' experiences. Qualitative research with a focus on phenomenography is discussed, giving the relevance and appropriateness of this approach to the study. Data collection methods and the types of data collected are also included in this chapter. **Chapter 4** presents the results – an analysis of the reflections from the students and staff. This analysis gives an understanding of students' and teachers' experiences with integration of learning and the development of integrative ability. **Chapter 5** forms the discussion, giving further analysis and interpretations resulting in making sense of students' experiences. A model of integration of learning is presented. **Chapter 6** contains the conclusions and recommendations, discussing the interpretations of the outcome space and implications for the future. Thereafter, the **References** used are presented, followed by the **Appendices**.

1.12 CONCLUSION: CHAPTER 1

Chapter 1 provided an overview of the study. The researcher gave a brief synopsis of integration of learning and the reforms in medical education to promote integration. A summary of the integrative efforts in the MBBCh programme at the University of the Witwatersrand was given. This was followed by a summary of the statement of the problem highlighting the significance and objectives of the study.

In **Chapter 2**, the literature review is introduced with a focus on integration and learning in medical education.

CHAPTER 2:
LITERATURE REVIEW

2.1 INTRODUCTION

This chapter is divided into two sections to review the literature that provides answers to specific questions in each section:

- **Section 1**:
    - Why curriculum integration?
    - What is curriculum integration?
- **Section 2**:
    - What is learning and how does learning occur?
    - What is integration of learning?
    - What facilitates integration of learning?

Section 1: Curriculum integration and what it is

This section undertakes an in-depth analysis of "**curriculum integration**", starting with a brief history on the subject to give the rationale for it. This is followed by a discussion on the meanings of curriculum in general and curriculum integration in particular. Curriculum integration approaches are discussed to gain a comprehensive perspective of those that facilitate the student's integration of learning.

Section 2: What learning is, how it occurs and how it is integrated

The literature on the concept of "**learning**" is then examined followed by how learning takes place according to key learning theories. This leads into a discussion of the literature relating to the adult learning theories for the 21st century. This section culminates with a presentation and discussion of the literature on instructional designs that promote integration of learning.

2.2 SECTION 1 – CURRICULUM INTEGRATION

2.2.1 Why Curriculum Integration?

In answering the question "**Why curriculum integration?**" the discussion commences with a brief review of the developments in medical education that led to the need for integration. There are several reports that have documented reforms in general education, nursing education and in medical education, specifically, from the 20th century to the present (Beck, 2004; Cooke, Irby, Sullivan & Ludmerer, 2006; Diekelmann, Ironside & Gunn, 2005; Dornan, 2005; Frank & Danoff, 2007; Frenk *et al*., 2010; Hiebert *et al*., 1996; Jones *et al.*, 2001; Mehta, Hull, Young & Stoller, 2013; Rohrer & Pashler, 2010). While most documentation is based on medical education in the United States of America, the reforms have had a significant impact on the structure of medical education the world over.

In the 19th century there were three main systems of medical education in the United States:

> …an apprenticeship system, in which students received hands-on instruction from a local practitioner; a proprietary school system, in which groups of students attended a course of lectures from physicians who owned the medical college; and a university system, in which students received some combination of didactic and clinical training at university-affiliated lecture halls and hospitals (Beck, 2004:2139).

From this literature it would seem that the problem with this arrangement was that medical education was highly variable with disparate outcomes because there were no standardised quality control measures and the competency levels of the graduates depended on the affordability of complementary learning opportunities.

Commenting on the situation, Cooke *et al*. (2006:1339) referred to the:

> …mediocre quality and profit motive of many schools and teachers, the inadequate curricula and facilities at a number of schools, and the non-scientific approach to preparation for the profession. This contrasted with the university-based system of medical education in Germany.

The literature shows that there seemed to be growing discontentment over this heterogeneity in medical education coupled with scientific breakthroughs which questioned the therapeutic efficacy of some treatments.

Outside the realm of medical education, there were calls for curriculum reform in higher education from as early as the 19th century. Speaking on the problems faced in secondary education in 1906, John Dewey (the proponent of progressive education in America) alluded to the importance of aligning education with life and that school studies occupy a place in the whole circle of human activities. Schools subjects are:

> …rendered unduly utilitarian and narrow when isolated. Just as in life the technological pursuits reach out and affect society on all sides, so in the school corresponding studies need to be embedded in a broad and deep matrix (Dewey, 1938:116).

The ensuing is a discussion of the reforms in the chronological order in which they occurred. For the purposes of this discussion the reforms are discussed in specific phases.

Phase 1 – Clerkship and Apprenticeship

Canadian born William Osler is considered one of the fathers of American medicine and Dornan (2005:91) cites him as a pioneer of what was the: "…epitome of a modern medical school, integrating the values of scientific medicine into clinical practice."

Dornan's utterances came as a result of Osler's work as foundation physician-in-chief and chair of medicine at Johns Hopkins University, Baltimore. Osler introduced a clerkship system that gave students a role in clinical service. This system increased students' exposure to patients as he believed that students should be taught at the bedside where they had direct contact with the disease (Dornan, 2005).

Also concerned about the quality of education, The American Medical Association lobbied for standardisation of medical education modelled on the application of the scientific method (Beck, 2004). The Carnegie Foundation appointed Abraham Flexner to lead a survey on medical education in the United States. As a school teacher, Flexner was a progressive educationalist with strong views on themes like social responsibility and widened participation and he was also a pioneer of active, learner-centred education (Dornan, 2005). The survey of all medical schools in the

United States culminated in the 1910 Flexner report which sparked groundbreaking reforms according to Frenk *et al*. (2010). Flexner recommended a four-year medical curriculum which is divided equally into laboratory sciences (Anatomy, Physiology, Pharmacology, Pathology); and clinical work (Medicine, Surgery and Obstetrics). Students were to gain clinical skills through apprenticeship where they were attached to the hospital for bedside teaching.

In the report, Flexner (1910:58) contended that:

> ...medical education is a technical or professional discipline; it calls for the possession of certain portions of many sciences arranged and organized with a distinct practical purpose in view...Its point of view is not that of any one of the sciences as such. It is difficult to see how separate acquisitions in several fields can be organically combined, can be brought to play upon each other, in the realization of a controlling purpose, unless this purpose is consciously present in the selection and manipulation of the material.

Flexner's report led to standardisation of medical curricula with the introduction of basic sciences, which had largely been ignored in the medical curriculum. Implied in the above quotation from the report is integration of the disciplines so that they are "brought to play upon each other" and this purpose is to be "consciously present" in the curriculum. In addition to this, Flexner (p.57) makes a subtle reference to some modern principles of adult learning: "The student is throughout to be kept on his mettle. He does not have to be a passive learner..."

This view is supported by Jones *et al*. (2001:699) who have observed that:

> …learning has moved the concept of teaching from "know ***all***" to "know ***how***" with an emphasis on active learning rather than the passive acquisition of knowledge

This also concurs with Flexner's (1910:53) assertion that:

> On the pedagogic side, modern medicine, like all scientific teaching, is characterized by activity. The student no longer merely watches, listens, memorizes: he does...the student cannot effectively know, unless he knows how.

Most medical schools that were influenced by Osler and Flexner have implemented the recommendations for over a century. However, the effectiveness of these

changes became less clear as time went by. Maizes, Schneider, Bell and Weil (2002) are of the view that medicine appears to have strayed far from Osler's call to know the human being experiencing the disease. Instead, managed care, the development of clinical practice guidelines and evidence-based medicine have done the opposite. In addition, there are several intervening variables such as disease epidemics and the internet that have had a significant impact on the dynamics of disease patterns, consumer expectations and access to information. In cognisance of the obvious gaps in health care, despite the "uniformly arduous and expensive" brand of medical education (Beck, 2004:2140), there were calls for a second set of reforms in medical education.

Phase 2 – Changes in Curriculum Content and Delivery

The Lancet (1934) and Walshe (1944) documented the need for curriculum revision and reform to prepare graduates adequately for the challenges they face in the real world. With reference to the curriculum, there were specific questions and recommendations about what should be included in the content; that:

> Preclinical subjects should be pruned of some details and more closely co-ordinated with each other and with clinical studies (p.173).

In an effort to maintain standards, in 1993 the General Medical Council of the United Kingdom published a report entitled "Tomorrow's Doctors" which outlined the framework for undergraduate medical education (Christopher, Harte & George, 2002; Dornan, 2005; Monkhouse & Farrell, 1999; Rubin & Franchi-Christopher, 2002). Amongst the recommendations were a reduction of the quantity of information given to students; a core curriculum with defined learning outcomes and integration of content from all disciplines; and early exposure of students to patients. Attempts to reduce the basic sciences content and adoption of integrative efforts like problem-based learning met with fierce opposition from some quarters. Hodges (2010) attempted to compare the traditional curriculum with the outcome-based one and identified practical problems that impede transformation from the former to the latter. Since both traditional and outcome-based curricula present advantages and disadvantages, Hodges suggests a hybrid which integrates the best features of each approach. Monkhouse and Farrell (1999:133) found it confusing that, while in

"Tomorrow's Doctors" there was encouragement for more scientific awareness, basic sciences were being drowned in a sea of "so-called integration". The same authors also express a lack of clarity on what "scientific method" meant and how it should be taught by posing the question:

> Is it some definite technique that the student can be taught, or is it something less tangible that it is hoped the student will acquire in the course of study? (p.133)

It would seem that there were no specific answers to the above question.

There were concerns that outcomes-based learning disempowers students as they have no control or autonomy over their learning experiences (Rees, 2004). This utterance is in stark contrast with Harden's (2002) view that students take ownership of their learning through outcome-based learning.

Williams and Lau (2004) argue that the reduction of factual knowledge and introduction of problem-based learning to replace didactic teaching embraced by about a third of the medical schools in the United Kingdom is a strategy which is untested with no evidence that the product will be better. The authors allude to an: "…enthusiasm for change rather than by rational responses to the shortcomings of traditional curriculums" (p.92).

Presenting a counterargument, Morrison (2004) supports the adoption of problem-based learning by three established medical schools in the United Kingdom which have almost 26 years of combined experience of this strategy. These schools were:

> …convinced by compelling theoretical basis in the psychology of learning (which is largely missing from traditional methods of teaching) and the experiences of other problem-based learning schools in Europe, North America, and Australia (p.798).

Teo (2007:302) explained that in Japan, where medical education was also heavily influenced by developments in North America, there were dramatic changes after World War II. Curricula vary but in general adhere to a traditional discipline-based approach with the first two years being spent on basic sciences (namely, Biology and Chemistry) followed by subjects like Anatomy, Physiology, Pharmacology and

contact with patients is usually during the fifth year of medical school. Putnam (2006:227), in a report on the reforms in medical education in six medical schools in the United States of America, concludes that the differences among the nation's 125 accredited allopathic medical schools loom large despite their shared mission of granting medical degrees to their graduates.

It seems that many medical schools – particularly in developing countries – are still trapped in the first generation as some have not adopted outcome-based curricula and integrative efforts like problem-based learning at all while others are at different stages of adoption of these approaches.

Phase 3 – Interdependence in Education and Transformative Learning

In spite of the second generation of reforms there are still grave doubts about the effectiveness of current medical education. Over a decade ago Jones *et al.* (2001) observed that despite curricular improvements few graduates exit medical school feeling confident and well prepared for their future role as doctors. The reasons that could cause this lack of confidence have been attributed to the technological changes and access to information which necessitate an interdependence of health care.

According to Frenk *et al*. (2010), there have been two generations of educational reforms in the past century – notably: a first generation of science-based curriculum at the beginning of the 20th century espoused by Flexner; and a second generation of problem-based learning introduced in the last decades of the century. A third generation is needed to improve the performance of health systems.

There was a call for "a thorough and authoritative re-examination of health professional education, matching the ambitious work of a century ago" (Frenk *et al*., 2010:1923) and, as a result:

> …the Commission on education of health professionals for the 21st century was launched in 2010. It consisted of 20 professional and academic leaders from diverse countries and was intended to mark the centennial of the 1910 Flexner report, which has powerfully shaped medical education throughout the world (p.1927).

The Commission report outlined gaps and inequities in health and healthcare and professional education which have not kept pace with developments and highlighted that medical education is in some instances fragmented, outdated with static curricula producing ill-equipped graduates. The Commission recommended, *inter alia*, that the structure and function of the health professional education system should be reformed to achieve two crucial outcomes: transformative learning and interdependence in education (p.1929). This echoes Albert Einstein's quote that:

> …the world will not evolve past its current state of crisis by using the same thinking that created the situation (Sturmberg & Martin, 2009:543).

The views of Frenk *et al*. (2010) support those of Jones *et al*. (2001) in calling for interdependence which brings in a different take on integration; that is integrating primary health care, integrating global perspectives, and integrating teamwork into programmes.

The Lancet (1972:1014) reported that:

> Lately, numerous medical schools have made major changes in their curricula and most have made minor changes, yet there have been few carefully planned attempts to evaluate the effects of such changes.

Therefore, in the 21st century, there are still questions on "What works best?". It would seem that lack of clarity of purpose and procedures on the reforms in medical education have created a conundrum which has resulted in some medical schools lagging behind or resisting change.

2.2.2 Challenges of Curriculum Change

Changing a curriculum is likely to present challenges, particularly change which is perceived to weaken the system, as in the case of integration. Kelly (1989:150) observes that:

> Curriculum change shares that tendency of all institutions to resist any attempts to do more than chip away at it and introduce relatively minor modifications.

Kelly (2009) further asserts that the teacher's role is central to the effectiveness of any attempt to change the curriculum.

Bernstein (1975; 1990) suggests that curriculum integration presents change which teachers experience as a threat to identity and is thus a source of resistance:

> Where we have integration, the various contents are subordinate to some idea which reduces their isolation from each other. Thus integration reduces the authority of the separate contents, and this has implications for existing authority structures (Bernstein, 1975:101).

In order to minimise resistance to curriculum integration, Bernstein (1975) suggests that the educators involved must have a consensus agreement on the integration approach of choice. This means that there should be no doubt as to what the integration means to them. Similarly, the content to be integrated must be spelt out and, in the process, educators obtain a deeper understanding of the approach. For the sustainability of the integration efforts, a committee of staff and students is required to monitor the implementation and provide feedback. This monitoring and feedback provides further information and reinforcement of the idea.

Bernstein (1975:109) emphasises the difficulties educators may face when structuring assessments in an integrated curriculum:

> Integration gives rise to multiple criteria of assessment. Without clear criteria of evaluation, neither teacher nor taught have any means to consider the significance of what is learned, nor any means to judge the pedagogy.

These cited problems of assessment may contribute to further resistance to true integration. In the conditions outlined above there is an emphasis on a uniform understanding and agreement on the type of integration and processes a programme embarks on. There is also emphasis on the involvement of students in the integration and evaluation of the effectiveness of the endeavours.

The above discussion has outlined the poor state of medical education in the United States of America over a century ago. From early in the 20th century, concerns about the lack of integration were raised by Dewey (1938; 2002) who was not in favour of school subjects that were isolated. Osler and Abraham Flexner, followed by *The Lancet* in 1934 – some two decades later – highlighted the need to arrange the content in the curriculum to strengthen integration and also how students should learn to enable them to integrate learning. Although there was no obvious momentum towards integration of curricula, the need for it was documented and

talked about. Traditional curricula, with each science discipline offering its content from within a departmental silo, frequently failed learners as they advance to the clinical years, as observed by Wilkerson, Stevens and Krasne (2009). The ensuing discussion will take an in-depth review of curriculum integration, elucidating its meanings and approaches.

2.2.3 Curriculum: Definitions and Perspectives

Before focusing on the pertinent types of curriculum integration, it is important to review briefly what a "curriculum" is. It is not unusual to find the terms "programme" and "curriculum" used interchangeably. Many people still equate "curriculum" with a "syllabus" and thus "limit their planning to a consideration of the content or the body of knowledge they wish to transmit" (Kelly, 1989:10). From this statement, a "syllabus" is a listing of content areas or topics to be taught but a "curriculum" is much broader than that. According to Tyler (1949) there is need for proper curriculum planning which consists of four elements: objectives, content or subject matter, methods or procedures, and evaluation.

Boyle (1981:4) attempted to define the difference between "programme" and "curriculum" by saying that "programme" is often equated with "curriculum" as used in references focusing on formal school situations. Boyle goes on to suggest that definitions of "curriculum" usually express the concept of structured learning opportunities to achieve specified objectives while "programme" is the product resulting from all the programming activities in which the professional educator and learner are involved. According to Dent *et al*. (2009:194):

> The curriculum of a basic medical education course must be designed to ensure that appropriate learning opportunities are provided to enable the student to achieve the predefined learning outcomes for the programme as a whole.

This view implies that the programme is broader than the curriculum. However, in line with their definition Dent *et al*. (2009) further present a wider view of a curriculum (Figure 2.1) which suggests overlaps between curriculum and programme.

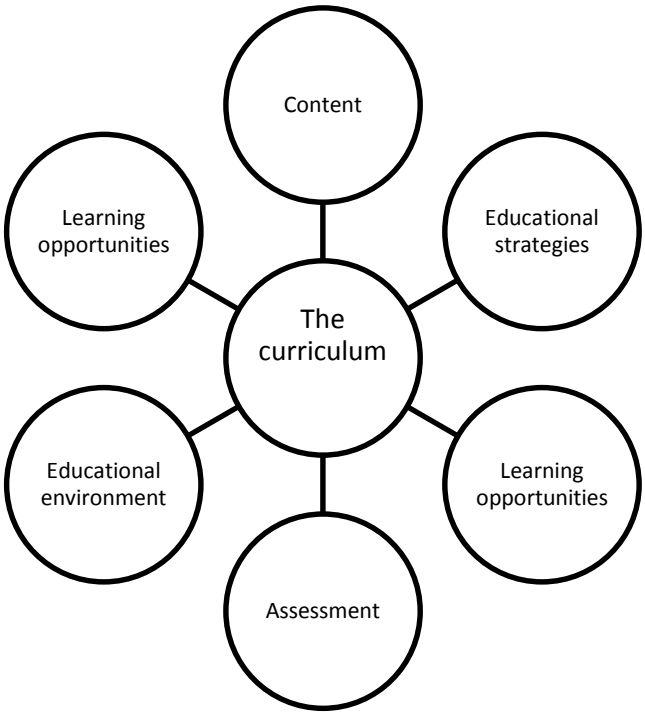


Figure 2.1: A wider view of a curriculum (adapted from Dent *et al*., 2009:11)

Similar to Boyle's (1981) view which suggests that a programme is broader than a curriculum, Dent *et al*. (2009) are of the opinion that a curriculum is about the teachers' activities, and the way they make these happen in a teaching programme.

Similar to Tyler (1949; 1957), and according to Prideaux (2003:268), the definition of "curriculum" includes:

> …all the planned learning experiences and has at least four elements – content, teaching and learning strategies, assessment, and evaluation processes. The curriculum exists at three levels: what is planned for the students, what is delivered to the students and what the students' experience.

The first two levels refer to the formal curriculum and the last is informal. It is this last of these levels that is the essence of this study, finding out students' experiences.

The words "programme" and "curriculum" have different meanings to different people but the detail included in them is more or less the same. Of note is that a "curriculum" contains integrated components that are necessary for its completeness.

The discussion on curriculum cannot be complete without paying attention to the "official" or "formal" and "hidden" curriculum. According to McKimm and Barrow (2009:714), the "formal" curriculum is the one that is declared by faculty; this is the: "…written and published curriculum (for example, course documentation including the prospectus, course guides or lecturers' handouts)."

In contrast, the "hidden curriculum" is where students acquire values and patterns of behaviour often incidentally (Harden, 2001a; 2001b). According to Higashi, Tillack, Steinman, Johnston and Harper (2013:14):

> As opposed to the formal curriculum, which involves knowledge communicated via such mechanisms as lectures, planned small group activities, texts, and online learning modules, the basic premise of the hidden curriculum is that medical education is a cultural process through which students learn what is and what should be valued and how to discriminate between 'good' and 'bad' clinical practices.

As Hafferty (1998) and Hafferty and Franks (1994) observed, "culture" cannot be fully conveyed through the formal curriculum. This is because most of the medical culture that students internalise in terms of values, beliefs and related behaviours deemed important within medicine is learnt not within the formal curriculum but via a more latent one, a "hidden curriculum". In addition, certain subtle practices dominate the hidden curriculum arena. Several authorities – including Apple (1971), Fryer-Edwards (2002), Gaufberg, Batalden, Sands and Bell (2010), Hafferty and Franks (1994), Harden (2001a; 2001b), Joughin (2010), McKimm and Barrow (2009) and Wear (1998) – have cautioned that the hidden curriculum is not as quiescent as it may seem.

Case (1991:217) cites a specific example that "teachers verbally affirm the importance of critical thinking" although many tests mainly "require recall of factual information". Also, Jacobs (1989) cites another example (not so obvious) of the ambivalence between what educators purport and their actual actions. This is seen in the construction of the timetable where students are shunted from one teacher, subject, classroom (and sometimes another set of students) for every class period several times a day. These disconnections create compartments which negate integration.

Given these observations, the influence of the hidden curriculum in shaping or modelling students is highly significant. In essence, the hidden curriculum should be considered the “lived” curriculum because that is what the students “live” and experience.

This discussion reveals that a curriculum is a compendium of integrated elements that are designed to provide the learning opportunities according to plan. It is evident, however, that there may be variances between what the teachers intend for the students to learn, what they deliver to the students and what the students actually learn. What is planned for the students is presented as the formal curriculum which is to be found on paper. The way the learning experiences are presented and the general social environment in which the students are may result in the variances in intentions and the outcomes; and these are the results of the hidden curriculum. The formal curriculum is presented in predetermined pedagogical experiences like lecture and group discussions. In contrast, the influence of the hidden curriculum is covert and not predetermined. From this discussion it seems logical that exploring the experiences of the students themselves is an effective way of revealing the effects of the hidden curriculum on student learning.

The following discussion will examine what curriculum integration is.

2.2.4 Curriculum Integration: Definitions and Perspectives

“Curriculum integration” is a conundrum for some, hence the need to clarify the common terminology and approaches to enable curriculum planners develop solid and lasting designs that are accepted by many concerned. “Integration” is a term that denotes bringing things together. According to Case (1991:215), integration is the uniting of discrete elements into a whole; and in education curricula can be divided into subdomains, one being curriculum integration.

Case (p.216) discusses the forms of integration and refers to the elements which should be united. He describes the forms of integration as follows:

> Integration of content which means connecting the understandings promoted within and among different subject areas or disciplines.

> Integration of school and self, referring to the integration of what students study in school with students' concerns, desires, needs, queries, aspirations, dilemmas and so on.
>
> Holistic integration which refers to the integration of all further school-related experiences not expressly identified in the other forms of curricular integration. Included in this form of integration are formal and informal instructional practices, routines, methods, rules and school-based influences on students' learning.

From the mid-20th century there have been calls for integrated curricula in medical education and some medical schools have embraced integration albeit with varying degrees of acceptance and approaches. Often authorities and teachers in medical education hold polarised views with some in favour of and others against integration, leading to its slow- or non-acceptance in some schools. According to Case (p.215):

> The very act of learning typically involves integration – new beliefs are filtered through and connected to the individual's prior beliefs. Despite its ubiquity, educational debate about integration has been contentious, but not contentious about its merits.

There are many ways in which integration happens and it is imperative for educators to be conversant with the different approaches so that those relevant to their existing problems and situations are applied. Shoemaker (1991:793) observed that:

> Although integrative education was gaining national popularity, there were many different views of what it entailed and an equal number of terms to describe the various ways it might be approached.

Shoemaker (p.793) further defined the following approaches:

- ***Infusion*** approaches integrate a particular subject (such as writing or thinking skills) across the curriculum.
- ***Topics-within-disciplines*** approaches integrate multiple strands of the same discipline within the instructional setting. Examples include integrated language arts and integrated mathematics programs.
- ***Interdisciplinary*** approaches maintain traditional subject boundaries while aligning content and concepts from one discipline with those of another.
- ***Thematic*** approaches subordinate subject matter to a theme, allowing the boundaries between disciplines to blur. Topics can be narrowly or broadly focused.

- ***Holistic*** approaches represent two perspectives: addressing for example the needs of the whole child (the integration of cognitive, physical, affective, moral, and spiritual dimensions) and offering a curriculum that provides the context in which new knowledge makes sense.
- ***The mind/brain function*** approach uses instructional strategies and classroom organisation that engage students in using the four mind/brain functions.
- ***Integrative brainwork*** approaches use such information processing strategies as concept attainment, inductive thinking, advance organisers, concept mapping, and clinical interviews.
- ***Combined*** approaches incorporate aspects of several of the approaches mentioned above.

Jacobs (1989) supports an "interdisciplinary curriculum" which is seen as an approach that consciously applies methodology and language from more than one discipline to examine a central theme, issue, problem, topic, or experience. Along the same lines, Drake (2007:25) uses the terms "interdisciplinary" and "integrated" to generically describe a curriculum that connects the various disciplines in some way. This type of curriculum provides an opportunity for a more relevant, less fragmented, and stimulating experience for students.

Curriculum integration can be a holistic approach, a way of thinking that transcends simple changes or realignments in lesson plans across various subjects in disciplines. This approach enables students to integrate learning experiences and draw up their own meanings so as to understand themselves and their world. This is in line with Shoemaker's and Case's holistic approaches given above.

On the debate on curriculum integration, Beane (1995:616) argues that: "…the central focus of curriculum integration is the search for self- and social meaning."

Beane (p.616) downplays multi-disciplinary and inter-disciplinary approaches to integration as he sees these as pretenders of curriculum integration because:

> …in theory and practice, curriculum integration transcends subject-area and disciplinary identifications: the goal is integrative activities that use knowledge without regard for subject or discipline lines.

In a study by Booth and Ingerman (2002) on students' perceptions of Physics in the first year of study, they found that one course was seen as being useful in other courses, eliminating boundaries between the disciplines. In this sense, integration of learning is associated with a better learning experience because subjects contribute to each other and help with the understanding of other subjects. Booth and Ingerman's finding echoes Shoemaker's thematic approach.

There are other conceptions of curriculum structure and organisation that share similar tenets with Shoemaker's approaches. Some of these approaches can be applied to introduce and enforce integration. Harden *et al*. (1984:284) suggest the use of the SPICES model of curriculum strategy: "**S**tudent-centred; **P**roblem-based learning; **I**ntegrated teaching; **C**ommunity-based education; **E**lectives; and **S**ystematic". Some components of this strategy enable medical schools to move from traditional curricula to innovative ones that embrace modern concepts and approaches to education like problem-based learning, student-centred learning, community-based curriculum and integrated teaching. From the SPICES strategies, the points that are pertinent to this study are outlined below:

> **Problem-based learning**: The opposite of this strategy which is characteristic of the traditional approach is information gathering.
>
> **Integrated teaching**: Integration is the organisation of teaching matter to inter-relate or unify subjects frequently taught in separate courses. The traditional curriculum focuses on discipline-based teaching which leaves it to the students to put together the knowledge gained in each discipline into an overall picture of medicine.
>
> **Community-based education vs the traditional hospital-based education**: Community-based education provides students with motivating experiences as they deal with 'real' patients in the community. This approach promotes integration with theory and presents high chances for interdisciplinary education.

Jerome Bruner, the 20th century psychologist, proposed the concept of the "spiral curriculum" advocating that a curriculum as it develops should revisit the basic ideas repeatedly, building upon them until the student has grasped the full formal apparatus that goes with them (Bruner, 1971a; 1971b). According to Bruner (1996) the object of instruction is not coverage but depth. Harden and Stamper (1999:141)

describe the spiral curriculum where there is “an iterative revisiting of topics, subjects or themes throughout the course”. The features of a spiral curriculum are:

- topics are revisited;
- there are increasing levels of difficulty;
- new learning is related to previous learning; and
- the competence of students increases.

The spiral curriculum promotes vertical integration through revisiting of topics in all the stages. Integration is specified as one of the values of a spiral curriculum.

In congruence with the views of a holistic integration, Dressel (1965) suggests that curriculum models should be based on a clear understanding of the educational problems in existence so that the student applies major ideas in addressing a wide range of problems. The student’s experience should have continuity, sequence and integration.

Integration is a process which may take several years to accomplish. This idea is supported by Harden (2000) who described the “integration ladder” which demonstrates varying degrees of integration. The integration ladder, which was conceived by Fogarty (2009), is a continuum between almost negligible integration to full integration. Some of the levels discussed below by Harden (2000:551-555) exemplify those by other curriculum integration authorities like Drake, Fogarty and Shoemaker:

> **Step 1** – **Isolation** (fragmentation, anarchy) describes a situation where departments or subject specialists organise their teaching without consideration of other subjects or disciplines. This isolation is typical of the traditional medical curriculum with blocks of time allocated to the individual disciplines.
>
> **Step 2** – **Awareness**. As with isolation, the teaching is subject-based. However, some mechanisms are in place whereby the teacher in one subject is made aware of what is covered in other subjects in the curriculum. At this level, there is no explicit attempt to help the student to take an integrated view of the subject.
>
> **Step 3** – **Harmonization** (connection, consultation). Teachers responsible for different courses or different parts of the same course consult each other and communicate about their courses. There is a deliberate attempt to relate disciplines within the curricula rather than assuming students will understand the connections.

Step 4 – **Nesting** (infusion). This is an integrated approach where the teacher targets, within a subject-based course, skills relating to other subjects. The teaching, however, remains subject-based and the course is the responsibility of and in the control of the subject or discipline.

Step 5 – **Temporal co-ordination** (parallel teaching, concurrent teaching). Each subject remains responsible for its own teaching programme. The timing of the teaching of topics within a subject, however, is done in consultation with other disciplines. The implementation of temporally co-ordinated teaching introduces some of the advantages of integrated teaching and is a good starting point for a more integrated curriculum.

Step 6 – **Sharing** (joint teaching). Two disciplines may agree to plan and jointly implement a teaching programme. The shared planning and teaching takes place in two disciplines in which overlapping concepts or ideas emerge as organising elements.

Step 7 – **Correlation** (concomitant programme, democratic programme). In this step, the emphasis remains on disciplines or subjects with subject-based courses taking up most of the curriculum time. An integrated teaching session or course is introduced in addition to the subject-based teaching. This session brings together areas of interest common to each of the subjects.

Step 8 – **Complementary programme** (mixed programmes). This approach has both subject-based and integrated teaching, with the latter representing a major feature of the curriculum. The focus for the teaching may be a theme or topic to which the disciplines can contribute.

Step 9 – **Multi-disciplinary** (webbed, contributory). This approach brings together a number of subject areas in a single course with themes, problems, topics or issues as the focus for the students' learning. In this step on the integration ladder, the subjects and disciplines give up a large measure of their own autonomy.

Step 10 – **Inter-disciplinary** (monolithic). This step implies a higher level of integration with the content of all or most subjects combined into a new course with a new menu.

Step 11 – **Trans-disciplinary** (fusion, immersion, authentic). In trans-disciplinary integration, the curriculum transcends the individual disciplines. The focus is the field of knowledge as exemplified in the real world.

Discussions on curriculum integration illuminate the lack of clarity on meaning, purpose and functionality of integration. Although it seems that the merits of integration of learning are not questionable there has been contentious debate on how to implement it. Educationalists have proposed several approaches and suggestions on how to integrate curricula that promote integration of learning. It is acknowledged that integrating curricula is a process that can take a long time to

accomplish. Therefore, it is important for educators to be conversant with the different approaches so as to make informed choices.

2.2.5 Approaches to Curriculum Integration

During curricular review to address educational problems, educators need to determine their positions regarding the philosophies that guide them and profile themselves according to what they can do and what is beyond their sphere of influence. In emphasising the importance of educational continuity, Hirsh, Ogur, Thibault and Cox (2007:858) refer to:

> …horizontal integration (enhancing the development of general competency by linking learning experiences between and across clinical specialties) and vertical integration (enhancing evidence-based practice by linking advances in biomedical and clinical sciences to clinical problem solving).

Malik and Malik (2011) assert that to gain maximum benefit educators need to attempt both vertical and horizontal integration when developing an integrated curriculum. They see horizontal integration as integration between parallel disciplines such as Anatomy, Physiology and Biochemistry traditionally taught in the same phase of the curriculum (Figure 2.2). In contrast, vertical integration is integration between disciplines traditionally taught in different phases of the curriculum and can occur throughout the curriculum.

With still some level of confusion existing on the approaches to, and effectiveness of, integration in facilitating learning, educators need to invest in proper planning for integrated curricula. Taba (1962) reported that there is a lack of rigorous, systematic thinking about curriculum planning and called for a theory of curriculum development. In support, Drake (2007:25) posits that: "…one of the greatest appeals of integration is this lack of standardized definition."

This allows educators to be creative and make the curriculum as relevant as they want to, with as much student involvement as they see fit.

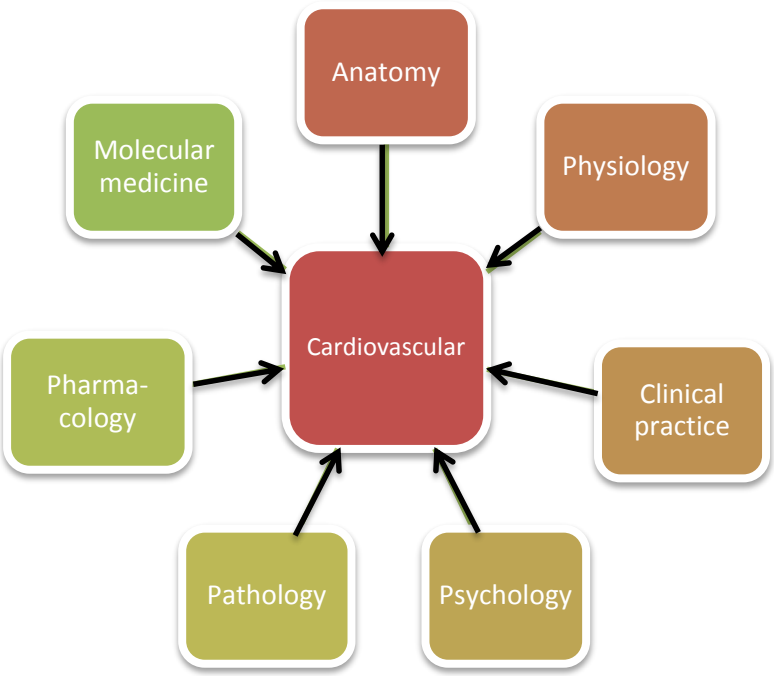


Figure 2.2: Horizontal integration (adapted from Dent *et al*., 2009:182)

In order to introduce or strengthen integration in a curriculum, it is essential to understand the existing curriculum first. Since the curriculum is a sophisticated blend of educational strategies, Drake (2007), Harden (2001a; 2001b) and Jacobs (1991) promote "curriculum mapping":

> Curriculum mapping is about representing spatially the different components of the curriculum so that the whole picture and the relationships and connections between the parts of the map are easily seen (Harden 2001a:123).

In view of the official and hidden curriculum, mapping provides curriculum developers, teachers, students and managers with a handle on the curriculum that they may not have had.

According to Drake (2007), mapping is a good way for integrating the curriculum since it identifies gaps and connections. It seems mapping resonates with Boyer (2004:573) who defines "integration" as:

> ...making connections across the disciplines, placing the specialties in larger context, illuminating data in a revealing way, often educating non-specialists, too.

Mapping can be done in different ways for different purposes. Drake suggests horizontal and vertical mapping. Vertical maps allow a picture of how the content, skills, and standards are connected and build on each other over the years. Vertical maps can also be used to focus on how the same skills and concepts are spiralled through the curriculum at a more sophisticated level (Drake, 2007:12).

According to Prideaux early introduction of clinical skills alongside basic and clinical sciences is a good example of vertical integration (Dent *et al*. 2009; Dornan & Bundy, 2004). Some courses – like Anatomy – seem to have had a tradition of factual overload taught in a manner that does not support integrative learning as in the quote below:

> Within traditional courses, anatomy programmes typically had a 'regional' organisation. All regions of the body were evenly distributed over the full complement of teaching weeks allocated to the subject. This arrangement inadvertently promoted the accumulation of details and isolated facts (Louw, Eizenberg & Carmichael, 2009:375).

In problem-based learning which was referred to earlier as the opposite of the traditional approach of teaching, students tackle problems, which act as triggers, in small groups under the supervision of a facilitator (Schmidt, 1993). According to Norman and Schmidt (1992), problem-based learning is a rationalist approach which is influenced by cognitive psychology; the approach is influenced by Dewey and Bruner. This is because of the emphasis on students actively constructing theories and testing their hypotheses deductively through discussion and literature review (Schmidt, 1983; 1993). Curran, Sharpe, Forristall and Flynn (2008) and Dahle, Brynhildsen, Fallsberg, Rundquist, and Hammar (2002) support the relevance of problem-based learning in small groups to promote effective learning. Problem-based learning is a practical way of implementing integrative approaches. The problems and triggers students are given to work on oblige them to collect and integrate related information from a variety of disciplines.

Approaches to curriculum integration are designed to link learning experiences between and across clinical disciplines in the same year of study and in subsequent years (horizontal and vertical integration). It would seem that in a curriculum there are many opportunities for integration and mapping the curriculum is a practical way

of identifying these opportunities. Problem-based learning is suggested as a practical way of presenting integrated learning opportunities.

2.2.6 Conceptions of Curriculum Integration in View of Complexity Science

It is doubtful that any responsible educator would consciously promote fragmented learning; that is learning that is not integrated. Fragmented learning is losing grip in a complex system like medical education. Other examples of complex systems include:

> …health and illness, the organisation, conduct and management of health-care systems, hospitals, clinics, classrooms, people and the nervous system (Mennin, 2010:21).

This discussion introduces the concept of complexity science as a derivative of the natural sciences, which Mennin sees as a relatively new and diverse field which has not yet gained much ground in the health professions.

There is a growing challenge of complexity in health care as Plsek and Greenhalgh (2001:625) assert:

> Across all disciplines, at all levels, and throughout the world, health care is becoming more complex. Your treatment will now be dictated by the evidence but this may well be imprecise, equivocal or conflicting. Your declared values and preferences may be used, formally or informally, in a shared management decision about your illness. The solution to your problem is unlikely to come in a bottle and may well involve a multidisciplinary team.

This may be in reference to the plethora of empirical knowledge on health and disease which has increased patients' access to it. There is also reference to the reduction of discipline boundaries promoting a multi-disciplinary approach. Zola (1972:493) writes about the change of focus in medicine from a specific aetiological model of disease to a multi-causal and comprehensive biopsychosocial one:

> Thus it is no longer necessary for the patient merely to divulge the symptoms of his body, but also the symptoms of daily living, his habits and his worries. Part of this is greatly facilitated in the 'age of the computer', for what might be too embarrassing, or take too long, or be inefficient in a face-to-face encounter can now be asked and analyzed impersonally by the machine, and moreover be done before the patient ever sees the physician.

Giving suggestions on curriculum development for medical education, David, Thomas, Howard and Bass (1998:3) outline some demands for medical education which include:

> Emphasize a patient-centered, problem-oriented, as opposed to a disease oriented approach in clinical training.
>
> In recognition of the constantly evolving nature of medical knowledge and the impossibility of imparting a complete knowledge base, set of skills, or pattern of practice to trainees, focus the content of training what is most relevant today, train physicians as effective problem solvers who can efficiently access an ever-evolving medical knowledge base, and motivate physicians to become effective, self-directed, lifelong learners.
>
> In recognition of the increasing complexity of medical care delivery, train physicians as managers and team members.

Some nine years ago, Cooke *et al.* (2006) described the state of medical education as that of perpetual unrest and, a few years later, Mennin (2010:21) observed that:

> …medical education exists in a state of tension between the tendency to fall back into traditional teacher-centred pedagogies and the urge to reach forward to newer, more interactive, authentic, integrative and transformative approaches to learning and teaching.

The issues raised above demonstrate that health care is a complex adaptive system:

> A complex adaptive system is 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 change the context for other agents (Plsek & Greenhalgh, 2001:625).

Complex adaptive systems organise themselves, adapt to changing circumstances, and achieve integration, learning and understanding through a process called "self-organisation". According to Mennin (2010:23) learning is seen as a continually emergent property of self-organisation and:

> Teachers, learners and curriculum planners promote conditions for self-organisation (integration) through dialogue, stories, problems, unresolved situations, questions and incomplete understandings, all of which serve to disturb the status quo…and stimulate curiosity, interaction and exchange…

This view emphasises the central role that dialogue, feedback and reflection play in integration when Mennin further refers to integration as: "…the dynamic interconnectedness that emerges from recursive interactions at multiple levels" (p.23).

Plsek and Greenhalgh (2001) affirm that the behaviour of a complex system emerges from the interaction among agents and is often non-linear with inherent unpredictability, although general patterns of behaviour can be drawn. According to Eoyang (2001; 2003) every individual is enmeshed in multiple social networks which function as complex adaptive systems as individuals and small groups interact, transform each other, and generate emergent system-wide patterns of health and health-related behaviours. Prozesky (2009) has commented on the role spirituality plays in people's lives. Fraser and Greenhalgh (2001) write about the transformation of competencies to capabilities in order to cope within a complex world: "expertise" is viewed as the ability to access knowledge and make connections across seemingly disparate fields and life experiences (p.800). In line with Beane (1995), students integrate learning experiences into their schemes of meaning so as to broaden and deepen their understanding of themselves and their world. This enables them to acquire and use knowledge in a natural way as they draw on all skills and knowledge to be able to deal with situations at hand; and since life itself does not know the:

> …boundaries or compartments of what we call disciplines of knowledge, such a context uses knowledge in ways that are integrated (Beane, 1995:616).

Clearly, integration is not a linear but complex process. In comparing learning outcomes to instructional objectives, Harden (2002) emphasises that learning objectives divided into three unrelated categories of knowledge, skills and attitudes neglect the complexity of medical practice and the important interaction of the cognitive, affective and psychomotor domains.

> A clearly articulated framework of practical, real-world objectives provides a rare opportunity for students to develop a clear pathway toward relevant competencies. Many previous curricula have relied on a layering of experiences that do not always build on one another and are not linked through a comprehensive framework (Harris, Snell, Talbot & Harden, 2010:647).

Many of the tasks in medicine are complex, requiring an integrated application of knowledge, skills and attitudes in no particular order. Thus, complexity science advocates for spiral curricula that are recursive, developmental and comprehensive. Assessment of competence requires a holistic integrated approach to patient care, taking into consideration how the student would behave in real life. Learning outcomes, in contrast to learning objectives, are broadly defined complex abilities that are demonstrable and focus on observable results (Harden, 2002). An outcome-based curriculum reflects a more student-centred approach where students take ownership of their learning.

Competence itself is a complex concept. It is not clear what it consists of, which components are most important to cater for the diverse needs of the students, and how best it can be measured. The length of time it takes for acquisition of competencies cannot be predicted with a high level of precision. Davidoff (2008:31) affirms that it is:

> …increasingly clear that competence is acquired primarily through experiential learning: a four-element cycle (or spiral) in which learners move from direct personal involvement in experiences, to reflection on those experiences, integration of their observations with sense-making concepts and mental models, and finally back to more experiences.

Davidoff's view concurs with the "spiral curriculum".

Developing and implementing an integrated curriculum could be an arduous task if not done systematically and collaboratively. Malik and Malik (2011) raise some insightful points in their outline of key suggestions for developing an integrated curriculum. Since integration of the curriculum entails a lot of time and effort, and crossing departmental borders which may cause conflict, it is important to train the staff members. Regarding the integrated curriculum, Bowden and Marton (1998:252) advise that:

> …students need to learn to be able to deal with the unknown future they will confront after graduation and to do so the curriculum needs to go beyond the specific content. This means that it will include integrating, holistic goals, making the whole greater than the sum of the parts, and will address as well the development in students of a capability to deal with the content in professional contexts.

The same authors make conclusions about important considerations for a shift from a teaching to a learning focus, which is an integrated curriculum:

> …adoption of a student learning outcomes focus will result in integrated academic programmes rather than differentiated, fragmented curricula and the planning of such integrated curricula will involve academic teams working together rather than individuals working solely in parallel…the university will have developed processes which involve members of the community, including professionals and graduates, in the design of the curricula…academic policy will need to be realigned to ensure that students experience coherent academic curricula…these changes need to be effectively communicated (p.252).

The above discussion sensitises educators to the complex nature of the health sciences. The importance of dialogue and feedback is emphasised to enable self-organisation or integration. Integration is not a linear process and the acquisition of knowledge, skills and attitudes is inextricably linked and in no particular order. The process of acquisition of competencies is complex with no clear formula to cater for the diverse needs of students. Given this complexity, development and implementation of an integrated curriculum requires a multi-pronged and collaborative approach.

This section has covered an in-depth discussion of the evolution of curriculum integration in medical education. Despite strong recommendations for and introduction of integration in medical education over half a century ago, there are varying levels of its applications in medical schools. Some relevant approaches to curriculum integration have been presented.

The next section will consider how learning takes place with a particular focus on **integrative learning**.

2.3 SECTION 2 – INTEGRATION OF LEARNING

2.3.1 Introduction

The previous section gave a detailed description and analysis of curriculum integration. This section reviews the subject of how learning occurs and ultimately how integration of learning occurs. Selected key learning theories that influence the way educators go about designing and implementing learning opportunities will also be examined. By stimulating greater awareness of how people gain knowledge about the different phenomena they encounter, educators will think more critically and consider applying a hybrid of those pedagogical approaches that facilitate the integration of learning by students who have diverse backgrounds and needs. There are many theories of learning, but knowledge from all these theories can be applied to existing learning situations appropriately. Included in this section is a review of learning that informs the phenomenographical approach and the conditions that promote integration and those that promote learning. It is important to create a common understanding of what learning is before integration of learning is interrogated.

2.3.2 Learning: Definitions and Perspectives

“Learning” is conceived and defined in many different ways. Simply put, learning is the acquisition of knowledge (Bower & Hilgard, 1981) and most people associate learning with schooling. Hill (1963) begins the discussion of learning by looking at the school as the setting in which learning is the primary focus. Illeris (2007) and Sandlin, Wright and Clark (2011) argue that much learning happens outside of school. Children will have learned many things like language before they start school: “The term ‘learning’ is used very broadly and partly also with different meanings” (Illeris, 2007:2).

For this reason, “learning” could refer to the outcomes of learning processes; the mental processes that take place in the individual; interaction processes between individuals and their material and social environment; and learning may be used synonymously as teaching.

To sum up all these meanings of learning, Illeris (2007:3) defined “learning” as:

> …any process that in living organisms leads to permanent capacity change and which is not solely due to biological maturation or ageing.

This definition leads to pertinent questions such as: “Which processes lead to permanent capacity change?” “How does permanent capacity change come about and how is it known?” It can be assumed that when there is permanent capacity change, the learning is applied in all situations and this leads to the integration of learning. It is, therefore, important to understand how permanent capacity change can be developed.

Learning may also be understood as the process of using a prior interpretation to construe a new or a revised interpretation of the meaning of one’s experience in order to guide future action (Mezirow, 1991:12). This means that individuals use revised interpretations to guide future action and, in the process of revised interpretations, knowledge is gained. Learning is a tacit invisible act (Bernstein, 1990). What people believe about the acquisition of knowledge, how it occurs and what it accomplishes influences its operation in their own lives (Kuhn, Cheney & Weinstock, 2000). Knowles (1990) concedes that learning is an elusive phenomenon and the way people define it greatly influences how they theorise about it and go about causing it to occur.

The above views of learning indicate that how one defines learning is related to one’s assumptions of how learning takes place and vice versa, and also what one considers to be evidence of learning. Based on this premise, teachers would typically teach according to how they perceive learning to take place.

2.3.3 How Learning Takes Place: Early Theories of Learning

A good understanding of how knowledge is acquired and retrieved will enable teachers to structure learning in a way that enables learners to acquire and retrieve knowledge for application at appropriate times. Historically, research in learning in medical education has been a neglected area of study, although it has increased in popularity since the 1970s. An assessment done in the early 1970s concluded that progress in medical education had not advanced at the same pace as it had in

medicine and clinical practice, and research and innovation in the field of medical education were limited (Dent *et al*., 2009). Social scientists, however, have postulated many theories in trying to decipher the complex subject of how students learn.

Attempts at understanding how learning happens date back to time immemorial. Interest in how people learn or how they gain knowledge about the world is recorded from as early as 403 or 402 BC in Plato's writings (Marton & Booth, 1997). Plato documented the dialogues that took place between Socrates and Meno. In a key dialogue Meno asked Socrates whether virtue could be taught and the latter responded that he did not even know what virtue was. He was convinced that Meno did not know either. Meno went on to object to Socrates' suggestion that they embark on a search for the meaning of virtue because:

> How can you search for something when you do not know what it is? You do not know what to look for, and if you were to come across it you would not recognize it as what you are looking for (p.8).

This objection which became known as "Meno's paradox" implies that, in order to learn something, one needs to have some knowledge of it. This alludes to vertical integration where old learning facilitates new learning. Therefore, knowledge comes from within, from the powers of the mind (Marton & Booth, 1997).

How learning occurs is the subject of learning theories and theories influence the pedagogy of learning. According to Jaffer (2010:273) "learning theories" explain how individuals learn while "pedagogy" describes the roles of teachers and learners, the relationship between them and the kinds of teaching and learning activities in which they engage. Bruner (1996:46) is of the opinion that:

> …in theorizing about the practice of education in the classroom (or any other setting, for that matter), you had better take into account the folk theories that those engaged in teaching and learning already have. For any innovations that you, as a "proper" pedagogical theorist, may wish to introduce will have to compete with, replace, or otherwise modify the folk theories that already guide both teachers and pupils.

Wenger (2009) concedes that there are many different kinds of learning theory with each emphasising different aspects of learning; therefore, each is useful for different

purposes. Wenger's assertion takes cognisance of the multi-dimensional problem of learning, differences about the epistemological nature of knowledge and what really matters in learning. It can, therefore, be assumed that the learning theory subscribed to by a teacher will influence his/her theory of teaching. However, Kreber (2006) is of the opinion that educational theories need not be seen as situational or context-specific problem-solving strategies. This means that educators may need to adapt theories to suit the education situation.

In recognition of the complexity of human motives, Hilgard (1949; 1997) believes that the psychology of learning and educational practices ought to fit together hand-in-glove. Teachers need to view theories as guiding models to be adapted to specific contexts and validated through practical experience. This concurs with Ramsden (1993) who argues that teachers need to be experts in both formal and informal theories in order to meet institutional demands, at the same time meeting the scientific demands of education. Ramsden further refers to demands like large classes and worsening staff-to-student ratios which threaten the quality of education.

Several centuries after Meno's paradox, interest in how people gain knowledge about the world gained momentum, particularly in the field of psychology. Early learning theories from the 17th century were supported by experiments on animals and observations of child growth. Bigge (1982:10) looks at pre-20th century and 20th century learning theories. The earlier learning theories from the 17th century focused on "mental discipline", "natural unfoldment" or "self-actualization" and "apperception". Mental discipline entails drilling the mind to remember certain content and regurgitate it when required – in an examination, for instance. The mind would be trained to remember specific pieces of information. "Natural unfoldment" or "self-actualisation" is in direct contrast to mental discipline. This approach enables students to unleash their potential and the teachers are there to support them. "Apperception" is a process where new ideas associate with old ones that the person already acquired. Teachers would present an idea the first time round and then expect students to associate this new idea with the one that pre-exists in the mind. Learning is, therefore, building on what is already known and widening the

range of possibilities of seeing the same thing (Bowden & Marton, 1998). This view of learning requires the application of integration and spiralling.

2.3.3.1 Behaviourism

The theories that followed in the 20th century were "behaviourist" and "cognitivist" and Taylor and Hamdy (2013) classify these as instrumental learning theories. Most of these learning theories fall into two major families: "stimulus-response" (S-R) theories and "cognitive" theories (Bigge, 1982; Knowles, 1990). The stimulus-response theories include those of theorists like Thorndike, Pavlov, Guthrie, Skinner and Hull. B.F. Skinner was regarded as the leading behaviourist of the 20th century (Williams, 1999). The cognitive theories are included in the works of Tolman and classical Gestalt psychologists and are discussed below.

"Behaviourist" theories emanated from studies on animal behaviour. For example, Pavlov monitored the secretion of saliva by hungry dogs after placing food and sounding a bell. He observed that the dogs would eventually salivate at the sound of the bell. Pavlov called this "classical conditioning" where the dog was conditioned to the sound of the bell, associating it with the coming of food. Pavlov believed that learning was a process of building conditioned reflexes through the substitution of one stimulus for another. He conceived learners to be empty organisms, which responded to stimuli more or less randomly and automatically (Knowles, 1990).

Thorndike and Skinner followed up on Pavlov and carried out more comprehensive experiments on animals, dogs, cats and chickens (Bigge, 1982). Their experiments included placing a hungry cat in a cage with an inside lever to open the door leading to the food outside of the cage. This cat would jump about scratching on the cage until it incidentally moved the lever which opened the cage. With time, Thorndike observed that the time it took the cat to open the lever reduced until the hungry cat went straight for the lever each time it was caged. This was the birth of "trial and error", a concept which became popular in education. He further promoted the stimulus-response psychology of learning, for example stating that: "…through conditioning, specific responses come to be linked with specific stimuli" (Bigge, 1982:53).

A teacher who subscribes to behaviourism believes students are passive organisms who respond only to stimuli from the external environment. This teacher emphasises and repeats those sections of the curriculum that he/she considers important. Thorndike's Law of Effect may be the basis for reward for high achievement and punitive measures for non-performance in the education arena.

In the mid-20th century, various proponents of behaviourism proposed educational strategies that still have a significant influence in present-day education. Robert Mager wrote a book on preparing instructional objectives which provided major stimulus in the introduction of behavioural objectives in education (Melton, 1978). Guilbert (2002) asserts that knowledge is not only memory of facts but what you do with it and sees objectives playing a fundamental role in minimising operational difficulties for the teacher and the learner. Behaviourism still has a place in medical education where curricula are outcome-based (competency based), meaning that achievement is measured against specific observable behaviours. Learning is assessed in terms of skills that are both observable and measurable because of the difficulty in measuring covert changes (Williams, 1999). Progression from one year of study to the next is determined by attainment of an acceptable cut-off score in each of the specified behaviours. Assessment of the performance of a behaviour appeals to the integration of knowledge and skills or application of learning. It may be concluded that well-structured learning opportunities that link theory to application promote integration of learning.

This dominance of behaviourism in modern-day education is further emphasised by the use of behavioural objectives as a means for structuring teaching and assessment in taxonomies, which will be discussed later.

2.3.3.2 Cognitivism and Piagetian Epistemology

The cognitivists criticised the behaviourists holding a view of learning that was in stark contrast to the latter. According to Taylor and Hamdy (2013), cognitive learning theories are concerned with learning in the mental and psychological processes of the mind, not with behaviour. Qualitative change in the organism is considered more important than the observable quantitative behaviour. The role of experience is elevated in determining future behaviours and choices. Cognitivists are concerned

with perception and the processing of information. This is the essence of epistemology.

Epistemology is an area of philosophy concerned with the nature and justification of human knowledge (Hofer & Pintrich, 1997:88). Epistemology is the study of theory of knowledge and attempts to answer the questions: "*What is knowledge?"* "*How is or should it be acquired, tested, stored, revised, updated and retrieved?"* (Kitchener, 1987). According to Bower and Hilgard (1981:2):

> …one of the most engaging issues within the theory of knowledge is the question of how concepts and knowledge arise, and what is the relation between experience and the organization of the mind.

Bower and Hilgard offer alternative epistemologies which include empiricism and rationalism. These are opposing positions where "empiricism" is the view that experience is the only source of knowledge while "rationalism" is the general philosophical position that reason is the prime source of knowledge (p.3). Prominent rationalist philosophers include Descartes and Kant.

Jean Piaget is one of the most eminent figures in 20th century psychology and epistemology and his work has been cited as the single most comprehensive theory of intellectual development (Marton & Booth, 1997; Moseley *et al*., 2005). As a genetic epistemologist, Piaget's studies focused on the biological and developmental growth of children. According to Kitchener (1986) genetic epistemology is the study of the passage from states of lesser knowledge to states of more advanced knowledge, including the study of the (intellectual, epistemic) mechanisms of the increase of knowledge. The central question of Piaget's genetic epistemology is:

> How is it that the human mind goes from a state of less sufficient knowledge to one judged more sufficient by logicians, or experts in the particular scientific area? (Piaget, 1970:12-13).

In looking at cognitive development, the nature of knowledge itself and how humans come gradually to acquire, construct, and use it, Piaget postulated that knowledge is acquired through the process of "assimilation" and "accommodation" (Kitchener, 1993).

In “assimilation” an individual takes in signals from the external environment in accordance with the internal structure of the individual. This is learning by addition, meaning that the new element is linked as an addition to a scheme or pattern that is already established (Bower & Hilgard, 1981; Furth, 1981). In assimilation, the “results of learning are characterised by being linked to the scheme or pattern” that is already established “in such a manner that it is relatively easy to recall and apply when one is mentally oriented towards the field in question” (Illeris, 2003:402).

In “accommodation”, the organism changes itself in order to take in influences from the environment (Illeris, 2007). Piaget (1977:68) sees this as a progressive theory change, retaining as much as possible of the original theory while integrating the disturbance as a new variation – hence eliminating it as a disturbance.

Although Piaget carried out his studies on children, Kolb (1984:25) observes that Piaget’s cognitive development theory identifies those basic developmental processes that shape the basic learning process of adults (Figure 2.3). For Piaget, the dimensions of experience and concept, reflection, and action form the basic continua for development of adult thought.

> The process of cognitive growth from concrete to abstract and from active to reflective is based on this continual transaction between assimilation and accommodation, occurring in successive stages, each of which incorporates what has gone before into a new, higher level of cognitive functioning (p.23).

According to Rowell (1989), Piaget attributes these dynamics of knowledge growth to his principle of equilibration, or self-regulation. New knowledge is a result of equilibration, a regulatory process which is the product of learning experiences of varying degrees of complexity (Piaget, 1987). The generation of new knowledge develops possibilities that are not observable because they are constructed by the learner. It also follows that generation of more possibilities results in richer interpretations, thereby increasing the complexity of the knowledge gained.

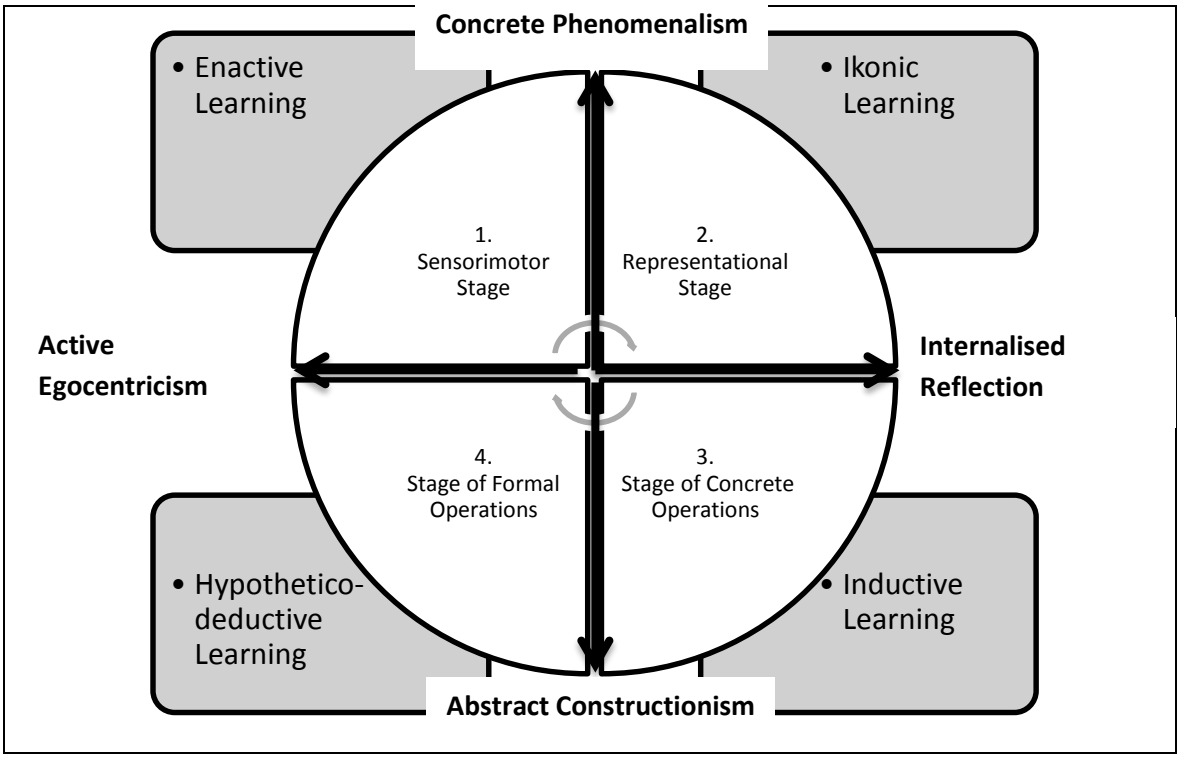


Figure 2.3: Piaget's model of learning and cognitive development (adapted from Kolb, 1984:25)

Piaget goes on to link possibilities with variation because variation creates gaps which create further possibilities. The mental schemes already formed need to be flexible in order for learning to occur. This has educational implications in that teachers have a role in creating opportunities for possibilities and eliminating resistance from the environment. The functioning of the structures is an internal process which is not observable. What is observable is the behaviour which is, however, affected by the attitudes and motivation to the new learning. Piaget suggests that educators should look for behavioural manifestations which may be communicating the attitudes and motivation.

This explanation of Piaget's cognitive development shares some similarities with experiential learning theory which will be discussed in ensuing sections. Of note is that cognitive processes also contribute to behaviour because perceptions of events, rather than the events themselves, are thought to ultimately influence behaviour (Williams, 1999). Therefore, for teachers to understand a student's reaction to a situation, they need to know the student's interpretation of that situation. On another note, although some cognitivists have maintained an affinity with behaviourism, the cognitive emphasis on thinking more readily blends with the

humanistic emphasis on affect, hence cognition and affect converge in the construct of personal meaning (Williams, 1999:47).

Cognitive development according to Piaget (1977) occurs when there is integration of new learning with old learning. Therefore, the teacher plays a role in enabling learners to link new learning with the knowledge they already accommodated in their cognitive structures.

2.3.3.3 Humanist Learning Theory

Humanist learning theory makes emotion (an internal psychological phenomenon) the focus of psychological study because feelings are viewed as primary contributors to behaviour (Williams, 1999). In placing important emphasis on the role of internal psychological processes in learning, this theory overlaps with cognitivism, discussed in the previous section.

Abraham Maslow's theory, which views motivation as an internal drive or need, subscribes to humanism. Maslow (1943; 1981) identified five types of hierarchical needs and theorised that a higher need will emerge when a lower one has been satisfied. More importantly, these needs are inner drives which are inherent in the organism's choice of future actions. In addition, external forces exert influence upon an organism's actions. Since the emergence of a higher need is contingent upon the satisfaction of a lower one, educators need to observe the possibility of unsatisfied needs preventing an individual's movement of growth to higher levels. Maslow further asserts that behavioural consistency is linked to how one feels, what he knows and how he acts. Behaviour change will occur only if the individual feels the need to change. Along with Carl Rogers, Maslow (1981) developed a humanistic or person-centred theory which emphasises the importance of paying attention to the educational environment (Dennick, 2012). Malcolm Knowles' principles of adult learning are rooted in the humanist philosophy (Holton, Swanson, & Naquin, 2001).

On self-actualisation and alluding to the importance of integration because of the quest to continually seek knowledge, Maslow (1943:385) purports that:

> Even after we know, we are impelled to know more and more minutely and microscopically on the one hand, and on the other, more and more extensively in the direction of a world philosophy, religion, etc. The facts that we acquire, if

> they are isolated or atomistic, inevitably get theorized about, and either analyzed or organized or both. This process has been phrased by some as the search for 'meaning'. We shall postulate a desire to understand, to systematize, to organize, to analyze, to look for relations and meanings.

In humanist learning theory, the role of the teacher is to make the educational environment motivating enough for students to learn in an integrated fashion. According to Maslow (1943), humans strive for meaning at the self-actualisation level (creativity, problem solving), therefore, integration is something they are almost hard-wired to do if there are no barriers in their way.

2.3.3.4 Constructivism and the Role of Culture / Society

"Constructivism" is a view of learning which is concerned with how learners construct an understanding (Dennick, 2012). In many ways, constructivism overlaps with cognitivism and humanism and Dewey and Piaget have been associated with its origins. Construction of understanding is influenced by the involvement of learners in the learning process and the need to enable them to build on their previous learning and experiences as they construct new knowledge.

According to Dennick (2012), while Piaget seemed to focus on individual development through a child's logical and mathematical reasoning, Vygotsky was interested in the way culture and society shaped thought structures in children. Vygotsky emphasised the social and cultural nature of learning. Individuals have an inherent potential for growth and development in problem solving. They, however, need societal assistance in that growth path (Daniels, 2004; Vygotsky, 1994). According to Davydov and Kerr (1995:16): "…Vygotsky understood the mechanism of determining individual consciousness by activity as mediated by culture and by the ideal."

With assistance and some form of nurturing, individuals can grow so that they can perform independently in future.

The role of peers has been reported in "scaffolding", a concept which is linked to Vygotsky's Zone of Proximal Development (Dennen & Burner, 2007). The Zone of Proximal Development is the distance between what is already known and what must still be learned and it is thought that because of cognitive congruence, peers feel this Zone of Proximal Development much more easily than teachers (Ten Cate

& Durning, 2007). “Scaffolding” is associated with providing students with the support they need for accomplishment of a task. This support is withdrawn gradually as the student acquires the necessary knowledge and skills (Sharma & Hannafin, 2007). Studying with peers may provide scaffolding which may have a positive effect on motivation and confidence to learn. In support of this important finding, Jordan, Carlile and Stack (2008) recommend peer learning to meet the social needs of students.

The relationship between cognitive operations and the role of culture has been echoed by Feuerstein in his “mediated learning experiences” which in effect elaborates Vygotsky’s Zone of Proximal Development (Moseley *et al*., 2005:56). Feuerstein believes that an organism has an inherent capability that needs a mediator’s assistance or intervention. The intervention should be timely and carefully planned to match the organism’s needs at any given time.

According to Knowles (1990) Dewey’s system is organised around several key concepts: “Experience”, “Democracy”, “Continuity”, and “Interaction” and this is echoed by Dewey himself when he concludes:

> The trouble with traditional education was not that it emphasised the external conditions that enter into the control of the experiences but that it paid so little attention to the internal factors which also decide what kind of experience is had (Dewey, 1938:42).

It would seem that Piaget, Vygotsky and Dewey’s ideas are congruent at some point (Bruner, 1997; Duncan, 1995). Glassman (1994) posits that there is little doubt that Piaget’s work informs Vygotsky’s theoretical perspective. The concepts by Dewey point to the role of cultural forms and meanings in perpetuating higher forms of human thought, a flavour of Vygotsky; his emphasis on the nurture of independent reasoning resembles Piaget’s thinking. Mayer (2008) examined Dewey’s dynamic integration of Vygotsky and Piaget and saw Dewey as a mediator between Vygotsky and Piaget. In contrast, Smith, Dockrell and Tomlinson (1997) believe that, although Piaget was not explicit regarding the role of social factors in cognitive development, Vygotsky’s work supports Piaget’s views.

Polanyi (1967), in recognising the strength with which people hold opinions and understandings which make change difficult, placed a strong emphasis on dialogue.

Dialogue is instrumental in shifting tacit knowledge; and this knowledge is a pre-logical phase of knowing which comprises a range of conceptual and sensory information that can be brought together to help form new understanding. From a social constructivist perspective the social context plays a central role in learning. The process of "knowledge development" is thought to originate internally but facilitated by social interaction with the outside world (Vygotsky, 1994).

Although there is some criticism that constructivism is an epistemological position that does not lead to a pedagogical method as reported by Dennick (2012), constructivism has important implications for teaching and learning (Kaufman, 2003). The constructivist teacher facilitates learning rather than transmitting knowledge. The teacher also respects prior knowledge and employs interactive techniques which facilitate the student's ability to build on it. Learning opportunities that include dialogue are encouraged to enable the learner to integrate new learning and construct new meanings.

2.3.3.5 Whole Brain or Brain-based Learning

Some of the focus on how the brain works has illuminated Piaget's pronouncements. The human brain is a complex system which changes structurally and functionally as a result of learning and experiencing (Respress & Lutfi, 2006). The concept of whole brain learning bridges the gap between the unique individual learner and the design and delivery of learning (Knowles, 1990).

In the view of Jensen (2008) brain-based education is the engagement of strategies based on principles derived from the understanding of the physiology of the brain. Jensen further asserts that the brain does not learn on demand by a school's rigid, inflexible schedule because it has its own rhythms. This resonates with the teachings of Dewey, Piaget, Vygotsky and all other authorities who were opposed to mechanistic theories.

The teacher's role in providing challenging and interactive learning opportunities enables the brain to generate new neural connections and pathways, which make it possible to assimilate information and this bodes well with integration of learning (Respress & Lutfi, 2006).

2.3.3.6 Situativity and Social Learning Theories

"Situativity" and "social learning" theories borrow from each other with significant overlaps that make a clear distinction between them an unnecessary task for the scope of this study. "Situativity" theory refers to theoretical frameworks which argue that knowledge, thinking and learning are situated in experience (Durning & Artino, 2011). A well-known proponent of this theory is Lave (1991:68) who contends that:

> …when something is situated, it implies that a given social practice, such as teaching or learning, is intricately interconnected with other aspects of ongoing social processes.

Hodkinson (2005) affirms that learning is complex and relational as there is no simple logical starting point from which other interrelated variables can be understood. As a result, changing one factor may result in others changing too. Therefore, each factor can only be understood in relation to others. The effects of informal learning and the hidden curriculum also contribute to the differences in what and how learners shape their identities with respect to different practices. To understand what is being learned and how, there is need to explore each practice (Lave, 1996).

Most social learning theories evolved from cognitive psychology but the "experience" aspect has connections with Vygotsky and Dewey's teachings. Albert Bandura's "social learning" theory is a blend of behaviourism and cognitivism with a flavour of humanism as he describes learning as:

> …internal representations of behaviour being construed through informative feedback resulting from one's direct behaviour, one's observation of examples of behaviour in other people, and the consequences of both (Bigge, 1982:161).

This highlights the role of modelling and its impact in influencing future actions. Bigge (1982:11) classifies Bandura as a contemporary exponent of behaviourism. Bandura is well known for his "social learning" theory which emphasises the importance of observing and modelling the behaviours, attitudes, and emotional reactions of others (Bandura, 1971). The same author explains that this theory observes human behaviour in terms of continuous reciprocal interaction between cognitive, behavioural, and environmental influences. Bandura's work is related to

the theories of Vygotsky, Lave and Wenger who emphasise the central role of social learning.

In “social cognitive” theory, Bandura (1991:248) also contends that:

> …human behaviour is extensively motivated and regulated by the ongoing exercise of self-influence. The major self-regulative mechanism operates through three principal sub-functions which include self-monitoring of one’s behaviour, its determinants, and its effects; judgment of one’s behaviour in relation to personal standards and environmental circumstances; and affective self-reaction. Self-regulation also encompasses the self-efficacy mechanism, which plays a central role in the exercise of personal agency by its strong impact on thought, affect, motivation, and action.

Behaviour is influenced by its consequences much of the time (Bandura, 1974). In Skinner’s behavioural model, consequences are thought to have a more powerful impact on behaviour than do antecedents – events that set the stage for the behaviour (Williams, 1999). In Bandura’s self-efficacy theory, people’s judgements of their own ability to deal with different situations are central to their actions (Kaufman, 2003). Depending on their assessment of their own self-efficacy, students will determine how much effort to invest in learning activities, and how long they will persist against all odds. Assessment of self-efficacy can motivate or dampen zeal in learning. Successes raise self-efficacy while failure lowers it. The teacher has a role in raising the self-efficacy of students by providing opportunities for observation of positive role models followed and by providing informative feedback.

Bandura (1971; 1977) explains that, from observing others, one forms a conception of how new behaviour patterns are performed and, on later occasions, the symbolic construction serves as a guide for action. In a study by Lefroy, Brosnan and Creavin (2011) medical students were found to gauge their capabilities not only through their own performance, but also by observing their peers perform. The initial approximations of response patterns learned observationally are further refined through self-corrective adjustments based on informative feedback from performance.

The implication of social learning theories to integration of learning and pedagogy is that instead of focusing on information giving only, teachers must also pay

attention to the situations in which the information can be used – that is, application of the learning.

Section 2.3.3 has discussed the theories that illuminate how learning takes place. Several theorists have linked new learning to previous learning. Those who believe that learning originates externally – like the behaviourists – also recognise the influence of previous learning on behaviour. Piaget's cognitive development of assimilation and accommodation seems to have influenced most learning theories with an emphasis on the integration of new learning with old learning. The next section will discuss 21st century theories of adult learning.

2.3.4 21st Century Theories of Adult Learning

From around the mid-20th century, there have been efforts to professionalise the field of adult education and develop its own knowledge base which differentiates adult learning from learning in childhood (Merriam, 2001). According to Merriam (1996:136), three of the most prominent efforts to codify these differences – andragogy, self-directed learning, and transformational learning – constitute most of the knowledge base of adult learning theory.

According to Merriam (1996:136):

> Whether one is involved in undergraduate, graduate, or continuing professional education, the learning transaction can be enhanced by understanding how adults learn and the conditions under which adults learn best.

Adult learning is the primary concern of andragogy, self-directed learning and transformative learning.

2.3.4.1 Andragogy

"Andragogy", a concept that Malcolm Knowles promoted, was grounded in several assumptions he made about the nature of the adult learner (Rachal, 2002). Translated from the Greek words *"paid"* meaning *"child"* and *"agogus"* meaning *"leader of"*, "pedagogy" literally means the "art and science of teaching children" (Knowles, 1970; 1990:54). The pedagogical model of teaching has thus been largely teacher directed and adults have also been taught this way to a great extent. In contrast, "andragogy" is the "art and science of teaching adults". Malcolm Knowles,

having a great interest in the art and science of teaching adults and influenced by John Dewey's progressive education, put together a unified framework about adult learning (Holton *et al*., 2001). This is a framework which is supported by the learning theories discussed earlier, by experience and by other research about the unique characteristics of adult learners.

Malcolm Knowles' andragogical model presented below (Knowles, 1970; Knowles, 1980; Bryan, Kreuter & Brownson, 2009) provides useful suggestions for improving the effectiveness of learning – also of medical students, who are adults. It should be noted that the points discussed in this model are not mutually exclusive. They are interlinked and complement each other.

1. ***The need to know***. To increase their motivation, learners need to know the relevance of all the aspects of the course that they are supposed to master and how the learning contributes to the ultimate outcomes.

2. ***The learner's self-concept***. Adults have a deep and perhaps subconscious need to be self-directing, therefore, learning needs to move from being teacher-dependent to self-directed.

3. ***The role of the learner's experience***. Teachers need to be cognisant to the varying durations needed by learners to assimilate and accommodate learning.

4. ***Readiness to learn***. Adults become ready to learn in developmental stages so they need to feel comfortable enough. Teachers need to gauge these stages so that learning experiences match the learner's level of cognitive development. In medical education the timely acquisition of skills is critical so this movement can be facilitated by exposure to models and simulation before real-life experiences.

5. ***Orientation to learning***. Adults' orientation to learning is life-centred or problem-centred with evident application to real-life situations. This school of thought may have contributed to the movement towards problem-based learning and the call for early exposure of learners to real-life situations.

6. ***Motivation***. Abraham Maslow and other humanists like Carl Rogers demonstrated the close link between motivation and learning. The process of accommodation is more demanding than assimilation and, therefore, there is a tendency for learners to avoid this aspect of learning if they have no strong motivation for it.

Malcolm Knowles' andragogy has not gone without criticism. On the role of internal and external motivation influencing learning, Misch (2002) argues that these factors are context-dependent, not easily distinguishable and interrelate with one another in a complex way. While adult learning principles have tremendous intuitive appeal, Stagnaro-Green (2004) concedes that they have not undergone rigorous analysis. In defense of adult learning principles, he points out that it is important to acknowledge that our present medical educational system lacks supporting data as well. Further to this, Alexander (2006:258) refers to the importance of speculation in educational psychology by stating that speculation allows us to fill in the empirical spaces, to conjecture about phenomena that cannot be directly weighed or measured, and to bridge rationalism and empiricism. Early in the 20th century, speculative psychology was regarded as mental psychology or mind reading and was progressively replaced with experimental psychology (Thorndike & Woodworth, 1901). Speculation may also serve as the founding ground for empirical research.

Several other studies have examined the intimate relationship of perception, affect and motivation and their role in learning. Perceptions of events, rather than the events themselves, are thought to determine behaviour and cognition and affect converge in the construct of personal meaning (Williams, 1999; Dirkx, 2001; Dirkx, 2008). Williams (1999:52) contends that: "…understanding a particular behaviour requires one to look beyond the situational context to the student's perception of that context."

From the above, it seems that identifying students' perceptions might form the basis for identifying appropriate interventions for improved learning.

2.3.4.2 Self-directed Learning

Houle, Tough and Knowles pioneered research in self-directed learning (Merriam, 2001). Self-directed learners are independent and able to take control of their own learning. Similar to andragogy, self-directed learning is humanistic and learning tasks are within the control of the learners who are empowered to take personal responsibility for their own learning (Kaufman, 2003). A recent strategy that seems to correspond with self-directed learning is the "flipped" classroom (McLaughlin *et al*., 2014). This is a student-centred content acquisition which is self-paced and

self-guided, enabling students to control when and how much content they view (p.237).

Self-directedness is important for adult learning in a group setting and learners should be encouraged to have choice and control whenever possible (Knowles, 1970; 1980). Studies on the application of the components of self-directed learning include paying attention to contextual influences on the interaction between the teacher and student; motivation and responsibility to self-direct learning which requires collaborative control of the educational transaction; and self-monitoring which includes the ability of students to monitor their cognitive processes (Lefroy *et al*., 2011; Mazmanian & Feldman, 2011; Pilling-Cormick & Garrison, 2007). Integration of learning happens in an environment that is controlled by the structure of the programme. This environment contributes to the conditions that make it possible to learn because educational context contributes significantly to learning potential (Hays, Lawson & Gray, 2011; Ling & Marton, 2012; Manning, McKinley & Chipamaunga, 2010).

2.3.4.3 Transformative Learning

There is no single model of “transformative learning”, according to Grabove (1997). There are many facets of transformative learning theory and practice that go beyond the scope of this chapter, therefore, only the pertinent ones will be discussed. Paulo Freire’s (1993) notion of transformative learning is conscientisation or consciousness-raising. Freire believed that there was no neutral education as it can either domesticate individuals or liberate them. He, therefore, propagated a dialogical approach to education so that individuals can reflect critically on their actions with a view to transforming them (Mayo, 1997). According to Illeris (2004; 2009) transformative learning is an extensive and comprehensive type of learning.

According to Dirkx (1997; 1998), Jack Mezirow’s work is perhaps the most well-known of theories of transformative learning in the field of adult education. Mezirow introduced transformative learning to the field of adult education in 1981 (Erickson, 2007). Mezirow (2003:58), who was influenced by Habermas and Freire, defines “transformative learning” as:

> Learning that transforms problematic frames of reference – sets of fixed assumptions and expectations (habits of mind, meaning perspectives, mindsets) – to make them more inclusive, discriminating, open, reflective, and emotionally able to change.

Transformative learning takes place through discourse which means dialogue involving the assessment of beliefs, feelings and values (Dirkx, 2000; Mezirow, 1997a). This way, learning can reach its ultimate goal which is to deliver autonomous, socially responsible thinkers.

To facilitate transformative learning, the following is a summary discussion of the suggestions by Mezirow (1991; 1997a; 1997b; 2000; 2003):

1. Educators must help learners become aware and critical of their own and others' assumptions and participate effectively in discourse. The ideal conditions of discourse are also ideal conditions of adult learning and of education.

2. New information be incorporated by the learner through an active process involving thought, feelings and disposition.

3. Educators must assume responsibility for setting objectives that explicitly include autonomous thinking and recognise that this requires experiences designed to foster critical reflectivity and experience in discourse.

4. Education must be learner-centred, participatory and interactive with group deliberation and group problem-solving.

5. Instructional material should reflect the real-life experiences of the learners.

6. To promote discovery learning, the educator often reframes learner questions in terms of the learner's current level of understanding.

7. Learners are helped to actively engage the concepts presented in the context of their own lives and collectively critically assess the justification of new knowledge.

8. Useful methods include critical incidents, concept mapping, and consciousness raising.

9. To foster self-direction, the emphasis is on creating an environment in which learners become increasingly adept at learning from each other.

It is apparent that, in many ways, andragogy and transformative learning share similar tenets that shape adult learning theory. According to Houle (1974:438):

> …if you teach a person what to learn, you are preparing him for the past. If you teach him how to learn, you are preparing him for the future.

This underpins efforts that recognise adult learning theories and the self-directedness of adult learners who become life-long learners.

Having reviewed the core concepts and assumptions integral to each of the major approaches to learning theory, the challenge is to determine their strengths and limitations with respect to the task of better integration of learning in medical education. This is not an easy task given the significant overlaps in schools of thought. There is no clear choice of a theory as they all have a place in medical education and thus are applicable at some point or other. Driscoll (2000) argues that, with the exception of behaviourism, the rest of the theories are limited in scope because each proposes instructional methods for the necessary learning conditions for a particular type of learning goal.

As a result, it would seem that current curriculum patterns and current methods of teaching reflect traces of all historic learning theories discussed above:

> In effect, the study of the psychological principles underlying curriculum and teaching is somewhat akin to an archaeological expedition: one can find fossilized remains of almost any learning theory that ever existed, no matter how outdated or how discredited it may be … Both the teaching and the curriculum of today reflect composites of many different theories of learning, sometimes unrecognized by those who practice them (Taba, 1962:77).

While Taba made these pronouncements half a century ago, they still hold relevance in present-day teaching. The reason for this persistence with what may be considered archaic practices may be the fact that today there is no coherent theory which encompasses consistently all aspects of learning.

2.3.5 Learning According to the Phenomenography Theory of Learning

According to Biggs (1999:60) there are two main theories of learning within the student learning paradigm: “phenomenography”, and “constructivism”.

“Constructivism” was discussed in Section 2.3.3.4. Learning according to the “phenomenography” paradigm is discussed below.

The origins of learning according to phenomenography can be traced back to the work of Ference Marton and the Göteborg Group (Gibbs, Morgan & Taylor, 1982). Ference Marton and colleagues took a different perspective into student learning by describing learning in ways which gave fresh insights into what learning consists of:

> Relatively little research has ever attempted to describe what students understand. Instead it tends to describe how much has been learned (p.124).

In phenomenography learning implies experiencing, understanding, perceiving or seeing something in a different way. To learn is to be aware of critical aspects of what is learnt because:

> The way we experience or understand something depends on what aspects we are aware of and can discern simultaneously (Runesson, 2006:397).

According to Bowden and Marton (1998:7):

> We act and react to a situation as we see it and the way we see it decides how we act. Effective action requires an effective way of seeing…the most important form of learning is that which enables us to see something in the world in a different way.

From the above, the implication is that there has to be variation in what students see for learning to take place. Learning is a way of interacting with the world and, as people learn, their conceptions of the phenomena change and they see the world differently (Biggs, 1999). Along the same lines, Marton, Runesson and Tsui (2004) describe learning as being aware of variation and that successful learners are able to be aware of variation in several different aspects of the object of learning simultaneously.

According to Marton and Booth (1997:84):

> ...the verb “to learn” has to have an object, but the blunt grammatical statement hides the fact that…in a sense it actually has two objects!

With reference to Figure 2.4 the principal object of learning is the "**What**" aspect, the direct object. This is the content that is being learnt. The "**How**" aspect refers to the experience of the way in which the act of learning is carried out.

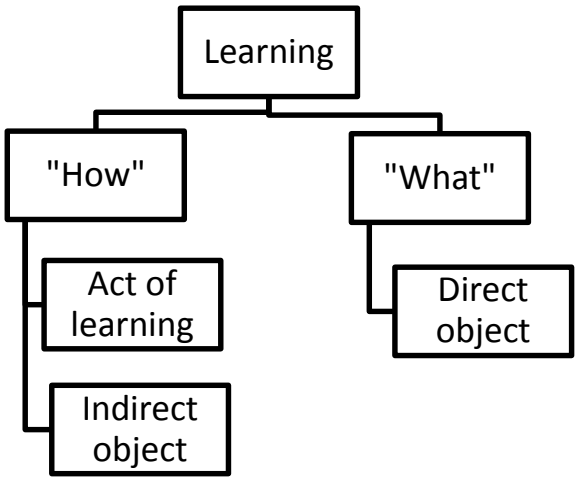


Figure 2.4: Learning in phenomenography (adapted from Marton & Booth, 1997:85)

The type of capabilities the learner is trying to master is the indirect object of learning (p.84). From Marton and Booth's (1997) explanation, the object of learning is intentional and the purpose may be to reach the phenomena the act points to, understanding that which is being learnt or committing it to memory. It can be simply put that when a learner is confronted with new information, the direct object, the learner will have their own conception of how to learn the content and the capabilities they need to master; and these conceptions vary qualitatively.

Marton and Booth (1997) further explain that the "**What**" and the "**How**" are inextricably related as they are different facets of an undivided whole. The authors also advise that in attempting to investigate learners' experiences of learning the researcher may focus on any of the aspects. This means that the researcher may investigate qualitative differences in the experiences related to the direct object (the content). Learners can also be asked to reflect and comment on their way of learning, that is, what outcomes or capabilities they are aiming at – the indirect object. The researcher may also be interested in what strategies students adopt to learn – the act of learning.

The essence of this study is to investigate this type of learning in order to reveal students' experiences of the phenomenon of integration.

2.3.5.1 Relationship between Teaching and Learning

This section briefly reviews the literature pertaining to "teaching" and "learning". Looking at teaching and learning broadly means including all the aspects that are perceived to impact on teaching and learning – that is, the teacher, the student and curriculum which forms the general environment in which the teaching and learning take place. These are important issues in enabling integration of learning. There are several studies on the relationship between teaching and learning as this is a cardinal issue in education. Previously Ramsden (1989:411) introduced his research on student learning and perception of the academic environment by asserting that: "Little systematic thought has been given to the design of academic environments which encourage student learning."

By this time, several studies that had been carried out did not show, either by students' self-reports or by objective measures, that students' learning is related to their perceptions of the environment (p.413). In this study, students attached importance to staff understanding of their learning needs and that a student's approach to learning was affected by his perception of the task, which, in turn, is influenced by the level of interest, personal commitment, and previous knowledge (p.426). In order to improve teaching and learning rather than only changing student's erroneous approaches and perceptions, there is a need to focus on both students and teachers and not treat the two separately (Åkerlind, 2005; Boulton-Lewis, Smith, McCrindle, Burnett & Campbell, 2001; Entwistle, 2007; Ramsden, 1979; Ramsden, 1989).

According to Entwistle (1991) and Entwistle and Peterson (2004) there is a close link between approaches to learning and the context of the learning. Approaches to learning can, therefore, be altered by contextually directed interventions. Trigwell, Prosser and Waterhouse (1999) designed the Approaches to Teaching Inventory to gain a deeper understanding of the relationship between students' approaches to learning and teachers' approaches to teaching. What teachers do in their classes

and what students achieve are affected by many factors but teachers are not always aware of the influence of these factors on their teaching (Bowden & Marton, 1998).

On writing about contentions on the merits of educational research, Kennedy (1999) observes that while the relationship between teaching and learning is most central, it is also most perplexing and least understood. Teachers find studies valuable when the studies give them a deeper understanding of this fundamental relationship (p.528). In an unpublished presentation at Michigan State University, Kennedy (2007) explains why many teachers are influenced by habit and not thought and knowledge. Often planning time is insufficient so teachers rely on routines and habit; timetable slots are invariable whether students are sullen and unresponsive or excited and engaged; and the relationships in the teaching and learning situation are uncertain because learning is internal to the student.

Nuthall (2004) contends that teachers must always be creating and adapting methods to meet the requirement of the curriculum but, for this to happen:

> …teachers must understand how their actions, assessment practices, and behaviour and task requirements affect what is going on in the minds of their students. In other words, they need insight into the learning processes occurring in their students' minds and how their teaching interacts with those processes (p.276)

This understanding supports the need for this study, to gain insight into the integrative processes that go on in students' minds. It seems logical that such understanding would guide teachers into designing and implementing integrative learning opportunities.

2.3.5.2 Students' Approaches to Learning

Understanding how students learn, with the aim of promoting more useful approaches to learning, has been the focus of research spanning several decades (Busato, Prins, Elshout & Hamaker, 2000; Dahlgren & Marton, 1978; Denton, 2011; Drago-Severson *et al*., 2001; Felder, 1988; Felder, 1996; Martin, Prosser, Trigwell, Ramsden & Benjamin, 2000; Prosser, Ramsden, Trigwell & Martin, 2003; Reid, Evans & Duvall, 2012). In discussing "approaches to learning", a comparison with a closely related concept, "learning style", will be made.

Furnham (2011:589) makes a distinction between “approach to learning” and “style of learning” as follows:

> …an approach to learning is mainly about motivation while style of learning (thinking) is about preference.... Both learning approach and style seem to be a function of many things, including a person’s ability, personality, and values; how learning is evaluated; and the subject being studied….According to the presage-process-product model, certain characteristics of the student (including their prior educational experiences, their personality, and their ability) as well as their learning context (how they are taught and assessed) influence their perceptions of that context (clarity of goals, satisfaction with teaching).

A learning style refers to the many ways in which students learn and Felder (1988:849) observes that:

> ….while the neurological processes involved in learning may be essentially the same for everyone, there are widely varying styles of implementing them. People preferentially perceive different types of information; tend to operate on perceived information in different ways.

From Felder’s observation, a “learning style” is a cognitivist description of how students learn while an “approach to learning” is a description of how students learn as influenced by the environment and motivation (Furnham, 2011). It seems that learning style may influence approach to learning, therefore the two are interrelated but not conflated. “Learning style” is more cognitivist while “approach to learning” is more phenomenographic as it describes a learning experience in a non-dualist perspective (Trigwell & Prosser, 1997).

Understanding one’s learning style and the dynamics of motivation can have a positive effect on a learner’s resilience (Hall & Moseley, 2005). In a study on the styles of learning of engineering students, Felder and Silverman (1988) observed that, in general, the teaching presented did not match the learning styles of the students as follows:

- More than half of engineering students were sensors but the education favours intuitors.
- Most students tend to be visual while most instruction is predominantly auditory.
- More than half of the students consider themselves to be inductive learners while almost every course is taught deductively.
- Many students are active or reflective learners but most classroom instruction does little for either one but sit passively.

Following their study on engineering students, Felder and Silverman (1988:674) proposed learning styles in Table 2.1.

Table 2.1: Dimensions of learning and teaching style

Preferred Learning Style		Corresponding Teaching Style	
sensory intuitive	perception	concrete abstract	content
visual auditory	input	visual verbal	presentation
inductive deductive	organisation	inductive deductive	organisation
active reflective	processing	active passive	student participation
sequential global	understanding	sequential global	perspective
(Source: Felder & Silverman, 1988:675).			

The problem that student diversity brings into education is real and seems to need more urgent attention now. Chapman and Calhoun (2006) suggest that taking student learning styles into account improves student motivation and to learn. As observed at the researcher's academic institution, there is an increase of students from disadvantaged backgrounds making their way into educational institutions where the curricula, including the environment, were designed to cater for the student who comes in with a firm academic grounding. Biggs (1999:57) made a pertinent observation that:

> In the days when university classes contained highly selected students, at university by choice, the traditional lecture followed by tutorial seemed to work well enough. Today, when the student population is quite diversified, many students seem not to be coping, while teachers feel they are being unfairly put upon. Some believe that these students should not be at university at all.

Biggs (1999) compares two students, one who goes about learning in an "academic" way and the other "non-academic". The "academic" student:

> …comes to the lecture with relevant background knowledge and a question she wants answered. In the lecture, she finds an answer to that question; it forms the keystone for a particular arch of knowledge she is constructing (p.57).

The "non-academic" student probably has no driving curiosity because he is there to obtain a qualification for a job so he may not even be studying in the area of his first choice. He has a less-developed background of relevant knowledge and he:

> …comes to the lecture with no questions to ask. He wants only to put in sufficient effort to pass. He sits in the same lecture as the academic student but he doesn't see a keystone, just another brick to be recorded in his lecture notes. He believes that if he can record enough of these bricks, and can remember them on cue, he'll keep out of trouble come exam time (p.57).

Prosser, Trigwell, Hazel and Waterhouse (2000) and Crossman (2007) suggest that background knowledge can affect the quality of students' learning and influences the way students perceive their teaching and learning situation and approach to their studies.

Marton and Säljö (1976) contend that learning has to be described in terms of its content considering differences in what is learned rather than how much is learned. In their study on qualitative differences in learning they contrast "deep learning" with "surface learning" as differences in students' approaches to processing learning. "Deep learning" is described as occurring when the learner is paying attention to gaining an understanding of the underlying meaning of the message, rather than to just knowing what the message is, which surface learning is. Deep learners pause and reflect on what they have read, and how it relates to previous learning (Marton & Booth, 1997:166). Prosser and Trigwell (1997a; 1997b) and Prosser, Martin, Trigwell, Ramsden and Leuckenhausen (2005) found a close link between teachers'

conceptions of teaching and learning and how their approaches to teaching influence how their students approach their learning.

Trigwell and Prosser (1997:243), on student learning, report that:

> …students who conceive of learning in a topic as a quantitative increase in knowledge, or memorising, are unlikely to be those who adopt a deep approach to the learning of that topic.

From the scenario by Biggs (1999) discussed above, it is evident that the academic student adopts a deep approach to learning while the non-academic student adopts a surface approach. This second student may have a weak attitude to schooling as Dirkx (2006:15) observed that:

> Affective issues influence why adults show up for educational programs, their interest in the subject matter, and the processes by which they engage the material, their experiences, the teacher, and one another.

Biggs (1999) proceeds to demonstrate that passive learning activities with a low level engagement of the student do not augur well for non-academic students. Such students need encouragement to use higher cognitive structures through active learning strategies like problem-based learning.

> Good teaching is getting most students to use the higher cognitive level processes that the more academic students use spontaneously (p.58).

These assertions by Biggs were supported by Prosser (2004) on researching on student learning with implications for problem-based learning. The findings in this study showed that the way students are experiencing learning in problem-based learning programmes is substantially different from the way students experience learning in traditional medical programmes. Groves, O'Rourke and Alexander (2003) and Norman (2006) have reported that use of higher cognitive processes happens as a high degree of mental flexibility and adaptability in clinical reasoning and this distinguishes experts from novices.

It would seem that studying plays an important role in cognitive science and Piagetian epistemology of how knowledge is acquired (Piaget, 1977; Biggs & Tang, 2007; Dennick, 2012; Kaufman, 2003). Students need time for assimilation and accommodation of new learning. This process requires comparing new learning to

the mental structures that were formed previously and reconstructing those structures to form new ones based on the new understanding. Students need to process the new information in order to make it useable and most of this cognitive activity is done during studying. However, the adoption of mind maps as an effective study strategy has been linked to the motivation to use them (Farrand, Hussain & Hennessy, 2002).

Learning is reported to be most durable when study is distributed over much greater periods of time (Rohrer & Pashler, 2010). The same authors allude to several other research reports which have recommended "spacing" of content and "interleaving" the learning of knowledge and skills. Spacing and interleaving enhance the learning of cognitive skills (Kornell, Castel, Eich & Bjork, 2010). Rohrer and Pashler (2010) suggest that interleaving can be achieved through rearranging content so that material from previous sections overlaps. This is supported by Lonka and Lindblom-Ylanne (1996) who intimate that their conception is to build up a knowledge base.

Although the importance of studying is recognised, due to the workload in the course, surface approaches to studying are sometimes adopted (Azer *et al*., 2013; Bowden & Marton, 1998; Hendricson & Kleffner, 2002; Prosser & Millar, 1989; West & Sadoski, 2011; Wilhelmsson, Dahlgren, Hult & Josephson, 2011).

Being influenced by Entwistle's findings, Felder and Brent (2005:58) re-iterate that:

> A goal of instruction should be to induce students to adopt a deep approach to subjects that are important for their professional or personal development….At the highest developmental level normally seen in college students (but not in many of them) individuals display thinking patterns resembling those of expert scientists and engineers. A goal of instruction should be to advance students to that level by the time they graduate.

Some study strategies have been linked to academic performance and teaching students to manage their time effectively has been recommended. West and Sadoski (2011), in their research on study strategies, report that time management and self-testing were related to academic performance in an integrated medical curriculum. While there is little information available about successful strategies for dealing with academic failure, it is logical that students who do not plan their time effectively set themselves up for failure in a programme as demanding as the medical degree (Sayer, Chaput De Saintonge, Evans & Wood, 2002).

For deep understanding of content students adopt varying approaches to studying – such as reference to others who are more experienced – an example of social learning theory. Observing and modelling behaviours of more expert performers is common in student learning (Bandura, 1971). The role of peers has also been demonstrated in studies on students' learning (Barber, 2012; Harlen & Crick, 2003). In line with social interdependence theory, other previous studies affirm that learning in cooperation with others is more effective than learning alone (Johnson, Johnson & Smith, 2007).

Halpern and Hakel (2003) intimate that information that is frequently retrieved becomes more retrievable and any information that is recalled grows stronger with each retrieval. Learning takes place through repetition that is embarked upon to create experiences of variation (Linder & Marshall, 2003; Marton, Wen & Wong, 2005; West & Sadoski, 2011).

Wilhelmsson *et al*. (2011:161) conducted a phenomenographic study on the features of understanding the subject of Anatomy in a medical education context and:

> When the students discussed their understanding, it was necessary for them to define an opposite of understanding, which they termed 'rote learning' or 'memorization'..... Two aspects of meaningfulness in learning anatomy can be distinguished in the interviews; one giving the learner a sense of relevance for the future profession and another giving the learner a sense of understanding. The two can be regarded as employing different kinds of logical reasoning. Providing a causal reason for anatomy, connecting areas like physiology, can render the anatomical knowledge meaningful through linking it with more general functions of the human body (causal logic).

The students in the study above experienced Anatomy as a subject linked to an accumulation of facts, memorisation and rote learning. Meaningfulness of the subject could be enhanced by linking it horizontally with other subjects.

From the above discussion it is apparent that there are differences in students' processing of information. Some students adopt surface approaches while others adopt deep approaches to learning. However, deep approaches to learning and studying enable integration of learning.

2.3.5.3 Role of the Teacher

Many studies have investigated the role of teachers in higher education and affirmed a comprehensive role in the whole teaching and learning process (Ausubel, 1960; Ausubel & Fitzgerald, 1961; Boulton-Lewis *et al.*, 2001; Gibbs, 1994; Laksov, McGrath & Josephson, 2014; Ramsden, 1992; Trigwell, Prosser & Taylor, 1994). Teaching is an art which needs to be mastered (Gage, 1978; Healey, 2000). In a study reported by Watkins, Dahlin and Ekholm (2005) some teachers in higher education did not understand deep learning, which is necessary for relationships and connections, as part of basic courses. This, therefore, meant that such teachers, who held the view that there is basic knowledge to be acquired before understanding, relating and applying can take place, had difficulties in seeing an internal relation between teaching and assessment (p.304).

The role of teachers in successful integration of curricula is central. Yeung and Lam (2007:134) report on the conceptions of teachers hindering implementation of integration. In their study, they revealed that:

> ….frontline teachers held fairly confused and narrow conceptions of curriculum integration. If teachers were truly expected to develop high-quality integrated programs in the schools they served, the curriculum development agencies should spell out clearly what they want to achieve in the curriculum reform. Moreover, all the stakeholders, including the officials and the teachers, must have a common platform for communication and deliberation of conceptions toward a curriculum change. As has been revealed in the study, the conception of curriculum integration is more than the technical techniques of linking various subjects… To improve the chance of success in achieving the goal of providing quality integrated programs to the students, teachers need much more professional inputs about curriculum integration.

The above authors emphasise the importance of developing teachers' conceptions of integration. Many of the conceptual descriptions of curriculum integration held by teachers were narrow or confused. In a study by Gibbs and Coffey (2004) there is evidence that training teachers increases the extent to which teachers adopt a student focus and improve students' learning. Ling and Marton (2012) remind teachers to be cognisant of the dynamic nature of the object of learning. What the teacher plans to teach may not be what the students learn. As a result, this may explain the variances in what students learn – where some learn well while others do not learn as intended.

Of note is that the object of learning can be influenced or swayed by the effects of the hidden curriculum so that learning occurs by means of informal interactions among students, faculty and others, and through structural and cultural influences intrinsic to the programme (Gaufberg *et al.*, 2010; Genn, 2001a; Genn, 2001b; Genn & Harden, 1986; Hirsch & Worley, 2013).

Some studies have illuminated the lack of knowledge of the school curriculum by some teachers. In a study by Muller, Jain, Loeser and Irby (2008:782), the researchers report that students experience:

> …numerous missed opportunities for achieving true integration because their teachers did not know the curriculum beyond their own lectures, did not communicate with one another, made no effort to discover what content has already been covered or what students would be learning in the future and failed to link their subject matter with the rest of the curriculum.

The above quote sounds like a classic example of the "isolation" level of Harden's integration ladder. This is the least integrated level where:

> …students attend a lecture on anatomy, and then move on to a lecture in physiology with neither lecturer being aware of what was covered in the other lecture (Harden, 2000:552).

Teachers have a role in making integration of learning an object of learning. A study by Pang and Marton (2003) found that students of teachers who consciously included patterns of variation in their teaching learnt better than students of teachers who did not demonstrate such knowledge or skill. Teachers play a role in motivating students and enabling them perceive relevance in their courses by creating clear goals and criteria for success; linking teaching to the achievement of external long-term goals; and identifying and catering for learners' personal needs such as affiliation or self-esteem (Jordan *et al*., 2008).

The ability to identify essential detail requires the ability to discern critical aspects of the content:

> ...when students do not learn, it may not be due to a lack of ability. An object has many aspects, and not all aspects are critical; thus students who fail to learn may be focusing on aspects other than the critical aspects. Alternatively, they may not be focusing simultaneously on all critical aspects and their relationships... (Ling & Marton, 2012:9).

On the whole, in line with Piagetian epistemology, teachers should provide learning contexts that maximise opportunities for disequilibration and cognitive restructuring (Moseley *et al.*, 2005). Fogarty (2009) recommends that teachers make deliberate efforts to integrate learning rather than assuming that students will understand the connections automatically. When the Dundee Medical School introduced an integrated curriculum in 1995, an integrated learning area was established to facilitate integration in the minds of students rather than leaving the whole task to the students to navigate through on their own (Davis & Harden, 2003).

Regehr and Norman (1996:994) emphasise the role of the teacher in influencing the storage and retrieval of information from memory:

> …educational strategies to enhance memory should be directed at three goals – to enhance meaning, to reduce dependence on context, and to provide repeated practice in retrieving information.

Regarding integration in the clinical area, the same authors document the importance of making the learning environment (context) and the application environment as similar as possible to promote categorisation and pattern recognition. In the clinical area students need to retrieve their basic sciences knowledge and integrate it with the signs and symptoms from individual patients in order to recognise appropriate patterns for a diagnosis. Regehr and Norman suggest that fostering a match between learning and clinical environments provides a rationale for "community-based education where all instruction takes place in patient care and community settings" (p.995).

A different dimension on the role of the teacher in promoting learning is that of respect as outlined by Goodman (2009). All human relationships call for a measure of respect and, as students mature, they formulate values and ideals that become concretised in their selection of favoured peers and adults (p.15). This may mean that the respect (or lack of) a student has for a teacher could be a factor that lurks in the hidden curriculum with positive or negative effects towards learning.

2.3.6 Integration of Learning: Definitions and Perspectives

> *What do you consider to be the end purpose of education? Is it not to bring about an integrated individual? – Krishnamurti 1895 – 1986*

It seems that there are not many explicit definitions of integration of learning. Following on the definitions of curriculum integration presented in Section 2.2.4 of this chapter, an integrated curriculum is assumed to lead to integration of learning. According to Lipson, Valencia, Wixson and Peters (1993:252) integration represents:

> a way to avoid the fragmented and irrelevant acquisition of isolated facts, transforming knowledge into personally useful tools for learning new information. Recently, educators have been encouraged to view curriculum integration as a vehicle for significantly reshaping the nature and content of schooling, as a response to various problems or failures in traditional programs.

The following is an attempt at a comprehensive definition of integration of learning:

> Integration of learning is the demonstrated ability to connect, apply, and/or synthesize information coherently from disparate contexts and perspectives, and make use of these new insights in multiple contexts. This includes the ability to connect the domain of ideas and philosophies to the everyday experience, from one field of study or discipline to another, from the past to the present, between campus and community life, from one part to the whole, from the abstract to the concrete, among multiple identity roles – and vice versa (Barber, 2012:593).

The term “integrative learning” is also used synonymously with integration of learning and, according to Huber, Hutchings and Gale (2005:11-12), integrative learning represents many different behaviours that can range from the simple and common-place to the complex and original. The behaviours are outlined below:

- Usefully blending knowledge and skills from different disciplinary areas, as in a learning community;
- Putting theory into practice, as in clinical practice;
- Considering multiple perspectives to advance collaborative problem solving as in a capstone project completed by a team of students from different disciplines;
- Adapting the skills learned in one situation to problems encountered in another;
- Reflecting upon connections made over time as when a student writes reflective essays in a multi-year portfolio;
- Across-the-curriculum integration of skills – learning in disciplinary or interdisciplinary settings.

Reference to the “hidden” curriculum is made in Section 2.2.3, this being distinct from the “intended” curriculum. Harden (1986a; 1986b) outlines questions to ask when planning a curriculum and suggests outlining educational strategies to be adopted for integrative learning and also paying attention to the educational environment or climate to be fostered. Dent *et al*. (2009) assert that Prideaux contended that the real measure of the degree of integration of a curriculum is not what is on paper but rather how much integration takes place during student learning. This is what makes it important to find out from the students themselves what integration means to them and how they go about doing it.

2.3.7 Theories Linked to Pedagogies of Integrative Learning

Wildman and Burton (1981) observe that instructional design methodologies have made sense of the complex task environment facing teachers. The design of instruction needs to consider the individual components of instructional systems hence the need for well thought out and empirical instructional strategies. The authors explored the possibilities (and problems) of integrating what is known about the psychology of learning with what is known about designing instructional systems. Discrepancies between teaching practices and curriculum theory have been an issue of concern for more than 50 years (Tyler, 1957). It seems *a priori* that the decisions that a teacher makes in the design of instruction depend to varying degrees on the implicit assumptions made about what, how, and why people learn.

Suggestions for avoiding potential mismatches between the theory to use and instructional design are helpful. In this study it is important to discuss strategies that promote integration of learning in order to guide teachers appropriately.

In looking further at the pedagogies for integrative learning, the frameworks and taxonomies discussed below share common features that support integrative learning. Some of these frameworks subscribe to the cognitivist tradition, for example, Bloom's and Gagné's while Ausubel's and Biggs and Collis's are more linked to the constructivist tradition.

2.3.7.1 Bloom's Taxonomy

According to Bloom the process of learning fits into one of three domains: Cognitive, Affective or Psychomotor (Forehand, 2005). Of note is that learning in the three domains is intimately integrated. The domains influence each other in that, for a student to master skills (psychomotor domain), there is need for underlying knowledge (cognitive domain) of the procedural steps. When students are motivated and possess positive attitudes (affective domain) towards the procedure they are likely to perform it at a high standard.

To ease the workload of preparing annual comprehensive examinations Bloom initiated the idea of a framework of educational objectives for each of the domains (Krathwohl, 2002). The objectives were based on behaviours that teachers could observe. Of note is that in the taxonomies learning objectives are classified in a range of progressive levels and this enables observation of cognitive, psychomotor and affective behaviours as they improve from simple to complex. This also made it possible for teachers to design learning opportunities that facilitate observable progression of learning leading to the attainment of desired competencies. From these taxonomies Bloom became one of the leading authorities in the design and classification of educational objectives.

About 45 years later, Bloom's Taxonomy was revised based in part on the structure of educational objectives, in part on advances in cognitive psychology, and in part on numerous other attempts to classify educational objectives in keeping with developments in education (Anderson, 2005; Krathwohl, 2002; Moseley *et al*., 2005). In the revised cognitive taxonomy in Figure 2.5, the cognitive process

categories are hierarchical in their degree of complexity. This has educational implications in that teachers need to consider improving cognitive performance through the alignment of learning objectives, assessment and instruction (Moseley *et al*., 2005).

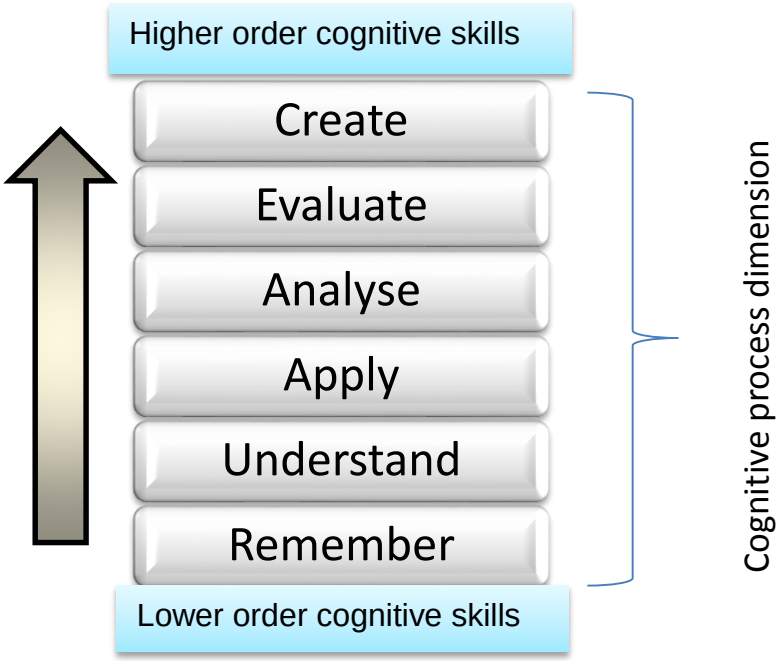


Figure 2.5: Revised Bloom's framework (adapted from Moseley *et al*., 2005:105)

The cognitive domain taxonomy is an integrated hierarchical structure which suggests that movement up the levels of cognitive skills is contingent upon mastery of the one or ones below. This implies integration since learning is building on previous knowledge and increases in complexity in a continuum from lower order to higher order cognitive skills. A student who displays the ability to apply or analyse has mastered the material at the levels of remembering and understanding (Forehand, 2005). It would seem that the lower order cognitive skills correspond with the surface approach to learning while higher order cognitive skills are applicable in the deep approach to learning strategy. For integrative learning, teachers need to promote learning opportunities that facilitate movement from lower order to higher order cognitive skills.

2.3.7.2 Gagné's Types of Learning

Similar to Bloom, Gagné's types of learning are hierarchical with the most complex type at the top. There are five domains of learning: "…motor skills, verbal information, intellectual skills, cognitive strategies and attitudes" (Moseley *et al*., 2005:47).

Gagné (1972; 1984:384) refers to these domains as outcomes of learning which are categories within which generalisations can legitimately be drawn, according to both reason and empirical evidence; also evidence of when and how learning occurs.

Gagné advises that for his type of learning to occur learning opportunities need to be interactive and different from traditional methods. Interactive methods of teaching are at the centre of the 21st century theories of adult learning. These methods facilitate integrative learning. Amongst Gagné's types of learning the possession of intellectual skills demonstrates integration of prior learning. Cognitive strategies require problem-solving skills and Gagné advises that these cannot be taught effectively using traditional methods. Verbal information or "declarative knowledge is dependent on the recall of internally stored complexes of ideas or schemas" (Gagné, 1984:379-383).

2.3.7.3 Ausubel's Learning Theory

According to Moseley *et al*. (2005:67) Ausubel is a strong proponent of meaningful learning and claimed that rote as opposed to meaningful learning is more likely to take place when:

- The material to be learned lacks logical meaning
- The learner lacks the relevant ideas in his/her cognitive structure
- The individual lacks a meaningful learning set (a disposition to link new concepts, propositions and examples to prior knowledge and experience).

Ausubel sees the development of conceptual understanding as the goal of education and, therefore, it is important for:

> …teachers to present new learning in such a way that students can relate it to their existing knowledge taking into account the complexity of the new learning and the cognitive development of the learners (p.68).

Meaningful learning is part and parcel to higher order thinking (Ivie, 1998) and this is the type of learning that promotes integration.

Ivie (1998:37-39) outlines Ausubel's Learning Theory and the categories that are pertinent to integrative learning are presented below:

- ***Metaphor**:* Ausubel views knowledge as representing an integrated system. Ideas are linked together in an orderly fashion. The human mind follows logical rules for organising information into respective categories. The cognitive structure is hierarchically organised in terms of highly inclusive concepts under which are subsumed less inclusive subconcepts and informational data. Teaching and learning, therefore, are largely matters of erecting cognitive structures (scaffolding) to hold new information.
- ***Cognitive structure**:* This category emphasises the learner's cognitive structure in the acquisition of new information and builds on previous knowledge.
- ***Hierarchy**:* knowledge is organised in a hierarchical structure, like a pyramid. The most inclusive ideas at the top of the pyramid are the dominant and most enduring elements in the hierarchy. They possess a longer life span in memory than do particular facts or specific details, which fall at the base of the pyramid.
- ***Subsumption (Assimilation)**:* when a new idea enters consciousness it is processed and classified under one or more of the inclusive concepts already existing in the learner's cognitive structure, similar to Piagetian epistemology.
- ***Anchorage**:* the major concepts (subsumers) in cognitive structure act as anchoring posts for new information. The cognitive stability provided by anchoring ideas helps to explain why meaningful learning is retained longer than rote learning. Meaningful learning is anchored; rote learning, is not.
- ***Organizers (abstract ideas presented in advance of a learning**:* Ausubel (1960) and Ausubel and Fitzgerald (1961) see the role of advance organizers in increasing discriminability of learning and for long-term retention potentials.

The aim of Ausubel's theory is to facilitate "integrative reconciliation" (Moseley *et al*., 2005). The categories which seem to embrace Piaget's cognitive development and Bloom's conceptions of knowledge acquisition emphasise building on previous learning in an integrated system. The hierarchical structure of knowledge with most inclusive ideas at the top of the pyramid is similar to Bloom's ideas. The concept of anchorage explains why meaningful learning, that is, "deep learning" is anchored while rote learning or "surface learning" is not.

2.3.7.4 Biggs and Collis's SOLO Taxonomy

According to Biggs (2002:1), teaching and learning take place in a whole *system*, embracing classroom, department and institutional levels and further explains that:

> …in a poor system, the components (curriculum, teaching and assessment tasks) are not necessarily integrated and tuned to support learning, so that only 'academic' students spontaneously use higher-order learning processes. In contrast, in an integrated system, all aspects of teaching and assessment are tuned to support high-level learning.

Biggs (2002) and Biggs and Tang (2007) suggest that constructive alignment is such a system. It is an approach to curriculum design that optimises the conditions for quality learning.

> The 'constructive' aspect refers to what the learner does, which is to *construct meaning* through relevant learning activities and the 'alignment' aspect refers to what the teacher does, which is to set up a learning environment that supports the learning activities appropriate to achieving the desired learning outcomes (Biggs, 2002:1-2).

This is so because the teaching methods and assessments are aligned to the learning activities assumed in the intended outcomes.

The SOLO taxonomy (Figure 2.6) describes the level of increasing complexity in a student's understanding of a subject, through five levels of response.

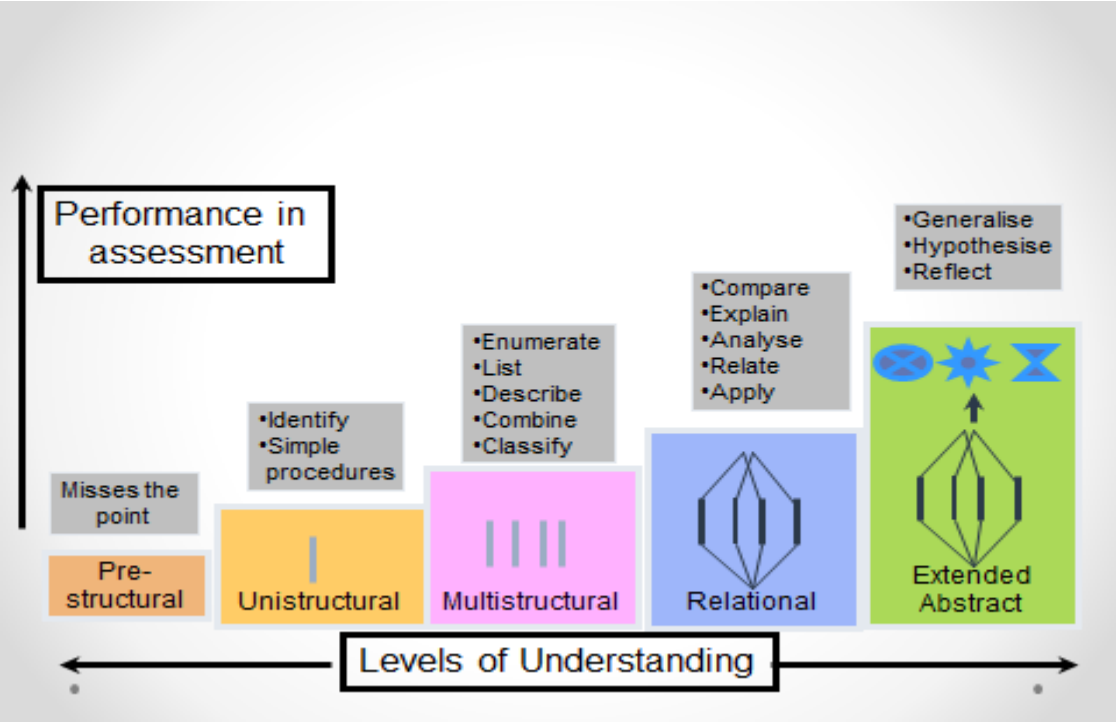


Figure 2.6: SOLO taxonomy (adapted from Biggs, 2002:3)

The levels are as follows (Moseley *et al*., 2005:87):

- ***Pre-structural***: here students are simply acquiring bits of unconnected information, which have no organisation and make no sense.
- ***Unistructural***: simple and obvious connections are made, but their significance is not grasped.
- ***Multistructural***: a number of connections may be made, but the meta-connections between them are missed, as is their significance for the whole.
- ***Relational***: the student is now able to appreciate the significance of the parts in relation to the whole.
- ***Extended abstract***: the student makes connections not only within the given subject area, but also beyond it, and is able to generalize and transfer the principles and ideas underlying the specific stance.

The SOLO taxonomy theory is based on Piaget's developmental stages and levels of learning. The taxonomy enables teachers to identify the complexity and quality of thinking expected of and produced by students at any given stage, therefore, it can be a useful tool for evaluating learning. The SOLO taxonomy is also a useful tool for promoting integrative learning as the student is encouraged to make connections within and across the levels. In some previous studies, ideas from SOLO taxonomy

have informed the understanding of structural relationships between categories (Trigwell, Prosser, Martin and Ramsden, 2005).

2.3.7.5 Experiential Learning

The theory of experiential learning, according to Kolb (1981:290) maintains that learning is a process involving the resolution of dialectical conflicts between opposing modes of dealing with the world – action and reflection, concreteness and abstraction (Figure 2.7).

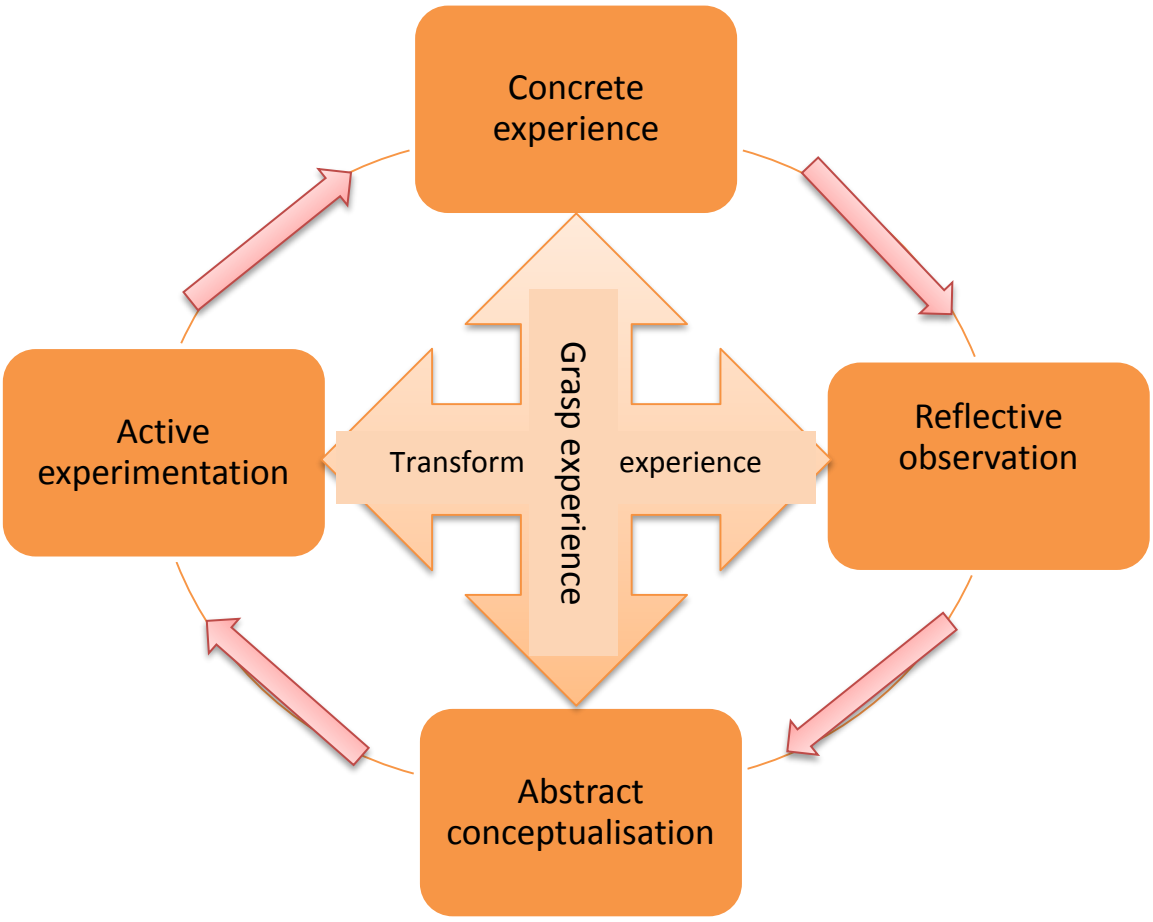


Figure 2.7: The experiential learning cycle (adapted from Kolb & Kolb, 2009:299)

Kolb's Experiential Learning Theory can assist learners to understand their unique learning preferences and capabilities (Kolb & Kolb, 2009). Matching these with the demands of learning tasks in a demanding programme like medicine can increase

learning effectiveness. According to Kolb (1984); Kolb and Kolb (2009); Wilson, O'Donohue and Hayes (2001); Wirth and Perkins (2008) the attributes of experiential learning that are pertinent for integration of learning are discussed below:

- **Experiential learning** begins when the learner interacts with the environment and this is when the learner gets concrete experience. This engagement can be inhibited by too much workload when the learner scratches the surface rather than has a deep engagement which is necessary for linking with other experiences.
- **Sensory information** from the experience is integrated and compared with existing knowledge and this is reflective observation, watching stage. Reflection requires space and time for it to take place. As in the first step above, too much workload inhibits reflection which requires stillness and quieting the mind to foster reflection. Information skills of sense making, information gathering and information analysis can aid in the development and expression of the thinking mode of learning.
- **The thinking mode** creates new models, ideas and plans for action. This is abstract conceptualisation where abstract hypotheses are formed. Thinking requires the ability to represent and manipulate ideas in your head so this can be distracted by intense direct emotion and sensations as well as pressure to act quickly. This process of creating new models requires reflection and integration with what is already known as in the process of integrative learning.
- In the final stage, **active experimentation** is when new action is taken. This is a doing stage which requires commitment and involvement in the practical world of real consequences. All the other stages above are tested in reality here. This implies integration of all that was learnt previously in the earlier stages.

The Experiential Learning Cycle is consistent with the works of Piaget and other modern-day theorists who observe learning as having both active and intellectual dimensions.

The theories linked to pedagogies of integrative learning discussed above share very close similarities. They all suggest that learning occurs in a hierarchical and incremental process in domains that are inextricably linked. In general learning objectives in domains of learning are classified in a range of progressive levels starting from lower order to higher order skills. Higher order skills correspond to deep learning and it has been discussed that deep learning promotes integration.

From Bloom's taxonomies a student needs underlying knowledge in order to master skills. In contrast, the mastery of skills is influenced by attitudes a student possesses towards the skill. Gagné's hierarchical type of learning emphasises the use of interactive learning experiences that build on and integrate with prior learning. Ausubel promotes meaningful learning which is synonymous with deep learning. Knowledge is an integrated system because ideas are linked and build on each other in an organised manner to make meaning (Moseley *et al*., 2005). Biggs (2002) advises that an integrated system supports high-level learning because teaching and assessments are aligned. Experiential learning is a process of action and reflection as experiences are integrated with new knowledge (Kolb, 1981). The final process is further integration of all learning in previous stages when new action is taken.

However, it would seem that the Experiential Learning Style and some conceptions of learning and teaching are independent attributes. Bradbeer, Healey and Kneale (2004) identified undergraduates' conceptions of teaching and learning geography and found that the conception of learning that occurred by being taught mirrors the predominant conception of teaching. In addition, Bradbeer *et al*. (2004) found that the students at lower levels of conception conceived learning as the increase in knowledge and also learning as memorisation for reproduction.

2.3.8 Fostering Integration of Learning

As discussed in Section 2.3.4, 21st century adult education emphasises self-directed learning and constructivism where students actively construct their own learning from the range of experiences available to them (Dent *et al*., 2009). Regehr and Norman (1996) lament the lack of close coordination between education and psychology and yet the two disciplines should inform each other for fruitful lines of inquiry that could lead to quality education. The same authors observe that for students to gain a deep understanding of their content, it is not simply by the quantity of information amassed but by the extent to which the information is organised into a coherent, mutually supportive network of concepts and examples.

> …information in isolation is inert and unhelpful. Only when the information is integrated into the individual's semantic network will it be available and functional for future purposes (p.992).

The views expressed above imply a progression from assimilation of facts to digestion of content in order to construct meanings and accommodate it in a useable way in future. This is similar to Piaget's epistemology and the constructivists view of learning. The implication for teachers is that there should be time for students to individually reflect on their learning so as to construct their own understandings which can then be readily integrated with future learning.

Often integration of learning is left to the students to do and most theories of intellectual development construe the ability to integrate knowledge as a relatively sophisticated skill, which develops over time and requires considerable effort and experience to attain (Huber *et al.*, 2007). The same authors have outlined practical suggestions on how to foster integrative learning and these are discussed below.

2.3.8.1 Curriculum

The curriculum is an obvious starting point for questions about opportunities for synthesis. Where and when are students asked to put the pieces together in order to better understand or solve important problems? Where and when are students encouraged to make links between their academic, personal, and community lives?

2.3.8.2 Pedagogy

In the discussions above it has been emphasised that the effectiveness of curricular innovations depends on the pedagogies that support them. Knowledge about educational theories needs to be applied in the drive to help students develop integrative habits of mind. Due to inadequate use of research and inadequate generation of evidence to support education, education in the 21st century is not that different from education in the 18th century (van der Vleuten & Driessen, 2014). Many familiar pedagogies can serve the goal of integrative learning. Indeed, just about any format that allows groups of students to turn their attention to common problems, issues, themes, or tasks – the seminar, for example – can prompt integrative learning, if the topic is of sufficient scope and interest to be elucidated by insights from different disciplines and perspectives. Experiential strategies, like service learning, study abroad, or internships, invite students to make connections between coursework and community, theory and practice. Innovative approaches

using new media can relate objects or texts to contexts, and enable creative simulations.

All of these pedagogies share certain qualities. They acknowledge the realities of a changing world where disciplinary and curricular isolation are neither feasible nor desirable. They require (and develop) intellectual dexterity on the part of the teacher and the student, as well as the ability to speak to, if not from, a broad spectrum of knowledge and experience. They also embrace a commitment to creating time and space for dialogue and conflict. As a result, these pedagogies necessitate a more flexible approach to assessment, with well-designed assignments throughout the course, and multiple opportunities for structured reflection to help students take a more intentional approach to their own learning.

What is needed in teaching for integration, above any particular pedagogy, is an intentional approach. This means, first, designing courses with integrative learning in mind and, second, asking questions and gathering evidence about the specific challenges and dilemmas that students face as they develop their capacities as integrative learners. If integrative learning is only as good as the pedagogy that supports it, then integrative teaching will be only as successful as the arrangements that make it possible and make it work.

In examining the issue of the rotational approach to medical education, Holmboe, Ginsburg and Bernabeo (2011) report that rotating students through clinical disciplines within short spaces of time creates many transitions which seem to be harmful to learning. The transitions disrupt continuity and integration and more importantly relationships created with patients and other members of the team (Ogur, Hirsh, Krupat & Bor, 2007). Instead of short clinical rotations, several studies have recommended integrated clerkships which allow students to stay longer in the same environment with the same patients, resulting in more effective integration of learning. Integrated clerkships are documented in studies by several authors including Mazotti, Kirsch and O'Brien (2011).

2.3.8.3 Assessment

According to Gibbs and Simpson (2004) it is assumed that assessment has an overwhelming influence on what, how and how much students study. Assessment

is a particular challenge for integrative learning and an ambitious student learning goal.

> It is a goal that for too long has depended upon serendipity rather than planning in its achievement and it's often not included as an element in assessments (Huber *et al*., 2005:10).

Assessment has been cited as one of the factors that motivates students to study leading to a generally accepted notion that assessment drives learning. However, it would seem that assessment may lead to a surface approach to learning. Wormald, Schoeman, Somasunderam and Penn (2009) report that a "surface approach" to studying is typified by the students' aim to memorise facts, to complete the task of learning, for example, to prepare for an examination. Wood (2009) sees a higher value of assessment in learning, in observing that repeated testing during learning was shown to promote better memory for content than a single test at learning.

The unintended effects of assessment include the tendency for students to cram for examinations (Epstein, 2007). This negates integrative learning. If the integration of learning is made an expected outcome of a programme then there should be intentional strategies for assessing the quality of student integrative achievement. In undergraduate medical programmes many assessment formats test core knowledge and basic skills, under-emphasising the integration of core knowledge into clinical practice (Epstein & Hundert, 2002). This level of integration contributes to professional competence which Schön (1983) refers to as the ability to manage ambiguous problems, tolerate uncertainty, and make decisions with limited information. According to Epstein and Hundert (2002:227) integration is one of the dimensions of professional competence which include:

- Incorporating scientific, clinical and humanistic judgement.
- Using clinical reasoning strategies appropriately (hypothetico-deductive, pattern-recognition, elaborated knowledge).
- Linking basic and clinical knowledge across disciplines.
- Managing uncertainty.

It seems that if integrative learning is to be assessed comprehensively, the above points need to be considered.

2.3.8.4 Faculty Development

Huber *et al.* (2007) observe that with so much riding on pedagogy and classroom-based assessment, educators committed to integrative learning are putting in place not only relevant experiences for students, but also opportunities for faculty to develop the capacity for integrative teaching. Some examples for faculty development include workshops on classroom approaches that promote connection making and problem-based learning. The same authors emphasise the importance of creating a culture of integrative teaching amongst the academic community which includes teachers and students.

2.3.8.5 Strategic Design Initiatives

There are many ways to strengthen integrative learning from approaches that focus on the structure of the curriculum to those that give students the tools to connect their academic learning with their lives. Which ones make the most sense for any particular institution depend on what is already happening there, as well as on the commitment to integrative learning as an educational goal. Huber *et al.* (2007) suggest that educators should find out where and when integrative learning is (and is not) taking place. It seems this function can be achieved through mapping the curriculum as suggested by Harden (2000).

2.3.8.6 Creative Faculty Support

Again Huber *et al*. (2007) observe that most educators are intrigued by the concept of integrative learning but have different ideas about what integrative learning means, how it develops, and what it looks like in practice. This observation correlates with earlier discussions on some of the reasons for resistance to curriculum integration. There is need to increase forums and establish official engagements to talk about integrative learning to enable educators develop a more widely shared understanding about its nature, varieties, and value, and about how, when, and where it can best be fostered.

2.3.8.7 Commitment to Knowledge Building

Huber *et al* (2007) further suggest that integrative learning initiatives should be accompanied by monitoring and evaluation of integrative efforts. The same authors observe that when assessment instruments, such as assignments or surveys, are well designed, they can serve as pedagogical tools as well. Kreber (2007:1) posits that the challenges of the 21st century require higher education institutions to prepare not only discipline specialists but independent thinkers, productive citizens, and future leaders and this can be achieved through the scholarship of teaching and learning. Boyer (2004) and Schön (1995) elaborate on several scholarships that are designed to promote life-long knowledge building. According to Boyer (2004:571) scholarship is limited to a hierarchy of functions and basic research is viewed as the first and most essential form of scholarly activity with other functions flowing from it.

2.3.8.8 Recognition that Institutionalisation is a Long-term Process

Again, Huber *et al* (2007) remind educators that integrative learning is a long-term process, that requires leadership, creativity, and flexibility on the part of everyone involved. To sustain the work, there is need for collaborative work and involvement of new members of staff. This way the integrative initiatives receive support from all quarters.

Huber *et al.* (2007) have proposed practical suggestions on how to foster integration of learning. The suggestions which support the work of other authors are comprehensive as they cover most pertinent aspects of the design and implementation of integrative learning. This long-term process requires the buy-in of key stakeholders and implementers who are in a position to direct the needed human and material resources.

In summary, Section 2 presented literature on learning in general and learning that is integrative in particular. Instructional designs that promote integrative learning have also been presented and most resonate with constructivism, experiential learning and learning as experienced by the student. Some approaches that impede integrative learning and those that mediate have also been discussed as important interventions are required to ease the learning of students in demanding curricula such as the undergraduate medical programme.

2.4 CONCLUSION: CHAPTER 2

Chapter 2 is divided into two sections. The first section commences with a literature review on the rationale for curriculum integration followed by the features of integrated curricula. The second section reviews literature on learning, and how learning takes place according to selected theorists. The most common theories of learning have been presented ending with what are considered 21st century adult learning theories. There is significant overlap in the theories and, for educators, it is important to be fully conversant with them so as to apply and adapt as appropriate. It is logical that the application of effective pedagogies leads to effective learning which enables transfer of learning to different contexts. Perspectives of learning according to constructivists and phenomenography have been presented as the approaches that seem more appropriate for integration of learning.

The next chapter focuses on the methodology of this study.

CHAPTER 3:
METHODOLOGY

3.1 INTRODUCTION

The purpose of this chapter is to outline the methods that were used to collect and analyse the data that were needed to achieve the objectives of this longitudinal phenomenographic study. The rationale for choosing the methods is outlined, including the details on how data were collected and analysed applying the methods in this qualitative research paradigm. These methods yield qualitative data on students' experiences of integration of learning as they go through the first six years of the MBBCh programme, describing actual and intended learning processes and outcomes from the students' perspectives.

Before focusing on phenomenography, the chapter starts with a brief discussion of qualitative research. This is followed by a discussion of phenomenology, the broad paradigm to which phenomenography is related. The longitudinal nature of the study will be illuminated together with the description of sampling, data collection and analysis processes that were employed. Particular attention was paid to ensure the credibility of this study methodology and the chapter concludes with a description of the tenets that render this phenomenographic study methodology empirical.

3.2 QUALITATIVE RESEARCH

An investigation into students' experiences of integration of learning lends itself to qualitative inquiry. Denzin and Lincoln (2000:3) define "qualitative research" as a situated activity that locates the observer in the world, so that qualitative researchers study things in:

> …the natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them.

According to Merriam (2002:3-4):

> The key to understanding qualitative research lies in the idea that meaning is socially constructed by individuals in interaction with their world. The world, or

> reality, is not the fixed, single, agreed upon, or measurable phenomenon that it is assumed to be in positivist, quantitative research. Instead, there are multiple constructions and interpretations of reality that are in flux and that change over time. Qualitative researchers are interested in understanding what those interpretations are at a particular point in time and in a particular context.

It is in this quest to understand students' interpretations of learning that the researcher chose qualitative research as more appropriate than quantitative research. Qualitative research has a long history in the human disciplines and John Dewey is recorded as one of those who pioneered the use of qualitative research in education, according to Denzin and Lincoln (2000).

There are several epistemological approaches within the realm of qualitative research and different strategies and procedures have evolved with time. Some of the more commonly used approaches or types of qualitative research include: basic interpretive, phenomenology, grounded theory, case study and ethnography. For the purposes of this study, phenomenology and grounded theory will be discussed briefly.

3.3 PHENOMENOLOGY

"Phenomenology" is a philosophical paradigm based on a predominantly mental metaphor, that is, *"the centrality of human consciousness"* (Babbie & Mouton, 2001:28). The aim of this method is to understand (not explain) people. Unlike in Comte's positivism where people are seen as biological organisms in the natural world, in phenomenology people are conceived as conscious, self-directing, symbolic human beings:

> The phenomenologist emphasizes that all human beings are engaged in the process of making sense of their (life) worlds (Babbie & Mouton, 2001:28).

Because of the philosophical nature of phenomenology it can be understood to underpin all qualitative research; therefore, qualitative research has roots in phenomenology (Merriam, 2002; Babbie & Mouton, 2001). According to Merriam (2002) a phenomenological study focuses on the essence or structure of an experience and attempts to deal with inner experiences unprobed in everyday life.

The phenomenological tradition seems to have grown out of German Idealism around the mid-18th century. As it evolved, several phenomenologists emerged, notably Husserl in the mid-19th century, followed by Schütz then followed by Charles Taylor in the 20th century (Babbie & Mouton, 2001). According to Denzin and Lincoln (2000:488) Husserl's philosophical phenomenology provides the point of departure for Schütz and other social phenomenologists. Husserl was concerned with the structures of consciousness that make it possible to apprehend an empirical world, while Schütz argues for a focus on the ways that people experience the world. Some authors have quoted writings which consider Husserl to be the founder of phenomenology which was developed into a movement by Heidegger, Schütz, Sartre, Merleau-Ponty and Gadamer (Hasselgren & Beach, 1997; Sandberg, 2005). Marton and Booth (1997) consider Husserl the founder of modern phenomenology.

According to Denzin and Lincoln (2000:487):

> ...the qualitative inquiry's pendulum is constantly in motion with "interpretive practice" engaging both the hows and whats of social reality; it is centered both in how people methodically construct their experiences and their worlds and in the configurations of meaning and institutional life inform and shape their reality-constituting activity.

From the assertion above, indeed qualitative research has continued evolving with the development of more approaches like phenomenography, with close links to the phenomenology paradigm.

"Qualitative research" is a method while a "paradigm" is:

> …a basic belief system or worldview that guides the investigator, not only in choices of method but in ontologically and epistemologically fundamental ways (Guba & Lincoln, 1994:105).

In this qualitative study, the belief system of choice was "phenomenography". This approach yielded qualitative data on students' and teachers' experiences as they go through the six years of the programme.

3.4 PHENOMENOGRAPHY

3.4.1 Origins

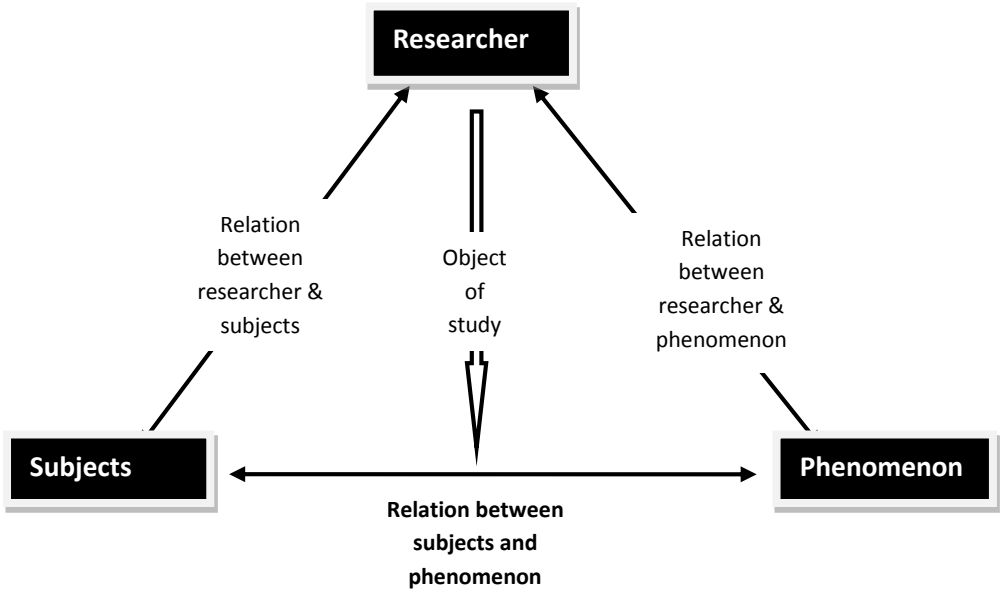
In this study, students' experiences of integration of learning and how that integrative ability develops were determined through phenomenographic research. According to Svensson (1997:162) "phenomenography" is fundamentally a research orientation; but it also includes characteristics of a method of a general kind intimately related to the orientation, which makes it appropriate to look at phenomenography also as a research approach. Phenomenography is a non-dualist research approach with an educational interest and, according to Marton and Booth (1997:111):

> Phenomenography is not a method in itself but a way of – an approach to – identifying, formulating, and tackling certain sorts of research questions, a specialization that is particularly aimed at questions of relevance to learning and understanding in an educational setting.

With reference to Figure 3.1, the object of study in phenomenographic research is not the phenomenon being discussed *per se*, but rather the relation between the subjects and that phenomenon (Bowden & Green, 2005). There is a relationship between the researcher and the phenomenon and between the researcher and the subjects but this is not the focus of the study. The researcher instead focuses on finding out about the *object* of study, which is the *relation between the subjects and the phenomenon*.

The phenomenographic approach is non-dualist in that: "…meaning is seen as being constituted in the relationship between the individual and the phenomenon" (Trigwell, 2006:369). In contrast, dualist approaches make a distinction between the individual person or subject and the phenomenon or object.

According to Entwistle (1997), phenomenography started from an experiment with first-year university students by Marton and Säljö in 1976 in Gothenburg. In this experiment students were asked to read an article and answer questions about the author's message. The students' answers showed qualitatively different levels of understanding with a distinction between deep and surface approaches to learning;



(Adapted from Bowden & Green, 2005:13)

Figure 3.1: Phenomenographic relationality

and from this study: "…techniques of rigorous qualitative analysis which have become one of the hallmarks of phenomenography were developed" (p.127).

Several writings on what subsequently became phenomenography can be traced to this original research and further work led by Ference Marton at the Department of Education and Educational Research in Gothenburg, Sweden (Hasselgren & Beach, 1997). Svensson (1997:161) who was involved in this original research reports that the term "phenomenography" was first used by Ference Marton in 1981:

> It was used to refer to research already carried out and also to refer to a suggested research programme. What was taken to be common to the research carried out and the programme suggested was the aim to describe people's conceptions. In the programme suggested, descriptions of conceptions were made the aim, and the term phenomenography was used to refer to this aim realized in practical research.

According to Säljö (1979) developmental differences in conceptions of learning, particularly how to operationalise differences in learning performance, contributed to the further curiosity that led to Ference Marton's research.

Hasselgren and Beach (1997) see the roots of phenomenography in phenomenology and report that the term "phenomenography" first appeared in

research texts in 1954. This took place in an article about phenomenology in which the term “phenomenography” was used to distinguish psycho-pathological research from other branches of phenomenology, particularly existential phenomenology. However, phenomenography is not phenomenology. Both phenomenology and phenomenography fall within the interpretative research tradition because the main feature is that person and world are: “…inextricably related through person’s lived experience of the world” (Sandberg 2000:11).

Although both have human experience as the object of research, with phenomenology are:

> …inextricably linked a set of methods of going about the study of experience and theories about its nature, which makes its subsumption of phenomenography problematic.... (Marton & Booth, 1997:116).

Table 3.1 outlines the relationship between phenomenology and phenomenography. Phenomenology uses a philosophical method of developing a single theory of experience and awareness, while phenomenography adopts an empirical orientation to studying the qualitatively different ways in which others experience phenomena; thus: “…phenomenography and phenomenology differ as to purpose” (Marton & Booth, 1997:117).

In phenomenology the researcher explores and reflects on his/her own experience while in phenomenography the focus is on reflecting on other people’s experiences. Sandberg (2000) sees phenomenology and phenomenography complementary as the researcher reflects on own experiences in order to clarify other people’s experiences. Marton and Booth (1997:121) allude to this complementarity by saying:

> At every stage of the phenomenographic project, the researcher has to step back consciously from her own experience of the phenomenon and use it only to illuminate the ways in which others are talking of it, handling it, experiencing it, and understanding it.

Table 3.1: The relationship between phenomenography and phenomenology

Phenomenography	Phenomenology
The structure and meaning of a phenomenon as experienced can be found in pre-reflective and conceptual thought.	A division is claimed between pre-reflective experience and conceptual thought.
The aim is to describe variation in understanding from a perspective that views ways of experiencing phenomena as closed but not finite.	The aim is to clarify experiential foundations in the form of a singular essence.
An emphasis on collective meaning.	An emphasis on individual experience.
A second-order perspective in which experience remains at the descriptive level of participants' understanding, and research is presented in a distinctive, empirical manner.	A noumenal first-order perspective that engages in the psychological reduction of experience.
Analysis leads to the identification of conceptions and outcome space.	Analysis leads to the identification of meaning units.
Source: Barnard, McCosker and Gerber (1999:214).	

In summary, Trigwell (2006:368-369) explains that:

> The essence of the phenomenographic research approach is that it takes a relational (non-dualist) qualitative, second-order perspective, that it aims to describe the key aspects of the variation of the collective experience of a phenomenon rather than the richness of individual experiences, and that it yields a limited number of internally related, hierarchical categories of description on the variation.

Nita Cherry, on her account of when and why she would suggest using phenomenography, says:

> I would really recommend phenomenography to anyone who wishes to bring a high level of rigor to the construction of meaning from text (Bowden & Green, 2005:62).

3.4.2 First-order and Second-order Perspectives

Marton (1981:178) and Marton and Booth (1997:118), make a distinction between research undertakings according to "first-order" and "second-order" perspectives or approaches. A first-order perspective is an ontological statement concerned with how something really is while the second-order perspective looks at how a

phenomenon is conceived (Sjöström & Dahlgren, 2002). The second-order approach is centred on experience as described, not the objective facts of a phenomenon (Ashworth & Lucas, 1998). A statement on why some students prefer some subjects over others is a first-order perspective while a question that seeks answers to students' experiences of certain subjects is a second-order perspective. The first statement reflects an orientation towards the world while the second statement reflects an orientation towards people's conceptions of the world. It is this second perspective, "second-order" perspective which is directed towards experiential description that proponents of phenomenography promote.

Marton (1981) recommends the use of both first-order and second-order perspectives as they are complementary. In this study on experiences on integration, students were asked:

- How does integration take place? What processes mean or lead to integration?

These are first-order perspective questions. In the second-order perspective, students were asked:

- What are your views about your own ability to integrate concepts? What helps you to integrate concepts?

Formulating questions that address the second-order approach has distinct reasons in that:

> .....to find out the different ways in which people experience, interpret, understand, apprehend, perceive or conceptualize various aspects of reality is sufficiently interesting in itself, not least because of the pedagogical potentiality and necessity of the field of knowledge to be formed. Secondly, the descriptions we arrive at from the second-order perspective are autonomous in the sense that they cannot be derived from descriptions arrived at from the first-order perspective (Marton, 1981:178).

Marton (1981:191,195) believes that a large portion of Piaget's work was of a second-order perspective in saying:

> No-one has provided anything like as many detailed and such ingenious descriptions of children's qualitatively different conceptions of various aspects of their reality as has Piaget.

According to Hasselgren & Beach (1997:195):

> Phenomenography started as an experimental enterprise, with interest for outcomes of learning and how students approached the learning task...

In looking at the driving force behind phenomenography, Marton and Booth (1997) discuss a situation where students who take the same course of study and encounter the same learning opportunities, sit for the same examination but produce different outcomes. Rather than assuming that such a scenario would produce similar outcomes, interest should be on how each of the students experiences the learning opportunities. This gives grounds to believing that:

> ...in order to make sense of how people handle problems, situations, the world, we have to understand the way in which they experience the problems, the situations, the world that they are handling or in relation to which they are acting. Accordingly, a capability for acting in a certain way reflects a capability for experiencing something in a certain way.....You cannot act other than in relation to the world as you experience it (Marton & Booth, 1997:111).

In this study, an interest in describing integration in learning, as students see it, and describing the variation in their experiences, phenomenography was the most appropriate approach of investigation in this educational setting because

> Phenomenography is focused on the ways of experiencing different phenomena, ways of seeing them, knowing about them, and having skills related to them (Marton & Booth, 1997:117).

3.4.3 Awareness

The structure of awareness, which originates from the works of the phenomenological philosopher Gurwitsch, is at the core of any phenomenographic study (Booth, 1997). According to Marton and Tsui (2004) “awareness”, used as a synonym for “consciousness”, is the totality of our experience of the world at each point in time. Every situation is experienced against the background of a vast number of previous experiences. For example, to experience a dog as being big implies a relative experience of small dogs. In general, people are aware or conscious of many things at the same time but the degree of awareness of any particular thing at any given time differs.

> The items which are thematic constitute a gestalt, which is conjoined with the constituents of the thematic field through unity of context or unity of relevance (Booth, 1997:141).

This means that some things come to the forefront of awareness (theme of awareness) while the rest are in the margins (thematic field). This structure of awareness changes depending on the context and relevance of subject matter. This is a critical point in learning because it implies that educators have a role in making it possible for students to learn. Marton and Tsui (2004) observed that students' learning should not be accidental but should be a result of conscious attempts by the teacher to bring about the intended learning outcomes. This is the reason that, in this study, efforts were made to determine conscious attempts to enable students integrate learning so that it is not left to students' own devices.

Marton and Ling (2007) use the term "object of learning" to change the mindset from learning objectives which are pre-determined. They argue that student learning outcomes cannot be pre-determined because there are three types of "objects of learning":

> The intended object of learning
>
> The enacted object of learning
>
> The lived object of learning
>
> (Marton & Ling, 2007:42).

Having the enacted and lived object of learning is an acknowledgement that students do not always learn what is intended. This is akin to the "hidden curriculum" that was discussed in Chapter 2 of this study. The enacted object of learning has also been called the "space of learning", thereby depicting what is possible to learn (Marton & Tsui, 2004).

3.4.4 A Way of Experiencing Something (Variation)

For students to learn something there is need for variation which impacts on their level of awareness on any particular thing at any given time. In variation theory (which is discussed in more detail in the next section) learning is always the learning

of something, and the object of learning is the capability to do something with something (Marton & Tsui, 2004; Runesson, 2006).

> Medical students, for instance, might be advised by their professors to try to notice different features of their patients, such as the color of the lips, the moisture of the skin, the ease of breathing, and so on; this is being told. But in order to follow this advice, the students must experience those features, and the only way to experience them is to experience how they can vary. Noticing the color of a patient's lips, for example, would not mean very much if lip color was the same for everyone (Marton & Tsui, 2004:10).

This example given above is a demonstration of how educators assist students to see variation and also bring the issues to the direct focus of the students, the object of learning. As Linder and Marshall (2003:275) observe:

> …learning is about changing those aspects of the phenomenon that are present in the theme, and the role of teaching is to focus on the educationally critical aspects…

Approaching learning this way widens the space of variation for the learner. Those aspects which are brought into the learner's focal awareness are learnt better than those which remain in the thematic field.

The way individuals experience something is the unit of phenomenographic research. According to Marton and Booth (1997:113), a way of experiencing something is: "…an internal relationship between the experiencer and the experienced."

A way of experiencing something is:

> …experiencing something as something, experiencing a meaning that is dialectically intertwined with a structure… a way of discerning something from, and relating it to, a context. The meaning of something for someone at a particular point in time corresponds to the pattern of parts or aspects that are discerned and are simultaneously objects of focal awareness (Marton & Booth, 1997:112).

As mentioned earlier, when something is discerned and becomes an object of focal awareness it means that there is variation in the sphere of focus. According to Marton and Pong (2005) "variation theory" is a further development of phenomenography, focusing on the structural aspect of a conception with particular

reference to structures within conceptions, not between conceptions. Variation theory sees phenomenography as making allowances for variation in human meaning, understanding, conceptions, awareness or ways of experiencing a particular phenomenon (Åkerlind, 2005). Learning is multi-faceted and complex and, therefore, requires a method that can shed light on what it is possible to learn in terms of what may be discerned, and also identify critical conditions in the learning environment (Runesson, 2005).

Marton and Ling (2007) contend that most learning theories adopt a psychological perspective but variation theory starts with a pedagogical interest. Variation enables the researcher to identify the structure of awareness underlying the students' varying experience of phenomena. In *Learning Study* by Marton and Ling, variation theory was used to design learning situations (Runesson, 2006; Marton & Ling, 2007). Variation theory reveals significant features of teaching and learning, thus illuminating what is critical for learning.

Different learning outcomes may signify a difference in perception of the same phenomenon. This difference in perception may result in students failing to focus on critical aspects as intended by the teacher. This challenges assumptions about learning and teaching.

> Teaching becomes a conscious structuring act, in which the teacher is supposed to mould learning experiences for students, to make it possible for them to discern the critical aspects required for understanding an object of learning in a particular way (Marton & Ling, 2007:42).

According to Marton and Ling (2007:42-43):

> What is enacted makes it possible for students to learn an object of learning, but what is lived depends on how each individual student experiences the lesson.

In this study on students' experiences of integration, the focus was on finding out the lived object of learning. One of the questions that students were asked was:

- What do you see as integration of learning ability? What would make you say "I am able to integrate?"

In variation theory, what is learned is of central importance because people act in relation to situations as they see them. According to Kneebone (2002) to practise medicine well requires the integration of intellect, skill and emotion. In medicine and the care of human beings, how the situation is seen is of decisive importance and powerful ways of acting originate from powerful ways of seeing (Pang & Marton, 2003).

In phenomenography, according to Sandberg (2000), the term “conception” is used to refer to people’s ways of experiencing or making sense of their world. There is a close relationship between what is conceived and how it is conceived. In this study, attempts were made to explore this relationship by asking students:

- What is integration of learning?
- How does integration of learning take place?
- What helps you to integrate learning?

For students to conceive of integration they need to be aware of it. According to Marton and Booth (1997:108):

> In order to experience something as something, we must be able to discern it from and relate it to a context, and be able to discern its parts and relate them to each other and to the whole.

The questions asked above were a further attempt to determine students’ awareness of the concept integration and how they discern it from and relate it to the context of learning.

3.4.5 Categories of Description and the Outcome Space

The major outcome of phenomenographical research is categories of description which Ashworth and Lucas (1998) describe as a structure within which the various student conceptualisations of the relevant concept are fitted. Categories of description should be grounded in the “anatomy of awareness”. Since the ways of experiencing something are limited, a few categories should be explicated addressing critical variations in the data.

Marton and Booth (1997) make a distinction between a “way of experiencing something” and “categories of description”. The former refers to the described while the latter refers to description. A “way of experiencing something” refers to an individual’s awareness of a phenomenon while “categories of description” are the qualitatively different ways a phenomenon is perceived. Categories of description refer to the “*collective level”* (p.128):

> To be more precise, the outcome space is the complex of categories of description comprising distinct groupings of aspects of the phenomenon and the relationships between them (Marton & Booth, 1997:125).

In this study, the outcome space depicts key qualitative similarities within and differences between categories. The different ways in which students experienced integration of learning are parsimonious and formed the outcome space.

3.5 GROUNDED THEORY

According to Denzin and Lincoln (2000:511) “grounded theory” is a qualitative research approach which works from a constructivist perspective:

> Theoretical categories must be developed from analysis of the collected data and must fit them; these categories must explain the data they subsume. Thus grounded theorists cannot shop their disciplinary stores for preconceived concepts and dress their data in them.

The above description of grounded theory means that research does not have to be grounded in some formal theory that is already in existence. Glaser and Strauss (1965:5) emphasise the role of qualitative research as a: “…strategy concerned with the discovery of substantive theory.”

Many researchers have adopted some tenets of grounded theory, like constant comparative method of data analysis:

> …which is continually comparing one unit of data with another in order to derive conceptual elements of theory, even though they may not be developing a theory (Merriam, 2002:8).

This study on students’ experiences of integration borrows pertinent aspects of grounded theory.

3.6 STUDY POPULATION

To achieve the study objectives data were collected from two populations:

- Medical students in the MBBCh programme between March 2012 to June 2014, in each of the Year 1 to Year 6 groups, and
- Academic staff involved in teaching in all six years – planning and reviewing the curriculum, carrying out teaching and assessing learning.

Using these two populations allowed for an important triangulation necessary to gain a more complete and detailed understanding of the nature and effect of integrative learning in the programme.

As the number of medical students in each year varies from an average of 250 in Years 1 and 2 to 300 in Years 3 and 4, it would have been impossible and impractical to interview each one of them (Nachmias & Nachmias, 1981). For these reasons a reasonably representative sample was selected.

3.7 SAMPLING

In qualitative research sampling, the interest is not in "How much?" or "How often?" but to understand the meaning of a phenomenon from the perspective of the participants (Merriam, 2002:12). Qualitative researchers typically engage in purposive rather than random sampling (Miles & Huberman, 1984:25). Random sampling is, therefore, not necessary and if samples are small may even result in a sample which is not representative of the whole. Instead it is preferable to choose those participants who have a lived experience of the phenomenon, from whom the most can be learned. Åkerlind (2008:243) cautions that phenomenographic analysis is time consuming, therefore:

> ...it is common to aim for the minimum sample that can be expected to show the range of variation that would be present in the population as a whole.

Qualitative inquiry typically focuses in depth on relatively small samples, selected purposively (Patton, 2002). In a study conducted by Marshall (1996) new themes stopped emerging after about 15 interviews and theoretical saturation was arrived at 24 interviews. Patton argues that it is important to select "*information-rich"* cases for study in depth because these cases:

> …are those from which one can learn a great deal about issues of central importance to the purpose of the inquiry, thus the term purposeful sampling (p.273).

Marshall (1996) says a purposeful sample is also known as a judgement sample. This is an intellectual strategy that may require developing a framework of the variables depending on the researcher's practical knowledge of the research area.

Theoretical sampling occurs when a new sample is selected to examine and elaborate on theories generated. Denzin and Lincoln (2000) explain that, as the researcher refines categories and develops them as theoretical constructs, gaps in data and holes in theories will be found. This necessitates going back to the field to collect delimited data to fill the conceptual gaps and holes. Such theoretical sampling is implicit in the iterative nature of qualitative research.

3.7.1 Sampling Techniques

Researchers in qualitative research use several sampling techniques which include:

1. Judgement / purposive sampling which is achieved through stratification using specific attributes.
2. Theoretical sampling occurs when a new sample is selected to examine and elaborate on theories generated.
3. Convenience sampling is used to reach the most accessible subjects.

In this study the principal sampling approach was "purposive". As discussed in the previous paragraph, purposive sampling researchers handpick the cases to be included in the sample on the basis of the judgement of their typicality (Cohen, Manion & Morrison, 2000). The researcher obtained a list of all the students in the undergraduate programme from block coordinators. The list also contained the final year mark to enable stratification according to academic performance. To achieve representation when drawing the sample, certain characteristics were considered and these include year of study, graduate and school leaver entrants, gender, race, mother tongue and academic performance. Theoretical sampling was employed where needed to collect more data to fill information gaps that emerged from preceding rounds of data collection.

3.7.2 Sample of Students

The total population was made up of six cohorts of students in MBBCh 1 to 6. Specifically, the sample was drawn from the following:

- Cohort 1: the 2014 class of MBBCh 1 students
- Cohort 2: the 2014 class of MBBCh 2 students
- Cohort 3: the 2013 class of MBBCh 3 students
- Cohort 4: the 2013 class of MBBCh 4 students
- Cohort 5: the 2013 class of MBBCh 5 students
- Cohort 6: the 2013 class of MBBCh 6 students

In this way not only the perceptions of each year group could be investigated but also how their perceptions and abilities concerning integration of learning develop from year to year.

The student population was stratified according to high achievers, middle achievers and low achiever students. Based on their most recent examination results, those who attained above 75 % were classified as high achievers, those between 60 % and 74 % were middle achievers, while those attaining 59 % and below were considered to be low achiever students. This last group included those students who were repeating a year or block. This stratification was applied to all the years of study – meaning that in each year attempts were made to interview at least one student in each of the strata. In addition to this stratification according to academic performance, efforts were made to include all the population groups and achieve gender balance. The researcher believed that one's performance, gender and race may have a bearing on one's perception of learning. In a study by Green-Thompson *et al.* (2012) it was evident that in a South African setting, issues of ethnicity could have an impact on students' learning. Marton and Booth (1997) pointed out that constituent thematic fields or external horizons from which different ways of experiencing a phenomenon are born can present constraints in the way a learner brings a phenomenon to focal awareness.

An important point of note is that students' results were used for stratification only. There was no reference or link to the results thereafter. A profile of the student participants is provided in Table 3.2.

Table 3.2: Profile of the student participants

Interviewee Number	Race	Gender	Year of study	Date of interview
1.	White	Male	4	24/04/2013
2.	White	Male	4	24/04/2013
3.	Black	Male	4	16/08/2013
4.	Black	Male	4	21/08/2013
5.	Black	Male	4	13/04/2012
6.	Indian	Male	6	28/02/2013
7.	Mixed	Female	4	09/04/2014
8.	Mixed	Female	4	09/04/2014
9.	Mixed	Female	5	29/04/2013
10.	Mixed	Female	5	29/04/2013
11.	Mixed	Female	5	29/04/2013
12.	Black	Female	2 (repeat)	07/10/2013
13.	Black	Female	2	09/04/2014
14.	Black	Female	2	09/05/2014
15.	Indian	Female	2	09/04/2014
16.	White	Male	2	09/04/2014
17.	Black	Female	3	14/05/2014
18.	Black	Female	1	15/05/2014
19.	Black	Female	1	15/05/2014
20.	White	Male	3	16/05/2014
21.	Black	Female	3	16/05/2014
22.	Black	Male	3	27/05/2014
23.	White	Male	1	28/05/2014
24.	Black	Female	1 (repeat)	19/05/2014
25.	Black	Male	5	18/06/2014

3.7.3 Sample of Teachers

"Teachers" in this study referred to all academic staff involved in the programme:

- Teachers of medical students in Years 1 to 6 of the programme between March 2012 and June 2014.
- Academic staff involved in developing / reviewing the six years of the reformed MBBCh programme.

Specifically, a representative sample of teachers was targeted by identifying the coordinator of each discipline taught per cohort of students. For example, in MBBCh I, the course coordinators of Physics, Chemistry, Biology, Sociology, Psychology and those who teach the different components of the Medical Thought and Practice course were targeted. Those academic staff members who were involved in the review of the curriculum for each cohort were also interviewed. This population is small but the researcher initially reached those who were at the forefront of the review and then used "snowballing" to follow up any staff members who were recommended by this core group. According to Biernacki and Waldorf (1981) "snowball sampling" also referred to as "chain referral sampling" yields a study sample through referrals made among people who share or know of others who may possess knowledge or information that is of research interest.

3.7.4 Sample Size

Since this was a qualitative study, "saturation" determined the sample size. "Saturation" occurs when no new categories are developed as analysis proceeds and all new data fit into the categories already derived (Denzin & Lincoln, 2011). In this study, saturation was reached after around 18 student interviews.

The total sample size was 35 (25 students and 10 teachers).

Fifteen (15) students were interviewed in semi-structured in-depth interviews while data from 10 students were obtained through four focus group discussions. Data from the teachers were obtained through semi-structured in-depth interviews only.

According to Trigwell (2006) phenomenographic studies can be substantial undertakings with usually between 10 and 30 interviews of about 30 to 60 minutes

each. In this study the duration of the interviews and focus group discussions ranged from 35 to 90 minutes each.

3.8 PHENOMENOGRAPHIC DATA COLLECTION

The purpose of data collection was to elucidate the different ways in which students experience integration in the undergraduate medical programme. Marton and Booth (1997) advise that in phenomenographic research, the methods of data collection and data analysis are inseparable. This is because data analysis can influence further data collection to follow on the angles of the responses given. Another observation by these authors is that, while the researcher acquires learning in the process of investigating something, research subjects also learn more about the phenomenon, because of the reflective nature of the process. Respondents were asked to explain what “integration” was and, in this process, they learnt more about it.

After the stratification described above, the researcher invited the students for face-to-face interviews. A time that suited the student was negotiated and the voluntary nature of the invitation was emphasised. About eight students could not attend the interviews as they were writing tests, exams or felt too swamped with their studies to take part in the data collection. Those students who could not partake in the interviews were replaced by others on the list. As a result of this, data collection was accomplished over a period of 27 months in order to talk to students when it most suited them. The first interviews were conducted in March 2012 while final data collection occurred in June 2014. This also gave the researcher time to reflect on the data collected and re-direct sampling. This is in line with Marton and Booth’s (1997) observations that although the sampling frame is determined at the beginning, because of the iterative nature of phenomenographic data collection the processes of collecting and analysing data cast light on the plans, shift them, fill them in and sometimes turn the whole thing around.

3.8.1 Data Collection Methods

All data were collected by the researcher through semi-structured in-depth interviews and focus group discussions being guided by a number of pre-determined

themes which were explored further following the angles of discussion. According to DiCicco-Bloom and Crabtree (2006:315):

> The individual in-depth interview allows the interviewer to delve deeply into social and personal matters, whereas the group interview allows interviewers to get a wider range of experience…

In this study the purpose of the interviews and focus group discussions was to reveal the qualitatively different or variation of ways in which the students experienced integration of learning in the MBBCh programme.

The information sources and data collection methods are outlined in Table 3.3.

Table 3.3: Information sources and data collection methods for the study

Objectives (summarised)	Information source	Data collection method
1. Students' experiences	▪ Medical students in Years 1 to 6 of the programme	▪ Semi-structured interviews ▪ Focus group discussions
2. Teachers' experiences	▪ Teachers of medical students in Years 1 to 6 of the programme ▪ Academic staff involved in reviewing the reformed MBBCh programme	▪ Semi-structured interviews
3. Links between students' conceptions and educational experiences	▪ Medical students in Years 1 to 6 of the programme	▪ Semi-structured interviews ▪ Focus group discussions
4. Contribution to the debate on current theories of integration of learning	▪ Literature on theories of integration ▪ Data collected for Objectives 1 to 3	▪ Literature search ▪ Available after data collected for Objectives 1 to 3

The main data collection method, semi-structured interviews, used tools that introduced an entry question like “What is your understanding of ……?” Subsequent dialogue followed on angles of responses, leading to the development of different categories of how the phenomenon is experienced. Interviews were recorded using a voice recorder and transcribed in full:

> Phenomenographic interviews are typically audio taped and transcribed verbatim, making the transcripts the focus of the analysis. The set of categories or meanings that result from the analysis are not determined in advance, but ‘emerge’ from the data, in relationship with the researcher (Åkerlind, 2005:323).

Focus groups and further individual interviews were used to refine ideas and not necessarily to increase the size of the original sample (Denzin & Lincoln, 2011). The chosen instruments enabled probing to explore inner feelings and experiences which would not have been possible if, for example, a questionnaire was used.

3.9 DATA ANALYSIS

Data analysis is an iterative process which commences during data collection and involves reading and re-reading of transcripts. According to Miles and Huberman (1984) data analysis begins from the beginning of data collection when the researcher draws conclusions to decide what things mean, and to note regularities, patterns, explanations, possible configurations, causal flows, and propositions. A preliminary data analysis is necessary to check and track the data to see what is coming out of it. From this, areas that require follow up and further probing can be identified. Grbich (2013) explains that preliminary data analysis is a process of engagement with the text not with the purpose of critiquing or summarising the data but more to gain a deeper understanding of the values and meanings which lie therein.

According to Marton and Booth (1997:133):

> The analysis starts by searching for extracts from the data that might be pertinent to the perspective, and inspecting them against two contexts: now in the context of other extracts drawn from all interviews that touch upon the same and related themes; now in the context of the individual interview.

This process involves selecting one particular aspect of a phenomenon and inspecting it across all of the subjects, and then another aspect.

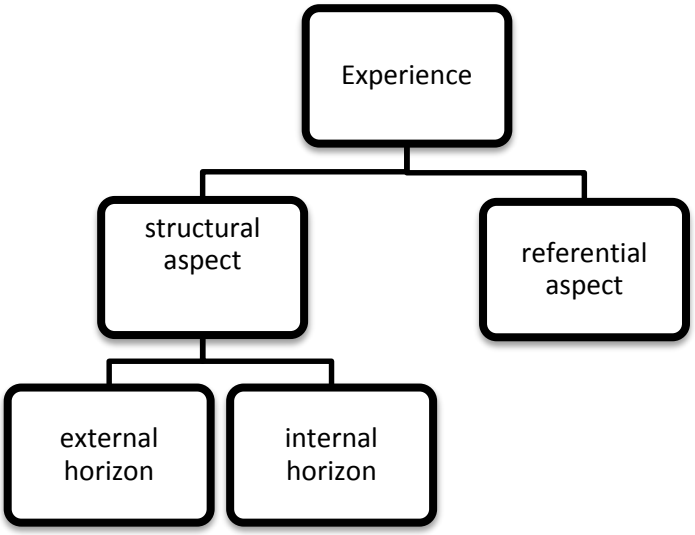
Since the meaning and structure of human awareness are seen as dialectically intertwined, Bowden and Green (2005) advise phenomenographers to emphasise both meaning and structure in analysing ways of experiencing a phenomenon:

> This is reflected in the phenomenographic iteration between clarifying categories of description (regarded as focusing primarily on meaning or, more precisely, the referential aspect of meaning) and clarifying logical relationships between the categories (regarded as focusing primarily on structure or, more precisely, the structural aspect of meaning) during the analysis (p.70).

Figure 3.2 clarifies Bowden and Green's (2005) advice. According to Marton and Booth (1997:87) an experience has a "structural" aspect and a "referential" (or meaning) aspect. Marton and Booth liken the "structural" aspect to seeing a deer in the woods. When looking at a deer in the woods one sees parts of its body and their relationship in terms of stance.

> The structural aspect of a way of experiencing something is thus twofold: discernment of the whole from the context on the one hand and discernment of the parts and their relationships within the whole on the other (p.87).

The same authors further explain that the "referential" aspect of an experience refers to the meaning one gives to what they are seeing. The referential aspect is thus intimately intertwined with the structural aspect. The environment which surrounds the deer is called the "external horizon" while the parts of the deer and their relationships are called the "internal horizon" (p.87). Both the "external" and "internal" horizon form the structural aspect of the experience; and are, therefore, also intimately intertwined.



(Adapted from Marton & Booth, 1997:88)

Figure 3.2: The unit of a science of experience, a way of experiencing something

In this study, the researcher used the "anatomy of awareness" as a framework for structuring students' experiences. The researcher expanded on the suggested way of experiencing something depicted in Figure 3.2 to guide data analysis. The explanation of the anatomy of an experience given above can be inferred to mean that when students encounter something new, in addition to discriminating it from the environment; they also give a meaning to it. Of note is that they give their own meanings which may be different from other students. It can also be assumed that their meanings are influenced by the factors in the external and internal horizon.

The researcher used qualitative software called MAXQDA 11. The use of qualitative data analysis programmes speeds up the processes of locating coded themes and grouping data in categories but the programme cannot analyse the data for the researcher (Patton, 2002; Leech & Onwuegbuzie, 2007). The researcher remains the main tool for data analysis and for framing the study and decisions on what to include and what not to include.

> The analysis usually starts with a search for meaning, or variation in meaning, across interview transcripts, and is then supplemented by a search for structural relationships between meanings (Åkerlind, 2005:324).

Using the above “anatomy of awareness” as a guide, the researcher studied all the transcripts in depth and selected excerpts that seemed to convey the most significant information. The excerpts were then de-contextualised and compared followed by grouping and re-grouping until the outcome space was formulated. The following specific data analysis steps were used:

1. Familiarisation, reading and re-reading through the transcripts. This is characterised by a high degree of openness to possible meanings.
2. Compilation of answers from all responses by question.
3. Condensation/ reduction of the individual answers.
4. Grouping/ classification of similar answers.
5. Comparison of categories.
6. Naming the categories to emphasise their essence.
7. Contrastive comparison of categories and looking for causal linkages which is a description of unique characters and resemblances between categories.

3.10 DATA TRUSTWORTHINESS

In qualitative research the quality of research is considered in different approaches and the one that is pertinent to this study is “trustworthiness” (Guba and Lincoln, 1989). “Trustworthiness” encompasses elements like reliability, validity, credibility, transferability and others. According to Babbie (2010) and Bryman (2008) “reliability” is a matter of whether a particular technique, applied repeatedly to the same object, would yield the same result each time. “Validity” is seen differently and it refers to the degree to which the research findings truly represent the phenomenon being studied (Åkerlind, 2005).

Grounded theorists cited in Morse, Barrett, Mayan, Olson and Spiers (2002) state that, while all research must potentially be considered worthwhile, the nature of knowledge within the quantitative paradigm is different from the knowledge in the qualitative paradigm. According to Shenton (2004) the “trustworthiness” of qualitative research generally is often questioned by positivists and, as a result,

naturalistic researchers have used different terminology to distance themselves from the positivist paradigm.

Consequently, each paradigm requires paradigm-specific criteria for addressing rigour or “trustworthiness” – the parallel term for quantitative rigour. In this phenomenographic study the question of “validity” refers to how well the outcomes correspond with human experience of the phenomenon. This relates to the relationship between the data as obtained from the respondents and the categories that were generated. To strengthen validity, the aims of this study and practical details of the methods used in identifying the categories are clearly reflected. Further to this, all excerpts that support the categories have been provided.

Åkerlind (2005) further explains two types of checks, “communicative” and “pragmatic”, that render the study acceptable. “Communicative” validity checks place a strong emphasis on the researcher’s ability to argue persuasively for the particular interpretation used, that is a defensible interpretation. This requires presenting the research methods and categories of description to the relevant research community. Other such validity checks are “research seminars, conference presentations and peer-reviewed journals” (p.124), members of the population represented by the interview sample and the intended audience for the findings. In general, within the qualitative research paradigm, seeking feedback from interviewees is recommended but this is regarded as inappropriate in phenomenography because:

> **Firstly**...the researchers’ interpretations are made on a collective, not an individual interview, basis. The aim is to capture a range of understandings within a particular group. This means that the interpretation or categorization of an individual interview cannot be fully understood without a sense of the group of interviews as a whole.
>
> **Secondly**...the researcher’s interpretation may go beyond the individual’s explicit understanding at the time of the interview, due to the researcher’s search for underlying, often implicit, meaning. In addition, the ontological assumptions underlying the phenomenographic approach indicate that an individual’s experience of a phenomenon is context sensitive, and so can change with changes in time and situation (Åkerlind, 2005:330-331).

The researcher fulfilled communicative validity checks by presenting the study to different research communities at seminars and conferences.

“Pragmatic validity” checks provide attention to possible discrepancies between what they say they do and what they actually do (Sandberg, 2005). Some authorities argue that phenomenographic research should be judged by its value in producing useful insights into teaching and learning rather than by its theoretical purity (Entwistle, 1997).

According to Trigwell (2006:371):

> Phenomenography does not aim to study an objective reality, so a parsimonious outcome space that corresponds to human experience or *makes sense* is seen as the communicative validity of the outcome.

This study has presented practical recommendations for the improvement of integration of learning at the researcher’s institution and at other institutions with similar undergraduate programmes.

“Reliability” reflects the use of appropriate methodological procedures for ensuring quality and consistency in data interpretations, thus reliability concerns the procedure for achieving truthful interpretations (Sandberg, 2005). Most of the approaches for validity above are also relevant for reliability. Reliability checks include coder and dialogic reliability where, according to Åkerlind (2005:331):

- ***Coder reliability check*** – is where two researchers independently code all or a sample of interview transcripts and compare categorisations, and
- ***Dialogic reliability check*** – is where agreement between researchers is reached through discussion and mutual critique of the data and of each researcher’s interpretive hypothesis.

In phenomenographic studies, the above reliability checks are not used uniformly as their popularity varies and the reasons given are similar to those above for validity. An alternative to these reliability checks lies in documenting and rationalising the processes as clearly as possible, which is what the researcher accomplished comprehensively in this study.

To sum up phenomenographic data analysis ensuring quality controls, Bowden and Green (2005:15) suggest the following:

- The use of no other evidence except the interview transcripts,
- The bracketing of the researcher's own relation to the phenomenon,
- The use of group analysis in order to ensure the first two controls are effective, and
- The analysis of the structural relation between the categories of description being postponed until after the categories have been finalized.

In this study the researcher focused on the object of study, that is, the relationship between the students and how they experience integration of learning in the programme. Although the researcher has substantial familiarity with the integration that is offered in the programme, she bracketed her perspectives of it to pave the way for an unbiased view of how the students viewed the integration.

The use of semi-structured in-depth interviews and focus group discussions for data collection from students in different years of study as well as staff provided a further dimension of the triangulation needed to investigate the integration of learning phenomenon fully. Denzin (1978:294-307) identified four basic types of triangulation:

- ***Data triangulation****:* involves time, space, and persons.
- ***Investigator triangulation****:* involves multiple researchers in an investigation.
- ***Theory triangulation****:* involves using more than one theoretical scheme in the interpretation of the phenomenon.
- ***Methodological triangulation****:* involves using more than one method to gather data, such as interviews, observations, questionnaires, and documents.

In this study the researcher used data triangulation and methodological triangulation with the use of interviews and focus group discussions from students and teachers over three years.

3.11 ETHICAL CONSIDERATIONS

This study was based on obtaining information from human participants. Therefore, ethical considerations were important. It was important to ensure anonymity by excluding respondents' names on all interview guides and in focus group discussions. To explain the study to the students and teachers, the researcher

distributed participant information sheets emphasising that participation was voluntary. The students and teachers signed the information sheets to give informed consent.

To ensure the confidential nature of the data all recordings were carried out by the researcher and coded using numbers. The data were stored password-protected in the researcher's computer. The researcher was not in a position to influence students' marks, examinations or their programme outcome. The researcher is the overall course coordinator for Medical Thought and Practice course from which a small proportion of the sample was drawn. Given that Medical Thought and Practice is a small component of the first two years of the programme, the researcher had neither direct contact with, nor access to, influential and confidential information concerning the students.

The anonymity of teachers and curriculum reviewers was promoted and maintained. Names were not recorded and codes were used instead.

Ethics approval for this study was granted by the Human Research Ethics Committee (Medical) at the University of the Witwatersrand. The ethics approval number is: M110471.

3.12 CONCLUSION: CHAPTER 3

In Chapter 3 the researcher outlined the study methodology and the methods that were used. A distinction of "phenomenography" from "phenomenology" clarified the second-order perspective of the former. "Phenomenography" was explained and the rationale for this approach as a method of choice was demonstrated. Sampling methods and the specific sample from which the data were obtained were also presented. The "anatomy of awareness" which was employed in data analysis and constituting the categories was outlined. Finally steps to enhance the trustworthiness and ethical requirements of the study were discussed.

CHAPTER 4:
RESULTS

4.1 INTRODUCTION

The aim of this study is to explore students' experiences of "integration of learning" in the MBBCh undergraduate medical programme. This chapter presents the data that were analysed to reveal the qualitatively different ways in which the students who were interviewed experienced integration of learning in the programme. The data were analysed using phenomenography, a research method which is useful in tackling research questions of relevance to learning and understanding in an educational setting (Marton & Booth, 1997). Phenomenography enables understanding of the different ways in which students experience integration of learning in the undergraduate medical programme and their views on their ability to integrate concepts within and across disciplines. Students' conceptions were realised in an "outcome space" which is a collection of categories of description of integration of learning, and these categories are logically related to one another by a hierarchically inclusive relationship (Åkerlind, 2005; Bowden & Green, 2005).

As discussed in Chapter 3, in phenomenographic data analysis the "outcome space" represents categories of description that portray the relations between the phenomenon "integration of learning" and the students who were interviewed. The categories of description are further broken down into qualitatively different conceptions of integration of learning derived from the data provided by the students, represented in the form of quotations of student responses. This is in line with the relational epistemology that phenomenography espouses. Of note is that the categories represent the experiences of the group that was interviewed, not conceptions of individual students. The layout of the outcome space at the beginning of the chapter is followed by a description of the categories.

To maintain anonymity each quotation is labelled according to the student number and year of study allocated in the interview coding system. The researcher selected pertinent quotations, some of which were shortened. Being mindful not to lose the

richness of the conceptions, some sections of the quotations are underlined to increase the visibility of the quoted part.

Data from the teachers were analysed and used to triangulate students' conceptions. Although the core of the study is student experiences, revealing teachers' understanding of the phenomenon is important because this has implications on the recommendations for strengthening of integration of learning. As Martin *et al.* (2000:409) observed:

> Programs of academic development for teachers in higher education need to focus on the vexed question of subject matter and how it is constituted for students before considering how teachers should approach their teaching.

With reference to the importance of including teachers' perceptions in research, Ramsden (1989:158) suggests that in order to help students learn better, there is need for an increased focus on both students and teachers and not treat the two separately because:

> The time has passed, if it ever existed, when we could locate students' learning problems inside their heads and carry on teaching them regardless.

In Chapter 1 four objectives were outlined. In this chapter the findings will address the following three specific objectives. The fourth objective will be addressed in Chapter 5:

1. To explore undergraduate medical students' experiences of integration of learning and their views on their ability to integrate concepts within and across disciplines from the first year to the sixth year of their studies; and how this ability develops.

2. To gain insight into what the teachers know about integration of learning, and how they view their roles in the implementation of integration in the programme; and their experiences as they implement activities designed to integrate learning.

3. To clarify students' conceptions of the links between their ability to integrate learning and their educational experiences in the MBBCh programme.

4.2 THE OUTCOME SPACE

Three categories of description make up the outcome space. As phenomenographic data analysis is not interested in content analysis (Marton, 1986; Wilhelmsson *et al.*, 2011), these categories represent the qualitatively different experiences of the 25 students and 10 teachers who were interviewed:

- Conceptions of meaning and processes of integration of learning.
- Conceptions of how to integrate learning and development of integration ability.
- Conceptions of the links between integration ability and educational experiences.

In the tables that follow the outcome space has been presented using as a guide the framework of the "anatomy of awareness" as espoused by Marton and Booth (1997) and Booth (1997) discussed in Chapter 2. The authors analyse learning as having a "**What**" aspect and a "**How**" aspect. In this study, the "**What**" aspect is the "direct object" which, is the phenomenon – integration of learning, how it is experienced and understood by the students. The "**What**" is the referential aspect or the meaning, which is intimately intertwined with the structural aspect or the "**How**" aspect (Marton & Booth, 1997:84). The "**How**" aspect contains two components, the "internal horizon" and "external horizon". The "internal horizon" has two aspects, the "indirect object" and the "act of learning". The "indirect object" describes the types of capability the learner is trying to master, while the "act of learning" focuses on the experience of the way in which learning is carried out in order to attain the desired capabilities.

The "external horizon" of the "**How**" (structural aspect) consists of two aspects, "intrinsic motivation" and "extrinsic motivation" – both influencing the internal horizon. According to Jordan *et al.* (2008:157) Maslow's theory of motivation shows a division into "intrinsic" and "extrinsic" factors. "Intrinsic" motivators are factors internal to the individuals that are rewarding in themselves without the need for incentives (for example, self-esteem) and "extrinsic" motivators refer to factors external to the individuals that motivate them to respond (for example, high grades).

Throughout data analysis in this chapter and the discussions in subsequent chapters, the terms “perception” and “conception” sometimes appear to be used interchangeably. However, in this study, the term “perception” is used primarily to refer to the experience of something in the context in which the integration of learning takes place. The term “conception” is meant to refer to the experience of something which is abstract, for example, perceived relevance (Prosser, 2004).

This research revealed five “conceptions” of integration of learning as depicted in Table 4.1.

Table 4.1: The outcome space

Conception	**Referential Aspect (“What”)**	**Structural Aspect (“How”)**	
	Direct Object	**Indirect Object**	**Act of Learning**
1	Passive process	Ability to remember everything	Knowledge increase Memorising/cramming
2	Consciously putting it together	Ability to identify essential detail	Sifting content, bigger picture Picture formation, visualisation Deep understanding
3	Subjects are related	Ability to link concepts	Integrative learning
4	Systematic process	Ability to manage patients systematically and comprehensively	Pattern recognition Application of learning in the clinical area
5	Happens automatically	Ability to learn for life	Learning for meaning

The first, **Conception 1**, has a direct object referring to a passive process, with an indirect object referring to the ability to memorise everything and an act of increasing knowledge, memorising/cramming. The second, **Conception 2**, has a direct object referring to consciously putting it together, with an indirect object referring to the

ability to identify essential detail with an act of sifting content to see the bigger picture, link to previous learning, picture formation, visualisation, and deep understanding. The third conception, **Conception 3**, has a direct object referring to subjects are related with an indirect object referring to ability to link concepts and an act of integrative learning. The fourth conception, **Conception 4**, has a direct object referring to a systematic process, with an indirect object referring to the ability to manage patients and an act of pattern recognition. The final conception, **Conception 5**, has a direct object referring to happens automatically, an indirect object referring to ability to learn for life and an act of learning for meaning.

The experiences are logically related with a hierarchical relationship with increasing perceptions of value, and this progression takes place as students move from MBBCh 1 to MBBCh 6. The lowest level of conception is that integration of learning is a vague and abstract concept which happens passively while an ability to integrate learning is conceived of as an atomistic acquisition of fragmented facts. The respective act of learning is experienced as knowledge increase. A conception of increasing appreciation of the phenomenon is that it is important to consciously link concepts through identifying essential detail. This is a perception of higher value as it includes the ability to remember everything. A conception of higher value is that subjects are related as they contribute to each other. Understanding one leads to the understanding of another. The concept of integrative learning is introduced and this happens during studying. The most sophisticated conception is that integration of learning happens automatically as students accumulate knowledge and experience. Integration of learning, therefore, becomes a way of thinking, an unconscious competence for life in an integrated career. Students adopt strategies that enable learning for meaning while drawing on all knowledge and skills.

As mentioned earlier in this chapter, the "**What**" and the "**How**" are inextricably linked. For this reason, in the ensuing presentation of findings the researcher will attempt to pick up themes and link them with the data. This will happen sometimes without restricting the findings to the columns as presented in the tables.

4.3 CATEGORIES 1 AND 2

- **CONCEPTIONS OF THE MEANING AND PROCESSES OF INTEGRATION OF LEARNING, AND**

- **CONCEPTIONS OF HOW TO INTEGRATE LEARNING AND THE DEVELOPMENT OF INTEGRATION ABILITY**

Conceptions of the meaning and processes of integration of learning form the referential aspect of the experiences. This aspect relates to the direct object which is the content that is being learnt according to Marton and Booth (1997). The "indirect object" presents students' perceptions of the capabilities that demonstrate that they are able to integrate. The "act of learning" details students' experiences on how they acquire the ability to integrate learning. The conceptions are presented, showing the hierarchical relationship between them and structural relationships with other aspects of the "outcome space".

To establish a common understanding of the phenomenon under discussion, at the beginning of each interview the researcher asked the respondents to explain what they understood by "integration of learning".

The structural relationship between the conceptions of the meaning and processes of integration of learning in the outcome space shown in Table 4.1 are discussed below:

Conception 1

The understanding of the internal structure of integration of learning is least inclusive. A fragmented conception of integration of learning as a passive process which is difficult to conceptualise emerges. Integration of learning is considered vague and abstract and happens in the background somehow. The phenomenon (integration of learning) is not in the focus of awareness of the students and also not in the focus of awareness of the teachers.

The conception of the internal structure of the ability to remember everything is experienced as a quantitative increase in knowledge which is a conception of least sophistication. The focus of the student is on acquiring individual internal

fragmented facts. In this process, the students apply various learning tools in order to increase knowledge.

Conception 2

Students experience the understanding of integration of learning as a student activity requiring effort to consciously look for links in subjects in order to see the bigger picture. A linked relational structure is emerging where there is an appreciation that integration needs to happen, however, the process is experienced as being difficult and time consuming. The conception of the internal structure of the ability to identify essential detail is an experience of higher value. There is a realisation that out of the fragmented facts accumulated above; some are of more value than others. There is a focus on memorising or cramming the detail of subject matter together with sifting the essential from non-essential.

> **Conception 2** differs from **Conception 1** in that an appreciation of the importance of integration of learning is developing and the need to bring it to the focus of awareness is experienced. However, there is still a sense of vagueness of the phenomenon. The effort is more content driven with a focus on individual internal concepts of subject matter and those parts that are essential. The act of learning requires memorising and assigning a level of importance which is at a slightly higher level than a quantitative increase in knowledge. This increases in value to sifting content, picture formation, visualisation and deep understanding.

Conception 3

The understanding of the internal structure of integration of learning is experienced as a more inclusive conception, that of linking a set of subjects that complement each other. There is an awareness of how understanding of one subject helps with understanding of another, hence the workload of studying is reduced. In this integral relational structure, subjects are brought closer together, eliminating boundaries between them. Subjects are not atomistic but more coherent entities that form a whole. The conception of the internal structure of the ability to link concepts is

experienced as the more valuable ability to link a series of complementary and integral ideas that form a whole. The whole is made up of the integral concepts from subjects in other disciplines. The act of learning is a student activity for concept linkage and linking to previous learning.

> **Conception 3** differs from **Conception 2** in that the linked relational structure which emerged earlier is confirmed in this later experience. While there is need to link the subjects together to find common ground, this helps with understanding other subjects. The affective constructs become positive as the experience of integration of learning is beneficial; it reduces the atomistic nature of subjects as studying one contributes to the whole. The focus is on linking parts of a subject that contribute to understanding another or contribute to the whole. These parts include the essential ones that were identified in **Conception 2**. The act of learning, integrative learning, requires linking to previous learning and includes picture formation and visualisation which enables identifying links in the essential detail that was identified in **Conception 2**.

Conception 4

The understanding of the internal structure of integration of learning is experienced as a more inclusive conception which can be a student and teacher activity. There is variation in the experience of the phenomenon in that it can be taught or cannot be taught but it is seen to be integral to the process of learning. The phenomenon can be brought about by triggers to elevate it to the focus of awareness. The attitude towards integration is more positive as it is viewed as a better learning experience. The conception of the internal structure of the ability to manage patients systematically and comprehensively is experienced as a qualitative shift in intention and strategy. Students adopt a deep approach to learning in order to gain a deep understanding and make meaning out of the concepts. Patterns emerge from the meanings abstracted and the patterns are employed in management of patients in the clinical area.

Conception 4 differs from **Conception 3** in that integration of learning is seen as a more cohesive phenomenon. While subjects are experienced as related, as in **Conception 3**, they are now part of a system. Mastering of the whole satisfies an external demand, the management of patients systematically and comprehensively. The act of learning is superior to the previous one in that it is application of previous learning and from individual internal processing to application in the clinical area. There is awareness that deep learning enables effective management of patients. **Conception 4** is more sophisticated than **Conception 3**.

Conception 5

The understanding of the internal structure of integration of learning is experienced as a most inclusive conception which forms an integral component of brain activity. Because of this inclusivity, integration of learning is experienced as not difficult, and leads to a complete and beautiful learning experience; and, with time, is experienced as partly an unconscious competence. This is the most positive affective construct of the experience. The conception of the internal structure of the ability to learn for life is experienced as an ability that transcends the discipline of medicine to the development of lifelong skills which are applied in the clinical area and beyond. This is the most inclusive conception which includes an awareness that the individual lives in a complex integrated world. Learning here satisfies internal demands which include cultural and spiritual needs.

Conception 5 differs from **Conception 4** in that while integration of learning is still seen as a systematic process, it is an integral whole of day-to-day activity which happens subconsciously. The experience is more of a student activity and is the most inclusive conception of all the cognitive and affective constructs. This conception satisfies internal demands for self-organisation and ability to live and operate in a complex integrated environment. There is a qualitative shift in the strategy of the act of learning, from learning to be a doctor to learning for meaning and learning for life. This act of learning subsumes all the other acts of learning.

Having established the hierarchical categories of the referential and structural aspects of the outcome space, the ensuing presents extracts of pertinent quotations that support the conceptions of meaning and processes of integration of learning as well as the act of learning as experienced by the students, with relevant triangulation from the experiences of the teachers. Table 4.2 contains the details of the voices of the students as all the words in the table are found in the extracts.

At the beginning the researcher asked the respondents to explain their understanding of “integration of learning”. The purpose of this was to establish a common understanding of the phenomenon. It was evident that most students had difficulty in conceptualisation of the phenomenon. There was hesitation as most students struggled to articulate what they understood by “integration of learning”. This hesitation was observed across a range of students from MBBCh 1 and even later in MBBCh 4. The researcher shared the meaning of integration of learning which includes connecting the understandings promoted within and among different subject areas or disciplines horizontally and vertically (Case, 1991). Two groups of conceptions emerged from the students’ understanding of integration of learning: mental process (cognitive) constructs and affective constructs. After discussing what students perceived as integration processes, the researcher tailored the discussion specifically towards students’ experiences of integration of learning.

Having established the hierarchical categories of the structural aspect of the outcome space, these are also elucidated and expanded by quotations that represent conceptions of how to integrate learning and how integration ability develops. The indirect objects and acts of learning will be presented and discussed together as they are inextricably linked.

Students were asked to explain what they experienced as the ability to integrate learning and how that ability develops. In general the feelings were that integration ability grows with maturity and, just like integration itself, many students had not thought about it. While some could not tell how to measure their ability to integrate, others explained that when they felt comfortable with explaining something to someone clearly they felt they would have been able to integrate.

Table 4.2: The detailed outcome space summarising the voices of the students

The "What" or Referential Aspect		The "How" or Structural Aspect			
Direct object		Internal horizon		External horizon	
Cognitive constructs	Affective constructs	Indirect object	Act of learning	Intrinsic motivation	Extrinsic motivation
1. Passive process - *difficulty in conceptualisation* - *Interview as a trigger* - *happens in your mind* - *saved in your mind*	Vague and abstract concept	**Ability to remember everything** - *recall a concept with absolute clarity* - *simplify concepts* - *explain to others*	Knowledge increase (learning tools: mind maps, puzzles, pictures, diagrams) Memorising/cramming	**Ability takes time, develops with maturity and experience** - *first year you don't integrate* - *real taste in fifth year* - *foundation gets laid in fifth and sixth year* **Perceived relevance** **Studying** - *sit down properly and go over things* - *hear how others think (others – peers, people with more experience)* - *triggers and repetition* - *"Aha!" moments* - *"Once in a while" moments* - *"Wow" moments*	**Programme structure** - *MBBCh 1 and 2* - *MBBCh 3 and 4* - *MBBCh 5 and 6* **Overload and assessments** - *stack of notes* - *"do or die"* **Role of the teacher**
2. Consciously putting it together - *link different subjects* - *bringing things together* - *find common ground* - *see bigger picture, holistic view* - *connecting it together* - *triggers* - *"light bulb" moments*	Requires thinking Needs full understanding Time consuming Extra studying Difficult, easier for brighter students	**Ability to identify essential detail** - *understand small details* - *understand the basics* - *big things*	Sifting content, bigger picture Picture formation, visualisation Deep understanding		
3. Subjects are related - *subjects contribute to the other* - *other subjects help in understanding others* - *understanding them as a unit* - *cannot stand on its own*	Reduces workload Better learning experience	**Ability to link concepts** - *like pieces of a puzzle* - *links that help understand other concepts* - *link basic sciences with pathological sciences*	Integrative learning Link to previous learning - *triggers* - *repetition, seeing things all the time*		

The "What" or Referential Aspect		**The "How" or Structural Aspect**			
Direct object		Internal horizon		External horizon	
Cognitive constructs	Affective constructs	Indirect object	Act of learning	Intrinsic motivation	Extrinsic motivation
4. Systematic process - *can be taught* - *cannot be taught – learn from others with experience* - *becomes more complex*	Not difficult	**Ability to manage patients systematically and comprehensively**	Pattern recognition Application of learning in clinical area		
5. Happens automatically - *brain automatically integrates* - *saved in your mind* - *a way of thinking* - *unconscious competence*	Complete and beautiful	**Ability to learn for life** - *an integrated career*	Learning for meaning - drawing on all skills		

Integration ability is something that is largely not formally measured or tracked in the programme, as integration is not a competence expected of students as expressed by **Teacher 4**:

> *... they often assess the student's ability purely on one paradigm; the paradigm of getting a clinical science interpreting a knowledge and regurgitating what they've learnt...They won't say that this student is superior because they have an integrated framework of thinking. That's hardly ever the paradigm they use for giving extra marks...They don't regard integrated thinking as a student's competence, which is quite sad…* [**Teacher 4**]

The conceptions are presented in the same hierarchical order of increasing complexity and inclusivity of the perceived experiences given above.

4.3.1 Conception 1

Many students, particularly those who were struggling academically, and some teachers experienced difficulty with articulating their understanding of integration and some admitted to not having thought about it at all before. Their responses were punctuated by long pauses and hesitations. Other teachers were articulate and familiar with the theoretical constructs of the phenomenon. The response of the student below epitomises the vagueness of the concept:

> *Oh well, I was going to ask you that just to make sure of that… my understanding of integration of learning is that you are taught from a broad variety or from a broad Uhm… what can I say?... broad base, so you have many subjects that you are learning or many fields that you are learning, but Uhm… it's supposed to be… it's supposed to contribute to the one Uhm… the one… let's say for example, if…*[**Student 5, MBBCh 4**]

It seems that integration is largely taken for granted or not thought of in the undergraduate programme, as evidenced by the quote from a teacher:

> *...If I must say I think this conversation has been quite challenging because I don't think we have thought about integration as a unitary thought…* [**Teacher 4**]

For both students and teachers, the interview questions triggered further awareness and thoughts on integration. The interview brought the phenomenon to the foreground, to the focus of awareness. There was a suggestion that, by asking these

questions, some people might be triggered to think about integration further and act, hence the interview was seen as a trigger:

> *What you need to do as well is ask people six months down the line if your interview actually made an impression on how they do things because I'm sure for a lot of people that haven't thought about it and you just might actually initiate it...the follow-up would actually be quite a nice little twist...* [**Teacher 5**]

> *..we'll start with the questions I mean I saw your list, I was presuming that, so I didn't do a lot of preparation I mean obviously it triggered me to think a little about it in the times since…* [**Teacher 7**]

A teacher who shared a comprehensive understanding of the meaning of integration of learning conceded that it is a difficult concept for students to understand:

> *I mean maybe because it is quite abstract, it is difficult for them to see it...* [**Teacher 1**]

Since the concept is vague, for some students integration has been a passive activity. A first-year student's experience is that integration happens in the mind. There is no connection of the process to learning or experience:

> *It's like it happens in your mind…Honestly I can't say I am like consciously putting it together like Ok…it's like it's saved in your mind in a way so…it will be used but it won't be conscious…it will just happen…* [**Student 18, MBBCh 1**]

> *…..I feel like …the integration I've ever done was very passive. I never really sat down and said OK let me see the links. I feel like it's important to actually sit down and try to make those links and think about those links...* [**Student 12, MBBCh 2**]

As students gave accounts of their experiences of how they determine their ability to integrate, an experience of low complexity on their approach to learning is the ability to remember everything.

> *I feel that I will miss certain things from time to time and I just feel that that's an indication of not having fully understood and integrated everything together…* [**Student 9, MBBCh 5**]

> *So, for me I can say integration has taken place very well when I can recall a concept with absolute clarity you know, when it doesn't confuse me, when I don't have to sit and puzzle over how it possibly works, it's not something that I just crammed for the sake of… Uhm… getting two points in an exam or something, it's something I actually did for the sake of understanding it. So, if I get complete*

understanding of the concept then I say integration has taken place… [**Student 15, MBBCh 2**]

According to **Student 15**, gaining knowledge and memorising it does not enable one to integrate learning. It is only when the students have gained complete understanding of the concept that they consider themselves to have integrated learning. The student also suggests that cramming is inferior to obtaining complete understanding of a concept.

Following the ability to remember everything, some students felt that if they can simplify concepts and explain them to others they feel they have been able to integrate:

...when you can take something... a very complicated thing that you have been able to integrate and make it so simple for somebody who had never heard it before, to see that actually I've understood this concept... [**Student 4, MBBCh 4**]

Students shared their various ways of approaching integration of learning. Since there are not many opportunities of learning that address integration overtly and formally in the programme, students have devised their many varied ways of doing it.

Student 22 below echoed the importance of preparing for a lecture in order to benefit from it. In addition the student acknowledges that students learn differently and there is an awareness of learning styles. The student finds that some knowledge of the lecture in advance stimulates the attention span during the lecture:

…in first year we were taught about the eight intelligences… and how other people learn better by listening and then other people learn better by visualising…Ok so I don't want to confirm that I am not a good listener…but when I go to lectures not knowing anything I am most likely to leave the lecture not having stored anything in my brain, because… as the lecture goes on I will understand everything they say but at the end… err… it all goes out… Yes, so when I have prepared for lectures…I think it stays in there. So when you're prepared, you don't lose concentration and… err… when it comes to integrating…I think preparing for lectures… [**Student 22, MBBCh 3**]

As mentioned before, students experience integration of learning differently, similarly experiences of the "act of learning" are different. The act of learning that seems directly linked to acquiring the ability to remember everything is knowledge

increase. This is the least sophisticated conception which requires students to apply various learning tools in order to remember everything. In the process some students memorise facts so that they can regurgitate them when they explain to others or to the teachers in the clinical area. On encountering new information, such students revealed variations in the way they approach integration of learning by applying various learning tools like mind maps, pictures, diagrams and puzzles in order to gain a deep understanding of the concepts and identify links in subjects. The students also alluded to further quantitative knowledge increase by consulting textbooks and cross-referencing for a deeper understanding. This would enable ability to clearly explain concepts to the next person which was seen as one way of determining integration ability. Representative quotes follow:

> *... you use a lot of tools, and you draw a lot of pictures and diagrams, you know, you use a lot of textbooks, cross-referencing and making sure that you understand the little concepts so that the whole thing when it comes together becomes something that you can easily, say, articulate to the next person*...[**Student 4, MBBCh 4**]

> *…I usually draw pictures of like… when I am studying and when someone tells me something I usually think of a picture of a simple example. Like with Physics last year, I had Physics so when they'd told me something I'd try to make a picture and visualise, that's how I learn; and then with the integrating part as soon as I grasp the concepts and understand what's going on then I can say "Ok, I do this…*" [**Student 24, MBBCh 1-repeat**]

From the accounts above, integration requires engaging with course content, *"not just reading, but engaging in it"* as **Student 4**, MBBCh 4 says. This student is implying a deep understanding of content to be able to link it to the next. Student 10 presumes that there are times when students read without engaging with what they are reading:

> *…it's necessary to be theoretically sound before you attempt to try to integrate anything because a lot of the problems that we have with integration is perhaps our knowledge is lacking so we can't integrate stuff that we don't know…* [**Student 10, MBBCh 5**]

Conception 1: *Summary*

In summary, at the lowest level of conception, many students experienced difficulty with conceptualising integration of learning which seemed a vague and abstract

concept. It is something that is not in the focus of awareness as evidenced by students and teachers. However, there is acknowledgment that it is important; and needs a conscious effort to link concepts in the different courses of the programme. The ability to remember everything is the least sophisticated conception of the ability to integrate learning. This happens early in the undergraduate programme when students apply several learning tools in order to acquire knowledge. Efforts to simplify concepts and explain to others are experienced as evidence of ability to integrate learning.

4.3.2 Conception 2

Although **Student 12** thinks integration is a passive process, a more sophisticated conception emerges in the student's thoughts – making integration a conscious activity so as to look for links in different subjects.

The conscious process of linking subjects requires thinking and gaining a deep understanding of the subjects. This process is, therefore, seen as time consuming. Students who hold this view find it difficult to integrate learning when there is a heavy workload as represented by the quotes below:

> *So when there is so much work, I don't have enough time or I feel like I don't have enough time…to go through it and understand it…so that when I am reading something else I can find that link…I haven't understood something enough for me to form a link so that's where I struggle a bit when I don't give myself time to fully understand a concept because if I understand the concept then I can remember it properly so that when something comes up, I can sort of remember it or apply it because most of the lecturers tell us that they are trying to teach us concepts but it's kind of difficult*… [**Student 17, MBBCh 3**]

> *I feel like you need more time because, if you are failing, honestly it's difficult to integrate because all of a sudden your focus is shifting from learning and integration to "Oh, my God, I just need to pass". So now you are not even thinking about integrating, you don't have time to think. And if you start by integrating, it's like you are wasting time because you need to learn the content of the work*… [**Student 12, MBBCh 2**]

Linking different subjects together in order to find common ground is a conception of higher value:

> *Integration of learning… Uhm I have never really thought about it actually… let's see… finding ways to sort of link different subjects together, finding common*

> *ground in each of the subjects … that's how I sort of understand my being able to link subjects together concept*…[**Student 17, MBBCh 3**]

In order to identify the links in subjects, there is need to study and gain a deeper understanding, therefore, this calls for additional time spent on integration of learning:

> *…integration would be extra studying…* [**Student 11, MBBCh 5**]

Although integration is important, it is a difficult process to implement:

> *…it's a difficult process to implement but it does need to happen….* [**Student 11, MBBCh 5**]

Student 15 below shares a contrasting experience from the one above and thinks that integration is not difficult:

> *It's not that integration is a hard concept, it's just that it's a concept that requires you to think…and that's not something that we are incapable of doing, it's just that we are not forced to do it ...it just kinda becomes… Uhm… a skill that is not… it's like a pencil that just becomes blunt you know, it can work but it won't work as well….* [**Student 15, MBBCh 2**]

In relation to the above student's experience who thinks that integration is not hard to do, there is a variation of experience with **Teacher 1** who thinks that integration is far more complex than people think and that:

> *…the actual process of the student seeing how things fit together I think is quite a difficult thing…* [**Teacher 1**]

As a result **Teacher 1** feels that integration needs to be a conscious effort so the role of the teacher is to ensure that concepts from different disciplines are not taught in silos or in discrete packages, but in conjunction with one another so that students can make sense of a bigger picture. Some students find triggers helpful in finding links in subjects:

> *…I feel like it helps me understand things a bit more so that in future, it's less likely that I would forget it because I have formed those links in my mind so that if somebody were to say a disease, it would trigger something, it would trigger a whole thing in my mind, whereas last year if you told me something about the pelvis, I can't find any links, I can even remember half the stuff we learnt last year*

because I only focused in that on the pelvis and then it just disappeared. There is nothing for me; there is nothing to trigger anything…. [**Student 17 MBBCh 3**]

And the way I integrate it is I try to find a link between every subject to be able to say Ok… from this part and from this part if I connect them I can be able to say "Ja [yes]*, indeed I am really interested, I am enjoying what I am doing and I can go on with it". I don't want to give up because there is that link that just makes it feel like it's really something because sometimes when you do things like Physics for instance and you feel like I am doing medicine why should I be doing Physics, but if you put it in the context of everything together you actually realise that they are connected and they play a role. So for me I use it, it makes me feel like there is a reason for everything that I am doing this year...* [**Student 19, MBBCh 1**]

Although some students were not very familiar with the phenomenon and view integration as a process that requires time to do, they expressed appreciation of it. Integration makes learning easier because it puts everything together and makes it easier to learn. Integration works out to be beneficial to the student:

I've noticed that it's really...you know time consuming but you see that you don't have to go over things more than, you know, once or twice... [**Student 4, MBBCh 4**]

…if you've heard it before and you integrated it more I think it would be highly beneficial. … [**Student 16, MBBCh 2**]

*Yeah it's a tough question but… Uhm,… it takes place but I don't know... you have to work out a method to be able to integrate things together. You can't keep them separate like we said, you have to, if you studying one subject you must have another one that is next to... and link them together… [**Student 2, MBBCh 4**]*

The teacher below echoes the importance of integration of learning since subjects build on each other:

I think it's important for them to see in the sense that it makes the learning easier somewhat because if the principle is the same in Physics as that aspect of Chemistry and that aspect of Biology, it means by learning something from Physics, you are actually adding onto your Chemistry and Biology and wherever else it applies... [**Teacher 9**]

Some students felt that integration is easier for brighter students because they can easily identify relationships in different subjects:

> *In my view, the thing that helps me to integrate concepts is if there is a common concept in the two different subjects or three or four…if there is nothing in common then it's difficult to integrate. The brighter students could … find relationships that I could not even have imagined between the different subjects and different things. It was like a tree they could find the stem and they could find the different branches. Meanwhile for me I would just like maybe in one branch I could just see the leaves. They could see the bigger picture. And like, "Oh it's actually one tree", for me it's just different branches. And the different branches I can see they are related somewhere in this area and that area but I couldn't see the overall connection of the tree. …* [**Student 12, MBBCh 2**]

The above is an account from a student who was repeating the year. This student needed more assistance to be able to see the connections that made up the tree.

This finding was echoed by some teachers who have experienced that brighter students find it easier to integrate than those students who were struggling. Logically, it holds true that brighter students have a deeper understanding of the content and, therefore, see connections much more easily:

> *… they* (struggling students) *are actually just trying and sometimes not succeeding coping with each subject on its own. Integration requires you to understand enough here to be able to see that it is related… if you don't understand this, you can't possibly see a link… and so if they are struggling with the content per se, the link is beyond them and we are trying to… forcing them to try to do both simultaneously…* [**Teacher 9**]

Teacher 9 is alluding to a sequential process of helping struggling students see links in subjects. There is need to understand subject matter first then look for links rather than expecting them to do both at the same time:

> *…the first observation that I have to make is that it's the brighter students, so the students who are getting higher marks who are most able for the most part to integrate… and the weaker students have particular difficulty with that, now it may be that weaker students are stupid or it may be that they don't have enough data in the first place, because you can't integrate what you don't know… in the old time when we accepted only super bright students, these students would integrate for themselves… it comes together for them…I think they don't have a problem by and large, they have a big enough database and enough reference points that they can do it themselves…* [**Teacher 7**]

In agreement with **Teacher 9**, **Teacher 7** implies that students need to gain a deep understanding of content first or have a broad mental database before they can be expected to see links between subjects. The student below brings in a paradigm

which links the influences of the teaching approach from high school to the ability to integrate learning:

> *Even from school, each subject had its own exams, you never had to link them, never, so I think it's been instilled in us that you have to learn in blocks, you only have to pass each subject you know, if you study for that test you will be fine and you don't actually have to think outside the box…* [**Student 11, MBBCh 5**]

> *…the learning background of the learner Uhm will make a significant contribution to their ability to integrate effectively…I think that students who come from a disadvantaged background Uhm have got Uhm a severe disadvantage in terms of integration…* [**Teacher 1**]

From the experience of **Teacher 1** students who come from disadvantaged backgrounds will struggle with integration of learning.

The content of some courses in the undergraduate programme is inter-related so integration is seen as connecting everything in medicine together and this implies horizontal and vertical integration as represented by the following quotes:

> *Integration of learning is when you… ok say like when you're in second year we had Anatomy as a separate course, then Physiology as a separate course and we had Molecular Medicine as a separate course… so on their own…you do Physiology on its own and then get tested on its own but at the same time there are some Anatomical factors that you need to understand Physiology… but then integration would be … putting everything together because … because in Physiology, even in second year, students still say that Molecular Medicine is almost the same as Physiology because you will find some Physiology in Molecular Medicine and you find Molecular Medicine in Physiology but so integration is taking everything in medicine and connecting it together…* [**Student 22, MBBCh 3**]

In **Student 22**'s experience is a connection with the next experience, subjects are related. This connection is consistent with the phenomenographic nature of the outcome space which is a collective of experiences that are intertwined as discussed earlier. In courses that are linked and complement each other, some courses are needed in order to understand other courses.

Students have experienced content overload as they cover a broad range of subjects. They see ability to sift important content as an indication of ability to integrate learning. The ability to identify and understand essential detail is seen as

evidence of having mastered the bigger picture, as represented by the following quote:

> *....my ability to integrate what I have learnt is in maybe trying to discuss the case without referring to the notes... picking up the minor detail or the very specific detail about a case... I find that also I think a good marker for learning ability... picking up the small thing that is not necessarily so related to the case but is a big thing if missed or picking up the small thing that is related to the case but it's not easy to pick up would show that... for me, I've been able to learn... it's the small details that will show that you are comfortable with the broad picture and that you've gone deeper and you understood the concept or you've gone deeper in trying to understand the small details…* [**Student 5, MBBCh 4**]

Student 5 conceives that small detail that is basic can be a big thing hence the importance of sifting content in order to identify essential detail. A variation in experience is seen in **Student 6** and **Student 4** below who conceive essential detail as important for managing patients. Essential detail is needed for a management plan and for appropriate information at the appropriate level:

> *You won't go down to find the details. In your day in your front line, you are not going to go down to your molecular or cellular level. You understand the basics of what's happening but now you are looking at a more overview. With patients you are not going to talk about their Anatomy. I need to manage a sick patient you know. You put the big things you know, because you can't memorise everything. You put the big things in sort of a plan and how you are going to approach it and what you're going to do…* [**Student 6, MBBCh 6**]

> *And you know, you can see the way people are presenting as well; in hospitals. I still have colleagues who still open a book when they are presenting to a consultant, at this stage and they... bullet by bullet by bullet. And the consultant looks at them and says: "You haven't learnt what it means at this level, to pitch appropriate information at an appropriate level because you are not taking what you have learnt and making it something that you can see that you've understood..."* [**Student 4, MBBCh 4**]

Student 6 and **Student 4** refer to the importance of sifting and using important content when in the clinical area where there may be no time to focus on less essential matters. The utterances by **Student 4** are inclusive of concepts of the various abilities that demonstrate integration of learning. In order to come up with a diagnosis of a patient, the student demonstrates understanding of content by focusing on more essential material instead of regurgitating what was memorised.

> *But the other thing in terms of integration, there are I think things that are important for us to know and then there are some things that are less important for us to know…* [**Student 16, MBBCh 2**]

Student 16 gives the impression that content that is integrated is important content. This student is interested in that differentiation so that learning should focus on what is important to know. Deep learning requires the learner to understand meaning in what they are learning. This is consistent with the ability to transfer that learning to another situation or to see connections with previous learning. For this to happen, students allude to reading up after hours and to consulting different resources for rich information. A teacher who was interviewed concurs that they encourage students to consult several sources:

> *So the tutorials where we give the students questions… and then they come back to the class hopefully with prepared answers, it's very important that they do that themselves before they come to the class in order to benefit, Uhm because it's their engagement with it themselves, addressing the material from the point of view of the question. … they can get their 60 %... they're not going to get the 85 % right in honest engagement. So the integration happens for all students when they engage with the material themselves, whether it's a group learning or sitting you know, sitting with a textbook and trying to clarify details of anything that they missed or didn't understand in the lecture…* [**Teacher 7**]

Conception 2*: Summary*

In summary, in **Conception 2**, a slightly more sophisticated conception of integration of learning emerges. There is a better understanding and appreciation of the phenomenon although it requires thinking and full understanding; it is time consuming because of the need for extra studying and may be difficult to do. Students' conception is that integration is a conscious effort of putting it together in order to link different subjects horizontally and vertically so that they see the big picture. In the process of integration of learning triggers facilitate the linking to previous knowledge. The ability to identify essential detail is a conception of higher value than the ability to remember everything. Although still atomistic in nature, the act of learning is superior because students memorise or cram the facts that they gathered and they also realise that not all the facts are important so they start sifting content and aim at the bigger picture. In sifting content there is realisation that small detail may sometimes be the important material needed.

4.3.3 Conception 3

Subjects are experienced as complementing each other so that knowledge in one subject could lead to better understanding of another. With an appreciation that subjects are complementary, the student below further affirms the importance of consciously linking subjects together:

> *I understand that all the things that we have learned… the subjects, they all at the end of the day...they will be influential in our career, like they all will be integrated in there, and help us in different ways to understand like certain aspects of our field in the future and I think like other subjects could help you in understanding other subjects...* [**Student 18, MBBCh 1**]

Student 23 and **Student 20** below bring in a different dimension to the process of integration of learning. The realisation that subjects are related sometimes comes as a student recognises that integration is an involuntary response when it has been triggered by similarities in a lecture, or a "*light bulb"* moment after gaining more understanding:

> *It's not always easy but sometimes it just happens Uhm sometimes you will be sitting in a Health Systems Dynamics lecture and you will start doing something about blood flow and density and then you realise "Oh, this is something you did in Physics, like the calculations on this exact thing" sometimes it's not even a voluntary response, you just… it sort of just creeps sometimes that Oh…this is how this relates to that.* [**Student 23, MBBCh 1**]

> *Probably more difficult concepts that wouldn't have been able to explain themselves with one subject so you needed that integration to get a more general understanding of it and then if you… once you understand that more difficult concept then you get that "light bulb" moment…that's generally what's happened to me in the past.* [**Student 20, MBBCh 3**]

Student 25 alludes to horizontal and vertical integration by referring to integration of learning as understanding subjects as a unit:

> *I think it's… Uhm… a matter of understanding… Uhm… different fields of learning in relation to one another like in first year we were doing … Physics, Chemistry, Biology and, from a distance, they were looking like everything … focusing on different aspects while all in all everything could be put together… putting different fields together and seeing how they relate to each other and then… and understanding them as a unit instead of understanding them as… different pieces.* [**Student 25, MBBCh 5**]

Similar to the conception above, the student below expands further to linking all aspects of theory and practicals in order to see one system because subjects are related. This is a more comprehensive view which gives the impression that when there are linkages the system works:

> *…my understanding is sort of bringing together all facets of learning, like the different studies and the practicals as well as the theory bringing it together so that it's one whole working system rather than just pieces.* [**Student 9, MBBCh 5**]

Subjects are interdependent to the extent that they cannot stand as independent units:

> *Uhm to me it means Uhm taking different fields of study and then putting them together to show us that they work together, like they are related in a way that one cannot stand on its own but then for one to stand on its own it needs other fields of study… Ja* [yes], *that's what I understand.* [**Student 24, MBBCh 1**]

The process of linking subjects into a unified unit eliminates boundaries between them. This is a more complex view of integration of learning:

> *Different components are put together so you can use one component.* [**Student 3, MBBCh 4**]

The other purpose of putting subjects together and linking them is for them to make sense, to enhance understanding. Linking them is seen as a better learning experience:

> *It's the taking of separate subjects and interlinking them so that they make sense and can feed off each other so instead of being two completely separate subjects, you're almost putting them together to make it a better learning experience really.* [**Student 20, MBBCh 3**]

As presented earlier in **Conception 2**, students have experienced complementarities in the subjects to the extent that boundaries between them are eliminated when students progress in the programme. An ability to identify and link concepts that help understanding other concepts is a perception of a higher value than knowledge increase and memorising:

> *I think when I can see a link and that link helps me understand one of those concepts that I am linking, I think that's when I feel like the integration has been*

successful but when I sort of maybe see a link but the link isn't helping me understand something then I struggle… then I struggle to integrate, I sort of don't even bother trying anymore if it seems useless to do it basically… [**Student 23, MBBCh 1**]

The student below likened integration to putting pieces of the puzzle together. In this process, one is forced to search for information in order to fill any gaps and this also results in appreciation of information that was thought trivial initially.

…firstly it forces you to think about how different subjects are related to one another. There are certain things that we take for granted until we're forced to stop and think about it, integration brings to your attention just how useful other concepts have been...it helps you understand the relevance of everything and how they all work together like a puzzle piece…like all the puzzle pieces have to be together for you to get a complete picture…you might actually find that there is an easy link to remember this new piece of information because of its relation to another subject, so that's how I would tackle the new piece of information… [**Student 15, MBBCh 2**]

Other students see the ability to link basic sciences with pathological sciences as ability to integrate. This is a higher level conception as it happens later in the years and mostly in the clinical area. **Student 3** below also alludes to horizontal integration. The following quotes are representative:

...let's say I'm going to be studying about like Musculo-skeletal, Arthritis and then when I study like Inflammatory Arthritis whatever degenerative then I get the different signs and symptoms and read them… Ja [yes] *but then as I read them in my brain I'm like think about the normal how the joints are… and then what happens to change that like when I'm studying inflammatory the mechanisms that go on to disturb the normal to the abnormal. So and the treatment, what I have to do... Something more or less like that…* [**Student 3, MBBCh 4**]

I've studied the process of mechanism of how things function and operate so like the normal and the abnormal and in like incorporate it, how does one fix that abnormal? So it's Uhm how I personally do it as a student?... [**Student 2, MBBCh 4**]

The student below highlights the importance of first understanding what integration is in order to consider the ability to integrate. Although from the accounts of the teachers that were interviewed, it is evident that some students do not possess sufficient understanding of what integration is and its processes. Students have, however, designed some ways of assessing their own ability to integrate learning:

> *…maybe it's also with the understanding of what we are integrating, what integration is really. That made me understand as well how to integrate better and how to link certain things…* [**Student 17, MBBCh 3**]

Some students explained their experiences on types of studying that are more effective for integration of learning. Drawing mind maps is experienced by some as a particular way of finding links between subjects. Other students referred to 'integrative learning', seen to be studying all subjects in juxtaposition instead of focusing on only one at a time. The following quotes are representative:

> *… instead of studying one system in isolation you study the Anatomy, then the Physiology then the Histology altogether so that it is relevant and you have a broader scheme of how you approach things...integrative learning and taking into consideration what you are taught at the bedside and also what you are taught in the lecture and how they come together*... [**Student 4, MBBCh 4**]

> *The ability is knowing when you can look at…for example, if you don't know anything that the lecturer is talking about and you just see maybe slides and you have no idea…I now understand that I have to look at the bigger picture. And the bigger picture is pulling the other subjects. So not just looking at what you're doing at that point, in that lecture but everything you know about that subject because of what the other subjects have given you information about... they are not separate subjects, even though we do separate subjects they're not really separate subjects…if I have to draw a mind map about the subject you have a lot of linkages…If you don't see the links between the different components then you are not integrating…* [**Student 13, MBBCh 2**]

> *... from my personal perspective I integrate it by going through the lectures in a systematic view... you go through Pharmacology a bit, you go through the Anatomy, you go through the Pathology and everything must be combined*... [**Student 2, MBBCh 4**]

Studying as an important step in the process of acquiring the ability to integrate was further expressed by a student who likened it to creating a mental library to refer to when necessary:

> *That's how you putting it and that's your template now and then from there you start pulling out and asking*... [**Student 6, MBBCh 6**]

Integration is easier when a student can identify related concepts in subjects. According to Harden *et al.* (1984), integration is the organisation of teaching matter to interrelate or unify subjects taught in separate courses. The traditional curriculum focuses on discipline-based teaching which leaves it to the students to put together

the knowledge gained in each discipline into an overall picture of medicine. The concept of “spiral curriculum” referred to in Chapter 2 advocates that a curriculum re-visits the basic ideas repeatedly and builds upon them until the student has grasped the connections. This approach would help students see the links in an institutionalised manner. Repetition of core content serves as a trigger which creates curiosity in the student. Students would learn to study that way and see it as a way of doing business. They would not then single out integration as extra work that takes time:

> *For me it meant the information will stay in my head longer because I got it from this side and that side. If I do forget from Anatomy at least I remember from Physiology, if I don't remember from Physiology then I can remember from Anatomy…* [**Student 12, MBBCh 2**]

> *Usually it's like when something is automatically obvious…like topics which are similar or maybe a concept that is similar…like in Physiology, you learnt about blood and you learnt about anaemia, and now blood is mentioned in Molecular Medicine, then you automatically think about what you've learned in Physiology. It takes like an obvious trigger most of the time…* [**Student 14, MBBCh 2**]

> *I think by seeing things all the time because…sometimes you're probably not even aware of it, whether it's happening but like constantly seeing a particular scenario, a particular word all the time appearing constantly, you start wondering why is it appearing all the time then it forces you to go now and start looking for that link and then that's sort of how it works for me …if I have seen a word before, it irritates me…Why is it still there, why is there like this nibbling in my brain? There is obviously a link between, there is a link somewhere that I have missed then I just have to go and search for it and, when I find it, it becomes easier to learn because then it starts triggering things…* [**Student 17, MBBCh 3**]

Another experienced variation is that to be able to integrate, there is a need to visualise and link new learning to experience otherwise integration is not possible. This experience could be personal or reflecting on an image of something.

> *... visualise something...if you can't see an image of something then it's pointless, you can't make a connection with it but, as soon as you have the visual aspect of it and you see the work and you see and experience like a personal experience of the disease and something like that, you incorporate all those three together like you see the host, you see the environment and you see the microbe you know those three together...* [**Student 1, MBBCh 4**]

Conception 3: *Summary*

In **Conception 3** a higher level of understanding of the phenomenon is that subjects are related and contribute to each other. The attitude towards integration of learning improves further as it is a better learning experience which reduces the workload of having to study subjects individually. The ability to link concepts is a conception of more value because it subsumes the previous one, identifying essential detail. Students realise that subjects are related and it becomes important to link to previous learning. They use picture formation and visualisation as tools for learning, and these are more sophisticated tools. According to students' experiences, most of the linking of concepts occurs during studying and studying for integrative learning. This is experienced as students studying several subjects at the same time.

4.3.4 Conception 4

An even more sophisticated conception is that integration of learning is seen as a systematic process. However, there were variations on whether it is a taught process or one which develops and happens spontaneously with experience and learning from peers and others more experienced. The variations in conceptions were apparent in the conversations with **Students 9, 10 and 11** who were interviewed together:

> *Uhm… and I don't think integration could actually be taught, you'd learn from experience and also from tips with people with more experience, that's what I find with the consultants and people that we meet on a daily basis in the fifth year. They just… they give you a further understanding on how to put everything together…* [**Student 9, MBBCh 5**]

> *…for me it's pretty much a systematic approach, so I have got my headings for example…risk factors…aetiology...signs and symptoms...following that structure helps me integrate…* [**Student 10, MBBCh 5**]

> *I disagree with that. I think integration is a learnt process you can't just…if you take someone from second year and shove them into fifth year, they would not know anything, they wouldn't know how to integrate or approach a case…it's just for everybody, the whole integration process happens differently, but I think that you need to be exposed to having to integrate before you can learn how to…* [**Student 11, MBBCh 5**]

Student 10 explained above that when she has her headings lined up, she thinks of the disease as a whole based on the theoretical knowledge that she has acquired including the risk factors of this disease. Following this systematic process reminds her of how the patient presents with this disease, and all of that is mostly based on what she has seen in the wards. The student is relating to her experience which would have made it difficult to integrate that way earlier in the years of study before clinical exposure.

Student 11 affirms that integration should be taught while conceding that it happens differently in different individuals. The student alludes to the importance of experience in being able to integrate learning because, in MBBCh 2, students have not acquired much experience. **Student 9** above foregrounds the role of experience by acknowledging integration tips they get from senior, more experienced students and teachers. Apart from integration being taught, people with more experience are seen to play a role in enabling students to integrate learning. Not only teachers are seen to be more experienced, peers are also included in the category of those who can assist with integration of learning. This makes integration a collaborative activity.

In contrast, teachers are of the view that students need to be taught how to integrate learning so they can consciously put it together. As mentioned above teachers think integration is difficult so students need to be taken through the process. Integration of learning needs to be made explicit to them particularly for the benefit of the average student who struggles with seeing links:

> *I don't think that they can do it by themselves. I actually think that integration is something that you lead students through... I don't think that our average students are actually capable of doing that...I think that it's something that needs to be made explicit to students… often when you try to look for evidence of integration, you are going to see them throwing up their hands and rolling their eyes…* [**Teacher 5**]

Some students experience integration of learning as a process which runs through the undergraduate programme but with increasing complexity. The student below sees the subjects as contributing to a system:

> *That's how life works, however, if I am studying first year Surgery, if I am studying first year Physics, the system is a system. There are inputs and there are outputs and there is a system as a whole and the variables which then interplay to it bring*

about, they become more complex...but the fundamentals of how it is, they are still the same… [**Student 4, MBBCh 4**]

According to a final year student, integration is possible with pattern recognition following common patterns like signs and symptoms. Understanding common patterns will make it possible to isolate atypical presentations which require more thorough investigations. The students felt they needed to do this pattern recognition for the ability to manage patients systematically and comprehensively.

...when it comes down to the clinical aspect or what you Uhm doing in the front line it's more when it comes to a pattern like recognition the basis of your integration…I remember seeing a patient like this, the patient had this, this, this, now you looking for things, you remembering how to do things and that's how we talk much of integration and pattern recognition. That's how you putting it and that's your template now and then from there you start pulling out and asking... [**Student 6, MBBCh 6**]

I think it's literally exposure to cases that's taught me to integrate because before that I thought very much in different blocks… [**Student 11, MBBCh 5**]

...because I feel that that's, you know, the ultimate to be able to see patients and be able to understand what they are going through, Uhm... you know, the Biology of it and also emotionally and, trying to pull all the information that you have been learning and do what is best for the patient and what is best for the patient's disease... [**Student 5, MBBCh 4**]

The student below expressed an experience of a consultant's remarks in a clinical area. The student was failing to identify the basic information and integrate with the patient's history in order to make a proper diagnosis:

You are just basically giving me back what I could have asked a patient. And at this stage I need you to be able to take the basics and what the patient has taught you and think about it in terms of a focused diagnosis... through time and through application of knowledge; they can do better... [**Student 4, MBBCh 4**]

... you go to hospitals as well and you start seeing patients and you start integrating your work with the patients and your theory because now you have to put theory with the practical and that's where I like it... so like when you see a patient, you say: "Ok, I remember this, I remember the Anatomy, what's wrong with the patient, I remember a little bit of the Physiology, what's going on in the patient and I remember some of the Pharmacology I can treat the patient." So I think it's a learning process and I think that by the sixth year you should be able to integrate all the work that you have accumulated during the past five years and to be able to help that patient, that's the way I see it… [**Student 1, MBBCh 4**]

Previous experience and application of learning in the clinical area are seen to be prerequisites in the development of ability to integrate learning. This is how a deep understanding develops, for integration to take place.

> *I try to think of whether I've learnt the stuff before or whether I've seen a similar thing before or I've heard about it somewhere or read about it before...from a personal experience. Yes, even when you studying you like "Oh, yes, this happened to me or this happened to my relative or whatever."…* [**Student 3, MBBCh 4**]

> *....so I think it's nice when you have a lecture and....apply that to a real case, you know, to see a real patient. So you will be speaking about any disease like ulcerative colitis and you actually go to the ward and you see a patient with the signs and symptoms of ulcerative colitis...So I think that's the best way to incorporate everything...* [**Student 2, MBBCh 4**]

In agreement with the above sentiments, a teacher shared experiences on how students could be assisted with integration in the clinical area:

> *...maybe it would be more relevant to re-discuss the Physiology of the GIT*[1] *when they were seeing patients with peptic ulcers or diarrhoea as opposed to just hoping that they remembered what they learnt about the Physiology in second year…* [**Teacher 8**]

> *…on the ward rounds I like to do things around the bedside and about specific patients what I like to do is apply whatever knowledge they have to those specific patients so it's not just textbook recall and that sort of thing, it has to be mainly physiological and anatomical issues that fit in with what that case is demonstrating and that would be brought up at the time…* [**Teacher 8**]

Student 2 refers to the critical nature of medicine, saving lives. For this reason, the perception is that it is paramount to set high standards for the management of patients:

> *... the pass mark, you know, the pass mark, the requirements to get in, all of those things, you know, can maybe be a higher step, because at the end of the day we are saving lives…we are dealing with patients and we are a very high professional career and you know, to have someone who actually knows 60 % of the work, like for example... he's not good enough to become a doctor you know...* [**Student 2, MBBCh 4**]

[1] Gastro-intestinal tract

Conception 4: *Summary*

In summary, **Conception 4** is more cohesive and of a higher level of inclusivity. Subjects are seen as a part of a system and the attitude is that integration of learning is not difficult. There are variations in experience of whether it is a taught process or one which can be learnt from peers and teachers who have accumulated experience. The system of integration becomes more complex and is likened to how life works. The ability to manage patients systematically and comprehensively is an inclusive conception which is superior to the other conceptions before this one. In managing patients, students apply their knowledge and skills in an integrated manner to solve patients' problems. This perception of the act of learning for this ability is sophisticated, requiring pattern recognition, a deep understanding of the concepts and application in the clinical area.

4.3.5 Conception 5

A student who is close to completion of the undergraduate programme shared the experience of horizontal and vertical integration. According to the student horizontal integration happens in the earlier years of study when students look for links in the basic sciences in order to build a knowledge base. Later in the years when the student has acquired the basic knowledge, integration becomes an automatic process as the students build on what they already know:

> *I think… Uhm… horizontal…I will start… Uhm… putting things together, try to understand … that's more like at the beginning of the year, and then but as the year goes, it's a matter of… Uhm… let's say maybe when we are in the… Chemistry class, in first year and then when they are talking about something that I have heard of in Physics, then I would try to understand them both… And then with vertical…because after let's say… I am in fifth year, so everything that I have studied from second year… first year, second year, third year and then now it more of happens automatically… you have to pick up on something that you already know or that you have done…* [**Student 25, MBBCh 5**]

When one has acquired a broad knowledge base, integration becomes a spontaneous brain activity; that is integrating new knowledge with already existing knowledge. As discussed in Chapter 2, opponents of behaviourist model theories

believed that in the process of learning the brain is actively involved in constructing information rather than a passive recipient of external stimuli. The brain does not learn on demand by a school's rigid, inflexible schedule because it has its own rhythms (Jensen, 2008). According to Durning and Artino (2011), knowledge, thinking and learning are situated in experience and the excerpt below affirms what some students think about how the brain plays a central role in the process of integration of learning. Unlike the students who have experienced integration of learning as a passive activity with no expressed link to prior learning, the conceptions of the students below are that, once a student has learnt how to integrate and acquired deep understanding of knowledge, integration happens passively and automatically as a function of brain activity:

> *Ja* [yes]*, I think the brain, the contours work in one straight line. I think that the brain makes pathways because you can remember things and you remember Pathology and you remember a bit of Anatomy, Physiology, Micro-Biology and Pharmacology so I think that* <u>*the brain automatically integrates*</u> *things and files things in a specific order…so I think you maybe might study one subject at a time, study the lecture notes you know and a bit of pharmacology but I think that the brain automatically remembers in a fundamental order but also mixes the different subjects together*… [**Student 1, MBBCh 4**]

Below is a conception of a student who experiences integration of learning as a skill that is automatically picked up as one goes along and recalls all the knowledge one has about a relevant topic:

> *I think it's something that* <u>*automatically happens*</u>*, like if you are in Physiology and you talking about enzymes and automatically all the knowledge you have about enzymes comes to mind…* [**Student 14, MBBCh 2**]

The above supports views from other students that integration of learning is a systematic process which develops with experience and becomes a way of thinking. Integration becomes a brain activity and, to use a description from **Student 20** in MBBCh 3, integration of learning develops unconsciously and becomes some form of "unconscious competence":

> *….Ja* [yes] *I think you…it's… you're probably not aware of it because I don't know… it's something called* <u>*unconscious competence*</u> *where if you learn something, you may not think you know it or there was use in knowing it but then you're going to use it further on in life. So I think it's probably that…* [**Student 20, MBBCh 3**]

Student 24 shares a conception of a higher value of how integration happens. The student conceives integration of learning as a process that has been incorporated into people's daily activities:

> *Well, it takes place outside like when you're talking to people… in normal day activities and in ways that we also don't realise that we are actually integrating different fields together…* [**Student 24, MBBCh 1**]

Integration is also seen to be both conscious and unconscious and becomes second nature as students link subjects vertically and horizontally; exemplified by **Student 25** who continues to recount the progression of integration:

> *And then with vertical… it's Uhm because after let's say… I am in fifth year, so everything that I have studied from second year… first year, second year, third year and then now it more of happens automatically like now I am doing my rotation in Surgery, so when I am in the wards there and then Uhm they are talking about a particular structure, it just happens that Uhm now I know what I have learned in second year in Anatomy and it would come up and I would try to link it with what's happening*…[**Student 25, MBBCh 5**]

Student 12 sums up the importance of integration of learning:

> *It is better because if you integrate the work it becomes like a basket, I don't know…but in* [student's home country] *we have a traditional basket they weave, so use different fibres and with different colours as well to create a basket. So in the same way I feel like if you can integrate in second year, you will have this <u>one complete basket and everything will make sense</u>...So if you integrate you end up with something <u>complete and beautiful</u>…* [**Student 12, MBBCh 2**]

As discussed in the literature review in Chapter 2, health care is a complex adaptive system which is a collection of individual agents with freedom to act in ways that are not always totally predictable. Their actions are interconnected so that one agent's actions change the context for other agents (Plsek & Greenhalgh, 2001:625). Below are quotes from students who articulated the complex environment in which they are and towards which they are studying.

> *… around integration I think that <u>every day is a journey</u>…you learn new things every day… and there is no one day where you can say I'm at my best today because, you know… <u>just life happens</u>... there is a whole knowledge base out there to learn… inside medicine, outside of medicine… in terms of people in terms of interactions…and you need to learn that once you finish … <u>there is another life that you have to live and things change</u>. So you need to be able to*

sort of get yourself ready for that world as well... that sort of long-term global integration of how the system works as a whole not just medicine... that helps you become better as a person because you are able to deal with situations outside of medicine and you can then apply life lessons to medicine and sort of relate it... [**Student 4, MBBCh 4**]

… because earlier I mentioned students they only learn for exams… once you start internship now you realise, "I passed my exams now I need to learn for life" because it doesn't mean the common case is pneumonia, now every patient I will have has pneumonia… it doesn't work like that… [**Student 6, MBBCh 6**]

…I think in the future we are going into a career that's very much an integrated career, it's going to require you to draw on skills from numerous subjects and disciplines… [**Student 16, MBBCh 2**]

…so there are all those things…it's not just about academics, you know…you have so much inputs, spiritual, family...and all those things which you need to be able to deal with… [**Student 4, MBBCh 4**]

The experiences of the above students have increased in inclusivity from conceiving integration in terms of their work as doctors to perceiving an integrated life in general. This demonstrates a more sophisticated level of conception of experiences.

Conception 5*: Summary*

In summary, **Conception 5** is the highest level of sophistication in **Category 1** and **Category 2**. This experience is superior and inclusive of all the others discussed above. The experience of students is that integration of learning develops spontaneously as a result of acquisition of knowledge and experience. It becomes second nature as the brain automatically integrates by linking new knowledge with what is already known.

The ability to learn for life is the highest level of conception of the ability to integrate learning. As students mature through the programme and build a deep knowledge base, they realise that they need to learn for life outside the undergraduate programme into an integrated career. These students are adults who have experienced other life demands like family and spirituality. In aspiring to achieve this ability, students learn for meaning drawing on all the skills they have.

4.3.6 Categories 1 and 2: *Summary*

In summary, **Category 1** presents the outcome space of the "**What**" of students' experiences on the meaning and processes of the phenomenon, integration of learning. The "**What**" or the referential aspect is the "direct object". **Category 2** presents the conceptions of how the ability to integrate learning develops. This category represents the internal horizon of the "**How**" or Structural aspect. The internal horizon is conceived of as containing the "indirect object" and the "act of learning". The "indirect object" is the capabilities that students experience as abilities to integrate learning while the "act of learning" is the diverse ways that constitute the variation in those experiences that students require in order to achieve the desired abilities (Marton & Booth, 1997).

It has been revealed that students have experienced cognitive and affective constructs of what integration is and the processes of integration of learning. The cognitive and affective constructs are inextricably linked. Students' conceptions are logically related in a hierarchically inclusive relationship with increasing value of the meanings. Most students had difficulty in conceptualising the phenomenon and some, including the teachers, experienced that the interview triggered them to think about integration of learning.

The lowest level of conception is that integration of learning is a vague and abstract concept which happens passively in one's mind. An ability to integrate learning is conceived of as an atomistic acquisition of fragmented facts, ability to remember everything and recall concepts with absolute clarity. The respective act of learning is experienced as knowledge increase. Students apply several learning tools including mind maps, pictures, diagrams and puzzles in order to increase their knowledge base. This is followed by a conception of increasing appreciation of the phenomenon; that it is important to consciously link concepts in order to find common ground and see a holistic picture. The ability to identify essential detail is a perception of higher value as it includes the ability to remember everything. This higher level of conception is experienced as more demanding as it requires extra studying and more thinking for deep understanding, picture formation and visualisation. Integration of learning is perceived to be more difficult but easier for brighter students.

Another logically related conception of higher value is that subjects are related as they contribute to each other. Understanding one leads to the understanding of another. There is a shift in the affective constructs which become positive. The conception is that integration of learning reduces the workload since studying one subject leads to the understanding of another. The concept of integrative learning is introduced and this happens during studying.

Another variation in the understanding of integration of learning is that it is a systematic process which can be taught or not taught. It is conceived that, if not taught, students can pick up the skill from senior students and teachers who are more experienced. The experience here requires a deep understanding of the content which is applied in the clinical area in order to be able to recognise patterns and manage patients systematically and comprehensively.

The most sophisticated conception is that integration of learning happens automatically as students accumulate knowledge and experience. The process becomes a brain activity and it happens automatically. Integration of learning, therefore, becomes a way of thinking, an unconscious competence. At this level, the affective constructs are positive as the phenomenon is conceived not to be difficult, resulting in something “complete and beautiful”. In this conception of highest value is the ability to learn for life in an integrated career. Students adopt strategies that enable learning for meaning while drawing on all knowledge and skills.

Studying is an act of learning that is conceived to take place throughout the programme and integrative learning takes place later in the programme, around the time students realise the importance of linking concepts. Since the act of learning, studying in different forms transcends the entire referential and structural aspects, it will be elaborated in **Category 3**.

4.5 CATEGORY 3: CONCEPTIONS OF THE LINKS BETWEEN STUDENTS' ABILITIES TO INTEGRATE LEARNING AND THEIR EDUCATIONAL EXPERIENCES IN THE MBBCH PROGRAMME

The conceptions and perceptions below relate to the intrinsic and extrinsic factors of the external horizon of the structural aspect of integration of learning. These conceptions are motivation factors which could be viewed as the internal and external environment in which students learn how to integrate. Dewey (1938) alluded to the importance of the environment in influencing the experiences students have.

Students shared their various experiences on positive and negative perceptions in the programme. The perceptions related to the structure of the programme, the role of the teachers and assessments are depicted in Table 4.3. These perceptions of an extrinsic motivation nature are inextricably linked with the intrinsic motivation conceptions and they are discussed together in more detail below.

There is an internal structural relationship between the "intrinsic" and "extrinsic" motivation factors of the "external horizon". The motivation factors influence the intentions and strategies adopted in the "internal horizon". There is no hierarchical relationship in the motivation factors but there is a structural relationship with the act of learning. Although discussed under each subheading, the "intrinsic" and "extrinsic" motivation factors are so inter-related that they are sometimes discussed concurrently. Separating them would defeat the phenomenographic stance of this study.

The motivation factors are not hierarchical in themselves but they form a structural relationship with the "**What**" aspect of this study. The motivation factors are experienced to be influencing the understanding of the phenomenon and the intentions and strategies adopted in the "internal horizon".

Table 4.3: Category 3 Structural aspect – external horizon

Category of description	The "How" or Structural Aspect *External horizon*	
	Intrinsic motivation	Extrinsic motivation
Conceptions of the links between students' ability to integrate learning and their educational experiences in the MBBCh programme	**Ability takes time, develops with maturity and experience** - *first year you don't integrate* - *real taste in fifth year* - *foundation gets laid in fifth and sixth year* **Perceived relevance** **Studying** - *Sit down properly and go over things* - *Hear how others think (others – peers, people with more experience)* - *Triggers and repetition* - *"Aha!" moments* - *"Once in a while" moments* - *"Wow" moments*	**Programme structure** - *MBBCh 1 and 2* - *MBBCh 3 and 4* - *MBBCh 5 and 6* **Overload and Assessments** - stack of notes - "do or die" **Role of the teacher**

The process of learning something new and remembering it later requires the motivation to do so. As discussed in Chapter 2, according to Piaget's epistemology learning happens through a process of assimilation and accommodation. The former focuses on similarities in what is to be learnt while the latter requires changing what is already known in order to take in new learning (Illeris, 2007) and this needs the motivation to do so. If a student is not motivated to accommodate new learning it will not happen – hence the centrality of motivation in integration of learning.

In this study this "external horizon" is influenced by "intrinsic" and "extrinsic" factors of motivation. The students experience these as factors that influence their "internal horizon"; that is the abilities they aspire to develop in order to integrate learning and how they go about doing it. The data present important student conceptions and perceptions related to "intrinsic" and "extrinsic" motivation: the ability to integrate

takes long to develop; and **perceived relevance** contributes significantly to motivation. In addition, students integrate learning when they are **studying**. The integration of learning happens in an environment that is controlled by the structure of the programme, the role of the teacher and assessments that set benchmarks for passing or failing the medical degree.

The impediments to integration were largely factors that were the opposite of those that facilitate. For this reason, and to present a whole picture, the opposing experiences will be presented together. The researcher was mindful of the fact that this is not evaluation research but a phenomenographic study of students' experiences. As such, attention was paid to those sentiments that described students' experiences while steering away from evaluation type data. It is acknowledged that there is a thin line between airing what the respondents did not like in the programme versus those experiences that are pertinent to their learning.

4.5.1 Ability Takes Time, Develops with Maturity and Experience

As alluded to earlier, integration ability is perceived to take time to develop and to require maturity as it is linked to the knowledge base and previous experience one has accumulated. There was a strong perception that *"you cannot integrate what you do not know"* so the longer one has been in the programme the more knowledge one accumulates, thus broadening one's knowledge base from which to integrate. There were several expressions linking integration of learning from the second and third year of the undergraduate programme onwards. Many students thought that it was not possible or not necessary to integrate learning in the first year of study because students did not know much then.

> *...the way integration works is such that <u>you build on what you know</u> and my knowledge in the first year and what it is now are very different because ... now I know better... it's not so much about taking in the volumes, it's about having <u>a way of thinking</u>. <u>And to sort of develop that… it takes years</u>…* [**Student 4, MBBCh 4**]

> *I think it happens… <u>it happens over time</u>. Initially when you learn something especially for the first time, you know the pace that we move at you wouldn't automatically now start to integrate things…* [**Student 14, MBBCh 2**]

Since integration of learning requires knowledge and experience, it was not perceived possible for a first-year student to master it. Integration is seen as an ongoing process and something that continues to develop, so even a fourth-year student has not mastered it. However, integration ability continues to develop until it becomes an automatic process, "*unconscious competence"*, as presented in the earlier sections of this study. Below are further quotes that are representative of students' experiences in this section:

> *I think it's like a learning process from first year you don't integrate, you keep everything outside you know because you study Biology and you write your Biology exam and you pass it, you write your* Medical Thought and Practice*, you write your other subjects, so I think that as a learning process, from first year you don't integrate...and, as you get older and you get more mature, you start learning how to integrate things and bring things together...by the sixth year you should be able to integrate all the work that you have accumulated in the past five years and to be able to help that patient… So, I think once you mature... you integrate automatically*... [**Student 1, MBBCh 4**]
>
> *…the real taste of integration probably only happened in fifth year…* [**Student 10, MBBCh 5**]
>
> *... although we were introduced to this concept of integrating everything together because of problem-based learning kind of thing, it's only in fifth year when you really understand and you have more, you gain more experience or knowledge on how to bring things together and how you are not supposed to just look at the box, you're supposed to look outside the box as well…* [**Student 9, MBBCh 5**]

The students' perception is that integration ability takes long to develop and appreciation of its importance surfaces later as students apply their learning in the clinical area. Acquisition of the ability is experienced as stretching over the whole programme and, for some, the foundation only gets laid in the fifth year. Little integration of learning is experienced earlier in the programme until around the fifth year when students spend more time in the clinical area. This application of learning in the clinical area is a sophisticated conception which subsumes use of learning tools and studying as all experience is recalled leading to learning for life, the highest ability conceived in Category 2.

Teachers corroborated students' views that integration ability takes long to develop, with one saying:

I learnt to integrate in lectures only towards the end of second year... [**Teacher 7**]

4.5.2 Perceived Relevance

The perceived relevance of a course was experienced as an important factor on students' motivation to integrate learning. Students found subjects that did not have an obvious relevance to medicine boring. Most perceptions on relevance or lack of it pertained to MBBCh 1 hence they are presented here. As Knowles (1980) observed, adults are motivated to learn things that are relevant, that they will put to immediate use.

> *...there's a bit of will-power or sometimes it's not necessarily will-power but your view on whatever subject it is...which for me it helps in how I learn, or it helps in how quickly I grasp concepts or it helps in how well I do in...*[**Student 5, MBBCh 4**]

> *...for most subjects I'd want to pick out the actual important stuff in what we are doing...I just don't have the enthusiasm. You study it because you need to pass but not because you enjoy it…I have never been a numbers person in my life, so I decided to do medicine because I love working with people and I loved Biology at school, and then now I am doing Physics again and it's like numbers again everywhere and then I get to those parts where I don't see the link and I am like Agh…here we go again…* [**Student 19, MBBCh 1**]

Students gave accounts of their conceptions on **perceived relevance** of MBBCh 1, the first year of the undergraduate medical programme, where students learn basic science subjects. In this study when students were asked about integration in the first year most of them were keen to share their experiences which showed that they did not think there was a need to integrate concepts at that level as the subjects were largely not perceived to be relevant for medicine. Although integration ability develops later in the programme as students mature, lack of perceived relevance had a negative impact on students' motivation to integrate learning as evidenced by the following pertinent quotes:

> *In first year I don't think you really need these abilities*. *There is so much pressure in first year. Like they exclude so many people in first year and stuff, so in first year I feel like you should just pass you shouldn't worry about integration…* [**Student 12, MBBCh 2**]

> *Uhm I don't know about first year, I can't even tell you about it. First year I really don't feel like I did anything on integration, I just pushed through…* [**Student 17, MBBCh 3**]

> *...honestly I am of the view that most people are of this view that first year is more of a sifting year…to get rid of the people that they feel cannot handle second year...so I feel like there is no real integration taking place…* [**Student 15, MBBCh 2**]

> *…first year is very… there are a lot of subjects that aren't related, let's just call it what it is. I don't think it would be wise to integrate Chemistry with Physics…* [**Student 10, MBBCh 5**]

In support of students' perceptions of the relevance of the first year in promoting integration of learning, **Teacher 3** voices strong views about the lack of integration in both MBBCh 1 and 2. The teacher's perception is that the two years are so separate to the extent of viewing them as two distinct and separate entities:

> *I think our first year of medicine is a waste of time because there is no integration there,...especially vertical integration... am not sure why we still have first year in medicine ...I think while on the one hand we are looking at integration we should also look at the lack of integration. I think in the first year* [MBBCh 1] *and second year* [MBBCh 2] *there is no integration. Second year is largely Anatomy and Physiology and we accept that there is no integration. Integration only starts in the third year onwards and they become GEMP 1* [Graduate Entry Medical Programme] *students... Basically it's first year in MBBCh 1 and first year in MBBCh 2, it doesn't build on…* [**Teacher 3**]

Students from MBBCh 1 to MBBCh 4 struggled to see integration with some of the subjects like Physics and Chemistry. In contrast, the student below felt that students need to adapt to the environment first so they can integrate more easily. As a result, the student felt that MBBCh 1 should be used for that adaptation:

> *… there is a lot of adaptation that happens in the first year...not just academically, socially... it's not just about academics…You have so many inputs, spiritual, family...and all those things which you need to be able to deal with...once you have adapted to the environment, how things work, Uhm...you can integrate easier…* [**Student 4, MBBCh 4**]

The majority of the students felt that the first year was a repeat of what they had done in high school. For example, some felt that Physics and Chemistry concepts were very similar to what they had done before university-level education. Some of

the teachers who were interviewed affirmed this experience that some of the concepts are the same:

> *Some of the material, especially in the first quarter, is similar to aspects of…the Matric syllabus has but there are things that the teachers have taught them wrongly…* [**Teacher 9**]

The teacher above seems to justify the teaching of concepts that are similar to high school (Matric) with the suggestion that some of the teaching was wrong. However, students' perceptions of this repetition in content resulted in low extrinsic motivation towards their studies. Many students did not take the first year seriously enough to study and integrate concepts. Where there was a low perception of relevance, the motivation to study and integrate learning was also low:

> *I find that I don't really enjoy most of the subjects from first year, I just sort of did them so I could get to second year and it was sort of a stepping stone if you could say...sometimes I would wonder why I was doing it in the first place...* [**Student 17, MBBCh 3**]

> *…I feel like Physics and Chemistry I don't know where they feature in our medical career…so for me it was just…Agh...let me just finish this year. Not even interested in the integration because I was just looking forward to coming to the second year and actually doing the things that are actually medicine and not those…* [**Student 12, MBBCh 2**]

> *...sometimes you will be studying something and you think 'I am never going to use this as a doctor', so you struggle to see the importance of it so it makes you not to take it as seriously...* [**Student 23, MBBCh 1**]

Student 12 and **Student 23** present a variation in their experience of motivation to learn. Their perception takes a holistic and broader outlook for studying towards being a doctor.

4.5.3 Studying

The concept of studying has been presented above and many students refer to studying as an act of learning. Students have experienced that studying presents triggers that facilitate the identification of links in subjects. The students below further highlight the importance of studying based on their experiences:

> *The once in a while moment…possibly it would have to be when I'm calm, and it would be when I see something in one of the subjects and it triggers something that I did before. So it was not like I would sit and say now I want to integrate. It will be just as I would be studying and I would pick it up, and I would be like OK and then I'd link it. I wouldn't try like focus on it and the "Wow!" moment and dig deeper. It will just come to me like "Oh! OK, those two are related"…* [**Student 12, MBBCh 2**]

> *…when you sit down properly and go over things when you're studying it reminds you of other links in other subjects and then, therefore, you develop a link. And you start integrating the subjects. I think it definitely takes some time to happen…* [**Student 14, MBBCh 2**]

> *…the links are always there but then sometimes the time given for you to study…it depends on how many times you study in a week, the preparation for the exam and stuff…* [**Student 3, MBBCh 4**]

A key experience is that most integration occurs while studying, when the student is calm and not feeling rushed.

> *...So, what I'm trying to say is that from the beginning, if you are somebody who is involved and does other things except from just studying… you are already behind...and if you are somebody who takes time with core principles you have to go back and take your time to understand that and then that, and then that…in order for you to sort of bring this... this global vision that you have and understand what you are doing...* [**Student 4, MBBCh 4**]

According to **Student 4**, studying is pivotal to understanding core principles. The student's perception is that studying is necessary all the time in order to gain a global vision of understanding.

4.5.4 Programme Structure

4.5.4.1 MBBCh 1 and 2

As outlined in Chapter 1, MBBCh 1 and 2 are discipline-based years of study.

MBBCh 1 covers distinct basic sciences subjects – Physics, Chemistry and Biology; and social sciences subjects – Sociology and Psychology. In 2010 a new course called Medical Thought and Practice 1 was added to introduce horizontal integration in the first year and vertical integration with the second year. This course Medical Thought and Practice 1 carries two components which are Health Systems

Dynamics and Integrating Skills. In Health Systems Dynamics students are taught to model systems so they appreciate the fact that everything functions as a system. Integrating Skills is divided into three sections: Integrating Lectures, Logic and Critical Thinking and Medical Terminology. Integrating lectures are designed to teach students how to look for links in the various courses of the year and enable them to see that all the subjects are linked. All other components of Medical Thought and Practice 2 are assessed through multiple-choice question examinations while integrating skills are assessed through an assignment where students demonstrate their ability to link concepts.

MBBCh 2 covers Anatomy, Physiology, Molecular Medicine and Medical Thought and Practice 2. Medical Thought and Practice 2 is a carry-over of the same two components – Health Systems Dynamics and Integrating Skills – but at a higher level. The formative assessment for this course includes computer modelling of systems and an assignment which requires students to look for linkages in the courses that they are taking in the year, thus assessing students' ability to carry out horizontal integration.

Students verbalised their various experiences of integration of learning in MBBCh 1 and 2 and these are presented below.

As mentioned earlier, one course in the first two years of the MBBCh programme was designed to strengthen integration of learning. Medical Thought and Practice is a course that teaches students how to integrate learning by consciously looking for linkages in the different subjects they take in the first and second years. This course was perceived as a good introduction to integration.

> *So, as I was saying that with Health Systems Dynamics with Medical Thought and Practice, the basis of how I was taught to approach questions and stuff; those things still haven't left me...And, in first year you don't realise how important these principles are in psycho-social development, of a person. Uhm... So, that's why I'm saying that it's those sort of systems that you keep having to going back to but they make sense once you know how to approach them… and I think...that's, for me that's been a great help.* [**Student 4, MBBCh 4**]

> *…integration in certain courses, Medical Thought and Practice … the whole premise of our project was to integrate facts from different courses. So that certainly did* [help with integration]… [**Student 23, MBBCh 1**]

> *I also find with like a lot of the graphs in Chemistry, they can be explained so well using Health Systems Dynamics…* [**Student 16, MBBCh 2**]

The above student saw the relevance of the Health Systems Dynamics component and how it could be used in other courses to explain concepts and demonstrate systems better. **Student 16** has experienced how the principles in one course can be used to explain concepts in another course.

> *…Uhm ... back to the Psychology and Sociology, I don't think this year as opposed to as it would be next year...when we start seeing patients and that, I think the application of that would be greater…especially this year Logic, Sociology and Psychology, have become more related. We are doing more of critical thinking. Last year when we did the pure logic and the skills, we didn't really look at that but this year when we were looking at moral dilemmas, we're looking at like the Sociology, people sociology and how it affects, how they approach problems…* [**Student 16, MBBCh 2**]

The above student's conception is an anticipation of the vertical integration when they apply learning in the clinical area while seeing patients.

> *Well, sometimes I have been able to integrate them, like for example with Medical Terminology, it helps with Anatomy. Especially when you are studying Anatomy for the first time there is a lot of different… new words that you are not so familiar with. Sometimes because you did Medical Terminology you are able to realise 'Oh, this word refers to the kidney'…Physiology and Molecular Medicine as well sometimes there are similar concepts, similar topics. I could say sometimes I have been able to integrate them…* [**Student 14, MBBCh 2**]

The fact that Medical Thought and Practice carries over from the first year into the second year was seen as a positive factor in promoting vertical integration.

> *I'd say definitely at the beginning of last year when we started out, I wouldn't have said integration was a very important thing, I would have said "Oh, you know these facts and those facts…you just know it and then it starts happening but… even after the first like lecture when we were told about vertical and horizontal integration, I still don't think I appreciated it as much," … Uhm… but as the year went by and I saw how the things were brought together in the Integrating Lectures and that, I started to see how important it was, and then especially coming to this year, and how things build…* [**Student 15, MBBCh 2**]

Similar to some of the perceptions of **Teacher 3**, **Student 15** experienced horizontal integration in MBBCh 1 but partial vertical integration with MBBCh 2:

In MBBCh 1…I can definitely say amongst those subjects, there was integration happening but there is no vertical integration taking place between MBBCh 1 and MBBCh 2 because from what I have experienced, this year, all I think was really useful from last year was Biology and obviously the Medical Thought and Practice courses carry over. So as far as they are concerned, there is integration taking place there as well and that has also been quite helpful… [**Student 15, MBBCh 2**]

Students spoke further to programme structure issues that were perceived to prevent them from linking concepts from the subjects they were taking in each year (horizontal integration) and taking the learning up to the later years (vertical integration).

I wasn't really sure how first year kind of connected to second year because first year was your basic subjects, the Physics and the Chemistry… those were good to get a general understanding of how things worked but I am not quite sure how it linked to second year because we went from that to Anatomy. So there wasn't like vertical integration, we just didn't understand that… [**Student 20, MBBCh 3**]

They would probably have been a little bit different. Last year my integration was more on a vertical level, like you said which was like… I think because of high school, you come with what you learnt and I was able to integrate that quite well because I did Physics and now am doing first year Physics and a lot of it is the same. I was able to integrate even in Chemistry. So I feel like on a vertical integration level it was good, but on a horizontal level I didn't really see how the subjects are connected to each other. To me they were all very different. None of them were really similar… [**Student 14, MBBCh 2**]

The perception of some teachers is that although there have been efforts to strengthen integration through Medical Thought and Practice, the integration may be less than what was envisaged:

OK, well I think people have made an attempt at integration right through from first year...I know that...the plan was to integrate a lot more I think than is actually happening… [**Teacher 5**]

… in first year and second year when we did… Medical Thought and Practice… yes, … so there were sections of integration… they will give you an idea that everything that we do, it doesn't end here, because remember there was a project… an assignment that we did in first year or second year, there would just… Uhm… take a particular disease in Medical Thought and Practice and then Uhm put them together and then… Uhm… say how do you describe this using different subjects you're learning and then…I remember I took… Uhm… a heart artery and I looked at it from the… Uhm… fluid flow in Physics and I looked at it from the Biology point of view, and how atherosclerosis works and then looked

at it from the Sociology, why do people end up having it, so and…at some point in the clinical years, I'd have to understand this, … Uhm… so it would be easier for me…when I have to… Uhm… approach a particular disease it's always easier for me looking at it from that, looking at everything I have learned from first year up to now… [**Student 25, MBBCh 5**]

The above is an experience of a fifth-year medical student who vividly recounts an experience of integration of learning in the first year. The student experienced that the ability to integrate learning horizontally and vertically was enhanced by the Medical Thought and Practice course.

I find the integrating lectures very useful to integrating information as well because I find they give you almost a new perspective sometimes on looking at it and two things that you thought might be totally unrelated, they can put them together in such a way that you are able to say…"I understand this now and how it works." … Uhm, … for an example, we had that lecture last year on… Uhm… I think it was the conductive nature of the heart and then ECG and how it all works and that was incredible to see how the Physics and basically the more medical side in Biology come together… [**Student 16, MBBCh 2**]

We don't get enough exposure of how to integrate and how to understand… because in first year with the Integrating Lectures we were told Ok in Physics; this is the topic and in Chemistry and in Bio here is the link. So that exposure in the first year it needs to change. Not saying now have a whole course for Integrating, but three lectures instead of one based on your actual projects it will make a difference… [**Student 13, MBBCh 2**]

From the accounts of **Student 16** and **Student 13**, the course Medical Thought and Practice informs students about horizontal and vertical integration in Integrating Skills, a component which focuses on building skills for integration. The students refer to the Integrating Lectures in that course and how they found them helpful in enabling them to see links in other subjects.

…I am not sure, maybe we will see the outcome from Medical Thought and Practice you know because I think that having these opportunities to integrate… Uhm… at an earlier level in the university system anyway even if they are not bringing it from school …Uhm,… one would hope… and certainly that's the intention of it, ….will play out in them being able to do it effectively so, Ja [yes]*, I am really keen to see how the students who have had two years of integrating exercises and so on… Uhm… if they can actually cope differently so will wait to see how that happens…* [**Teacher 1**]

The above teacher's perception is that introducing courses that help the students to integrate learning earlier in the programme would help them to do it effectively. In addition to students' experiences above, the experience of Student 4 below is an affirmation of how Medical Thought and Practice facilitates integration of learning:

> *So, as I was saying that with Health Systems Dynamics with Medical Thought and Practice the basis of how I was taught to approach questions and stuff; those things still haven't left me...There are inputs and there are outputs and there is a system as a whole and the variables which then interplay to bring it about, they become more complex...but the fundamentals of how it is, they are still the same. So that's why I'm saying that, that's how I have been able to apply it... I mean there are certain things that you've lost along the way, there are certain course contents that you have in Chemistry or Physics... I mean those things follow all the time, but...but you take the principles...and you sort of take what you've learnt and you sort of make it into this summed up nice picture that helps you understand...you just build on that; on those core principles and you are like: "I was taught this in first year"...and those are the sort of integrative things you need to learn from first year and bring them up...and, in first year you don't realise how important these principles are in psycho-social development, of a person...that's, for me that's been a great help...* [**Student 4, MBBCh 4**]

4.5.4.2 MBBCh 3 and 4

In the third and fourth years of the undergraduate medical programme, students are taken through system-based blocks and rotations. Eleven systems-based blocks attempt to integrate content from four longitudinal themes in teaching and learning and assessment. Final integrated written and clinical examinations at the end of MBBCh 4 assess all learning from the two years.

In general, students experienced that it was the structure of the programme from MBBCh 3 onwards that aided their ability to integrate learning. MBBCh 3 and 4 are based on the problem-based learning framework.

The problem-based learning structure of the programme requires students to learn in an integrated manner. Some students experienced a direct relationship of problem-based learning with what they encounter in the clinical area, thereby enabling linking basic sciences with pathological sciences.

> *Because now you realise what they are trying to teach you in the ward rounds is exactly what your problem-based learning was about…* [**Student 6, MBBCh 6**]

Problem-based learning is an introduction to that [integration] *and you are learning from fellow students and consultants because those are our facilitators. They are teaching us how the integration process works…in problem-based learning …hmm where they forced us to think about each aspect of the case in different slices and bring it all together…* [**Student 11, MBBCh 5**]

Student 11 recognises the role fellow students play in the integration of learning.

…we were introduced to this concept of integrating everything together because of problem-based learning … [**Student 9, MBBCh 5**]

Uhm… I think the first time we were actually forced to integrate knowledge was when we were presented with case studies, so our problem-based learning, for example, Uhm that forced us to actually look at all aspects of the case… looking at the Physiology and Anatomy and being able to put it all together in that one case so I think only when you're faced with a problem… Uhm… or a case are you forced to integrate, but before that we're learning very much in the blocks… [**Student 11, MBBCh 5**]

In terms of the timing of problem-based learning, some students felt that it should start earlier in the programme. However, because of the block system which compartmentalises systems into blocks and specific clinical cases into weeks, the perception is that integration of learning is not promoted:

…I think that it [problem-based learning] *is coming late into the programme because specifically with the blocks, that is how we should learn our theory and everything but in terms of problem-based learning where we're supposed to integrate things together, if it's Heart Failure week, you know the case is going to be Heart Failure to be honest before you have even heard the case and stuff…you sniff immediately from a mile away that he has heart failure…* [**Student 9, MBBCh 5**]

Teacher 8 seems to support the student's experience that problem-based learning starts late in the programme. The teacher's experience is that students are interested in early clinical exposure as it was conceived to be stimulating; and this is a motivator:

….I think there is a bit of a disconnect and students really are very interested in going to the wards early and doing practical things, touching patients, teaching patients… Uhm… you try to tell them that that will come but somehow they believe that their clinical exposure is important which stimulates them and I am sure it would stimulate them more… [**Teacher 8**]

Although problem-based learning was experienced as a good potential structure for integration of learning, it was not a direct component of any assessments; students did not take it seriously because they study in order to pass assessments as supported by the following quotations:

> *...you learn a lot in the problem-based learning or whatever…but they never actually ask you questions on it...your stack of lecture notes and then you study for your exam and instead of taking your problem-based learning cases...At the end of the day, that stack of lecture notes is what's going to get you to pass…* [**Student 1, MBBCh 4**]

> *I think that problem-based learning is very, very important, I just think that Uhm because we were too focused on trying to pass… Uhm… and swot a bunch of facts we… we sort of disregard it and then when the assessments come, they often test us on facts and the whole problem-based learning process is sort of like lost in the wind…* [**Student 11, MBBCh 5**]

From the above sentiments, it is apparent that the potential role of problem-based learning to promote integrative thinking is really not used although it is perceived.

Teacher 1 below perceives gaps in the way in which problem-based learning is used. There is sometimes a perceived disconnection between problem-based learning and the lectures which are supposed to support the problem-based learning:

> *…there is the… problem-based learning case but there is the teaching event that happens outside of that and how those all link together…the students often see the cases as something separate from the lectures… so they'd* [lecturers] *just come and give an isolated lecture …without referring to the case of the week at all… and maybe they don't even know that there is a case that week …their understanding of what this curriculum is meant to achieve… Uhm… I think is a crucial part of the success of the integration mechanism you know being effective…* [**Teacher 1**]

In terms of progression from MBBCh 2 to 3, some students experienced difficulty with vertical integration because of the different approaches in learning in the different years. The volume of content in the third year was perceived to be similar to that of the second year; however, third year required the learning to be integrated:

> *And you have to have a different mindset going into second year and going into third year. Third year is more difficult in a sense that you're learning a similar*

volume but you have to just put it all together in your mind…and I don't think that we were fully prepared for that honestly… [**Student 8, MBBCh 4**]

The perception of **Teacher 5** about problem-based learning varies from the students and other teachers. This teacher conceives of a different type of integration which may be of more value:

I have never been particularly keen about the whole problem-based learning idea, because....pause...I think that there is a value in the final transfer of information later on not to learn things in one particular context… [**Teacher 5**]

4.5.4.3 MBBCh 5 and 6

In MBBCh 5 and 6 the undergraduate programme is structured in discipline-based clinical rotations. In MBBCh 5 students write an integrated year-end examination and in MBBCh 6, a final integrated year-end examination assesses all learning from the last five years of the programme. In these last two years of the undergraduate programme students spend most of the time in the clinical area where there are several opportunities to integrate all the learning in clinical blocks and rotations. **Student 6** shares positive experiences about integration in these years of study:

That foundation gets laid in your fifth and sixth year...as you go higher and higher in the years you pull in more resources, compacting them into your categories or boxes… [**Student 6, MBBCh 6**]

In terms of fifth year and sixth year they add more combined rotations like the IPC for example … brings in everything from Surgery, Medicine, Paediatrics. That's a nice integrated block where you are learning Family Medicine, where you learning your GP work. Basically when you're sitting in and any patient can walk in, that's what's nice about that block. You know you can't say I am only seeing Cardiology patients, you Neurology step aside because in that block you see what patient comes in front of you, be it a kid or be it a pregnant person or....in that block it's nice… [**Student 6, MBBCh 6**]

The perception of students on their preparedness for vertical integration is that it is not adequate. This is their preparation for integration from problem-based learning into the clinical areas in MBBCh 5:

… even though we had problem-based learning which I think was an introduction to integration, I don't think I could integrate at all in third year and fourth year… it's only now that I'm faced with things, I just feel like I have a better understanding and I can do it much better even though it's not great but there is something going

on…I still don't feel I was fully prepared for integration practically. So Uhm my real taste of integration probably only happened in fifth year… [**Student 9, MBBCh 5**]

The perception of **Teacher 1** seems to confirm **Student 9**'s experience that the problem-based learning might not prepare students adequately for integration of learning:

… I do believe that…some students have really battled to understand what it is we wanted them to do when we put them into a problem-based learning group and tell them to discuss this case. They don't necessarily have a sense of what it is that we're trying to achieve and you can tell them what we want them to do, they can go through the emotions but that richness…of seeing how things are put together, I am not sure that everybody gets it equally… [**Teacher 1**]

This problem of compartmentalisation is acknowledged by the teachers whose perceptions illuminate lack of integration in the clinical area and in assessments:

…the teaching takes place mainly in academic tertiary centres and so that is always going to infer in a way that patients with specific problems are in specific wards and the people within those wards think in a particular way for the seven weeks or whatever the students are seeing a certain view of the world according to what that unit does and how it practises its medicine... [**Teacher 8**]

When it comes to GEMP 3 and 4, I think we need to turn it upside down… I think there is not a lot of integration, we still have compartmentalised this block, that block and then we have a major exam where we call integrated…is it really integrated? ...you know I don't think so… [**Teacher 6**]

In the earlier years of study integration is perceived as a waste of time or too much work because there is no expectation to integrate and students still pass without integrating. However, in the final years of study the perception of the importance of integration rises as in the quotes below:

…if you can get by, through third year and fourth year, without integrating that you know that is a good indication of how the assessments need to change a little bit, because if you can just swot and get through your thing, you are not really thinking a lot you know so if you were faced with Uhm in the exams, more cases that forced us to integrate…it would help along the integration process… [**Student 11, MBBCh 5**]

… you can get by third and fourth year without integrating… you really can. "Ja" [yes]*, but you can't get by fifth year because it's such a practical year and the*

patient as a whole is in front of you. You are forced; you're thrown in the deep end to integrate… [**Student 10, MBBCh 5**]

Student 10 experienced that the programme structure in MBBCh 5 forces them to integrate learning. However, **Teacher 6** is of a contrasting perception that the integration in the programme is fragmented. The teacher explained that through problem-based learning there is a deliberate attempt in MBBCh 3 and 4 to encourage integrated learning theoretically, and to look broadly across different disciplines. But then:

...we put them in MBBCh 5 all of that is lost because now we go and compartmentalise everything so I don't see much integration happening… in the three-week block we say there is integration, we send them for a day or two into physiotherapy or speech engineering therapist. That's taking a chunk and putting a chunk in it… that's not really integration… [**Teacher 6**]

In line with **Teacher 6**, the student below laments the ambivalence between the teaching and assessments in terms of integration. While the teaching is integrated in the block system, the assessment is not:

I think that in GEMP 3… a lot of the problems we come across in integration… Uhm… with assessments is that …Uhm… during the block we're faced with whole cases so we clerk a patient,… take down the entire history … do an entire systems review and we are meant to link everything together and then we get to the test … so you have a Respiratory session, you have a Cardiology session, you have an Abdomen session and they just test those things … I think that's a little bit unfair …because it's on the spot testing of just Cardio instead of "What was the history?", "What did they present with?"… the actual thinking …Uhm… the actual integration process that they expect you to do throughout the block. [**Student 11, MBBCh 5**]

The experience of **Teacher 7** is that attempting to strengthen integration of learning in this undergraduate programme is an insurmountable task:

…so from my observation…, there seems to be less commitment and engagement throughout with integration horizontally and vertically. So horizontally would be in the problem-based learning blocks, truly integrating the different disciplines, I did not see that. … Uhm… and then the vertical integration, I don't get to meet with the physicians, for example…I don't even know who teaches in clinical medicine you know...it's going to take commitment really at the highest level at the faculty to deal with that,… Uhm… good luck!... [**Teacher 7**]

4.5.5 Overload

Conceptions of overload have been presented in students' experiences throughout the programme. All the students from the second year onwards experienced overload of content which presented major challenges in enabling integration of learning. Below are some of the experiences related to those aspects of the programme that were perceived to have a negative impact on ability to integrate learning:

> *…last year was tough. I studied sort of separately…there was just so much to get through and I didn't have time to try to find the individual links...you would be doing head and neck in Anatomy, Neuro in Physio… there was no link whatsoever because we would be studying it separately…* [**Student 17, MBBCh 3**]

The student above is referring to the workload which prevents students from looking for links in the individual subjects of the course. Note that the students' view of integration is that it takes long and requires time to do it – so when there is a heavy workload there is no time for integration. The workload being referred to is due to the content overload that has been reported earlier.

> *… because that's why I'm saying that the workload in itself, already puts you at a disadvantage…* [**Student 4, MBBCh 4**]

In the accounts of their experiences students were of the perception that it was important to master basics before moving on to the more difficult content. They found that mastering subject matter was time consuming; meanwhile teaching progressed on to more difficult material before they had time to study. Below is an account of how a student experiences the conflict between workload and the need to integrate learning:

> *…it's like…being crashed by a car and then trying to appreciate the importance of oxygen. You are more likely to worry about getting out of the car's way. It's just like that, we have got a car that's filled with Anatomy, everything else is bearable, Anatomy is what is the crux of everyone's stress. You try to be avoided by Anatomy and you're also trying to take in your oxygen which is your integration, which will help you understand it and you kind of discard the importance at the time but it is important…* [**Student 15, MBBCh 2**]

Many students in the second year of study reported experiencing an imbalance in the workload expected by the different disciplines. The content overload is seen to force students to focus more on those subjects that are perceived to be more demanding at the expense of others.

> *I feel like almost Anatomy shadows other subjects. It almost like leads to disintegration where we don't focus on the other subjects and people just only study…* [**Student 16, MBBCh 2**]

4.5.6 Assessments

In the MBBCh undergraduate programme students are assessed in various ways. Formative and summative assessments are presented in the form of written tests, practical exams, assignments and portfolios. A variety of written test and examination formats are applied including multiple choice questions and short answer questions. Assessments are spread throughout the year at varying intervals depending on the year of study. There were variations in the way students experienced assessments. Sometimes positive and negative conceptions were aired at the same time as in the statement below which shows that in the block system, integrated assessments were appreciated.

> *…second year was very separate… like, you wouldn't find Physiology questions in an Anatomy paper, it would be strictly Anatomy and Physiology would be strictly Physiology and Molecular Medicine and so on and so on… whereas now when we write it's all together. You have to study everything...the papers in SAQs*[2] *definitely are integrating with the case given the whole case study and from that you must know your way and work it out. You are supposed to know a little bit of Pharmacology and Pathology, a little bit of everything on the case so you are definitely integrating but unfortunately as a student you want to pass your exams and sometimes you don't always integrate everything together or study for it…* [**Student 7, MBBCh 4**]

From **Student 7**'s conceptions, some of the exams are integrated although the student's focus is on studying for passing. There was a variation of perceptions from the teachers' points of view. Several teachers' perceptions of the block approach is that it does not promote integration of learning. In addition, the students are

[2] Short answer questions

perceived to be attuned to the block structure so much that they compartmentalise their learning and expect compartmentalised examinations:

> *…the discipline-based knowledge is largely assessed in multiple choice questions, so that at the end of every block, the students have a Multiple Choice Question exam and each discipline, like Anatomy, Physiology, Microbiology and Pathology… will set a certain number of questions on purely what they taught in that block…so there isn't very much sort of integration if you like…* [**Teacher 1**]

> *But this layering of information I think is… it's very difficult to instill in them, they sort of feel "I have done this, when is the exam or test, after I have done it, I can wipe it out I don't even have to remember…" part of the problem is this block-by-block learning, but it was a Physics thing and now I am in Chemistry and in fact they complain if you try to set a question that looks like it's using Chemistry principles uh they'll say "Oh, but this is Physics, it's not Chemistry"…* [**Teacher 9**].

A variation on students' experiences is that assessments played a role in preventing integration of learning, citing lack of congruence between what is taught and expectations in assessments, and lack of standardisation of approaches:

> *… Multiple Choice Questions… I think they just put less of different subjects and then they just put the questions together. I don't think that they really integrate the questions themselves…they just ask you; give the features that explain this diagnosis or something and … that's all you have to write, you don't have to think more than that...* [**Student 17, MBBCh 3**]

Some students explained that sometimes in what is called an "integrated" test or examination the questions for each discipline are separate or require discipline-specific answers.

> *You see another problem which I mentioned was that we study only for exams. Why we study only for exams especially your final year and in your fifth year because every six weeks you have a rotation. The six weeks is pass, it's like "do or die"...You wouldn't worry about the rest. Why? Because it's not for the exam so that's a downfall. So now when you come to the real world you know only a handful of stuff that's what came in exams...* [**Student 6, MBBCh 6**]

A teacher responded to the question on how the students were being assessed in respect to integration and the response was:

> *I think a lot of the assessment is pseudo integrated. You got a case but you got very distinct demands within the case... So I think a lot of our cases, we're trying*

to make this kind of fancy integration but, in fact, the students haven't got that yet... [**Teacher 5**]

The experience of Teacher 6 is that the block system discourages integration if assessments follow the same block structure:

…if you put an integrated approach to a patient, they have to go and learn an integrated approach but if you put a block assessment method only… they are only going to pick up and focus on medicine. They are not going to bother about the Gynae history of a patient who has heart problems or how many times she's been pregnant. So I think that that's a fundamental flaw… it comes back to GEMP 3 and 4 (MBBCh 5 and 6)*, we're just too compartmentalised and students have picked up on it; 'why should we worry about integrated learning or an integrated approach to a patient… that's not what we're getting tested on. Our objective is to examine the chest or the lung', that's it, nothing else not even the rest of the body. And now we want these students to come out and say that they have had a nice integrated curriculum but they don't. I think at the end of the day, the assessment that we set will do what we need to do…* [**Teacher 6**]

In **Student 6**'s experience the concern is the frequency of assessments which prevented studying other than for passing. Sometimes students focused on spotting and memorising what they thought would come in the examinations to the detriment of integration. As discussed in the earlier sections of this chapter studying plays a pivotal role in enabling students see links in subjects.

Due to the pressure of work, students try to obtain clues about exams from the teachers, thus seeking guidance about the core to focus on when there is content overload. They then focus their attention on what is likely to come in the examination, not necessarily the core content that is necessary for integration of learning. However, sometimes students experienced a mismatch between the core that was emphasised and the focus of the examination as in the next quote:

And I think that the way assessments are run is that you can be given information in class and in lectures, and these people tell you this is important, this important, this is important. You go to the exam they ask you... and you sort of like; "you guys keep saying that this is how I should learn and the way I should take everything but the way you ask is such that by the time I get to this and that you ask me something which is very far away from the core principles of how I'm supposed to be thinking"... it becomes difficult for you because now you are forced to learn the extremes… [**Student 4, MBBCh 4**]

It is a widely researched conception that assessment drives learning (Wood, 2009; Wormald *et al.*, 2009). Since students' experience is that they learn for tests and exams, they will, therefore, not spend much effort on those aspects of the programme that are not assessed:

> *...the only way you pass is by passing exams and tests... sometimes you just do enough to be able to pass, and you might not integrate things, you might not take this and that whatever, you might say "listen I am here for my exams so I'm going to study, I'm not going to bring this into it"... and so, like I think it's too hard you know as a student…* [**Student 1, MBBCh 3**]

Teachers were also aware of the fact that students study for assessments – since integration of learning is not assessed, students will not bother much.

Some students failed to see the relationship between assignments and integration.

> *The assignments…they don't really help to integrate, but they help to reinforce the stuff that you learn…in my opinion…* [**Student 12, MBBCh 2**]

> *I don't think integration really plays a role in assessments …* [Laughter] *I don't think they correlate… we are assessed on notes that we have been given on the subject. And the focus is on the subject. It doesn't really matter what you are doing with the subject. It doesn't really matter your prior knowledge. If you know these notes then you know that you can pass the exam. I don't think they really impact on each other…* [**Student 14, MBBCh 2**]

Students perceived value of a subject as judged by the weighting of marks is also a determining factor of the amount of effort put into studying that subject as evidenced below:

> *I think you "spot" a lot you know, I think as a student you, Uhm, already know what the lecturer said to you, so you only study that section and you eliminate the rest of the lecture...leave out the Pharmacology because I know the Pharmacology will be 10 % of the work or 5 % of the paper so I would rather lose that 5 % and focus on another section. So, I think... I think in exams and tests, you, Uhm, you more focused on specific things, than actually seeing the bigger picture of things…* [**Student 2, MBBCh 4**]

4.5.7 Role of the Teacher

The teacher was seen as an important component and catalyst in the process of learning how to integrate and acquiring integration ability. Students appreciate teachers who take their time to explain and make complicated topics easier to

understand. Students acknowledged the teaching by highly experienced clinicians who made efforts to integrate theory with practice.

Some students experienced that teachers give practical examples that brought what they had previously thought closer to reality; integrating theory with practice, as exemplified by this reported statement from a professor in the clinical area:

> *Although this is important, in the wards this is what actually happens…* [**Student 4, MBBCh 4**]

Students relate to some teaching approaches that facilitate integration of learning like starting with a discussion of what is already known so that students build on what they already know. This supports spiralling of the curriculum that was discussed in the Literature Review (Chapter 2). These are tenets of adult learning which were promoted by Knowles (1980).

> *…they will kind of give us… a review of something that we did last year before we go in deeper… and then they will continue with systems and adding things onto things we already know…* [**Student 21, MBBCh 3**]

The teacher was also perceived to play a role in providing triggers by reminding students of the links in different subjects. Teachers who give examples that link to other subjects provide triggers for integration:

> *What helps me to integrate...if the lecturer tries to integrate themselves that automatically gets me thinking. Like…a lecturer says I'm sure you do remember this from Physiology, <u>that's what gets you thinking</u>. "Yes, I do remember this", your mind will spiral back to what you've learned and you try to integrate it...and discussions with people. Sometimes when you hear how people* (peers) *think, it sort of helps you to develop into integrating a subject…* [**Student 14, MBBCh 2**]
>
> *When lecturers tell us you'll need this one day…you guys did this in Molecular Medicine, you guys did this in Anatomy…and then it clicks "Oh! I do actually remember this"... And because they have already made you find that link between whatever subject you've done, it's easier for you to understand…* [**Student 13, MBBCh 2**]
>
> *Now you learnt about flow in Physics now you doing it again...in Biology… like "Oh yes! ...we studied this in Physics and we studied that in Biology" because <u>in my mind Biology is Biology</u>...* [**Student 3, MBBCh 4**]

Students have experienced the way teachers approach their topics as helpful in enabling them to integrate learning. Some teachers explain content in detail while others use case study scenarios to present information:

> *The method of teaching plays a very big role in how we integrate the subjects because sometimes if a lecturer presents a topic in a very complex manner you might miss the entire relevance of it to other subjects…* [**Student 15, MBBCh 2**]

> *And then it just helps that understanding and what happens is that I find even today we had a tutorial, for example, when I get the questions beforehand some of them I wasn't so sure about…I answer them and when we went into the tutorial and the lecturer got up and explained how the mechanisms all worked together and come together and integrated everything I walked out finding it very simple and if I had to answer the questions again, it would be really simple to go and say "Ok, it's not that complex and I could bring it all together"…* [**Student 16, MBBCh 2**]

Student 16 appreciated the advance questions which prepared the students for the tutorial. A teacher confirmed this practice:

> *So the tutorials where we give the students questions… and then they come back to the class hopefully with prepared answers. It's very important that they do that themselves before they come to the class in order to benefit, Uhm because it's their engagement with it themselves addressing the material from the point of view of the question…* [**Teacher 7**]

> *For me the lecturers that Uhm have helped me integrate are the lecturers that… do it as a case type of a thing. That systematic approach of epidemiology then aetiology then signs and symptoms in conjunction with pictures. I have generally Uhm understood those lecturers more than any other lecturers…* [**Student 10, MBBCh 5**]

> *…the lecturers that approach it in a case study way… Uhm that's the best kind of integration that's happened…* [**Student 11, MBBCh 5**]

Students found that some teachers were more approachable than others. Often students had questions and needed more explanation from a teacher usually on a one-on-one basis. Student-teacher interaction was perceived to play a positive role in enabling integration of learning. Where a student was not intimidated by the teacher they found more opportunities to seek clarification when needed:

> *…Interaction really helps with integration because it solidifies the concept in your mind, you know. You're able to understand it better and, therefore, when you see it in another subject you can identify it, because there is no point in me studying*

> *Anatomy… Uhm… and not understanding the concepts behind it because even if I see Anatomy blatantly staring at me in the face, in something like Molecular Medicine, I won't know, I would just ignore it because I will think something will strike me but I won't recognise it, I just won't understand it…* [**Student 15, MBBCh 2**]

In contrast, students presented varying experiences of the teacher as an obstacle to integration – where the teacher was seen to lack knowledge on integration; and applying teaching and assessment styles that do not promote integration of learning.

> *…they say that when you write your essay it's supposed to reflect that you read what they give. So if I start talking about other things that are not in… what I read, it looks as if I am not applying what I read or I did not read what we did. So I think it depends on the subject that we're talking about…* [**Student 19, MBBCh 1**]

The above student was recounting an experience with a teacher who expects the student to answer an assignment according to the notes that were given. The teacher expected the students to regurgitate the notes. On presentation of content some students experienced variation which did not promote integration of learning as in the quote below:

> *I think it depends also on how the information is being presented because sometimes… it can be presented in two completely different ways where you almost struggle to see connections, and trying to make those connections yourself is a little bit difficult…* [**Student 16, MBBCh 2**]

Several students were of the perception that some teachers within the same discipline and amongst disciplines do not coordinate their teaching. Often teachers did not have knowledge of what the others were teaching. Students found this presented an environment which made it difficult to integrate learning as the teachers did not provide links or triggers:

> *Maybe the problem is that lecturers don't know much about other subjects…* [**Student 14, MBBCh 2**]

> *...one lecturer doesn't even know what the other lecturer gave like two lecture sessions back…* [**Student 15, MBBCh 2**]

Several teachers that were interviewed acknowledged that there was no formal forum for teachers to coordinate their teaching across disciplines and sometimes within the same discipline. As a result teachers do not possess much knowledge

about the subject matter or timetable schedules of other disciplines in the same year and other years, for the purpose of horizontal and vertical integration:

> *Teachers operating in silos, blocks and lectures are assigned to individuals. Teachers have built their own niche areas. There is need to look at the bigger picture…so what for the student?...* [**Teacher 10**]

> *I think that there are lots of doctors that do teaching in this hospital that don't actually understand or know the GEMP programme…that's the other problem in this system – lots of people are teaching and know the small chunk but they understand or know a small slice of the pie, they don't know the entire pie picture and I think that that's one of the critical problems of this programme. We all don't know the bigger picture…* [**Teacher 6**]

Teachers were asked whether there were official forums for teachers to discuss integration of learning and following is a representative quote:

> *…medical education is not necessarily well structured within departments … apart from discussions…at university committees such as Undergraduate and Teaching and Learning Committee and the Assessment Committee, I presume that that's where the discussions take place, there is no real forum…* [**Teacher 8**]

> *I remember last year, we would be doing something maybe in one subject and then in another subject, one lecturer would be like… "I am sure…I don't know if you have done this yet or if you haven't done this or maybe you're going to do it"… the lecturer would be talking about something that we haven't quite grasped in the other subjects, so there wouldn't be a meeting of ideas because we wouldn't be understanding where the lecturer is going. So for me that was a bit difficult...* [**Student 17, MBBCh 2**]

The student went on to explain a perception that there sometimes was a disjuncture between lectures as a result of the teachers not talking to each other. Sometimes the students experienced disconnections between subjects as a result of teachers assuming knowledge that was not there. A teacher's experience follows:

> *I am not aware of a coordinated engagement of what is taught at each level. Everything is in silos and I am not sure that Uhm there's even any form of integration across the blocks of GEMP. Uhm, you know, there again it just seems to depend on personal interaction. So, if one person is teaching …and then teaching in GEMP, there's some continuity because of that but…you know you change the block coordinator and the continuity is lost…* [**Teacher 7**]

Some students felt that the responsibility of integration of learning rests with the teacher who is seen as the driver of integration. However, some teachers are

thought not to have an interest in integration as they are concerned only with teaching their specific components. If teachers do not integrate or encourage students to integrate, the student will not do it, as in the quote below:

> *… they'd just teach what they have to teach and then it's the end… their main concern is not to integrate…yes, so their goal is not to integrate. So, if their goal is not to integrate what about the student…? The lecturer is the driver, if the lecturer wants to turn the car the car will turn...so, the car is the student so if they can't turn the wheel the student won't turn. So, if all the courses are not interested in integrating with other disciplines, the students will also not integrate…* [**Student 22, MBBCh 3**]

In appreciating the importance of integration, some students felt that teachers do not possess the knowledge of integration because, if they did, they would maximise the benefits of integration in assessments:

> *And also if the lecturers have knowledge of integration…that means there is greater scope for answers as well because sometimes what happens is that your lecturer …only covers his or her section so when he is marking, he will see only the answers in his scope. Where there are multiple… there are numerous possibilities because of the integration, you could have explained something using another mechanism right…but if they only know of their subject and they don't integrate it with others, then when it comes to marking, they are limited in terms of their scope of answers and students also tend to lose out when it comes to that…* [**Student 15, MBBCh 2**]

Some teachers reported that integration is seen as an extra responsibility which is neither their role nor part of their job descriptions as in this teacher's account:

> *…in my view this (integration) is really over and above your commitments as a lecturer because the other lecturers in my school are not doing it…is it counting towards my hours of contact … integration proper is something that may actually in the end involve the heads of schools because there are manpower issues that need to be sorted out…* [**Teacher 9**]

4.5.8 Category 3: *Summary*

In summary, this section presented conceptions of the links between students' ability to integrate learning and their educational experiences in the MBBCh programme. Students' experiences in the external horizon are driven by both intrinsic and extrinsic factors of motivation. Intrinsic motivation are internal factors while extrinsic motivation are factors from the programme structure that influence learning

positively or negatively, depending on how they are perceived by the student. These motivation factors that are inextricably linked with the “internal horizon” form the environment in which integration of learning takes place. According to the students, there are experiences of factors that promote integration of learning and also those that inhibit it. There were positive and negative experiences of the programme structure, role of the teacher, and assessments. The students’ experiences in the “external horizon”, together with triangulation from the experiences of the teachers, are not hierarchical but structurally related. For this reason, they were presented together demonstrating their interconnectedness.

Integration of learning is perceived to take long throughout the programme. The ability to integrate learning develops with maturity and experience. As a result, students perceive little integration in the early years of study and experience real integration from around the fifth year as they spend most of their time in the clinical or direct application of experience with patients. The programme structure from MBBCh 1 to 6 is perceived to contain aspects that promote and also inhibit integration of learning. The perceived relevance of subjects stimulates motivation for integration while subjects that are perceived to be of little relevance stimulate opposing factors of motivation.

Most integration of learning is experienced to occur during integrative learning. Integrative learning, a type of studying is conceived as an act of learning which transcends both the “internal” and “external” horizons. Triggers and repetition are integral to studying and were perceived to be instrumental in enabling integration of learning. Teachers and assessments are perceived to play a role which sometimes promotes or discourages integration of learning.

4.6 CONCLUSION: CHAPTER 4

Chapter 4 presented the findings and analysis of the experiences of students of integration of learning in the MBBCh undergraduate programme. The following three categories of description formed the “outcome space”:

- Conceptions of meaning and processes of integration of learning;
- Conceptions of integration ability; and

- Conceptions of the links between students' ability to integrate learning and their educational experiences in the MBBCh programme.

The outcome space was structured using the "anatomy of awareness" framework as a guide. This framework reveals the students' qualitatively different experiences of the "**What**" and the "**How**" aspects of the phenomenon of integration of learning.

Variations in experiences were presented showing the structural relationships and hierarchical aspects in them. Students' positive and negative experiences that were presented address three of the four objectives of this study. The fourth objective will be addressed in the next chapter which discusses the study findings. The discussion will explore the findings and attempt to contribute student and teacher experiences to the debate on current theories regarding integration of learning.

With reference to Table 4.2, the qualitatively different student experiences of integration of learning reveal the following structural relationships in the outcome space:

- **Direct object** and **indirect object**. There is a direct and linked relationship of the corresponding hierarchical experiences in each of these objects. For example, a least inclusive conception of integration of learning is linked to the least sophisticated ability that students aspire to acquire. That is, if students experience integration of learning as a vague and passive process, they are likely to work towards the ability to remember concepts.
- The "**What**" and the "**How**". Students report adopting qualitatively different pathways of integration of learning, depending on their experiences and conceptions of the direct object, and conceptions and perceptions of the external horizon. For example, students who understand integration of learning as a cohesive and inclusive phenomenon are likely to adopt a superior act of learning which enables linking of concepts. However, their choice of strategy may be influenced by the workload or timing of assessments.
- The affective "**What**" and **external horizon** seem to show a structural relationship in that the attitude students hold about the meaning of integration could impact the motivation to integrate learning positively or negatively. Alternatively, the experience of the external horizon could also influence the understanding of the phenomenon. For example, students who understand integration of learning as difficult and time consuming are not likely to make an effort when they perceive a heavy workload.

- The **indirect object** and **act of learning** (both forming the **internal horizon**) are inextricably linked with a hierarchical relationship and structurally related as explained in the relevant sections above.
- The "**What**" cognitive constructs and "**What**" affective constructs are hierarchical and structurally related as explained in the relevant sections above.

These structural relationships reveal themes that will form the main points of discussion in Chapter 5.

CHAPTER 5:
DISCUSSION

5.1 INTRODUCTION

This chapter discusses the findings that were presented in Chapter 4. The analytical discussion presented in this chapter leads to an interpretation of the outcome space on students' experiences of integration of learning in an undergraduate medical programme. The themes that emerged in Chapter 4 will be discussed with supporting literature to strengthen the empirical stance of this study. The researcher will also present a logical model of integration of learning which portrays how students develop the ability to integrate learning as constituted from the findings of the students' experiences.

Specifically the aims of this chapter are to:

- Discuss and clarify each theme in the outcome space presented in Tables 4.1 and 4.2,
- Relate the themes to what was found in the literature review,
- Present a proposed model which describes the integration of learning,
- Discuss the structural relationship between the categories, validating the table and the model, and
- Link these relations to the literature.

This proposed developmental model needs further research to contribute to the current debates on integration and better understanding of integration of learning. Where relevant, the model will be linked to the integration ladder espoused by Harden (2000) in order to contribute further to the range of available models promoting educational understanding.

Despite an extensive search through published literature, the researcher is not aware of any previous study that has investigated students' experiences of how the integration of learning develops using phenomenography.

5.2 THE OUTCOME SPACE

The outcome space of the students' experiences on the integration of learning has been presented in Tables 4.1 and 4.2. Table 4.2 is repeated below (as Table 5.1) for ease of reference. All analysis and the words in this table were based on the transcripts because:

> If it is not in the transcript, then it is not evidence… (Bowden & Green, 2005:15).

This means that all the relationships discussed in this chapter are derived from the data. These relationships are:

- Cognitive constructs – Affective constructs
- Internal horizon – Direct object
- Intrinsic motivation – Extrinsic motivation
- External horizon – Direct object.

Of importance is that, in Table 5.1, emphasis is placed on a second-order analysis of students' own experiences and the relationship with the phenomenon, integration of learning. The description given by Prosser *et al*. (2005:151) matches the focus of this study:

> The categories of description and outcome spaces are meant to describe the variation in the key ways in which the experiences of the phenomena differ. They are not meant to be rich descriptions of the experiences themselves. They are not meant to describe individual differences in experience. They are not meant to describe the full variation. The categories form inclusive hierarchies, as shown in the descriptions of the structural relationships between the categories…Thus, for a transcript classified low in the hierarchy, the interviewee has shown little or no awareness of the experiences higher up in the hierarchy.

The findings presented in Table 5.1 describe the structure of awareness of the understanding of the integration of learning and the structure of the relationship between the students and integration of learning as supported by Marton and Booth (1997). It should be noted, therefore, that the findings do not represent how much or how correctly the students and teachers understand integration of learning but how they experience it.

For clarity and to strengthen the empirical nature of this phenomenographical study, the various aspects of this table will be discussed further in the ensuing sections. With reference to Table 5.1, the discussion continues with clarification of each theme presented in the outcome space.

5.3 HOW THE ABILITY TO INTEGRATE LEARNING DEVELOPS

The students' ways of understanding integration of learning is the direct object of this study. The direct object is also referred to as the "**What**" or the referential aspect of integration of learning. In ensuring focus on the object of study, the researcher first established the subject's understanding of the phenomenon under investigation, that is, "integration of learning". The direct object signifies the ways the students understand the phenomenon. From the transcripts the "**What**" or referential aspect ("direct object") of the outcome space was constituted. It became apparent that the "direct object" was constituted in cognitive and affective constructs and these had a linked relationship. The five cognitive constructs of the phenomenon had corresponding affective constructs which seemed to influence the cognitive conceptions. The cognitive constructs are logically related to one another "*through shared discernment of key aspects of the phenomenon"* and this correlates with the structure of categories of description espoused by Åkerlind (2008:243).

The "**How**" or structural aspect of the outcome space refers to how the students constructed a relationship with the phenomenon and the learning environment in the undergraduate programme. This aspect of the outcome space reveals the core of how students develop the ability to integrate learning and this is the epicentre of this study. Similar to the referential aspect, students' experiences of the structure of the development of the ability to integrate learning are constituted in a logical relationship with conceptions that are hierarchically inclusive of each other. Since there is a structural relationship with the referential aspect, the discussion of this aspect of the outcome space will be iterative, demonstrating linkages in the overall outcome space of this study. The relationships are summarised below:

Table 5.1: The detailed outcome space summarising the voices of the students (Table 4.2 reproduced for ease of reference)

The "What" or Referential Aspect		**The "How" or Structural Aspect**			
Direct object		Internal horizon		External horizon	
Cognitive constructs	Affective constructs	Indirect object	Act of learning	Intrinsic motivation	Extrinsic motivation
1. Passive process - *difficulty in conceptualisation* - *Interview as a trigger* - *happens in your mind* - *saved in your mind*	Vague and abstract concept	**Ability to remember everything** - *recall a concept with absolute clarity* - *simplify concepts* - *explain to others*	Knowledge increase (learning tools: mind maps, puzzles, pictures, diagrams) Memorising/cramming	**Ability takes time, develops with maturity and experience** - *first year you don't integrate* - *real taste in fifth year* - *foundation gets laid in fifth and sixth year* **Perceived relevance** **Studying** - *sit down properly and go over things* - *hear how others think (others – peers, people with more experience)* - *triggers and repetition* - *"Aha!" moments* - *"Once in a while" moments* - *"Wow" moments*	**Programme structure** - *MBBCh 1 and 2* - *MBBCh 3 and 4* - *MBBCh 5 and 6* **Overload and assessments** - *stack of notes* - *"do or die"* **Role of the teacher**
2. Consciously putting it together - *link different subjects* - *bringing things together* - *find common ground* - *see bigger picture, holistic view* - *connecting it together* - *triggers* - *"light bulb" moments*	Requires thinking Needs full understanding Time consuming Extra studying Difficult, easier for brighter students	**Ability to identify essential detail** - *understand small details* - *understand the basics* - *big things*	Sifting content, bigger picture Picture formation, visualisation Deep understanding		
3. Subjects are related - *subjects contribute to the other* - *other subjects help in understanding others* - *understanding them as a unit* - *cannot stand on its own*	Reduces workload Better learning experience	**Ability to link concepts** - *like pieces of a puzzle* - *links that help understand other concepts* - *link basic sciences with pathological sciences*	Integrative learning Link to previous learning - *triggers* - *repetition, seeing things all the time*		

The "What" or Referential Aspect		**The "How" or Structural Aspect**		
Direct object		Internal horizon		External horizon
Cognitive constructs	Affective constructs	Indirect object	Act of learning	Intrinsic motivation / Extrinsic motivation
4. Systematic process - *can be taught* - *cannot be taught – learn from others with experience* - *becomes more complex*	Not difficult	**Ability to manage patients systematically and comprehensively**	Pattern recognition Application of learning in clinical area	
5. Happens automatically - *brain automatically integrates* - *saved in your mind* - *a way of thinking* - *unconscious competence*	Complete and beautiful	**Ability to learn for life** - *an integrated career*	Learning for meaning - drawing on all skills	

5.3.1 Conception 1

At the lowest level of conception, integration of learning is a fragmented conception. It is conceived as a passive process which is difficult to conceptualise because it is not in the foreground of awareness. The affective construct is that the phenomenon is vague and abstract. The role of affect in adult learning has been researched widely and supports these findings. Dirkx (1997; 2008) observes that while emotion and affect contribute positively to learner motivation and self-esteem, emotions are nonetheless recognised as a kind of baggage that may impede effective teaching and learning. This perhaps explains the passive nature of the integration of learning if students' attitudes towards it at this stage are that the concept is vague. The interview triggered the students and teachers to think about the phenomenon of learning, thereby bringing integration of learning to the focus of awareness. This is evidenced by a teacher who suggested that the researcher:

> *...ask people six months down the line if your interview actually made an impression on how they do things because I'm sure for a lot of people that haven't thought about it and you just might actually initiate it...* [**Teacher 5**]

To support this finding, a study on integration of learning by Barber (2012:608) intimated that it appeared the interview questions sparked integration of learning as a student was integrating "*in the moment"* during the interview.

It is characteristic of phenomenography that the individual's experience of a phenomenon is contextually sensitive, and can change with changes in time and situation. Marton and Booth (1997) and Åkerlind (2008) confirm this statement by suggesting that people discern and experience different aspects of a phenomenon in different degrees at any one point in time and context. The interview indeed might have triggered active thinking about the phenomenon as suggested by Teacher 5 (above).

The finding of **Conception 1** is in agreement with that of Dahlgren and Marton (1978:25) that students' focus of attention varies between a passive and an active attitude to learning. In their study the students' first conception was that learning is something that happens to you and, according to their second conception, learning is something that you do. In this study, students' relationship with integration of

learning moves from being a passive process in the early years of the undergraduate programme to an active one of consciously putting it together.

At the lowest level of sophistication, students experience the ability to integrate as the ability to remember everything. The conception of the internal structure of the ability to remember everything is experienced as a quantitative increase in knowledge which is a conception of least sophistication. This is consistent with Anderson's (2005) assertion that knowledge is at the lowest level of cognitive taxonomy. The focus of the student is on acquiring individual internal fragmented facts in order to simplify concepts or be able to explain to others. In this process, the students apply various learning tools like mind maps, puzzles, pictures, diagrams and memorising in order to increase knowledge.

There is a relationship between the conception of the ability to integrate and the approaches to studying, which is the act of learning that most students adopt. With this low-level conception of the ability to be acquired in the earlier years of study, students adopt surface approaches to studying. This finding is consistent with that of Trigwell and Prosser (1997) on student learning in that students who conceive of learning in a topic as a quantitative increase in knowledge or memorising are not likely to adopt a deep approach to learning.

This study supports several other studies on students' approaches to learning (Entwistle, 1991; Marton & Säljö, 1984; Reid *et al*., 2012 and Trigwell & Prosser, 1997). In all these studies in higher education, and some specifically on medical education, it has been apparent that a deep approach to learning and studying leads to deep understanding which is favourable for integration of learning. In contrast, a surface approach to learning is not likely to lead to integration of learning.

Relating to problem-based learning Prosser (2004) found that students who held low-level or unsophisticated conceptions of problem-based learning adopted surface approaches to studying problem-based learning. Students expressed varied conceptions with some failing to see the value of problem-based learning in the programme that is largely discipline based. Bradbeer *et al*. (2004), in their study on students' perceptions of geography, noted that when students experience a learning situation that does not meet their expectations, they develop a low opinion of it and

view it as a waste of time. As made clear in the current study, the conception that acquiring individual fragmented facts as an ability to integrate occurs early in the undergraduate programme before students are mature enough to sift important detail. This finding supports Lonka and Lindblom-Ylanne (1996) who, in their research on epistemologies and conceptions of learning, found that medical students often saw learning as intake of knowledge to build up a knowledge base.

This conception of the integration of learning with a need to amass as much information as possible is consistent with the lowest level of the "**What**", where the phenomenon is conceived as vague and happens passively in the background.

5.3.2 Conception 2

The study reveals that, at a slightly higher level than **Conception 1,** there is a qualitative shift in affect, and that integration of learning is perceived as important so it needs conscious action. There is a linked relational structure between the cognitive and affective constructs. In **Conception 2** there is realisation of a need for full understanding of subject matter to eliminate vagueness in understanding of the phenomenon in **Conception 1**. The process of consciously putting it together, linking different subjects to see the bigger picture, requires thinking and full understanding of subject matter. This is perceived as difficult and time consuming because it requires extra studying. It is during this studying that "*light bulb" moments* (or critical features of the subject) are triggered which are perceived to be instrumental in identifying links in subjects. There is congruence between this finding and that of Ling and Marton (2012) where they recommend that students should be given an opportunity to discern the critical features of an object of learning. An object has many critical features so ingenuity may be required for students to focus on critical aspects. The same authors recommend some necessary conditions of learning that enable students to discern critical features.

The conception in the internal structure of the ability to identify essential detail is an experience of higher value because the effort is more content driven, with a focus on individual internal concepts of subject matter and those parts that are essential. There is a realisation that out of the fragmented facts accumulated in **Conception 1**

some are of more value than others. The act of learning (process of acquiring the ability to integrate) requires memorising or cramming the detail of subject matter together while sifting the essential from non-essential which is at a slightly higher level than a quantitative increase in knowledge. The ability to identify essential detail requires the ability to discern critical aspects of the content (Ling & Marton, 2012:9).

In their understanding of the meaning and processes of integration of learning students shared experiences which epitomise the inability to discern critical aspects of a phenomenon. **Student 12** eloquently put it as presented previously:

> *It was like a tree… they could find the stem and they could find the different branches. Meanwhile, for me, I would just like… maybe in one branch I could just see the leaves.... "Oh it's actually one tree"…* [**Student 12, MBBCh 2**]

As seen in this study some students and teachers perceived the ability to integrate learning as easier for brighter students. This finding supports Ling and Marton (2012) who suggest that it may be that brighter students focus on all critical aspects of a phenomenon and the interrelationships simultaneously, while weaker students – like **Student 12** – focus on aspects other than the critical ones. In this study, the experiences of some teachers related the influence of the type of background or high school education students had in preparing them for university education. Students from poor educational backgrounds were perceived to encounter problems with integrative learning. This perception supports a study by Prosser *et al.* (2000) on the effect of background knowledge and the quality of students' learning, their perception of the teaching and learning situation and approach to their studies. Students employ varying learning styles – like cognitive processing strategies – that enable them to process information for the purpose of identifying important points in the study material (Busato *et al*., 2000).

There is a direct relationship between the understanding of the phenomenon, "*consciously putting it together"* and the conceived ability to perform integration of learning, which is to identify essential detail. In other words, students who understand the process of integration of learning as needing to make it a conscious effort to look for critical aspects of the subject, realise that these aspects are essential enough to link with another subject. It is important to note that this study reveals that the act of learning that enables the development of this ability is linked with the affective construct in that sifting content to see the bigger picture requires

engaging with it. This is perceived as time consuming, requires thinking and may be difficult to do, particularly for students who are perceived to be weaker academically.

5.3.3 Conception 3

At a higher level than **Conception 2**, in **Conception 3** the understanding of the internal structure of integration of learning is a more inclusive conception of a whole. The linked relational structure which emerged in **Conception 2** is confirmed in this experience. Subjects are related and complementary as understanding of one contributes to the other. In this integral relational structure subjects are brought closer together, eliminating boundaries between them. Subjects are not atomistic but more coherent entities that form a whole. This finding is similar to Barber's (2012) and Booth and Ingerman's (2002) studies which found that one course was seen as being useful in other courses. For example, in the study on making sense of Physics in the first year of study, Booth and Ingerman found that one course was seen as a prerequisite for another course and useful in other courses. There is a further qualitative shift in the affective construct to that of appreciation as it is perceived to reduce the workload.

The present study reveals that the conception of the internal structure of the ability to link concepts is experienced as the more valuable ability to link a series of complementary and integral ideas that form a whole. It has been made clear that the whole is made up of the integral concepts from subjects in other disciplines. The act of learning is a student activity for concept linkage and linking to previous learning. In this experience the focus is on linking parts of a subject that contribute to understanding another or contribute to the whole. These parts include the essential ones that were identified in **Conception 2**. The study emphasises that the act of learning, "*linking to previous learning"* includes picture formation and visualisation which enables identifying links in the essential detail that was identified in **Conception 2**.

In this regard the concept of "prior knowledge" and its influence on learning has been researched extensively and the findings of this study support the research documented in the literature review. In previous studies it has been evident that prior

knowledge and understanding facilitates learning in an integrated way (Ausubel & Fitzgerald, 1961; Prosser *et al*., 2000). Knowles (1980) emphasises the importance of building knowledge on what students already know in order to facilitate learning.

It is clear that students experience value in integrative studying and discussion with their colleagues. This is in line with Polanyi (1967) and Vygotsky (1994) who recognise the importance of dialogue in shifting tacit knowledge, to form new understanding through social interaction with the outside world.

Students experienced a connection between repetition "*seeing things all the time"* which forms triggers and the ability to link concepts. This supports previous findings that learning takes place through repetition that is embarked upon to create experiences of variation (Linder & Marshall, 2003; Marton, Wen & Wong, 2005; West & Sadoski, 2011). Marton, Wen and Wong (2005:313) eloquently stated:

> … all the students think that repetition is important for memorization. In addition to popular wisdom, there is empirical research carried out during more than a century demonstrating that the likelihood of being able to recall something is higher if the learners hear or see that something several times than if they do not.

Research on study strategies and academic performance by West and Sadoski (2011) links time management that enables reviewing content repeatedly with improved academic performance.

In this phenomenographical study there is a direct relationship between the ability to link concepts and the understanding that subjects are related. Students who understand the phenomenon as subjects contributing to each other and to the understanding of one another do not experience boundaries between them. Therefore, such students conceive the need to link concepts in order to understand other concepts and also link subjects across different disciplines. This finding further supports that of Booth and Ingerman (2002) discussed above. The shift in learning strategy to integrative learning is consistent with an affective shift that it reduces the workload. In addition, gaining a deep understanding makes it a better learning experience.

5.3.4 Conception 4

In this experience, integration of learning is seen as a more cohesive phenomenon. While subjects are experienced as related as in **Conception 3**, they are now part of a system. **Conception 4** is a more sophisticated one as it subsumes **Conception 3**. The understanding of the internal structure of integration of learning is experienced as a more inclusive conception which can be a student and teacher activity. There is a variation in the experience of the phenomenon in that some feel it can be taught and others that it cannot be taught; however, overall it is seen to be integral to the process of learning. This finding supports Bradbeer *et al.* (2004) and Ling and Marton (2012) who found that the conception of learning that occurred by being taught mirrors the predominant conception of teaching. However, this study supports the integration of learning which requires triggers in order to bring it to the foreground of awareness. At this level integration is viewed as not difficult and that this is a more positive affective construct of the phenomenon.

The conception in the internal structure of the ability to manage patients systematically and comprehensively is experienced as a qualitative shift in intention and strategy; mastering of the whole satisfies an external demand. The act of learning in **Conception 4** is superior to the previous one in that it moves from individual internal processing to application in the clinical area. Students adopt a deep approach to learning in order to gain a deep understanding and make meaning out of the concepts. Patterns emerge from the meanings abstracted and the patterns that are employed in management of patients in the clinical area. This finding is consistent with the results from a study on students' understandings of integration where integration is conceived as the application of basic science concepts in clinical practice (Laksov *et al*., 2014).

Several senior students in the fifth and sixth year experienced real integration when they started applying their learning in the clinical area from the fifth year. Application in the clinical area was conceived as an opportunity to cement all knowledge learnt in the previous years. In previous writings and studies the importance of immediate application of theory has been emphasised in making the learning relevant and enabling reflection-in-action (Kolb, 1981; Kolb, 1984; Schön, 1995; Wilson *et al*., 2001).

There is a direct link between the internal horizon and the direct object. Those students who understand integration of learning as a systematic process, conceive the ability to manage patients systematically and comprehensively as evidence of the capability to integrate learning. Similarly, the act of learning is conceived as a more inclusive one – that of deep understanding – in order to acquire this ability which is more sophisticated than the others below it. With the opportunity and ability to apply learning in the clinical area, the affective construct is that integration of learning is not difficult.

5.3.5 Conception 5

At the highest level of sophistication, the understanding of the internal structure of integration of learning is experienced as a more inclusive conception which forms an integral component of brain activity. This finding is related to writings on how the brain functions when learning occurs (Jordan *et al*., 2008). **Conception 5** differs from **Conception 4** in that while integration of learning is still seen as a systematic process, it is an integral part of day-to-day activity which happens subconsciously. This echoes Norman's (2006) comments on clinical reasoning, a process which develops through diagnosing and managing clinical problems. The same author explains that this process requires automatically linking formal knowledge with experiential knowledge to be able to recognise patterns as they manage patients. The experience is more of a student activity and is the most inclusive conception of all the cognitive and affective constructs. Because of this inclusivity, integration of learning is experienced as not difficult. The shift in attitudes towards integration is positive and it is viewed by the students as a "*beautiful thing".* With time it is experienced as part of unconscious competence. This is the most positive affective construct of all the experiences.

When students have acquired the experience and knowledge that subjects are related and that it is a systematic process, the brain starts integrating automatically and it becomes a way of thinking.

The conception in the internal structure of the ability to learn for life is experienced as an ability that transcends the discipline of medicine to the development of lifelong

skills to operate in a complex integrated environment. This is a most inclusive conception which includes an awareness that the individual lives in a complex integrated world. This finding supports Mennin (2010) who argues that the dynamics in a complex world are not always totally predictable and people's actions are interconnected such that one's actions can change the context for another with variable outcomes. It is clear that learning here satisfies internal demands which include cultural and spiritual needs. The act of learning, which subsumes all the other acts of learning, is a qualitative shift in the strategy from learning to be a doctor to learning for meaning and learning for life.

Students experience learning for meaning which requires drawing on all skills to be the appropriate act of learning needed to acquire the ability to learn for life. Students' perceptions are that medicine is an integrated career in an unpredictable and thus complex world. This finding concurs with that of Barber (2012) who refers to the intercontextual nature of integration. "*Life is a journey"* and sometimes "*just happens"* as students near the end of their undergraduate studies and gain more maturity. They realise that medicine forms part of a life that they need to live. In order to prepare for this complex world, students experience a need to prepare for a long-term global integration of a life beyond medicine. This experience is related to the subject of "*scholarship of integration"* and Deweyan inquiry which looks at design as the more inclusive process of making things clear under conditions of complexity and uncertainty (Schön, 1995). This is consistent with the study of medicine, a career fraught with uncertainties about patients' symptoms and conditions that have no clear prescription. At this more mature age, students also experience the influence of spirituality in their lives (Prozesky, 2009).

The finding of the "*global integration"* notion of a student is reflected in Bowden and Marton's (1998) research that a student's way of seeing the subject under discussion typically draws on both formal and informal experiences. Therefore, integration of scientific understandings and experience of the world seem to be essential for the ability to learn for life. Students will be required to discern aspects of their knowledge and skill that are relevant at any given time and determine an appropriate response in a world with many possibilities which is also unpredictable and, therefore, complex as reported in writings by Beane (1995), and Fraser and Greenhalgh (2001).

This most inclusive conception of the ability to learn for life has a direct link with the understanding that integration of learning happens automatically. With the understanding that the brain integrates automatically the conception is that the brain draws on all skills that are saved in the mind and the whole process becomes unconscious competence. This study indicates that this level of highest inclusivity and sophistication is experienced to occur from the fourth to the fifth years of study.

5.5 HOW INTRINSIC AND EXTRINSIC MOTIVATION AFFECT THE DEVELOPMENT OF THE ABILITY TO INTEGRATE

As reported earlier there is an internal structural relationship between the intrinsic and extrinsic motivation factors of the external horizon. The motivation factors influence the intentions and strategies adopted in the internal horizon. Students' perceptions of the learning environment influence how a student learns (Entwistle, 1991; Jordan *et al*., 2008; Kolb & Kolb, 2005; Prosser & Trigwell, 1997a; Prosser & Trigwell, 1997b). There is no hierarchical relationship in the motivation factors but there is a structural relationship between them and the act of learning (Farrand *et al*., 2002). In this section, the intrinsic and extrinsic motivational factors will be discussed concurrently because they are inextricably linked and, therefore, separating them would defeat the phenomenographic stance of this study. Internal and external sources of motivation are interdependent and frequently interdigitate, and reciprocally affect one another in complicated ways (Misch, 2002).

The motivation factors are not hierarchical in themselves but they form a structural relationship with the "**What**" aspect of this study. The motivational factors are experienced to be influencing the understanding of the phenomenon and the intentions and strategies adopted in the internal horizon.

The process of learning something new and remembering it later requires the motivation to do so. As discussed in Chapter 2, according to Piaget's epistemology, learning happens through a process of assimilation and accommodation. The former focuses on similarities in what is to be learnt while the latter requires changing what is already known in order to take in new learning (Illeris, 2007) and this needs the

motivation to do so. If a student is not motivated to accommodate new learning it will not happen – hence the centrality of motivation in integration of learning.

In this study this external horizon is influenced by intrinsic and extrinsic factors of motivation. The students experience these as factors that influence their internal horizon (that is, the abilities they aspire to develop in order to integrate learning and how they go about doing it). The data present important student conceptions and perceptions related to intrinsic and extrinsic motivation: the ability to integrate takes time to develop and perceived relevance contributes significantly to motivation. In addition, students integrate learning when they are studying. It has been made clear that the integration of learning happens in an environment that is controlled by the structure of the programme, which includes the role of the teacher and assessments that set benchmarks for passing or failing the medical degree (Ling & Marton, 2012; Manning *et al*., 2010).

5.5.1 Ability Takes Time, Develops with Maturity and Experience

As constituted from students' experiences the student's perception is that the ability to integrate learning takes time to develop. The ability is perceived to develop over the course of the six years of the undergraduate programme. The ability is experienced as a learning process which starts from the early years of study, matures and becomes a way of thinking by the final year. The ability to integrate learning is conceived to be linked to the knowledge base and previous experience one has accumulated (Biggs, 1999). In addition, the motivation to integrate learning is perceived to develop with time as the need for it becomes apparent. As portrayed in Table 5.1, the need to motivate develops in response to a realisation that subjects are related and, therefore, linking them reduces workload, making it a better learning experience. This is a demonstration of the interconnectedness of the experiences.

5.5.2 Perceived Relevance

According to the "anatomy of awareness" the "external horizon" forms the context in which experience occurs. This context of experience is important as it may determine which aspects of the phenomenon are brought into focal awareness, and which remain in the thematic field (Linder & Marshall, 2003; Marton & Booth, 1997).

As discussed in Chapter 3, it is clear this means that some things come to the forefront of awareness (theme of awareness) while the rest are in the margins (thematic field). This structure of awareness changes depending on the context and relevance of the subject matter. There is a linked relationship between the external horizon and the direct object. For example, a phenomenon that is perceived irrelevant is likely to be pushed to the thematic field while a relevant one is brought to the focus of awareness. The study has revealed that students who experience integration of learning as irrelevant are likely to understand it as a passive process.

The importance of enabling students to perceive relevance in learning has been reported and details can be found in the writings of Knowles (1980) and Prideaux (2003). Perceived relevance increases the motivation to learn. Regehr and Norman (1996) make reference to “context specificity” (what is learned in one context may not be readily retrieved in another context), arguing that learning contexts should be as close as possible to the context in which the information is to be retrieved. In this sense context specificity plays a role in increasing the relevance of learning. In this study it would seem that the lack of placing the first year subjects in the context of medicine results in students struggling to see the relevance of the year.

5.5.3 Studying

The conception of most students is that studying plays a central role in their quest for attaining the ability to integrate learning. Their experience is that it is during studying that they are able to look for links in subjects when they revise their material and link to previous learning. This finding is consistent with cognitive science and Piagetian epistemology of how knowledge is acquired (Biggs & Tang, 2007; Dennick, 2012; Kaufman, 2003; Piaget, 1977). Students need time for assimilation and accommodation of new learning. Students’ experiences were that due to the high workload and in order to attain good grades, they need to study all the time so this is perceived as a way of life.

Some study strategies have been linked to academic performance and teaching students to manage their time effectively has been recommended. This finding supports West and Sadoski’s (2011) finding in their research on study strategies. Sayer *et al*. (2002) – in their research on the causes of academic failure – found that

deficient study skills were a primary contributor. For deep understanding of content, students adopt varying approaches to studying which include studying individually quietly, integrative studying and studying with peers who are perceived more helpful or experienced. Reference to others more experienced is linked to social learning theory where observing and modelling behaviours of more expert performers is common in student learning (Bandura, 1971). The role of peers has been demonstrated in studies on students' learning (Barber, 2012; Harlen & Crick, 2003; Trigwell *et al*., 2005). In line with social interdependence theory, other previous studies affirm that learning in cooperation with others is more effective than learning alone (Johnson *et al*., 2007). Owing to the workload in the course, surface approaches to studying are sometimes adopted. This is in line with previous studies on study habits and students' achievements (Bowden & Marton, 1998; Hendricson & Kleffner, 2002; Prosser & Millar, 1989; West & Sadoski, 2011).

The role of peers has been reported in scaffolding to provide students with the support they need to accomplish tasks (Dennen & Burner, 2007; Sharma & Hannafin, 2007). It is evident in this study that studying with peers provides some form of scaffolding which affects motivation and confidence to learn. This important finding supports Jordan *et al*. (2008) who recommend peer learning to meet the social needs of students.

Triggers and repetition are experienced to play a role in integration of learning. Triggers which sometimes were experienced as "*Aha"* moments, "*once in a while* moments" and "*Wow"* moments which occurred periodically during studying, and which also served as forums for repetition of content encountered in lectures or previous learning. This finding supports Halpern and Hakel (2003) who intimate that information that is frequently retrieved becomes more retrievable and any information that is recalled grows stronger with each retrieval.

5.5.4 Programme Structure

As observed above the structure of the programme is a component of the external horizon and presents factors that can facilitate or impede the students' journey of acquiring integrative learning capability. The quality of the academic environment is a significant factor in the diagnostic framework of causes of inadequate student

performance (Hendricson & Kleffner, 2002) and learning and teaching are context dependent (Gibbs, 1994).

5.5.4.1 MBBCh 1 and 2

Students experienced a lack of integration between MBBCh 1 and 2 with some perceiving the two years as very separate. Some teachers echoed similar perceptions and this finding is similar to the results obtained by Green-Thompson *et al.* (2012). With reference to the integration ladder by Harden (2000) discussed in the literature review chapter, the programme structure and teaching in MBBCh 1 and 2 fit into the first step of the ladder, "*Isolation"*. This is the bottom of the ladder which epitomises lack of integration in the curriculum and students' experiences echo this isolation in the curriculum.

> This "isolation" approach may be found in the traditional medical curriculum with blocks of time allocated to the individual disciplines. Students attend a lecture on anatomy, and then move on to a lecture in physiology with neither lecturer being aware of what was covered in the other lecture (Harden, 2000:552).

Notable is the fact that students do not experience real clinical exposure until in the fifth year of the undergraduate degree. According to Prideaux early introduction of clinical skills alongside basic and clinical sciences is a good example of vertical integration (Dent *et al*., 2009; Dornan & Bundy, 2004).

An exception to the above is that students experienced the course, Medical Thought and Practice as a catalyst in their development of the ability to integrate learning. The two modules of the course – Health Systems Dynamics and Integrating Skills – carry over into the second year, thus enabling vertical integration. In addition to this, Health Systems Dynamics and integrating assignments are components within the course which make deliberate attempts to help students integrate learning rather than assuming that students will understand the connections automatically. This finding resonates directly with Step 2 of Harden's (2000) integration ladder. As presented in Chapter 4 **Student 4** experienced that the seeds for integration of learning were planted in the first year through Medical Thought and Practice:

> *So, as I was saying that with Health Systems Dynamics with Medical Thought and Practice the basis of how I was taught to approach questions and stuff; those things still haven't left me...* [**Student 4, MBBCh 4**]

Rubin *et al.* (2012) called system dynamics in medical education "*a tool for life"* and the student's experience above seems to support this. The experience of **Student 4** responds to **Teacher 1**'s conception that introducing deliberate opportunities for integration of learning early in the undergraduate programme might be helpful:

> *I am not sure, maybe we will see the outcome from Medical Thought and Practice you know because I think that having these opportunities to integrate… Uhm… at an earlier level in the university system anyway even if they are not bringing it from school…Uhm,… one would hope…and certainly that's the intention of it, will play out in them being able to do it effectively so, Ja* [yes]*, I am really keen to see how the students who have had two years of integrating exercises and so on… Uhm… if they can actually cope differently so will wait to see how that happens* [**Teacher 1**]

Several students' experiences related to inability to seeing the relevance to medicine of most basic sciences subjects in MBBCh 1. The subjects were perceived to be similar to high school experiences. Some teachers echoed similar sentiments and suggested earlier clinical exposure for students. Bowden and Marton (1998:140) recommend early "hands on" experience to deal with the demotivating boredom of learning in a traditional course which seemed to be a repeat of high school. Apart from lack of relevance, some students experienced lack of integration within a discipline, citing Anatomy as an example. This finding supports that of Wilhelmsson *et al*. (2011) on medical students' understanding of the study of Anatomy. In their research, students echoed rote learning, endless lists of seemingly non-coherent anatomical terms and the detailed, extensive subparts about which the authors questioned their relevance. The authors argued that the understanding of Anatomy requires integration with its disciplinary neighbours like Physiology. Students perceived Anatomy to be taking up study time for other courses to the extent that it almost led to "*disintegration"*. This experience is linked to the recommendation by Louw *et al*. (2009:375) that:

> In order to fully appreciate why certain facts about structure and function need to be studied, and to ensure reasonable retention of the knowledge, the delivery of anatomy should ideally be integrated with the clinically relevant details.

5.5.4.2 MBBCh 3 and 4

MBBCh 3 and 4 are based on the problem-based learning approach. Through problem-based learning, students are helped to identify essential detail required to

solve patients' problems based on the case scenarios presented. The study reveals that students also realise the importance of linking concepts and they understand that subjects are related. However, there is variation in the understanding of purpose and appreciation of problem-based learning. Students' initial assessment of the value of problem-based learning in enabling them to integrate learning is low. As a result of the low opinion of problem-based learning, students adopt surface approaches in order to pass the milestones required at that given point. As students tend to attach more importance to components that are assessed, the fact that there is no assessment linked to problem-based learning resulted in low appreciation of problem-based learning.

The study reveals that the variation in the understanding of the purpose and processes of problem-based learning also applies to teachers. The appreciation of problem-based learning is incremental as students realise the similarities between that approach and managing real patients. A similar finding is reported by Prosser (2004) where students held low-level conceptions of problem-based learning and adopted surface approaches to it. In the same study, Prosser found students had difficulty in understanding what problem-based learning was about, leading to the conclusion that:

> It is not the way we design our courses and programmes in higher education that relates to the quality of student learning but how our students experience and understand the design (Prosser 2004:57).

In this study there are variations in acceptance of the problem-based learning approach by both students and teachers. The variations stem from the problem-based learning approach itself and how it is implemented, in line with similar findings by Hamdy (2008) and Taylor and Miflin (2008). A similar result can be found in writings where a mix of approaches that meet particular educational needs at any given time is recommended (Bowden & Marton, 1998).

5.5.4.3 MBBCh 5 and 6

Students' perceptions are that real integration happens in the fifth and sixth years and that the set-up of the programme "*forces them"* to integrate learning. This is understandable because students spend most of the time in the clinical area managing patients. During this time in the clinical area, students follow rotations

which are akin to the apprenticeship-learning model of the Flexnerian era discussed in Chapter 2. Several studies report on this rotation approach (Holmboe *et al*., 2011; Mazotti *et al*., 2011; Ogur *et al*., 2007; van der Vleuten & Driessen, 2014). Regehr and Norman (1996) observe the importance of clinical exposure in enhancing categorisation and pattern recognition, a function of integration of learning.

While some students shared positive experiences of the value of the rotation approach some teachers felt that the exposure was not adequate for true integration. This finding supports that of Holmboe *et al*. (2011) and Ogur *et al.* (2008) that short rotations through clinical disciplines may not support integrative learning.

In this study the perception of the students is that there is no formal integration and teachers corroborated by affirming their perceptions that integration of learning is not formally addressed in the undergraduate curriculum. In cognisance of this problem, Huber *et al*. (2005) suggested practical approaches for inclusion of formal integration of learning in undergraduate curricula. Step 3 of the integration ladder is harmonisation and this is where "teachers responsible for different courses or different parts of the same course consult each other and communicate about their courses" (Harden, 2000:552).

5.5.5 Overload and Assessments – *"Do or die"*

All students experienced work overload which necessitated adoption of varying learning acts and approaches. Of note is that students sometimes adopt approaches that are dictated by the situation at hand and not necessarily approaches perceived to be appropriate for a deep understanding of subject matter to enable integration. The pressure students experienced was referred to as "*do or die"* moments. This is consistent with the results of several studies on students' learning (Busato *et al*., 2000; Green-Thompson *et al.*, 2012; Prosser & Trigwell, 1997a).

During "*do or die"* moments, students experience confinement in adopting surface strategies to learning. These strategies militate against the concept of self-directed learning, a key process amongst those recommended for adult learning. Self-directedness is important for adult learning in a group setting and learners should be encouraged to have choice and control whenever possible (Knowles, 1980). It

would seem that the programme is not paying attention to contextual influences on the interaction between the teacher and student as reported by several authors (Lefroy *et al*., 2011; Mazmanian & Feldman, 2011; Pilling-Cormick & Garrison, 2007).

Students experience an imbalance in the workload between MBBCh 1 and 2 where the latter was extremely laden with course work compared with the first year. In addition some courses are perceived to be more demanding than others, particularly Anatomy in MBBCh 2. Also, later in MBBCh 3 and 4, students experience an excessive workload and they made reference to needing to study stacks of notes. This finding is consistent with research on learning challenges and instructional strategies (Kornell *et al*., 2010; Rohrer & Pashler, 2010). In preparation for assessments students adopt a surface approach to studying to the almost total exclusion of integration. Students also experienced an exchange of approaches depending on the timing of assessments which were termed "*do or die"* periods. The students' approaches were directed at accumulation of atomistic and fragmented facts for regurgitation in the tests and examinations (Biggs, 1996; 2002). Due to this demand, students adopted a surface approach to studying Anatomy in order to cover the volumes of work. This finding is similar to that of a study on the backwash effect of assessment (Watkins *et al*., 2005). Basic knowledge was considered superficial while real understanding was associated with deeper and more reflective learning processes. Further to this, acquisition of basic skills and facts focused on outcomes of learning and the technical procedures for measuring these, while higher order skills and advanced knowledge was more focused on processes of teaching and learning (p.284).

There is variation in students' perception of integration in assignments. While some experience integrated block assessments, the perception of others is that the assessments consisted of disintegrated units put together in an examination. Teachers concurred with the latter perceptions referring to "*pseudo-integration"* in assessments. Since assessment is believed to drive learning, if integration of learning is to be achieved it must be driven by integrated assessment (Dent *et al*., 2009).

5.5.6 Role of the Teacher

In this study students ascribe a central role of integration of learning in the teacher who is referred to as the "*driver",* as epitomised by the student's metaphor below:

> *…The lecturer is the driver, if the lecturer wants to turn the car the car will turn...so, the car is the student… So, if they can't turn the wheel the student won't turn. So, if all the courses are not interested in integrating with other disciplines, the students will also not integrate…* [**Student 22, MBBCh 3**]

From the above quote the teacher plays an important role in "intrinsic" and "extrinsic" motivation which, in turn, influences the "internal horizon" and the "direct object". Several studies have investigated the role of teachers in higher education and affirmed their comprehensive role in the whole teaching and learning process. This is consistent with studies by Ausubel (1960), Ausubel & Fitzgerald (1961), Boulton-Lewis *et al.* (2001), Gibbs (1994), Laksov *et al*. (2014), Ramsden (1992), Trigwell *et al*. (1994), Watkins *et al*. (2005) and Yeung and Lam (2007).

Students perceive teachers who are interactive as helpful. These are teachers who make attempts to constitute the object of study for the students in ways that triggered links and connections with other subjects. Triggers may help in foregrounding the object of learning. In line with Ling and Marton (2012) and (Apple, 1971) teachers are reminded to be cognisant of the dynamic nature of the object of learning. The hidden curriculum may interfere with the object of learning (Gaufberg *et al*., 2010; Genn, 2001a; Genn 2001b).

Students perceive some teachers to be lacking awareness of integration processes and how their subjects relate to other subjects in the same year, and even sometimes within the same discipline. Teachers share similar perceptions that some teachers did not possess adequate knowledge of the curriculum and that there were no formalised engagements on integration of the curriculum. Integration of learning was left to the students to do, similar to the findings of a study by Muller *et al*. (2008).

Students experience that teachers who do not make integration of learning an object of learning do not culture an environment conducive for integration. This is consistent with a study by Pang and Marton (2003) who found differences in learning outcomes as a result of how the concept was dealt with in the classroom. Teachers who used variation in their teaching enabled integration of learning. Teachers play

a role in motivating students and enabling them to perceive relevance in their courses (Jordan *et al*., 2008).

Teachers should provide learning contexts that maximise opportunities for disequilibration and cognitive restructuring (Moseley *et al.*, 2005). Teachers should make deliberate efforts to integrate learning rather than assuming that students will understand the connections automatically (Davis & Harden, 2003; Fogarty, 2009).

5.6 A MODEL OF INTEGRATION OF LEARNING

This study has shown that the meaning (*referential aspect*) and structure (*structural aspect*) of students' awareness of integration of learning are dialectically intertwined in that they mutually constitute each other. As such, this final phase of analysis and discussion emphasises both meaning and structure in constituting the outcome space in its inclusivity and complexity to demonstrate how students develop the ability to integrate learning.

With reference to Table 5.1, when the students' experiences are arranged in a hierarchical order with the development of students' ability to integrate learning as a focal point, the picture in Figure 5.1 is constituted. When arranged in this hierarchical order, it emerged that students in the earlier years of study reveal more rudimentary unsophisticated conceptions while those in the later years of study reveal more sophisticated ones. The picture that emerged resembles the cognitivist and constructivist frameworks that were discussed in Chapter 2. With reference to Biggs and Collis's SOLO Taxonomy (Biggs, 2002) discussed under Section 2.3.7.4 (Figure 2.6), the following similarities are drawn:

Conception 1: When students aspire for the ability to remember everything it is similar to the pre-structural level where students acquire bits of unconnected information.

Conception 2: When students realise the need to identify essential details it is similar to the unistructural level where simple and obvious connections are made.

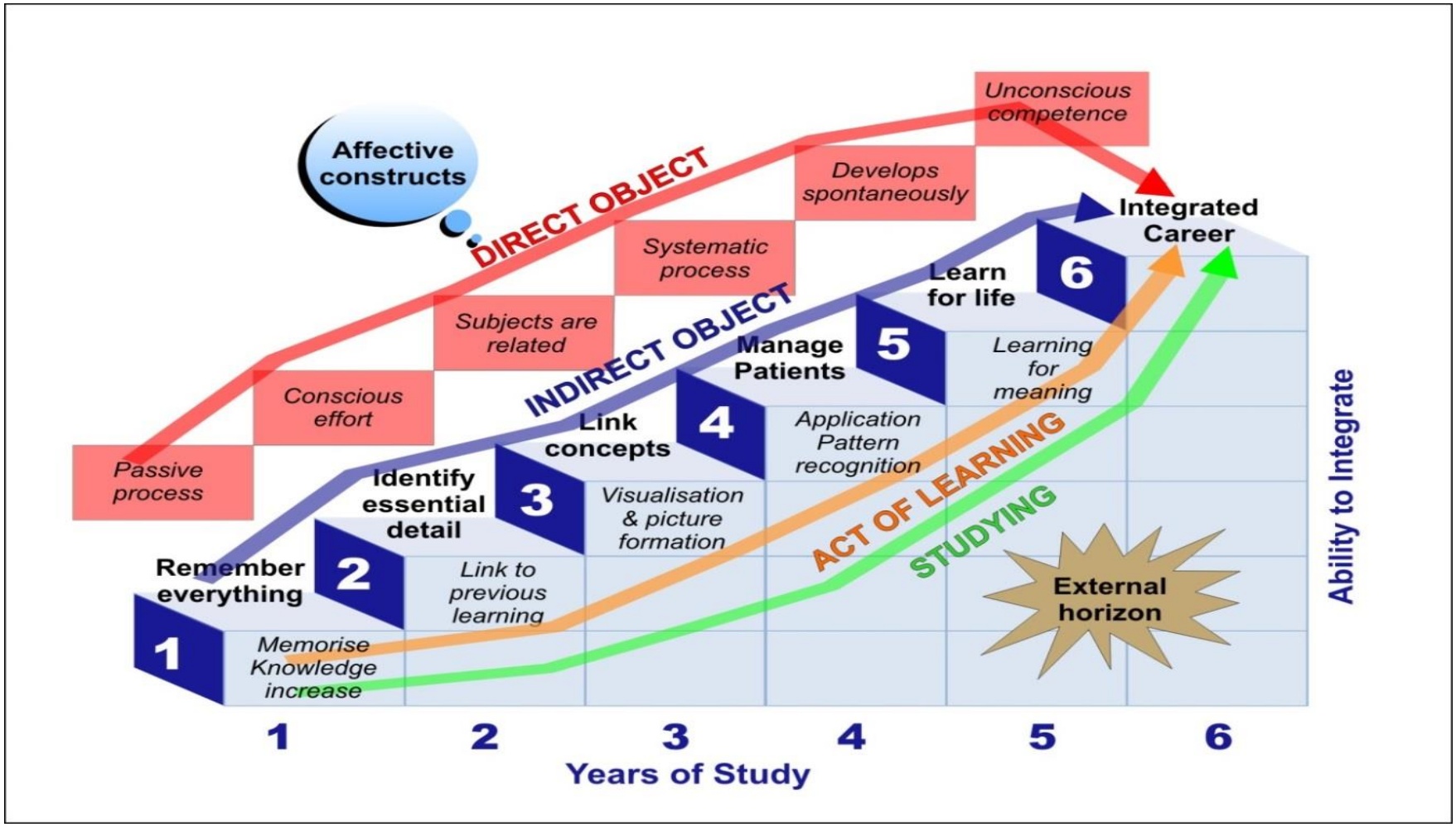


Figure 5.1: A model of integration of learning

Conception 3: When students' conceptions are related to linking concepts, visualisation and picture formation, it is similar to the multistructural level where a number of connections are made.

Conception 4: When students' conceptions are related to pattern recognition and application, it is similar to the relational level where the student is able to appreciate the significance of the parts in relation to the whole.

Conception 5: When students' conceptions are complex with views of learning for life in and outside an integrated career, it is similar to the extended abstract level where students make connections within and beyond the subject area.

As was observed by Trigwell, Prosser, Martin and Ramsden (2005), the SOLO taxonomy may inform the understanding of structural relationships between categories.

Further discussion will make reference to Figure 5.1 which portrays how students develop the ability to integrate learning. Figure 5.1 is the final graphic translation of the outcome space.

As discussed earlier, the "indirect object" forms the core of this study. The indirect object reveals the capabilities that students conceive as the measure for the ability to integrate learning. With reference to Figure 5.1 students experience the integration of learning as a relational process which starts from the first year to the final year. This is a process which is perceived to take time and is akin to climbing a ladder of steps that are not mutually exclusive but integrally linked with increased complexity and inclusivity through the years. This process is similar to the theories linked to the pedagogies of integrative learning and the taxonomies which observe that the capacity to learn and synthesise information develops in an intimately integrated hierarchy (Ausubel & Fitzgerald, 1961; Biggs, 2002; Forehand, 2005; Gagné, 1972; 1984; Ivie, 1998; Moseley *et al*., 2005). For example, the cognitivist view by Bloom sees learning in three intimately integrated domains – psychomotor, cognitive and affective (Forehand, 2005). The integration in the early years is minimal as it is experienced as an accumulation of fragmented facts. The students

perceive themselves to be immature since they have not accumulated much knowledge to build on. Consequently, their affective constructs lack sophistication as the phenomenon is perceived to be passive and abstract and this may contribute to their wanting to collect atomistic uncoordinated facts. From a cognitivist perspective, at this level the students display lower order cognitive skills which correspond with the surface approach to learning.

As students gain more knowledge and maturity their experiences increase in sophistication, starting with a realisation that not all the content they encounter is important. They experience a need to make a conscious effort to identify essential detail and, to do this, they also need to link to previous learning. This is linked to the cognitivist epistemological process of accommodation espoused by Piaget where knowledge acquisition requires linking new information with what is already known (Illeris, 2007). Related to this is constructivism where learners construct new knowledge by linking to previous learning (Dennick, 2012). The experiences are interconnected so the timeframes of occurrences of the experiences overlap. When the students are introduced to problem-based learning they experience the need to link concepts of the identified essential detail as they realise that all the subjects are related. At this stage there is a link to “constructive alignment” where the students are able to construct meaning through this environment which supports learning activities appropriate for integration (Biggs, 2002). There is an internal structural relationship between this conception of ability with the cognitive understanding that integration of learning means that subjects are related (Marton & Booth, 1997).The boundaries between subjects are being eliminated as they visualise and form pictures of the whole. Students perceive problem-based learning as an introduction to integration but the real taste of integration happens around the fifth year when they apply their learning in the clinical area managing patients. Here pattern recognition is experienced to be pertinent in order to manage patients systematically and comprehensively (Norman, 2006).

By the sixth year of studies, students experience the most inclusive conceptions of the phenomenon as they have matured and need to learn for meaning because they are learning for life. They also conceive a complex life in an integrated career fraught with uncertainties at the same time while attending to other life demands like family and spirituality. This is consistent with Pang and Marton (2003:181) who observed

that “when you educate people you want to prepare people for a future which is entirely or partly unknown”. At this point the shift in affective constructs is most positive with the phenomenon being perceived as one that is not difficult as it develops spontaneously to unconscious competence with a “*beautiful”* output.

There is a linked relationship between the external horizon and the affective constructs. Affective constructs influence the understanding of the meaning and processes of integration of learning. Some studies have reported that the amount of effort students put in their work would depend on whether the task was judged to be easy (Harlen & Crick, 2003). Consequently students who conceive integration of learning to be difficult put in less effort while the converse is true – students who possess a positive experience of the phenomenon will put in more effort. This means that ultimately, based on motivation alone, the length of time it takes students to acquire the capability to integrate learning varies. Further to this, several positive and negative factors are perceived to lurk in the external environment. The perception of positivity or negativity of these factors influences the affective constructs which, in turn, influence progress towards the ladder of integration of learning.

Throughout the programme, students experience studying as critical since that is where integration of learning happens. Studying is perceived to be necessary from the first year to the sixth year; however, varying approaches to studying are adopted. This finding supports Piagetian epistemology of how knowledge is acquired since students need time for assimilation and accommodation of new learning (Dennick, 2012; Kaufman, 2003). It is logical that this processing of new information in order to construct meaning and make it useable is a cognitive activity which is accomplished during studying. In the first year due to a perception of low relevance of the subjects, students adopt surface approaches to learning in order to pass assessments. In the second year due to a perceived heavy workload and teaching which is perceived not to promote integration of learning, surface approaches to studying are also adopted.

The perceived effect of assessments leading to the adoption of surface approaches to learning is present throughout all the years of the undergraduate programme. As observed by Epstein (2007), adoption of surface approaches to learning is one of the unintended effect of assessments. Students experience the adoption of deep

approaches to learning when they need to understand subject matter in order to identify links, link concepts and apply this while managing patients in the clinical area.

Students do not experience much horizontal and vertical integration of learning in the first two years of study which are largely perceived as two separate years. There is an exception to this experience where they perceive Medical Thought and Practice to be a course that introduces integration of learning and promotes horizontal and vertical integration.

There is also a linked relationship between the direct object and the indirect object in that students with a rudimentary conception of the phenomenon adopt fragmented practices or acts of learning in order to achieve unsophisticated abilities of integration of learning. Conversely, those students who experience sophisticated understandings of the phenomenon conceive integration of learning in a superior manner and adopt cohesive approaches of learning in order to attain highly inclusive abilities of integration of learning.

5.7 CONCLUSION: CHAPTER 5

In conclusion, Chapter 5 discussed the results of this study which investigated students' experiences of integration of learning and how the ability to integrate learning develops. The researcher is not aware of any previous study that has investigated students' experiences of how the integration of learning develops using phenomenography. The outcome space has revealed students' experiences that are logically related to one another by a hierarchically inclusive relationship and this is the nucleus of phenomenography. The outcome space which was constituted using the "anatomy of awareness" as explained in Chapter 4 is presented in Table 5.1 which formed the core of the discussion of this chapter. The table was translated into Figure 5.1 which depicts graphically how students develop the ability to integrate learning.

From Figure 5.1 it is apparent that students embark on a journey of integration of learning through taking steps that increase in complexity and hierarchical inclusivity. The integration of learning takes a relatively long time to develop, occurring from the first year to the sixth year but starting from minimal to highly complex acts of learning to be able to cope in a complex career in a complex world. The affective constructs

towards the phenomenon also change over the years from negative to positive. All this happens in an environment that is regulated by affective constructs and motivation factors. The acquisition of the ability to integrate learning is conceived to take long, depending on the effects of affective constructs and the external horizon.

In the final chapter (Chapter 6) conclusions and recommendations will be discussed based on the interpretation of the outcome space and its implications for the future. Recommendations for practical application of the model will be made to improve integration of learning in Higher Education programmes in general and specifically in undergraduate medical programmes.

CHAPTER 6:
APPLICATION OF THE MODEL

6.1 INTRODUCTION

In this final chapter, the researcher presents conclusions and recommendations which Higher Education institutions can consider for the improvement or strengthening of integration of learning. The recommendations, which present an application of the model of integration of learning, flow from the model presented in Figure 5.1. This chapter aims to apply the interpretations of the outcome space of students' experiences of integration of learning and suggests implications for the future. This is the first study known to the researcher that has investigated how the ability to integrate learning develops as experienced and told by the learners themselves using phenomenography. The objectives of this study were:

1. To explore undergraduate medical students' experiences of integration of learning and their views on their ability to integrate concepts within and across disciplines from the first year to the sixth year of their studies; and how this ability develops.

2. To gain insight into what the teachers know about integration of learning, and how they view their roles in the implementation of integration in the programme; and their experiences as they implement activities designed to integrate learning

3. To clarify student concepts of the links between their ability to integrate learning and their educational experiences in the MBBCh programme.

4. To contribute student and teacher experiences to the debate on current theories regarding integration of learning.

The data to address all the objectives were analysed and this culminated in the model of integration of learning presented in Figure 5.1. The following conclusions and recommendations derive from the data on students' experiences of integration of learning in an undergraduate medical programme. While this model is directly relevant to the University of the Witwatersrand, it will be applicable to other

universities that follow a similar model: basic sciences, hybrid problem-based learning blocks, and discipline-based clinical rotations.

6.2 SUMMARY AND RECOMMENDATIONS

The proposed model of integration of learning (Figure 5.1) presents a complete picture of the development of students' integrative ability showing linked and hierarchical relationships. This proposed developmental model is a logical presentation of integration of learning. The model requires additional research to provide further empirical justification. From the model factors emerge that are critical for integration of learning in that they either promote it or prevent it from occurring effectively. The factors are: teacher, curriculum, student and studying. Recommendations for application of the model will be drawn around interventions that impact on improvements specific to each of the factors identified. Gibbs (1994) refers to a proposition that research on student learning needs to feedback substantially into the context within which it is undertaken.

From the students' experiences, it is evident that the understanding of the phenomenon starts from the least sophisticated conception. Conceptions of integration ability develop gradually from fragmented to highly inclusive ones as students acquire more experience and mature in the programme. Students apply various learning tools as they see fit in order to acquire the ability they desire at any stage in the programme. As they climb up the ladder of integration ability, students encounter factors in the horizon that have an impact on their motivation and ability to integrate learning. Of note is that there is a positive shift of the understanding of the meaning and processes of integration and the conception of the ability to integrate learning, which correlates with a shift of attitude. The ability to integrate learning takes long as it develops over the entire six years of the degree.

These four factors depicted in Figure 6.1 – teacher, curriculum, student and studying – form the context in which integration of learning occurs. According to Entwistle (1991) there is a close link between approaches to learning and the context of the learning. Approaches to learning can, therefore, be altered by contextually directed interventions. It is from this school of thought that the recommendations below are framed for actions around each of the core factors. The aim of the recommendations

in this study is to expedite a steady, smoother and faster journey for the students so that they are able to develop more sophisticated conceptions together with more inclusive abilities to integrate learning.

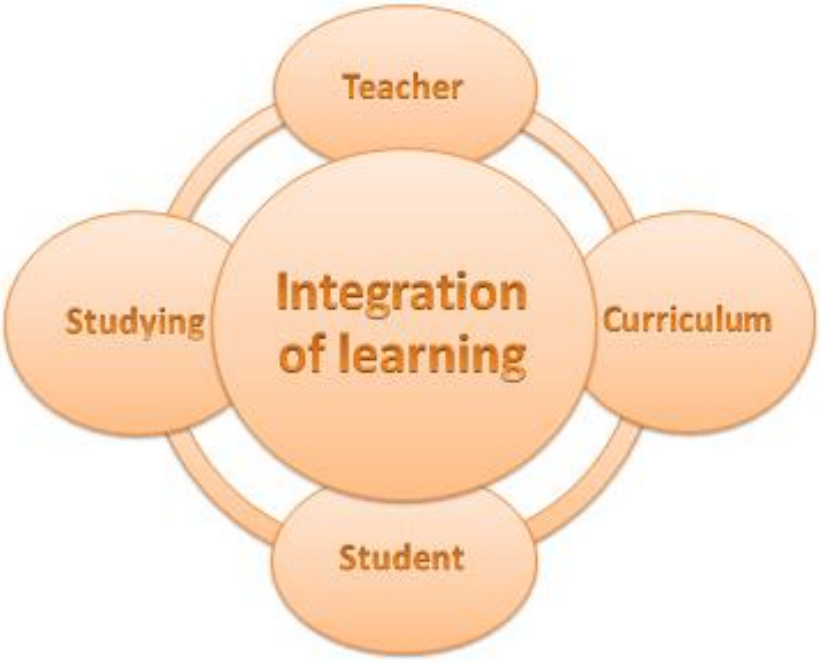


Figure 6.1: Core factors in integration of learning

The recommendations are given in the following sections.

6.2.1 Teacher

6.2.1.1 Consensus about integration

Academics need to develop some consensus about what integration is and why it is needed (Bernstein, 1975; 1990). As an acknowledgement of the polarised conceptions of the approaches of integration in medical education, the researcher recommends a flexible model that recognises the variable needs for integration of learning.

6.2.1.2 Teachers' conceptions of teaching

There is a need to change teachers' limiting conceptions of their own role in promoting integration in students' learning and develop the more sophisticated ones (Prosser & Trigwell, 1997a; 1997b). This can be achieved through short in-service courses, or even diploma and degree courses for teachers to improve their capabilities in supporting students to integrate learning. There is a need to ensure that the status of integration of learning is elevated so that it is an integral component of the discourse of and between teachers. The topic of integration should be discussed and given its proper status by committees involved in the development and reviews of curricula. If awareness of integration of learning is elevated, it is more likely to become an integral component of the curriculum. Ling and Marton (2012:9) recommend that when teaching:

> ...we should take as our point of departure what is to be learned (i.e. object of learning). For every object of learning and for every learner there are critical features that the learners must be able to discern; critical features are critical because the learners participating in the study have problems with them, and different learners may have different kinds of problems.

As discussed in Chapter 5, there is a major role for teachers to play in promoting and enabling students to integrate learning. It is important to promote the role of teachers in supporting students to integrate their learning. If teachers understand clearly how important integration is, and have clear concepts about how it should be promoted in their teaching, it will increase their motivation to make integration of learning an object of study and to monitor the development of integrative ability, rather than leave it totally as a student responsibility.

6.2.1.3 The scholarship of discovery and integration

Academic teachers need to further develop their experience of understanding through the scholarship of discovery (research) and the scholarship of integration and application (Åkerlind, 2004; Prosser *et al*., 2005). Integration should become a research focus of those involved in the programme – this could be stimulated by Faculty-wide discussions of the findings of this research. Such research should include monitoring the development of students' integration ability as a result of

implementing the recommendations of this study, as well as other revisions to curricula which may result from it.

6.2.2 Curriculum

6.2.2.1 Opportunities for integration – map the curriculum

Faculties need to identify opportunities for promoting integration. Teachers and programme planners need to map the curriculum to identify opportunities for moving up the integration ladder.

> Curriculum mapping is concerned with what is taught (the content, the areas of expertise addressed, and the learning outcomes), how it is taught (the learning resources, the learning opportunities), when it is taught (the timetable, the curriculum sequence) and the measures used to determine whether the student has achieved the expected learning outcomes (assessment) (Harden, 2001a:123).

Students' and teachers' experiences alluded to lack of knowledge of the curriculum by some teachers. Curriculum mapping will provide teachers with pertinent information and knowledge about their curriculum. With that knowledge, teachers and curriculum planners will be better equipped to accommodate recommendations to strengthen integration of learning. In a curriculum which promotes integration there will be constructive alignment of teaching and assessment; for example more time will be made available for individual study which is when most integration of learning takes place (Biggs, 2002). In addition curriculum overload will be eliminated as constructive alignment leads to focusing on the content and assessments that are core for attainment of overall outcomes.

Harden's (2000) integration ladder which was discussed in detail in Chapter 2 is a useful tool for improving integration in the curriculum. The ladder presents a hierarchy of steps with increasing emphasis of integration higher up. The emphasis of the steps closer to the bottom of the ladder is on disciplines while the higher steps emphasise integration across several disciplines. The suggestions for curriculum integration espoused by Harden (2000), Drake (2007), Beane (1995) and Fogarty (2009) serve as a good framework for decisions on how far to take integration. These suggestions depend on several factors including the existing curriculum, the experience and views of the teachers, and the organisational structure of the

medical school. Curriculum integration is important but complex, hence the decision to use elements of all three models. No suggested framework may be applicable without adaptations.

Step 1 Isolation

Although there have been efforts to improve integration of learning in the undergraduate curriculum, students and teachers experience substantial pockets of little integration. The conclusion may be that efforts to strengthen integration of learning need to start at the 'Isolation' stage; at the bottom of the ladder of curriculum integration. At this level each discipline uses its own perspective in its approach to:

> …curriculum content in terms of areas to be covered, depth of coverage, sequence and timing. No attention is paid to other or related subjects which contribute to the curriculum. The slots in the timetable are labelled with the name of the subject, which is taught by specialists in the discipline. Each subject is seen as an entity in itself (Harden, 2000:552).

There is a clear need for teachers to collaborate more closely on the depth of coverage of their subjects. Since students experienced a repeat of high school subjects in MBBCh 1, consider introducing clinical subjects at this level. This introduction would serve as an integrator of basic science content, and as the first step in a process of vertical integration of clinical content. The early introduction of clinical subjects would also increase the perceived relevance of the earlier years of the programme.

Step 2 Awareness

Formalise integration of learning through coordinated engagements and dialogue across disciplines. This will increase the teachers' awareness of how their courses relate to the programme as a whole. In this step of the integration ladder, although the teaching is subject-based, efforts are made to create awareness of what other subjects in the curriculum cover.

Step 3 Harmonisation

Introduce activities that bring about better connection and consultation about the programme. Increase formal dialogue amongst the respective teachers in committees and meetings.

Step 4 Nesting

Within their courses teachers should target skills relating to other subjects. "*Content drawn from different subjects in the curriculum may be used to enrich the teaching of one subject"* as explained by Harden (2000:553). After all, from students' experiences, there are no boundaries between subjects as "*other subjects help in understanding others"*. Some students shared conceptions that Health System Dynamics in the Medical Thought and Practice course could be used to understand other subjects. Harden gives an example of linking clinical medicine with the application of pathological principles.

Step 5 Temporal co-ordination

Consider parallel or concurrent teaching while each discipline remains responsible for its own teaching programme. The timing of teaching of topics and timetabling is done in consultation with other disciplines so that related topics are scheduled at the same time. An example is the teaching of the function of the heart in Physiology while the structure of the heart is being taught in Anatomy. This way the timetabling is facilitating the making of the links that students can accomplish while adopting integrative studying strategies.

Step 6 Sharing

Identify overlapping concepts in two disciplines and consider shared planning and joint teaching. Examples of disciplines with concepts that overlap and can be organising elements are: Biology and Physiology; Psychology and Sociology; Physics and Chemistry; Anatomy and Physiology; Molecular Medicine and Physiology. Through the identification of common areas of teaching, the disciplines appreciate that "*together they can teach the subject better, more effectively and more efficiently, than either could alone"* (Harden, 2000:553).

Step 7 Correlation

While remaining discipline based, introduce an integrated teaching session or course to bring together areas of interest common to each of the subjects. Harden gives an example of a subject-based programme in which the project or assignment given to students is designed to integrate the subjects.

Step 8 Complementary programme

Consider a mixed programme of both integrated and subject-based teaching with the former representing a major feature of the curriculum. In this step of the ladder, assessments reflect the emphasis on both integration and subjects. The literature abounds in examples of how problem-based learning is reflected in assessment, and these should be studied and copied.

Step 9 Multi-disciplinary

Bring together a number of subject areas in a single course with themes, problems, topics or issues as the focus for the students' learning. An example of an integrating theme is systems of the body. For example, courses are developed around the Cardiovascular system, the Respiratory system, and the Nervous system.

> In the thyroid module of the endocrine system block, for example, physiology may contribute to thyroid hormone system synthesis and its regulation, pathology to the underlying disease processes, pharmacology to the action of anti-thyroid drugs, surgery to the management of goitre, and medicine to the clinical manifestations and investigations of thyroid disease (Harden, 2000:554).

Of note is that the theme is the focus for the student's learning but the disciplines preserve their identity and each demonstrates how their subject contributes to the student's understanding of the theme. At this level of the integration ladder disciplines and specialisations are diluted as they lose some of their autonomy.

Step 10 Inter-disciplinary

Shift further to an emphasis on themes as a focus for the learning. Consider a much weaker focus on individual disciplines' perspectives at this higher level of integration. The content is all combined and subjects are not identified as individual courses in the timetable. This stage seems to link directly to a higher level of students' conception of integration where application of all learning takes place in the clinical area with patients who do not present themselves within a specific clinical discipline. Faculties need to consider introducing fully integrated longitudinal, year-long, district based clinical experience in the later years of study – as is increasingly being done in innovative integrated clerkships in medical education programmes.

Step 11 Trans-disciplinary

Look at the curriculum as exemplified in the real world to prepare students for the real world in which they live and function.

> The teacher provides a structure or framework of learning opportunities, but the integration is done in the mind of the student, based on hi-fidelity situations in the real world of clinical care (Harden, 2000:555).

This level correlates with the highest level of conception of integration of learning ability as experienced by the students in this study. In addition to integrated clerkships mentioned in the integration step above, an example that seems to meet the requirements of a real world set up is where medical, nursing and dental therapy students do some of their clinical training together. The rationale is: if they work together during their training they are more likely to work together effectively as a team after qualifying. So Faculties have to be catalyst for the managers of these programmes to determine how they can fit in meaningful periods of team learning in the clinical years.

6.2.3 Student

Understanding of integration of learning

There is need for students to make integration an object of learning. This means that integration will be in the focus of awareness, thus taking it from being a passive process. With a supportive curriculum and teachers who provide the needed scaffolding, students will adopt more sophisticated understandings of integration and adopt more sophisticated acts of learning and endeavour to consciously link subjects earlier in the programme. A deeper understanding of the concept will also increase the intrinsic motivation to integrate learning. The aim of this increase in motivation is to mould students to study for understanding rather than study with the aim of only passing tests and examinations.

Conceptions of integration ability

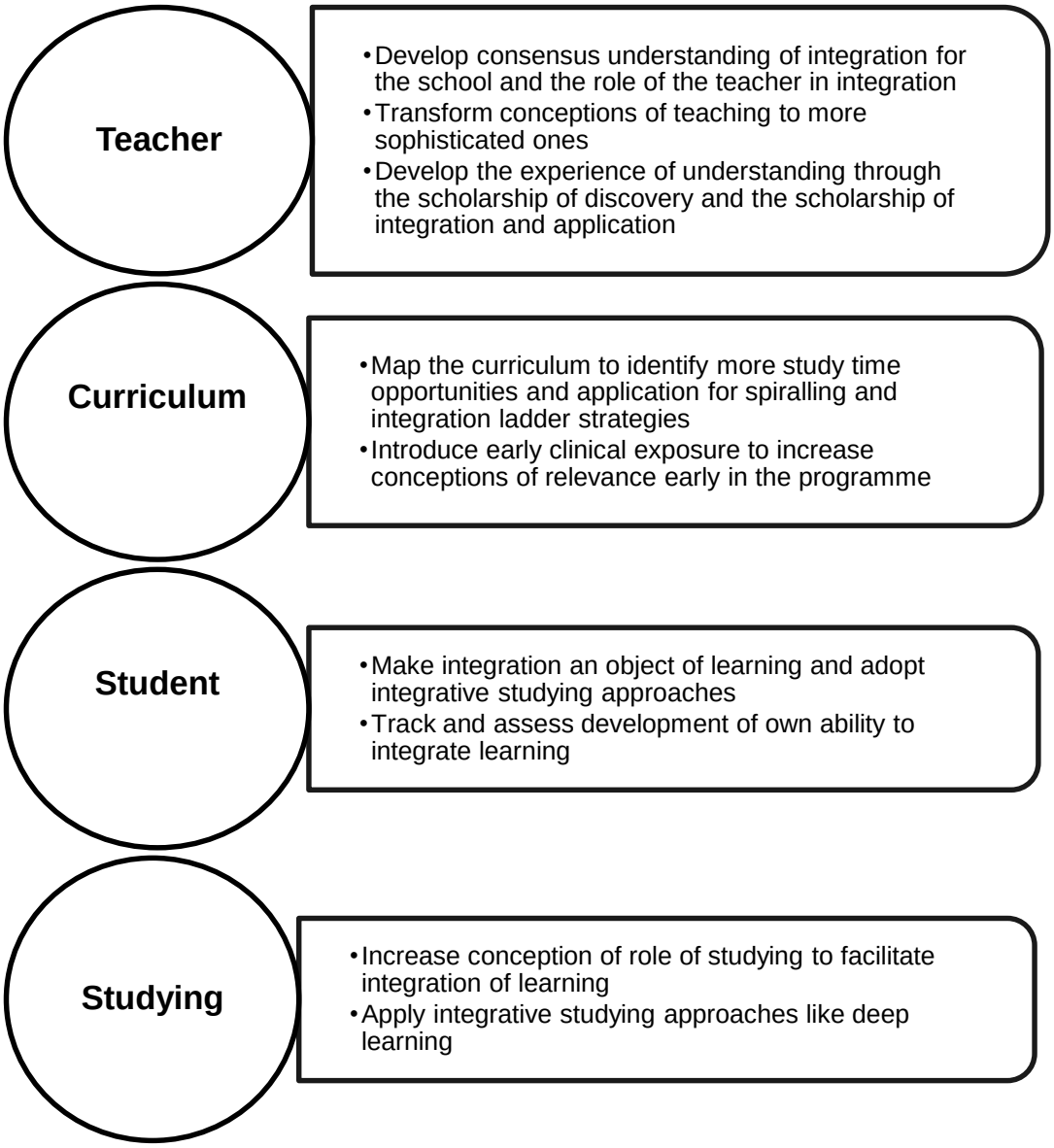
With more sophisticated understanding of integration, students will develop inclusive conceptions of the ability to integrate learning. Teachers should track and assess the development of students' ability to integrate learning.

6.2.4 Studying

As observed that integration of learning happens during studying, it is important for teachers to elevate the prominence of study time in the curriculum. Review students' study strategies and promote those that favour integration of learning. There is need to scaffold students so they adopt more inclusive study approaches which facilitate deep learning. Teachers need to coach students to adopt integrative studying styles

6.2.5 Summary of Recommendations

In summary the specific recommendations follow:



6.3 CONCLUSION: CHAPTER 6

Chapter 6 has presented specific recommendations drawn from students' experiences on their understanding of integration of learning and their conceptions on how they develop the ability to integrate learning throughout the six years of the MBBCh undergraduate medical programme. Teachers corroborated students' experiences and a model of integration of learning emerged. From this model, it

became apparent that in order to facilitate a smooth transition of integration ability, recommendations on interventions to be instituted centre around the teacher, the curriculum, the student and the ability to study effectively. It is envisaged that if these recommendations are implemented, students' passage through their journey will ease because:

> *…around integration I think that every day is a journey…* **[Student 4, MBBCh 4]**.

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APPENDIX 1:

PROTOCOL SYNOPSIS

CANDIDATE'S SURNAME: [Please print] Chipamaunga		FIRST NAME/S: Shalote, Rudo	STUDENT NUMBER: 392175
CURRENT QUALIFICATIONS: MAdEd			
TEL: 0117172741	CELL: 0827311089	E-MAIL: shalote.chipamaunga@wits.ac.za	FAX: 0117172323
DEGREE FOR WHICH PROTOCOL IS BEING SUBMITTED: PhD			
PART-TIME OR FULL-TIME: Part-Time			
FIRST REGISTERED FOR THIS DEGREE:	TERM : 1		YEAR: 2010
DEPARTMENT: Centre for Health Science Education (CHSE)			
TITLE OF PROPOSED RESEARCH: Integration of learning in an undergraduate medical programme at the University of the Witwatersrand – a longitudinal phenomenographic study			
CANDIDATE'S SIGNATURE:			DATE: 12 September 2011
SUPERVISOR'S NAME: Prof Detlef Prozesky			% Supervision 50%
SUPERVISOR'S QUALIFICATIONS: BSc, MBChB, MCommH, PhD			
SUPERVISOR'S DEPARTMENT: CHSE			
SUPERVISOR'S ADDRESS / TEL / E-MAIL: CHSE, Faculty of Health Sciences, 7 York Rd, Parktown, 2193. 0117172756. Detlef.prozesky@wits.ac.za			
SUPERVISOR'S NAME: Prof Donna Knapp van Bogaert			% Supervision 50%
SUPERVISOR'S DEPARTMENT: ~~Steve~~ Biko Centre for Bioethics until 12/11 * DEPT. NURSING & EDUCATION 01/12			
SUPERVISOR'S ADDRESS / TEL / E-MAIL: ~~Steve Biko Centre for Bioethics~~, Faculty of Health Sciences, 7 York Rd, Parktown, 2193. 011 7172720. Donna.vanbogaert@wits.ac.za NURSING EDUCATION			
SUPERVISOR'S NAME:			% Supervision
SUPERVISOR'S DEPARTMENT			
SUPERVISOR'S ADDRESS / TEL / E-MAIL:			

SYNOPSIS OF RESEARCH:
[Use reverse side of this page if more space is required]
One of the cornerstones of current medical programme reform in the world is 'integration': the horizontal and vertical integration of content from relevant basic science, pathological, humanistic and clinical disciplines. There is evidence that this assists students to assimilate and apply what they have learned more effectively, and thus enhances the goal of achieving professional competence. The six years of the MBBCh programme now contain a rich variety of features designed to advance integration in learning. However the ways in which students and teachers experience these kinds of integration are not known, nor is the effect that they are having on student learning. This study aims to investigate student and teacher experiences of a variety of events designed to promote integration in learning. This will deepen understanding the many and varied effects of such integration activities, and contribute to a body of knowledge on integration of learning in medical education.

ETHICS PENDING: Y ETHICS APPROVED: (Y) (circle appropriate symbol)		IF Y SUPPLY ETHICS CLEARANCE No: M11047	
SIGNATURE OF SUPERVISOR/S:	Donna Bogaert		
SIGNATURE PG OFFICE STAFF ……	REGISTERED YES….. NO…..	STAMP	University of the Witwatersrand CENTRE FOR HEALTH SCIENCE EDUCATION 2011 -09- 13 Faculty of Health Sciences 7 York Road, Parktown 2193

SYNOPSIS OF RESEARCH CONTINUED

Objectives of the study

1. To explore undergraduate medical students' views on integration in learning and their views on their ability to integrate concepts within and across disciplines from the first year to the sixth year of their studies.
2. To gain insight into what the teachers know about integration in learning, how they view their roles in the implementation of integration in the programme, and their experiences as they implement activities designed to integrate learning
3. To establish links between students' reported ability to integrate learning and educational experiences in the MBBCh programme.
4. To contribute student and teacher experiences to the debate on current theories regarding integration in learning.

Study design

I will carry out a longitudinal descriptive qualitative study applying phenomenographic methods. A longitudinal approach will enable collecting data from the same cohort over at least two years. Students' initial experiences of and reactions to the programme may differ with time as they mature through the programme. Phenomenography will enable collection of qualitative data on students' and teachers' experiences as they go through the six years of the programme. Phenomenography is a research approach that collects empirical data on the way people experience things around them. According to Marton and Booth (1997) phenomenography is used to reveal the qualitatively different ways in which a phenomenon can be experienced, understood or perceived. Phenomenography is a research approach with an educational interest and in this case a phenomenological paradigm is the one of choice. The phenomenon of integration in learning is one which exists in the understanding of persons involved in the learning process, as teachers or students, and for this reason an approach which clarifies that understanding has to be followed.

Study population

I will collect data from two populations:

- Medical students in the MBBCh programme in 2011 and 2012, in each of the Year 1-6 groups
- Academic staff involved in the MBBCh programme –planning and reviewing the curriculum, carrying out teaching and assessing learning.

Using these two populations allows for an important triangulation, necessary to gain a more complete and detailed understanding of the nature and effect of integrated learning in the programme.

Study sample and size

In this qualitative research study, I will use several sampling techniques with the principal sampling approach being purposive. In purposive sampling, researchers handpick the cases to be included in the sample on the basis of their judgment of their typicality (Cohen L. et al. 2000). To achieve representation I will consider gender, race, mother tongue and academic performance when drawing the sample. If needed I will employ theoretical sampling to collect more data to fill information gaps that may emerge from preceding rounds of data collection. The size of the sample will be determined by saturation.

Data credibility and analysis

For trustworthiness I will apply several verification strategies used in qualitative research. Data analysis will be an iterative process which commences during data collection and involves reading and re-reading of transcripts. In this process, I will select excerpts that convey the most significant information, de-contextualise and compare excerpts, and follow this by grouping and re-grouping of excerpts until outcome space is formulated. From this I will discern student and teacher experiences of the integration in learning. This will deepen understanding and contribute to a body of knowledge on integration of learning in medical education.

APPENDIX 2:

ASSESSMENT COMMITTEE COMMENTS

University of the Witwatersrand

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
FACULTY OF HEALTH SCIENCES
ASSESSORS MEETING

CANDIDATE: S C Lipanovunga.

Date of Assessor Group Meeting: 12/10/2011 School / Department / Division: CHSE.

Yes / No — Is the research question clearly identified and described?

Comments:

Yes / No / Not entirely — Is the design of the study and methods used appropriate for the research question being asked?

Comments:
- Expand on problem statement
- How do you sample teacher.
- Take out statement on validity & reliability
- Publication of your work is essential.
- To remove the video recording.
- Fix typos error
- Reference in first paragraph.

Is the study feasible within:

i. the applicant's resources? Yes / No

ii. the departments resources? Yes / No

iii. the time frame? Yes / No

Do you recommend:

i. shortening / lengthening of the protocol? Please specify and explain.

NO

ii. the appointment of a co-supervisor? Yes / No

Nominee/s :

Overall recommendation regarding the protocol :

i. revision of the protocol to the Supervisor (~~if HOD approval is~~ also required, please specify): (**Candidates**: one copy, list of corrections, supervisor approval letter – submit to PG Office) — Yes / No

ii. revision of the protocol to the satisfaction of the Assessor Group: (**Candidates**: six copies, list of corrections, supervisor approval letter – submit to PG Office) — Yes / No

iii. revision of the protocol and resubmission of the revised protocol to the next Assessor Group Meeting: (**Candidates**: six copies, list of corrections, supervisor approval letter – submit one copy to PG Office / 5 to school assessor group administrator/ for PhD all six copies to be submitted to the PG Office) — Yes / No

iv. candidate goes ahead: Yes / No

Assessor Names and Signatures :

GS CANJM

P.A. MCINERNEY

M. VAN GV

Assessor Group Chair

12/10/2011

Date

APPENDIX 3:

RESPONSE TO PROTOCOL ASSESSMENT COMMITTEE RECOMMENDATIONS

Response to the recommendations of the Protocol Assessment Committee

Date of assessment: 12 October 2011

Recommendation 1: Expand on problem statement (the problem statement did not answer the 'so what' question)

Correction: *Page number 5*. I added the following sentence to enrich the problem statement so that it answers why the research is important. **Knowledge of this will contribute towards better understanding of integration and development of effective models in educational practice.**

Recommendation 2: Show how you will sample teachers

Correction: *Page number 11*. I added the following to the sample of teachers:
Specifically I will obtain a representative sample of teachers by identifying the coordinator of each discipline taught per cohort of students. For example, in MBBCh I, I will interview the course coordinators of physics, chemistry, biology, sociology, psychology and those who teach the different components of Medical Thought and Practice course. I will also interview those academic staff members who were involved in the review of the curriculum for each cohort. This population is small but I will initially reach those who were at the forefront of the review and then use snowballing to follow up on any others who may be recommended by this core group.

Recommendation 3: Take out statement on validity and reliability

Correction: *Page number 13*. I deleted validity and reliability from the subheading "Data credibility/ trustworthiness" and also deleted the first paragraph that explained validity and reliability

Recommendation 4: Add publication in journals

Correction: *Page number 14*. Publishing of the report - I added – **and in international journals and literature**

Recommendation 5: Remove the video recording

Correction: *Pages 12 and 14* – I removed reference to video recording

Recommendation 6: Fix typing errors

Correction: *Page 3:* last sentence – I added 's' to year:

In 2006 following an accreditation visit by the Health Professions Council of South Africa (HPCSA) the first and second years of the programme (which were still

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discipline-based) were reviewed in terms of course content and integration of learning, and new courses were added to those years to facilitate integration of learning.

Page 9: third sentence – I added to and 's' to experience:
Variation enables the researcher to identify the structure of awareness underlying the students' and teachers' varying experiences of phenomena.

Recommendation 7: Add reference in first paragraph
Correction: *Page 2:* I added the reference at the end of the first paragraph:
There is evidence that this assists students to assimilate and apply what they have learned more effectively, and thus enhances the goal of achieving professional competence **(Harden, Snowden and Dunn 1984).**

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APPENDIX 4:

ETHICS CLEARANCE LETTER

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Ms Shalote Rudo Chipamaunga

CLEARANCE CERTIFICATE	**M110471**
PROJECT	Integration in an Undergraduate Medical Programme at the University of Witwatersrand-A Longitudinal Phenomenographic Study
INVESTIGATORS	Ms Shalote Rudo Chipamaunga.
DEPARTMENT	Centre for Health Science Education
DATE CONSIDERED	06/05/2011
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 22/06/2011 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Prof Detlef Prozesky

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

APPENDIX 5:

LETTER TO SUPERVISOR

University of the Witwatersrand
Johannesburg

Faculty of Health Sciences • Centre for Health Sciences Education

7 York Road, Parktown 2193 South Africa • Fax: +27-11-717-2339 • Telephone: +27-11-717-2329 • http://www.wits.ac.za/chse
email: shalote.chipamaunga@wits.ac.za

18 October 2011

Prof Donna Knapp Van Bogaert,
Steve Biko School of Bioethics,
Faculty of Health Sciences,
University of the Witwatersrand.

Re: Response to Protocol Assessment Committee comments

Dear Prof Van Bogaert,

Please find attached my response to the comments made by the assessment committee on 12 October 2011.

I have listed the comment followed by my response indicating page numbers.

Regards,

Shalote R. Chipamaunga
PhD Student number: 392175

APPENDIX 6:

APPROVAL OF CHANGE OF TITLE

UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

Private Bag 3 Wits, 2050
Fax: 027117172119
Tel: 02711 7172076

Reference: Ms Thokozile Nhlapo
E-mail: thokozile.nhlapo@wits.ac.za

21 October 2014
Person No: 392175
PAG

Mrs SR Chipamaunga
P.O. Box 40779
Garsfontein
0060
South Africa

Dear Mrs Chipamaunga

Doctor of Philosophy: Approval of Title

We have pleasure in advising that your proposal entitled *How the ability to integrate learning develops - a phenomenographic study* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

APPENDIX 7:
STUDENT'S CONSENT FORM

HOW STUDENTS DEVELOP THE ABILITY TO INTEGRATE LEARNING

– A PHENOMENOGRAPHIC STUDY

INFORMATION SHEET AND CONSENT FORM

Who I am

I am Mrs Shalote Chipamaunga. I am working at this University in the Centre for Health Science Education.

What I am doing

I am conducting research on students' experiences on the integration of learning in the undergraduate medical programme.

Your participation

I am asking for your permission to conduct an interview with you about your knowledge, opinions and experiences of integration in learning during your medical studies here at Wits. If you agree, I will ask you to participate in an interview for approximately 30 minutes. I am also asking you to give me permission to tape record the interview. I tape record interviews so that I can accurately record what is said.

Please understand that your participation is voluntary and you are not being forced to take part in this study. The choice of whether to participate or not, is yours alone.

If you choose not to take part, you will not be affected in any way whatsoever. If you agree to participate, you may stop participating in the research at any time and tell me that you don't want to continue. If you do this there will also be no penalties and you will not be prejudiced in any way.

Confidentiality

The results of the research, including personal details regarding sex, age, signature and opinions will be anonymously processed into the research report. All identifying information will be kept in a locked file cabinet and will not be available to others. I will refer to you by a code number or pseudonym (another name) in any publication of the research.

Benefits

There are no immediate benefits to you from participating in this study. However, this study will be extremely helpful in improving integration practices and approaches in the undergraduate medical programme.

If you would like to receive feedback on this study, I will send you the results of the study when it is completed sometime next year.

Who to contact if you have been harmed or have any concerns

This research has been approved by the Human Research Ethics Committee (Medical) – ref: M110471. If you have any complaints about ethical aspects of the research or feel that you have been harmed in any way by participating in this study, please contact the Chairperson of the HREC in Room 10004, 10th Floor, Senate House, University of the Witwatersrand.

CONSENT

I hereby agree to participate in research on integration of learning in an undergraduate medical programme at the University of the Witwatersrand. I understand that I am participating freely and without being forced in any way to do so. I also understand that I can stop participating at any point should I not want to continue and that this decision will not in any way affect me negatively.

I understand that this is a research project whose purpose is not necessarily to benefit me personally in the immediate or short term.

I understand that my participation will remain confidential.

……..

Signature of participant Date:……..

I hereby agree to the tape-recording of my participation in the study.

……..

Signature of participant Date:……..…..

APPENDIX 8:

FOCUS GROUP DISCUSSION / STUDENT'S INTERVIEW GUIDE

HOW STUDENTS DEVELOP THE ABILITY TO INTEGRATE LEARNING

– A PHENOMENOGRAPHIC STUDY

SEMI-STRUCTURED INTERVIEW AND/OR FOCUS GROUP DISCUSSION GUIDE FOR STUDENTS

Principal Researcher: Mrs Shalote R. Chipamaunga

NB. *The following are examples of the questions to be asked. Not all these questions may need to be asked because after the entry question, dialogue follows on angles of responses.*

1. What do you understand by integration of learning?
2. How does integration of learning take place? What processes mean or lead to integration? (Probe integration of learning and in assessments)
3. What are your views about your own ability to integrate concepts?
4. What helps you to integrate concepts?
5. Which aspects of the course have you found helpful in enabling you to integrate?
6. What do you find not helpful? Which aspects of the course have you found not helpful in enabling you to integrate?
7. What did/do the teachers do to help you integrate learning?

8. What do you see as integration in learning ability? What would make you say “I am able to integrate?”
9. How does integration ability develop? How did you develop this integration in learning ability?
10. What did you do, as an individual to help you integrate what you learnt in the different courses that you have been taking?

APPENDIX 9:

TEACHER'S INTERVIEW GUIDE

HOW STUDENTS DEVELOP THE ABILITY TO INTEGRATE LEARNING

– A PHENOMENOGRAPHIC STUDY

SEMI-STRUCTURED INTERVIEW GUIDE FOR TEACHERS

Introduction:

As from 2003, Years 3 and 4 of the programme were redesigned to be presented as integrated system based blocks, using problem based learning as the main learning strategy. As from 2005, Years 5 and 6 were also redesigned. Although clinical rotations in specific disciplines still formed the main learning strategy, a number of integrating activities and even rotations were included in the new programme in these years. In 2006 following an accreditation visit by the Health Professions Council of South Africa the first and second years of the programme (which were still discipline-based) were reviewed in terms of course content and integration of learning, and new courses were added to those years to facilitate integration of learning.

I would like to find out the various ways in which you experienced this course and integration efforts, specifically the module you are involved in teaching. Your experiences will be useful in improving integration in the programme.

I will ask you a few questions but feel free to share all your experiences about the course. The questions I ask are open-ended because they are intended to open the discussion which will then flow according to the information you share.

Confidentiality:

I will ensure that confidentiality is maintained by not sharing your responses with any other persons other than for the purposes of this research. I promise to treat any information that you give me in the **STRICTEST CONFIDENCE**. Any written reports will use only grouped data which cannot be traced back to you. You are welcome to ask for clarification of any questions that may concern you.

How you can contact me:

Ms Shalote Chipamaunga: Tel 011 717 2741,

e-mail:Shalote.chipamaunga@wits.ac.za

CONSENT:

- I agree to participate in the study on the understanding that my responses will be coded and will not be able to be traced back to me personally
- I understand that I may decline to answer particular questions or participate in individual parts of the study and that I am free to withdraw at any stage

Teacher signature: _____

Interviewer name and signature: _____

INTERVIEW QUESTIONS:

NB. *not all these questions may need to be asked because after the entry question, dialogue follows angles of responses.*

1. What is your understanding of integration in learning?

2. What is your experience of integration in this course?

3. What are the reasons for your experiences?

4. How are students assisted to integrate learning in this course?

5. Regarding your experience, which components of the programme carry the highest impact in enabling students to comprehend and apply their learning?