CHAPTER 2

THEORETICAL FRAMEWORK

2.1 INTRODUCTION

In this chapter the researcher addresses the philosophical educational context and important aspects regarding the learner in higher education. The researcher reviewed the literature that deals with the topic as well as with reflection, reflective practice, learning-centred education and the integration of critical reflection into the learning programmes of health science practitioners. The theoretical and conceptual framework discussed in this chapter assisted the researcher to provide the theoretical underpinning of the topic of study. This guided the analysis of the research results and helped to determine whether the outcomes of the study had been achieved.

2.2 THE SOUTH AFRICAN EDUCATION CONTEXT

2.2.1 Philosophical context

The South African education system underwent substantial changes after 1994. A variety of trends influenced the context of higher education in South Africa and also internationally. It is therefore essential to do a brief survey of these philosophical developments to enhance understanding of these changes and their consequences.

Higher education has been identified to play a vital role in economic and social development (UNESCO, 1995). Maintaining the relevance of education and the need to be a lifelong learner necessitates an adjustment in focus from teaching to learning. The learners have to be actively involved in constructing their own knowledge and a different educational approach has to be introduced which is more learning-centred. Quality education plays a critical role in the development of economical and social structures of a country and therefore it should be evident that health science education should be designed to encourage lifelong learning through reflective practice.

Technology development, knowledge and educational innovations necessitate a graduate who will be able to cope, adapt and continue learning in the world of work (Fielden, 1998). Furthermore UNESCO (1995) indicates that the regeneration of teaching and learning is crucial for enhancing its relevance and quality. It is also stated that learning programmes should expand the intellectual capacity of learners, should be designed with inter- and multidisciplinary approaches in mind and learning opportunities with applicable learning strategies must be created to increase learning effectiveness.

Education cannot be understood outside various contexts, one of which is the philosophical context. The world has been influenced by various philosophies which act as broad frameworks in terms of which mankind understands and interprets his/her reality and existence. Broadly seen, education according to

Gericke (2004:7) has been influenced by inter alia the following four major philosophical trends/driving forces:

- Form-matter driving force from the Greeks

- Creation, sin and redemption force from Christianity

- Nature-grace force from Scholasticism

- Nature-freedom force from Humanism

Education philosophy and theory should ultimately result in education practice. Part of education practice is the practice of learning facilitation that in turn relates to education and philosophical theory.

2.3   EDUCATIONAL CONTEXT

2.3.1 Learning paradigms

A paradigm according to Gericke (2004) is a person's individual way of interpreting reality, the criteria for value judgments and belief systems. There are basically three paradigms of learning, namely the objectivist, the interpretist and the emancipatory. Sometimes these paradigms are referred to as traditional, transitional and transformational paradigms of learning (Gericke, 2004).

The emancipatory (or transformational) education paradigm is presently the paradigm that forms the basis for the South African education system in terms of

its structure, focus, organization, curriculum development, learning facilitation, and assessment practices (Crouse, 1988).

Emancipatory education entails facilitation of transformative learning to learners who should, as a result thereof, confront presuppositions, analyse and explore alternative perspectives, transform old ways of understanding and act on new perspectives (Gericke, 2004). Emancipatory education therefore occurs when learner paradigms change and when the learners take deliberate actions as a result of such changes to embark on new directions.

Mezirow's transformative learning theory (Mezirow, 1990) of 1978 was conceptualised in several ways. According to Morrell and O'Connor (2002), transformative learning refers to learning that involves revision of significant aspects of our world-view, our view of ourselves or our way of "being in the world". In other words, the approach is holistic because it emphasises overall meanings and attempts to contextualise new learning within what is already known. Learning, therefore, can only be meaningful when it becomes clear, sensible and leads to new or revised interpretations.

When the educational paradigm is emancipatory (transformative), the learning paradigm that relates to it is known as a constructivist-learning paradigm. Constructivism represents a paradigm shift from education based on behaviourism to education based on cognitive theory. Fosnot (1996) has provided a synopsis of these theories. Behaviourist epistemology focuses on

intelligence, domains of objectives, levels of knowledge and reinforcement. Constructivist epistemology assumes that learners construct their own knowledge on the basis of interaction with their environment. Fundamentally, constructivist learning occurs where learners reflect critically, change their views and paradigms as a consequence of such reflection, and imaginatively inquire into issues with the aim of demonstrating their solutions to problems.

Baumgarter (2001) indicates that this paradigm implies that learning:

- is the constructed making of meaning;

- is action-orientated and communicative;

- is shaped by a particular paradigm;

- should be critically reflected;

- occurs through refinement and transformation;

- is instrumental, communicative and reflective to be authentic;

- becomes valid through rational discourse;

- should be active and based on a reflective decision to act; and

- should result in the acquisition of instrumental and communicative competence.

Crouse (1988) suggests that students be prepared by systematically developing their abilities in order to equip them for lifelong learning and creative application of knowledge on a high intellectual and scientific level. He also calls for the emphasis to shift from teaching to learning. The shift from teaching to learning

will result in the design, development and application of totally different policies, systems, procedures and approaches. Facilitators of learning in health sciences are responsible for the design of learning opportunities and experiences that will enable students to understand current knowledge and for assistance towards the acquisition of relevant related skills to apply within a diverse contextualised environment. The probability of successful and meaningful learning increases and will be marked by students' capability

to discern aspects of their knowledge and skill that are relevant to the situation, to determine what kind of response is required and to make that response effectively. The heart of the matter therefore is the development of the capability to see, and to experience certain sets of situations in a certain way (Bowden & Marton, 1998:135).

The theory of transformative learning is complex and encompassing. Transformative (transformational) learning theory is a constructivist theory, focusing specifically on learning in adulthood. Mezirow (1997) admits that not all learning that adults engaged in is transformative, but regards transformative learning as the most significant kind of learning in adulthood. Gravett (2005) continues to indicate the two domains of learning that Mezirow distinguishes, based on Habermas's communicative theory, namely communicative learning

(learning how to understand something) and instrumental learning (learning how to do something).

Mezirow's theory (Mezirow, 1990) can be divided into three themes (Gravett, 2005): the central role of learners' frame of reference in new learning; critical reflection as it relates to meaning transformation; and the verification of beliefs through rational (reflective) discourse. Mezirow (2000:100) describes discourse as "that specialized use of dialogue devoted to searching for a common understanding and assessment of the justification of an interpretation or belief". This involves assessing reasons advanced by weighing the supporting evidence and arguments and by examining alternative perspectives. In other words, discourse is the medium by which critical reflection can be put into action to promote and develop transformative learning (Taylor, 1998).

The relationship between the core elements of Mezirow's theory (Mezirow, 1990) is graphically depicted in Figure 2.1. Within the domains four kinds of learning can be differentiated (Mezirow, 1991): learning can involve refinement of existing frames of reference; learning can also involve the learning of a set of beliefs, feelings, attitudes, judgements and knowledge; learning can involve a change in certain beliefs or attitudes; and learning can involve the transformation of a habit of mind. Taylor (1998) considers critical reflection as the distinguishing characteristic of adult learning and as a central process in transformative learning.
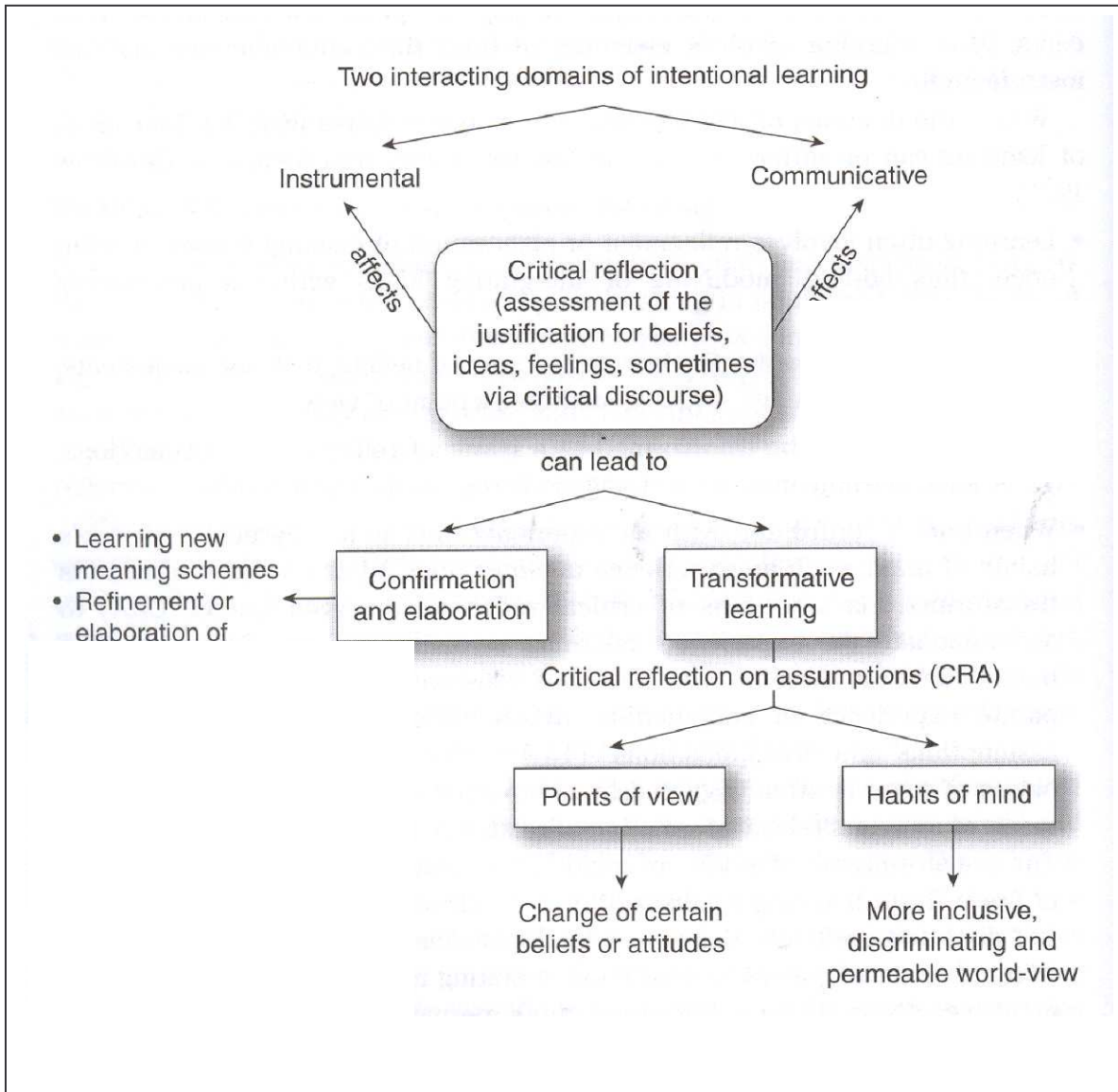
Two interacting domains of intentional learning

Instrumental

Communicative

affects

affects

Critical reflection
(assessment of the
justification for beliefs,
ideas, feelings, sometimes
via critical discourse)

can lead to

- Learning new
  meaning schemes
- Refinement or
  elaboration of

Confirmation
and elaboration

Transformative
learning

Critical reflection on assumptions (CRA)

Points of view

Habits of mind

Change of certain
beliefs or attitudes

More inclusive,
discriminating and
permeable world-view

Figure 2.1. Learning in adulthood, according to Mezirow (Gravett, 2005:28)

2.3.2 Education approach

An "approach" according to the Chambers-Macmillan South African Student's Dictionary (1996:45), is "the attitude you take or the way you deal with it". In the 1970s, research showed that learners approach intentional learning in different ways and that the diverse approaches lead to different learning outcomes (Gravett, 2005).

The South African education approach is known as outcomes-based education (OBE) aiming at the provision of meaningful learning opportunities. OBE requires educators to focus on what learners should be able to do as opposed to what they should know. According to Boughey (2004) OBE is therefore necessary in terms of its capacity to transform the sort of learning required by the country, as well as its capacity to make a national qualification framework function.

Curriculum reform (design and development) in health sciences also requires capacity building (development of knowledge and skills) that will ensure competent practitioners in the health care environment. Role change according to Holtzhausen (1998:33) involves "moving away from being a lecturer to being a facilitator, from not being the source of knowledge but the manager of knowledge". The role of the health science educator is therefore to create a context conducive to effective learning. According to Van der Westhuizen in Hassan (2003:65) the shift from the traditional approach includes:

- adopting a more facilitative role;

- becoming innovative and creative in facilitating learning;

- inculcating problem solving skills, creativity and critical thinking in learners;

- focusing more on assessment.

The movement towards emancipatory education and learning is a worldwide trend that has vast influences on educational theory and practice, particularly learning mediation and facilitation (Gericke, 1994).

"Transformation in the context of higher education is a change from one state to another – in educational terms the empowerment of students or the development of new knowledge" (Harvey, 1995:9). Transformed students are empowered, a state which is described by Morrison (1996:324) as "one in which they gain greater control of their own thinking, avoiding uncritical acceptance and passivity". The transformed individual has the ability and skills of analysis, critique, synthesis and innovation.

Ramsden (1992) states that learning should be about changing the ways in which learners understand or experience the world around them. The world around them includes the concepts and methods that are characteristic of the discipline/profession that they are studying. The vital competence in academic disciplines lies in understanding. By understanding Ramsden (1992:4) means the "way in which students apprehend and discern phenomena related to the subject, rather than what they know about them or how they can manipulate them".

Educational institutions are sites of multiple discourses be they liberal, technological, pragmatic, humanistic or professional and according to Barnett

(1997) no matter what the type of relationship that exists within the institution between authorities, professional and vocational training – critical reflection as such should retain the primary role.

Reflecting on my own practice, as well as past experiences of teaching and learning, I realised that to contribute to the full personal development of each student, any health science learning programme must make the individual aware of the importance of: "Reflecting critically on and exploring a variety of strategies to learn more effectively" (Smith, 2006) — as indicated by one of the developmental outcomes (listed under critical cross-field outcomes).

A self-regulated, flexible, reflective student/health science practitioner will be able to monitor his or her own progress. Such a student/practitioner is also able to monitor intrapersonal aspects like, amongst others, learning style preference, reflective learning, action learning, creative thinking and critical thinking. According to Du Toit, 2007 being metacognitively aware of how one learns is empowering. Identifying one's learning style preference in terms of one's strengths and weaknesses and developing flexibility is likewise emancipatory.

Reflection is an integrated part of metalearning or self-regulated learning. Metalearning demands the specific skill of reflection. The blueprint for learning about one's own practice is action learning — it simply refers to learning through action. Revans (2004) is widely credited as the person who used and developed

action learning in Europe. Revans once said, "Action learning is simply this —
asking questions and finding implementable solutions".

Kember (2000:27-28) reasons that the action research cycle incorporates
systematic observation and evaluation that will bring theory and practice to closer
accountability through public scrutiny. Action research in education is considered
good reflective practice. Burell and Morgan (1979) indicate that action research
consists of two components, namely "the process of generating change" and
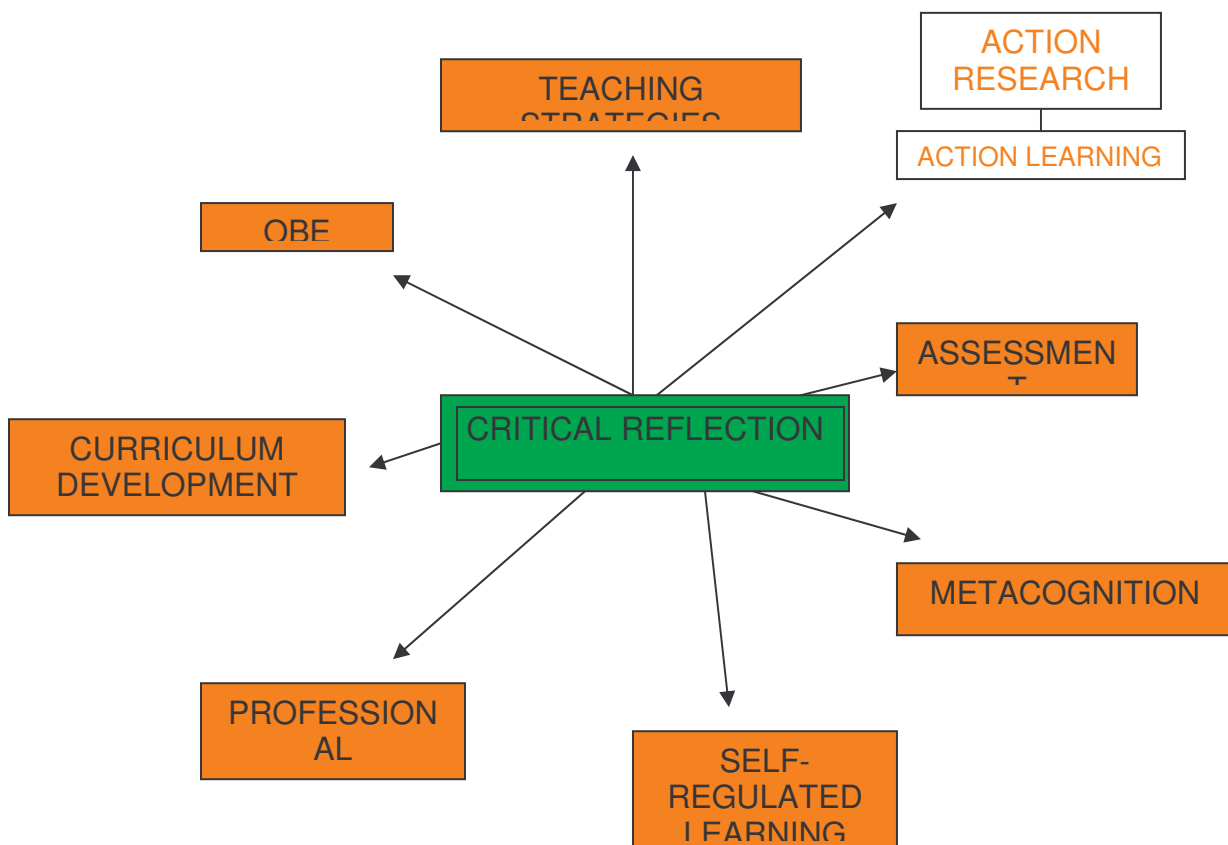"generating knowledge".

Figure 2.2. Integration of Critical Reflection in Teaching and Learning

In the view of the researcher, the conclusive framework in Figure 2.2 is a culmination of indicating how critical reflection as a learning skill is integrated and embedded in the comprehensive educational paradigm of action learning.

2.3.3 Learning outcomes

Research initiated by Marton (1975) indicates that different approaches to learning are aligned to different learning outcomes. It is indicated by Bowden and Marton (1998) that the concept of learning approaches emphasises the relationship between the object of learning (learning content), learning intention, the learning process and learning outcomes in a specific content. Gravett (2005:38) states that the research on learning approaches "has established a link between the depth of learning outcome and the learning approach or strategy used". Different approaches lead to differences in the quality of the learning outcomes. A distinction is metaphorically drawn between a deep and a surface approach (Gravett, 2005).

Deep learning approaches focus on what any discourse is really about and is associated with an active approach to learning. In adopting a deep approach to learning, students seek to understand. Students are personally involved in tasks and seek to attain underlying meanings and relationships between task and context (Gericke, 2004). The requirement for the kind of learning associated with

health science programmes is a deep approach, and for the researcher it means the realisation of significant learning that will last.

The terms "single- and double-loop learning" were first used by Argyris (1985) and Schön (1983) to distinguish between:

- instrumental learning where assumptions, values and theory do not change; and

- learning where paradigm shifts occur and as a result related assumptions and values are challenged and changed.

Kolb (1984) argues that goals are set on the basis of theory after which action is taken. Single-loop learning can lead to mere repetition of knowledge and fixed forms of learning. The learner works within a standard programme of study and sets goals and routes for learning within the discipline. Single-loop learning occurs within the loop in Figure 2.2.
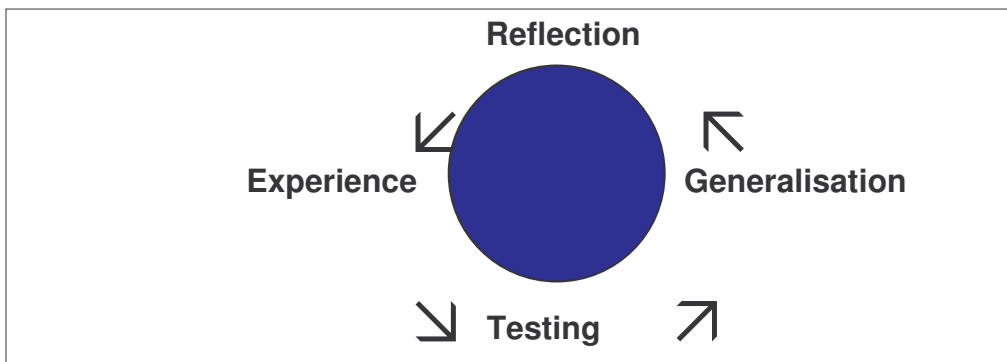

Figure 2.3. Single-loop learning (Kolb, 1984)

The moment that the learner becomes uneasy about his/her points of departure/ norms/values/paradigms he/she starts to leave the single loop and enter the double loop. Reflective dialogue and action commences but only after the shift has occurred; the learner returns to the single loop again with a new understanding of the discipline, a conception of development and an intention to act.

It is accepted that deeper-level learning arises from critically reflecting on one's own experiences. If learning gives rise to a change in basic assumptions, it is commonly referred to as double-loop learning in contrast to learning that does not challenge underlying assumptions, known as single-loop learning. In essence then, to 'learn something', the health science student must consciously experience a cycle of events, which begins when actions become experiences and deeper-level learning continues as the student reflects on the experiences, then develops, plans and implements new actions taking into account the outcomes of learning from 'doing' and 'reflecting'. According to Revans (2004:103) "there can be no learning without action and no sober and deliberate action without learning".

Double-loop learning according to Gericke (1994) will lead to a more effective way of making informed decisions about the way in which we design and implement action. The researcher is once again of the opinion that double-loop learning should be enhanced within the health science higher education sector.

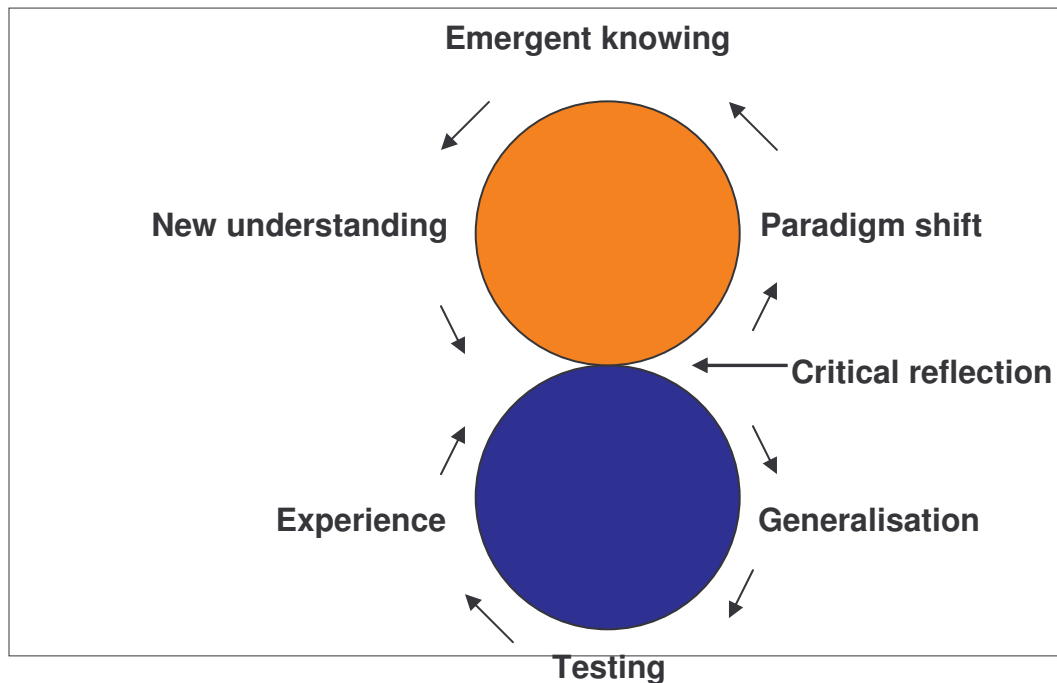Double-loop learning can be illustrated as follows in Figure 2.3.

Emergent knowing

New understanding   **Paradigm shift**

Critical reflection

Experience   **Generalisation**

Testing

Figure 2.4. Double-loop learning (Kolb, 1984)

Looking broadly at the policies and documentation of Government Departments dealing with education and training, it is apparent that embarking on an emancipatory education approach which is transformative in nature, is inevitable. If the consequences of actions/behaviour are as the person intended them to be, there is a match between intention and outcome. If not, there is a mismatch and a possible response to this mismatch may be to change the action/behaviour. Where the action is changing we refer to it as single-loop learning and where the underlying norm and value system changes we refer to it as double-loop learning. It is clear to the researcher that double-loop learning will lead to a more effective way of making informed decisions about the way in which we design

and implement action. It is therefore eminent that double-loop learning should be propagated within the higher education sector.

2.3.4 Curriculum and critical cross-field outcomes

Curriculum is narrowly seen as an array of learning areas, or broadly as the real-life learning experiences an individual needs to participate meaningfully within society. Another view of curriculum is that it is the learning area or outcomes with an emphasis on facts, concepts and generalisations of a group of learning areas. Malan, Du Toit and Van Oostrum (1996) propose a curriculum development model that may be applied to professional courses like Radiography. The model has been adapted to suit the higher education context in South Africa and the focus for this discussion is only on one of the three levels, namely the micro-level. At this level learning areas serve as guides to direct learners towards achieving outcomes (Olivier, 1999).

In OBE the role of the facilitator is that of facilitating and monitoring the learning process. The guidance that the facilitator in health sciences provides is in the form of specific learning procedures, which have a bearing on real-life applications through stimulation of creativity, self-learning and critical thinking (Olivier, 1999). On this micro-level it is necessary to formulate a number of specific outcomes that are essential for the mastery of knowledge, skills and processes in order to achieve the outcomes.
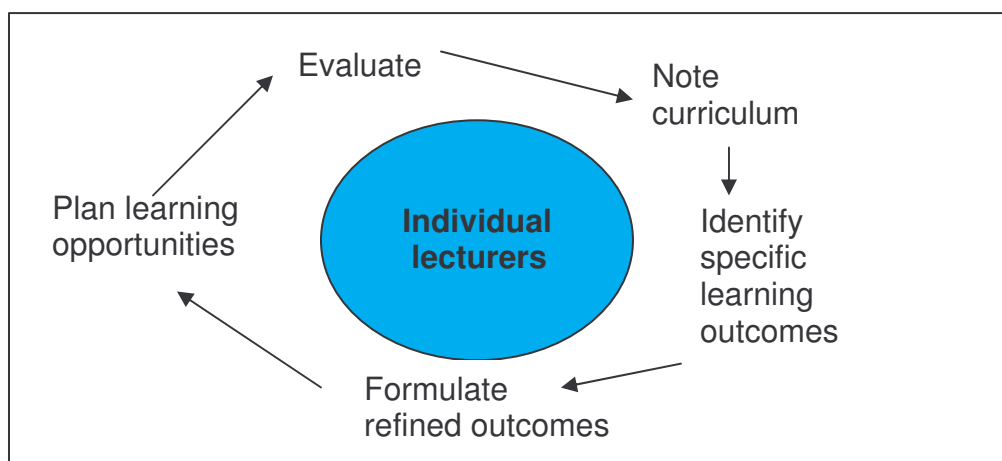
Figure 2.5. Curriculum Development Model on Micro-level (adapted from Malan, Du Toit & Van Oostrum, 1996)

According to Smith (2006:61), "designers of qualifications should ensure that all critical cross-field outcomes (CCFOs) have been addressed appropriately at the level concerned". OBE encourages facilitators to be creative and innovative when developing learning programmes — a shift from the confines of traditional education, which requires facilitators to be lecturers who teach fixed subject content, from a textbook, being lecturer-centred. Olivier lists the following differences between traditional education and outcomes-based education, which are adapted to the health science higher education context:

Traditional education	Outcomes-based education
a. Rote learning	a. Critical thinking and learning
b. Syllabus is content-driven, divided into subjects	b. Learning is a process and outcomes-driven
c. Textbook/worksheet bound	c. Lecturer is a facilitator
d. Lecturer-centred	d. Learner- and outcomes-centred
e. Syllabus is rigid and non-negotiable	e. Learning programmes are seen as guides
f. Emphasis is on what the lecturer	f. Emphasis is on outcomes – what

hopes to achieve	learners achieve
g.Curriculum development process not open to the public	g. Wider community involvement is encouraged

Table 2.1.Differences between traditional education and outcomes-based education (Olivier, 1999)

Furthermore, critical thinking competencies according to French and Rhoder (1992:187) involve interpreting, analysing or evaluating information, arguments or experiences, but need a purpose and an outcome. Critical thinking can be described as cognitive accountability. It entails providing reasons for actions or thought. This statement is congruent to the CCFOs in that students must seek answers and better their learning strategies.

The CCFOs are the outcomes the South African Qualifications Authority (SAQA) wishes all students to demonstrate at the end of any learning programme or intervention. In health sciences specifically, outcomes presume competencies, and competencies presume certain demonstrations by the student. The following section discusses the typical learner in higher education.

2.4   THE LEARNER IN HIGHER EDUCATION

2.4.1 Introduction

Maintaining the relevance of education to professional and societal needs and the need to be lifelong learners necessitates a change in focus from teaching to learning. The students themselves have to be actively involved in constructing

their own knowledge and a different educational approach and strategies have to be introduced in health science education, which will be learning-centred.

2.4.2 Learner biographical profile

A biographical profile of a learner in higher education gives a brief description of the characteristics or experience of such a person according to Chambers-Macmillan South African Student's Dictionary (1996).

Successful provision of higher education is dependent on proper knowledge and understanding of students' characteristics and needs. Factors that need to be incorporated in all strategies, methods are inter alia demographics, psychological and sociological characteristics, cultural background, religious affiliation, level and quality of school preparations and family background. Students in higher education are generally regarded and dealt with as adult learners. However, it appears that aspects such as autonomy, responsibility and self-determination are generally perceived as significant attributes of adulthood. Adults have a self-concept of being responsible for their own lives and decisions (Knowles, Holton & Swanson, 1998).

Although it is not likely for all lecturers to know all these elements related to learners, knowledge about learners' biographical profiles would be useful for meaningful design and development of learning opportunities and activities.

In general however, students entering the higher education health science system do have certain characteristics that are of relevance with regard to learning facilitation. These are subsequently briefly discussed.

2.4.3 Learner typification

A typical learner in higher education is regarded as an adult learner by Gravett (2005:8) because he/she:

- is an adult by definition, which implies that learning facilitation should confirm and promote independence, responsibility, self-determination, negotiation, dialogue and operation;

- brings accumulated experience to the learning process, which includes prior educational and life experiences that are linked to his/her identity;

- is life-world and life-task orientated because he/she wants to apply what is learnt in life-worlds;

- participates in higher education because he/she wants or needs to study and is activity orientated.

The term "adult" is not easy to define and is repeatedly socially constructed. Adulthood is seen as the stage of fulfilment of roles assigned to adults and according to which they accept their responsibilities. According to Gravett (2005) teaching must also rather be seen as learning facilitation, which includes all the

activities of the facilitator of learning that has a conscious intention of and potential for assisting, advancing and enabling effective learning.

In health science education, learning programmes are constructed in such a way that work-integrated learning forms an integral part as from the first year of study. The implication thereof is that students are exposed to and experience real-life situations from a very premature stage of formal teaching and learning.

The experience of adult learners can be utilised and affirmed in several ways. Gravett (2005:15-16) indicates the following aspects:

● Exploring existing knowledge – existing knowledge and experience serve as an interpretative framework for learning. Meaningful learning should relate existing knowledge with the learning outcomes to such a level of consciousness where it can be explored and clarified.

● Linking new learning to existing knowledge – facilitation of learning activities must be created where experiences are also made available to fellow learners as a resource for learning.

● Reflecting on existing knowledge – opportunities should be afforded to learners to reflect and to scrutinise their convictions. Stimulating learners by confronting them with anomalies and discrepancies in their existing views will enhance the process of reflection.

● Providing opportunities for interaction with co-learners in small groups. Resources can be pooled and shared learning can take place.

- Creating experiences that can be utilised to stimulate reflection as a base for the construction of meaning – by utilising learning methods such as case studies etc., a common base of experience can be established.

- Assisting learners to learn from experience with a view to personal or professional transformation – authors such as Schön (1987) and Boud (1992), to name a few, explored learning from experience by reflecting and acting on it extensively in adult education literature. A common feature to views regarding learning from experience is that learners talk about experiences, analyse them, identify the implications and act on these implications.

Radiography practice, for instance, also demands total responsibility for patient care and radiation protection by students as early as the first year of study. The radiography student is expected to behave in an adult manner and to demonstrate it in his/her professional socialising. It is therefore assumed that radiography students have the characteristics of an adult learner, but also characteristics of a professional practitioner due to the demands of practice.

2.4.4 Learning styles

In the last 30 to 40 years it has been proposed that teaching would be more effective if institutions of higher learning took account of differences in students'

learning styles. Probably the most widely accepted and best-validated conception of learning styles is Marton's (1976) "deep processors" versus "surface processors" based upon the levels of processing theory developed by Craik and Lockhart (1972). Thinking about learning styles can lead a facilitator to consider about different ways of teaching, with a view to accommodating different ways of learning. To be an effective health science facilitator, a variety of techniques and teaching tools must be available to maximise learning for as many students as possible.

According to Weinstein and Mayer (1986) learning styles are preferences and habits of learning that have been learned; everyone is assumed to be capable of going beyond a particular "style" preferred at the time. Therefore students can learn strategies that enable them to be effective when learning through methods that are not compatible with their preferred "style". These authors add that the student's prior knowledge; intelligence and motivation are learnable characteristics. Institutions of higher learning should design and develop learning programmes to accommodate differences in individual characteristics and preferences. This refers inter alia to students' preferred thinking, perceptual and learning styles. The thinking style of a learner relates to and influences perceptual, learning and learning facilitation styles.

Teaching and learning practices in higher education urgently need improvement. This is supported by the literature on educational change in general (Hargreaves,

1997). *Learning style* is a concept that can contribute to realising this paradigm shift, not only in informing practices but also in bringing to the surface issues that highlight the role and responsibilities of institutions of higher learning. In being more sensitive to the differences students bring to the classroom, it can also serve as a guide to designing learning opportunities that match or mismatch students' styles. This mismatch can indeed be viewed in a positive manner through the fact that facilitators in health sciences are challenged beyond their comfort zones. The implication is that facilitators must become whole brain practitioners themselves and create opportunities that will ensure effective learning.

Curriculum designers often fall into the trap of referring to the "learner" as if there is only one type of learner or as if all learners are clones of the same type of learner. Such thinking can lead to an oversimplification of approach by assuming that all learners are alike. One should keep in mind that learning styles, preferences and abilities may vary.

As individuals differ, so do their learning styles. Each learner is unique and has a distinct style of preference. According to Klopper (2000:80) a learning style refers "to the way a learner constructs knowledge and processes information". Entwistle (1988:28) defines a learning style as "the general tendency to adopt a particular strategy in learning". According to Kolb (1984) numerous studies have been undertaken within diverse professional groups, but there is little evidence

available on how radiography students prefer to learn. The knowledge about the preferred learning styles of students can be utilised by educators, managers etc to optimise learning and to promote lifelong learning. Fowler (2002) conducted a study to identify the preferred learning styles of radiographers. The study concluded with a summary indicating that radiographers are generally strong in perceiving information or experience in a concrete manner and processing this information actively. However, they are weaker in the use of the attributes "concrete experience" and "reflective observation". From this single research study it is indicated that there is a need to assist radiographers to facilitate reflective practice and maximise learning from practice. Helping students to understand their learning styles and preferences can maximise learning and promote lifelong learning.

Taking that "Every classroom represents a complete spectrum of learning style preference", Herrmann (1996) emphasises that a variation in design and delivery approaches by health science lecturers would facilitate the development of the full potential of the student. This will not only accommodate learners' thinking preferences, but also develop areas of lesser preference.

Kloppers (2000:80-85) mentions a number of learning style theories that exist: "Whole-brain thinking, Dunn and Dunn learning style inventory, Myers-Briggs type indicator, Herrmann Brain Dominance Instrument (HBDI), Felder-Silverman Learning Style Model and the Kolb Learning Style Inventory". Furthermore, in

health sciences it is indicated by Kloppers (2000:91) "a deep holistic approach is a requirement for knowledge construction and conceptual change". When the deep approach to learning is following intentionally, metalearning takes place.

Herrmann (1996:42) points out that each hemisphere of the brain is "specialized in a different way and physical connections secure integrated brain activity". The two hemispheres left and right represent the cerebral processes. The cerebral mode is the more intellectual, cognitive part, while the feeling-based processes (visceral) are represented by the limbic system's two halves. The limbic mode is the more emotional, visceral and structured part of the thinking processes (Figure 2.4). The dominance between the paired structures of the brain provides the basis for measuring the level of dominance.

The HBDI is an assessment tool developed in 1977 and finalised in 1981, which quantifies the degree of a person's preference for specific thinking modes. At the core of Whole Brain Technology is a metaphor of how the brain works; there is observable evidence that thinking styles can be best described as a coalition of four different thinking selves. These selves are characterised as follows:

- The A-quadrant Analyser (logical thinking, analysis of facts, processing numbers).

- The B-quadrant Organiser (planning approaches, organising facts, detailed review).

- The C-quadrant Personaliser (interpersonal, intuitive, expressive).

- The D-quadrant Visualiser (imaginative, big picture thinker, conceptualising).

Thinking preference profiles based on the results of the Herrmann Brain Dominance Instrument (HBDI) can be displayed on a four-quadrant grid. It has been documented by Knowles (1990) that effective learning occurs only if the whole brain is involved in learning. Students arrive at institutions of higher learning with thinking style preferences that have been established through schooling and life experiences. According to the New York Times (17 March 2008), Prof. Robert J. Sternberg cautions that there is often little resemblance between the way thinking is taught in school and thinking in the real world. Most real-life problems can be tackled only within the real-life context. Everyday problem solving often takes place as a group endeavour in which people behave differently and less rationally than they do as individuals.

The goal of education is to promote higher level thinking. Education needs to capitalise on individual strengths while working toward improvement of the weaknesses through facilitating analytical, creative and practical learning. The knowledge and skills that Sternberg (1990) believes are worthwhile come from the Triarchic Theory of Intelligence. This theory in itself was groundbreaking in that it was among the first to rebel against a psychometric approach to intelligence in favour of a more cognitive approach. Sternberg's theory (1990) comprises three parts: componential (analytic); experiential (creative) and

practical (contextual). Meaningful learning is important for intellectual ability. According to Sternberg (1990) knowledge is a form of intelligence and intelligence is redefined to incorporate practical knowledge. Knowledge is the ability to think and learn within new conceptual systems. Sternberg's model for developing expertise has five key elements: metacognitive skills, thinking skills, learning skills, knowledge and motivation. The collaborative influence of these elements leads to the acquisition of skills and knowledge (Sternberg, 1988). Facilitating learning in health sciences should therefore be geared not just towards advancing a knowledge base, but also towards developing reflective, analytic, creative and practical learning with a knowledge base.

A thinking style preference leads to a learning style preference and in turn determines a student's dominant cognitive mode in which he or she communicates. Differing mental preferences contribute to the level of success or failure of communication processes (Herrmann, 1996:115). Effective communication is fundamental to successful human interaction and very susceptible to family, social and clinical situations.

Learning style models are well documented in research, namely the Myers-Briggs Type Indicator (MBI), Carl Jung's theory of psychological types and Kolb's learning style inventory. The Herrmann Four Quadrant Whole Brain Model, however, is not the only instrument that quantifies a person's preference for thinking in four different modes based on the task-specialised functioning of the physical brain (Herrmann, 1995)

The reason for selecting the Herrmann model is that it is a valid method of evaluating a person's strengths and weaknesses using the innovative Whole Brain Thinking approach. Whole Brain Thinking is the science of cultivating the ability for individuals to act outside their preferred thinking styles. In the health science educational context the Herrmann model can increase educational outcomes, create a learning community that understands and respects the learning preferences of lecturers and students and offers opportunities for learning based on personal uniqueness and specialised learning styles. In 1980 Bunderson (2004) conducted a HBDI validation study and found good evidence that four stable, discrete clusters of preference exist; the scores derived from the instrument are valid indicators of the four clusters and the use of the instrument meets high professional standards as applied in learning, teaching and self-assessment settings (Herrmann, 1996).

The metaphoric whole brain model of Herrmann (1995) can be used as exemplarto develop flexibility and cater for diversity. Health science facilitators are encouraged to become sensitive to the expectations of the students when planning learning opportunities. The alignment between the expectations of the students and the planning of the facilitator is illustrated in Figure 2.6 – it indicates that the learning environment can promote learning style flexibility (LSF).

The left structured mode is categorised by processing dealing with logical, rational, critical and quantitative issues and activities. The procedural, planned,

sequential and organised elements of learning are found in the structured left mode. Left mode learning is depicted by achievements, fact-based knowledge and traditional ways. The experiential right mode is categorised by processing dealing with visual, conceptual, emotional and interpersonal aspects. Right mode learning can be described as participative and future-orientated.
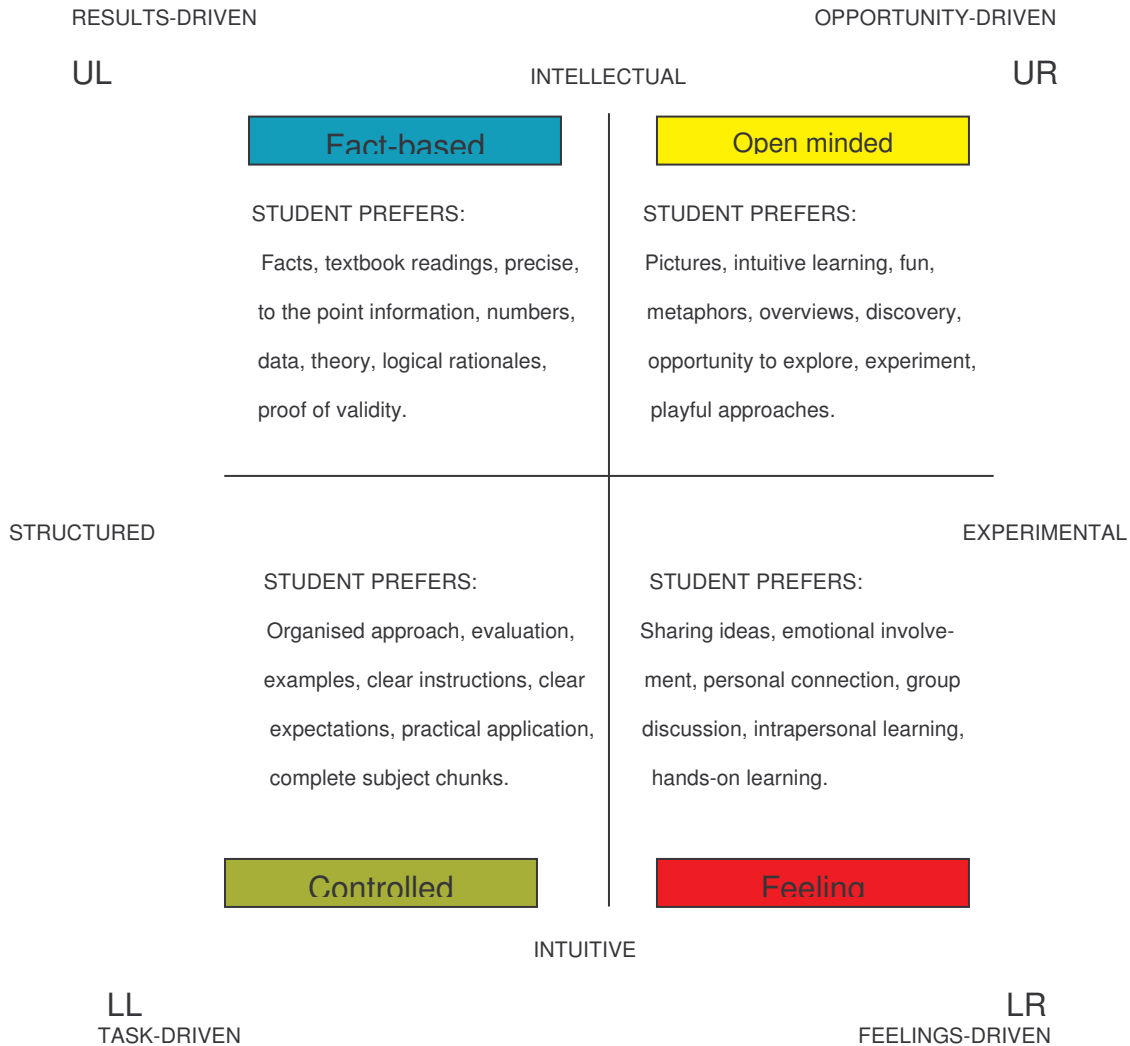
RESULTS-DRIVEN   OPPORTUNITY-DRIVEN

UL   INTELLECTUAL   UR

Fact-based	Open minded
STUDENT PREFERS:	STUDENT PREFERS:
Facts, textbook readings, precise, to the point information, numbers, data, theory, logical rationales, proof of validity.	Pictures, intuitive learning, fun, metaphors, overviews, discovery, opportunity to explore, experiment, playful approaches.

STRUCTURED   EXPERIMENTAL

STUDENT PREFERS:	STUDENT PREFERS:
Organised approach, evaluation, examples, clear instructions, clear expectations, practical application, complete subject chunks.	Sharing ideas, emotional involve-ment, personal connection, group discussion, intrapersonal learning, hands-on learning.
Controlled	Feeling

INTUITIVE

LL   LR
TASK-DRIVEN   FEELINGS-DRIVEN

Figure 2.6. Thinking preferences: Alignment of expectations of students and planning of facilitator (adapted from Du Toit, 2004)

A learning opportunity or a series of learning opportunities that incorporates all these modes will ensure that students' preferred learning styles are accommodated and less preferred thinking modes are utilised.

Functioning effectively in any professional capacity, however, requires working well in all thinking modes. Felder (1996:18) states that the objective of education should thus be "to help students build their skills in both their preferred and less preferred modes of learning".

Furthermore, outcomes-based education emphasises the necessity of learning provision according to learner needs. It is therefore important always to bear in mind that although students might share characteristics, they remain individuals with unique preferences and needs (Candy, 1998).

Lumsdaine and Lumsdaine (1995) indicate four modes of students' learning that complement Herrmann's model:

- *External learning* is teaching from authority through lectures and text books. It is predominantly *A-quadrant learning.*

- *Internal learning* can be described as an insight, a visualisation, and the synthesis of data. This is predominantly *D-quadrant learning.*

- *Interactive learning* is brought about by discussion, hands-on activities where a student can try, fail, retry with an opportunity for verbal feedback and encouragement. This is a predominantly *C-quadrant learning.*

- *Procedural learning* is characterised by repetition to improve skills and competence. It is predominantly *B-quadrant learning*.

It has been documented by Knowles (1990) that effective learning takes place if the whole brain is involved in learning. Interpreted in terms of the Herrmann model this means that all four-brain quadrants are included in teaching and learning activities.

Cognitive functions are optimally utilised when learning activities are constructed in such a way that the cognitive functions associated with all four quadrants of the Herrmann model are used.

The HBDI does not test competencies, but gives an indication of preferences and potential competencies (Herrmann, 1995). Although the HBDI was originally developed for adult users in a corporate environment, it has been successfully used with higher education students (Lumsdaine & Lumsdaine 1995, De Boer & Steyn 1999, De Boer, Coetzee & Coetzee, 2001).
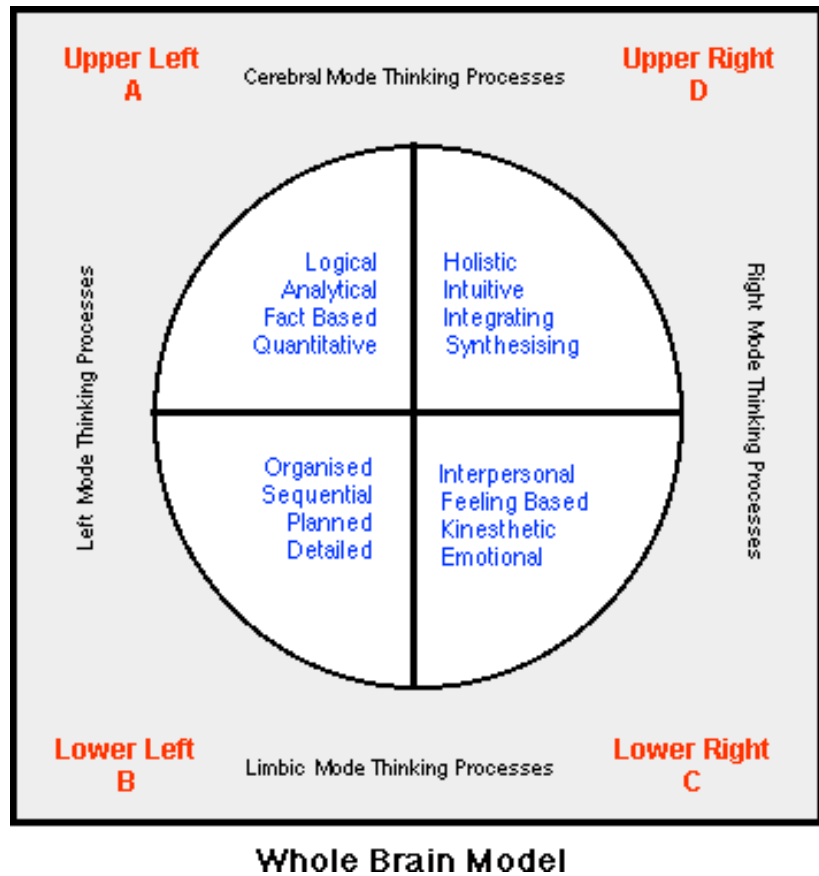
Figure 2.7. The Herrmann Whole Brain Model (Herrmann, 1998)

2.5   THE NATURE OF REFLECTION

Reflection is no new concept; in fact, Aristotle discussed reflection many years ago. "Reflection can be seen as a mirror imaging or producing a likeness upon which to contemplate. Mirrors also deflect light; thus the mirror image may also be illuminating and assist in viewing the images more clearly" (Garrett, 1992:218). The seeds of reflective practice can be traced back to the educational philosopher John Dewey (1933) who argued that the ability of an individual to reflect is initiated only after he identifies a problem as well as recognising and accepting the uncertainty this generates. He furthermore claimed that reflective

thinking requires continual evaluation of beliefs, assumptions and hypotheses against existing data and other plausible interpretations of the data. Dewey (1933) was an influential writer of educational thought and practice who advocated student-centered learning. He is considered to have initiated the concept of reflective thinking as an aspect of learning and education, defining it as:

> *active, persistent and careful consideration of any belief or*
>
> *supposed form of knowledge in the light of the grounds that*
>
> *support it and the further conclusion to which it tends*
>
> (Dewey, 1933:9).

Dewey argued that the development of reflective thinking should be an educational aim.

A definition of reflection is further given by Boud, Keogh and Walker (1985:43):

> *Reflection in the context of learning is a generic term for those*
>
> *intellectual and affective activities in which individuals engage*
>
> *to explore their experiences in order to lead to new understandings*
>
> *and appreciation.*

The mentioned authors' definitions move towards the context of professional practice in that both view experience as the touchstone for reflection.

King and Kitchener's (1994) work on reflective judgment follows the work of Dewey (1993) on reflective thinking. Their model takes into account cognitive development and contends that the ability to recognise and deal with ill-defined problems depends on beliefs about knowledge. Reflection is thus a process by which experience is brought into consideration when you are dealing with any matter. Reflection is the "evaluation of how and why we understand, think, feel or act in a specific context" (Escrow, 1990:6).

According to Kloppers (2001:35) the reflective process (Figure 2.5) consists of:

• an awareness of uncomfortable feelings and thoughts;

• a critical analysis of the situation;
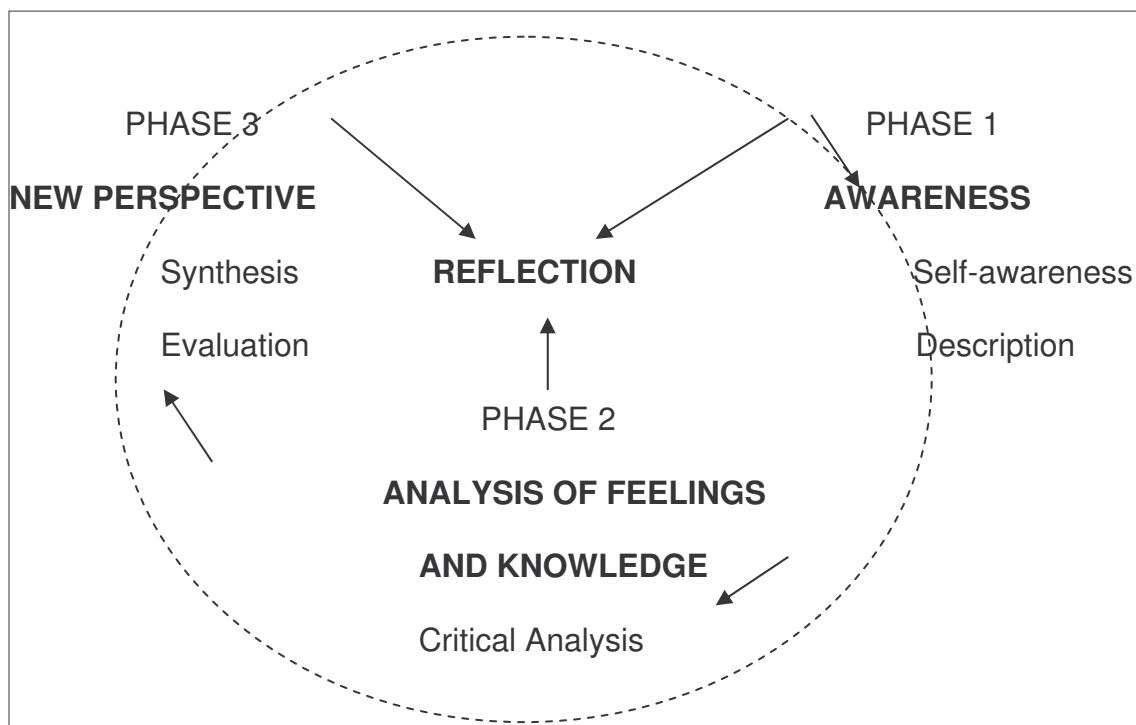
• the development of a new perspective.

Figure 2.8. Reflective process and integrated skills (Kloppers, 2001: 37)

From the nature of the reflective process, a paradigm shift from the logical-positivistic view to the direction of reflection is essential. Self-awareness is an essential component of reflection during phase one, which means an honest investigation of a specific situation. Boud et al. (1985:12) state that description implies the ability to recognise the key characteristics of the experience. During phase two a critical analysis of knowledge is done which includes an evaluation of how relevant knowledge applies to a specific situation. The new perspective phase consists of the integration of new knowledge with prior knowledge. Atkins and Murphy (1993:1190) define evaluation as "…the making of judgments about the value of something, it includes the use of criteria and standards".

Reflection starts to get critical in nature once learners show the potential to look at things differently (Gericke, 1994).
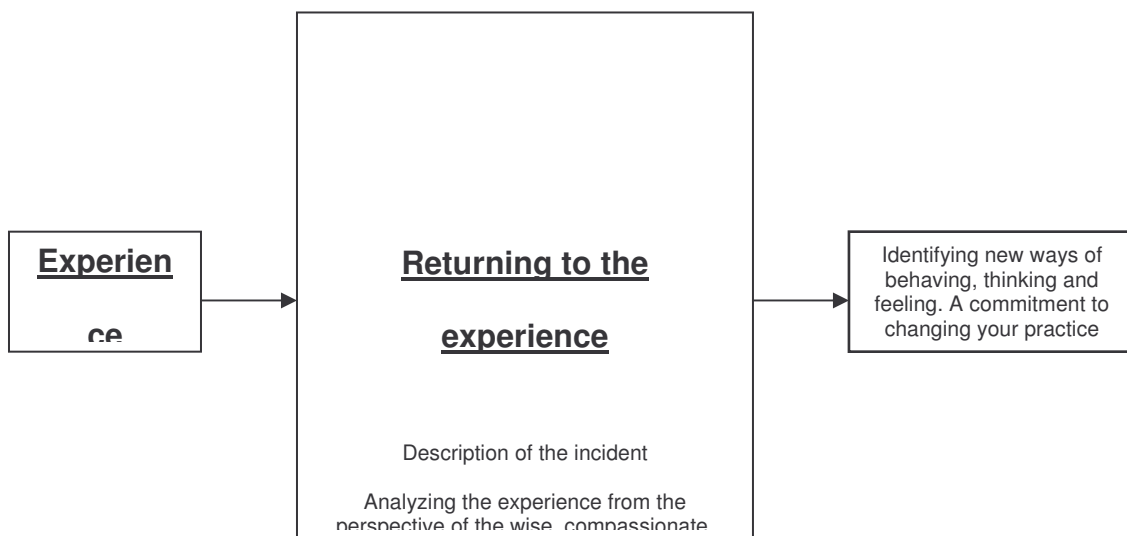

Figure 2.9. The Reflective Learning Cycle (Adapted from Boud, Keogh & Walker, 1985)

Schön (1983) describes the process of reflective practice when he categorises knowledge into two types, namely technical rationality ("the knowing that") and professional artistry ("the knowing how"). Both types of knowledge are needed in becoming a reflective practitioner.

Greenwood (1998) has criticised the limitations of Schön's model (1983) because it involves only two components of reflective practice, namely reflection-in-action and reflection-on-action. Greenwood's view of reflection-before-action, involves thinking through what one intends to do before doing it. Furthermore, another limitation of Schon's contribution is that it refers only to the practice situation in a studio; he does not make reference to the theoretical element of the large majority of professional programmes. The recognition that reflection can take place in an academic context and not only in a situation of professional practice must be noted.

Johns (2000:34) describes critical reflection as:

a window through which the practitioner can view and focus self within the context of his own lived experience in ways that enable him/her to confront, understand and work towards resolving the contradictions within his practice between what is desirable and actual practice".

Boyd and Fales (1983) claim that critical reflection is the difference between whether a person repeats the same experience several times, becoming highly

proficient at one type of behaviour, or learns from experience in such a way that he is cognitively or affectively changed.

This critical reflection is therefore viewed as transformational learning, which Baumgartner (2001) says, "…can occur gradually or from a sudden, powerful experience and change the way people see themselves and their world".

Freire (1972) and Mezirow (1981) share some of the same philosophical underpinnings. Both believe that knowledge is not "out there" to be discovered but is constructed through the interpreting of new experiences (cognitive rational approach). Daloz (1999), however, uses the concept of development where he believes in the role of a mentor in guiding a learner on a journey that is affected by his social environment (development approach). The cognitive rational approach may therefore be most relevant during initial education with the development approach being more relevant within Continuing Professional Development (CPD).

The amount of understanding and learning that takes place as a result of the iterative process of critical reflection depends on the individual's amount of self-awareness, honesty and openness to feedback.

Johns (2000) suggests the engagement of the "ten C's of reflection" in order to engage effectively in the critically reflective process:

- Commitment – dedication to the process of reflection.

- Contradiction – challenge inconsistency during reflection.

- Conflict – differences in how to reflect effectively.

- Challenge and support – confronting own methods of learning.

- Catharsis – reflecting through art and images.

- Creation – construction of own learning through reflection.

- Connection – linking experiences with learning expectations.

- Caring – reflective thoughtfulness.

- Congruence – exploring similarities with previous learning experiences.

- Constructing personal knowledge in practice – creating and applying learning.

All role players in health science training can adopt the "ten C's of reflection"; it will contribute to sharing and development of understanding between critical thinkers.

From the nature of the reflective process it is clear that radiography must move away from the reductionistic, logical-positivistic view and that a paradigm shift in the direction of reflection is essential. In this process of learning the educator's reflection with the adult as learner is important. Bruni (1991:172-173) points out that the formulas of dialogue, discourse and narrative centre around images of language, power and subjectivity". In health science education it is essential that the educators reflect together with the adult learner about the learning situation

and his/her experiences of the cooperative learning relationship. "To grasp shared meaning from experience is essential learning for the true art of nursing" (Garrett, 1992:221).

Boud, Keogh and Walker (1985) indicate in their description of reflection that the central point of reflection in learning is experience. The complex model of learning from Jarvis (1987) highlights the fact that reflection is recognised as being related to other forms of thinking and learning.

Furthermore, the Atkins and Murphy (1993) model of reflective thinking identifies the process of reflection as the internal examination of self, which results in a changed conceptual perspective. The key elements of this process can be divided into three stages:

• Awareness of uncomfortable feelings and thoughts

• Critical analysis

• New perspective

Another higher order thinking process, which might be compared to reflection, is metacognition. This term has been used to refer to two somewhat separate phenomena, namely knowledge about cognition and regulation of cognition (Baker & Brown, 1984). The act of monitoring one's own cognition requires self-reflection. Metacognition is clearly a reflective process. Baker and Brown (1984) clearly state that effective learning requires an active monitoring of one's own cognitive activities.

In this study reflection is considered to be a process that operates at a number of levels and leads to new perspectives. The concept of reflective thinking can thus be considered to be a holistic process and a multi-faceted activity; it is, in other words, the "ability to stand back from the self" and examine critically one's own thinking patterns. Critical reflection is therefore considered as an underlying skill required to achieve all learning outcomes.

According to Hargreaves (1997) reflective practice is a tool that is believed to result in both improvement in professional development and patient care. Reflective practice can be defined as "the process of turning thoughtful practice into a potential learning situation (Jarvis, 1992:26).

There are three types of reflection:

- Reflection-before-action – planning before the incident (Reed & Proctor, 1993).

- Reflection-in-action – thinking on your feet (Schön, 1987).

- Reflection-on-action – retrospectively reviewing an incident (Schön, 1983).

Gibbs (1988) describes a reflective practice model namely the cyclical or structured model. He continues to encourage radiography students to utilise the cyclical model of reflection, which provides a general framework, which guides the student into "reflection-on-action".

Barnett (1997) in particular brings together three domains of critical practice, namely critical analysis, critical reflexivity and critical action, while Fook (2002:41) refers to the potential of critical reflection for "emancipatory practices".

2.5.1   Reflection and Assessment

Reflective skills are considered important for effective practice as reflected in the benchmark standards for healthcare professionals (Quality Assurance Agency for Higher Education UK, 2001), and they need to be assessed. Hyland (1992) asserts that assessment often focuses on simple, technical skills because they are easy to observe and measure, while ignoring more complex aspects of practice such as critical reflection.

Schön (1991) and Johns (1995) state that all reflection should be coached or guided by another person. For assessment to be reliable students need some guidelines about what is expected of them. Stewart and Richardson (2000) explored the experiences of physiotherapists and occupational therapists that underwent assessment of their reflective work. Data from student focus groups and interviews showed concerns about fairness, consistency and the impact of the student/tutor relationship.

Kember and Leung (2000) have developed and tested a questionnaire to identify levels of reflective thinking. This work was carried out with student

physiotherapists, occupational therapists, radiographers and nurses. The questionnaire covers four scales representing Mezirow's (1991) levels of reflective thinking; to be reliable it focuses on the following:

- Habitual action – activity carried out with little conscious thought as a result of frequent repetition.

- Understanding – thoughtful action.

- Reflection – the critique of assumption about the content or process of problem solving.

- Critical reflection – becoming aware of why we perceive, think, feel or act as we do, leading to the redefinition of a problem and redirected action.

However, Du Toit (2007) adds another level of reflective thinking:

- Scholarly reflection – grounded in the literature and evidence from action research.

Reflective writing is often suggested as a suitable instrument for assessment, but students may have excellent reflective thinking skills but poor language integration. Deep reflection is likely to include consideration of complex cognitive and affective issues that may be difficult to express in the written form. Rich (1995) indicates that students may be reticent to document details of their mistakes in writing, particularly if they relate to clinical work where patients may have been discomforted by their actions. One advantage of written reflection is

that it is retrospective and allows the student time to collect and organise his thoughts.

Assessing reflection and using reflective strategies for facilitating assessment present healthcare educators with a significant challenge with a range of dilemmas. Research and inter-professional collaboration are needed to support those who have then responsibility for assessment to ensure that the process is fair and transparent.

2.6   CONCLUSION

This chapter reviewed literature of the more prominent writers on the topic of reflection in order to provide a framework to interpret the literature. An element of confusion surrounds the literature because the concept of reflection has become so widely and diversely used that it is now found within disparate contexts and based upon divergent frames of reference. Notwithstanding the wide interest in reflection, the concept is still ill defined and the reliability and validity of the way in which it is assessed are still questionable.

The study furthermore reveals the changing South African educational context. Successful provision of higher education is dependent on proper knowledge and understanding of learner characteristics and needs. Knowledge of students' thinking preference profiles would be useful for meaningful planning and creating

significant learning facilitation. Learners in higher education are generally regarded and dealt with as adult learners.

In the next chapter the research approach, design and methods are discussed to find answers to the question on how to integrate critical reflection as a learning strategy in the design of health science learning programmes.