

CHAPTER 1

BACKGROUND AND SUBSTANTIATION

1.1 INTRODUCTION

In South Africa today a constant stream of demands characterise higher education. Crouse (1988:1) states categorically “the educator can no longer sufficiently equip students for the demands put to him/her”. He continues to suggest, “Students should 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”. It is obvious that educators in health sciences need to revisit, rethink and evaluate criteria by which they practise. According to Du Toit (2007), to take part in the renaissance (in other words the revival, the strengthening) in education and training it is the individual, and not the education or training institution that should initiate, implement and nurture the new paradigm.

Another challenging factor is that we live in a rapidly changing world, a world of super complexity (Barnett, 2000). The more rapidly the world changes, the more unknown the future becomes. The unknown brings about uncertainties and therefore asks for creativity in all aspects of life, including education/training and learning. The paradox is that we have to prepare students for the unknown super

complex future by means of the known – our current knowledge (Barnett & Hallam, 1999). Two questions came to the mind of the researcher: How can we as facilitators encourage students to engage in the type of learning that will help them develop the capabilities associated with higher education and how do we prepare students for a rapidly changing future? Part of this process of rediscovering creativity means that in health science training the facilitator and the student need to become versatile and whole-brain partners.

The researcher, having been involved in health science education for twenty years, realised that facilitators are often frustrated in their attempts to help students become skilled inquirers and critical thinkers. When teaching, our aim is to promote, assist and advance learning. Leamson (1999:3) refers to teaching as having “the conscious intention of, and potential for facilitating learning in another”. For the purpose of this research learning facilitation includes all the actions of the facilitator that have the conscious intention of and potential for assisting, helping, advancing and enabling learning” (Gravett, 2005:ix). Especially, with reference to the clinical component of health science training, facilitators must create a meaningful teaching/training and learning environment within which students can learn to convert their theoretical knowledge into practical skills. The ever-closer integration of learning and work in health sciences means providing faster, more flexible, customised learning pathways and also much greater use of action learning to ensure professional excellence.

Furthermore, the researcher supports the view of Ramsden (1992) that the ways in which students understand or experience should be changed to enhance effective learning. It therefore implies a qualitative change in a view of reality. Learning brings about change and change means growth on a continuous basis (Du Toit, 2007).

According to Ramsden (1992:5) the vital competence in academic disciplines lies in understanding; this means “the way in which students apprehend and discern phenomena related to the subject”. In order to construct meaning, productive learning should be promoted. Every student is created with unique, unlimited potential. Facilitators need to create opportunities by which students’ potential could be rediscovered and developed. Learning, be it intentional or incidental, should, according to Du Toit (2007), lead to deep learning characterised by exploring, discovering and experimenting.

The global employment market expects graduating health science students to be flexible, adaptable and prepared to take responsibility for their own learning and their own continuous and professional development. Stefani and Nicola (1997) indicate that a paradigm shift is required in our concept of higher education from one of providing instruction, to one of promoting effective learning. Health science lecturers and clinical tutors must demonstrate leadership to shift their focus from teaching or providing instruction to facilitating collaborative inquiry as a means of empowering students.

A facilitator in health science training who wants to become a leader should model leadership in his or her own practice. The value of self-assessment and self-monitoring is, according to Du Toit (2007), an essential element for intrapersonal leadership development in the context of lifelong learning. Therefore the imperative for all health science facilitators of learning is to determine to what extent they are leaders. Catering for different learning styles in one's own practice and becoming a reflective facilitator are proof of one's leadership potential. Reflective thinking and learning form an integral part of the professional development of a leader.

An influential writer of educational thought and practice, John Dewey (1933:27), who is considered to have initiated reflective thinking as an aspect of learning and education, defines 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 introduced a distinction, which has endured, between critical reflection and less considered reflection. He argued that a person who is not sufficiently critical might reach hasty conclusions without examining all the possible outcomes. Dewey also argued that the development of reflective thinking should be an educational aim. The pace of technological change and the volume of

available information highlight the need to develop learners' ability of critical reflective thinking. In Dewey's original work, reflective thinking is placed in a broad context; however, there has been a tendency to reserve it for the context of professional practice. Boyd and Fales (1983:99) describe reflective learning as the process "of internally examining and exploring an issue of concern, triggered by an experience, which creates and clarifies meaning in terms of self, and which results in a changed conceptual perspective".

Lecturers and clinical tutors need to embrace meaningful planning/designing of a learning-centred approach if they are to provide students with rewarding experiences and produce a new generation of critically reflective health science practitioners. This demands of facilitators to plan innovatively. The restructuring of education and training in South Africa has as core principle an outcomes-based approach. It is pointed out by Olivier (1998:21) that this learning approach intends to focus equally on knowledge, skills, the process of learning and the outcome. According to Olivier (1998) certain processes or critical cross- fields are appropriate for students to achieve as outcomes. The processes include critical thinking, problem solving, analysing, synthesis, communication, teamwork, socialising, application, information verification and appreciation. These interpreted processes categorised according to the Herrmann model and combined with the expectations of students with thinking preferences in all four quadrants, indicate that an outcomes-based approach and a whole brain

approach to teaching and learning are complementary with regard to educational activities (Du Toit, 2007).

The challenge of this research is to determine how to design learning programmes to encourage reflective thinking. How to promote action learning (reflection-in-action) and action research (reflection on reflection-in-action) in curriculum design (Schön, 1987) also need to be investigated.

Action learning is grounded in the approach pioneered by Evans (Kember, 2001), which implies that there can be no learning without the action and no knowing without the effort in practice. Action learning thus promotes the creative integration of thinking and doing in practice. Action learning, according to Evans (Kember, 2001) involves working on real problems, focusing on learning and actually implementing solutions. It is a form of learning by doing – not only for learners in the health sciences, but also for the researcher/practitioner in education.

In the education setting, action research is a “researching while teaching approach” (Schartz, 1993:114). Practitioners research the teaching situation and improve teaching and learning based upon the information collected from the research process. Action research is therefore a method of inquiry, which can help to bridge the gap for practitioners, between theories, research and practice in education (Holter & Schwartz-Barcott, 1993).

In reviewing the literature, it was decided that a mixed method research design was the more appropriate approach to collect and analyse data, integrate the findings, and draw inferences using both qualitative and quantitative methods. Distinctiveness of action research is also evident to monitor facilitation of learning initiatives and planned learning strategies, to improve upon the educational process.

The researcher is of the opinion that the following comment of De Vos et al. (2002:365) is of value and applicable to this research: “A combination of qualitative and quantitative methods is imperative when doing intervention research and action research”.

A rather useful guide to the researcher and applied as such is the definition provided by Kemmis and McTaggart (1988:35) that states:

Action research is a form of collective self-reflective inquiry undertaken by participants in social situations in order to improve the rationality and justice of their own educational practices, as well as their understanding of these practices and the situations in which these practices are carried out.

It is further elaborated that action research specifically is composed of a series of cycles and each cycle consists of a series of steps, which include planning,

action, evaluation of and reflection on the outcome of the action. In this research only one cycle of action research (responded) has taken place in a 10-week period and therefore the researcher is of the opinion that the potential exists within this context to continue with a series of action research cycles in future.

According to Williamson (1997:96), reflection can be “a tool for directing and informing practice setting, or transforming and reconstructing the social environment”; the social environment implies the different clinical settings.

Students in health sciences need to take greater responsibility both for their learning and their understanding of the relationship between theoretical learning and its application in clinical practice.

Traditionally in health science education, the predominant model of professional education has been described by Schön (1983) as technical rationality, which emphasises the teaching of technical skills and systematic actions. This is the model, which has predominated in especially radiography education. Periods of theoretical learning, mainly the transmission of theory through lectures, would be followed by a clinical placement. Frequently, little or no effort was taken to link theory with clinical practice.

Therefore, this research needs to investigate the concept of critical reflection to assist in breaking down the traditional barriers between theoretical and clinical

components. A concern currently in professional programmes, such as radiography, nursing and pharmacy is to find effective and appropriate activities for strengthening the learning-centred approach.

Action learning and action research are both intended to improve practice in general. Action research intends to introduce some change regarding one's professional practice and action learning uses some intended change as a vehicle for learning through reflection, specifically in health science education.

With reference to the education of health science practitioners, work-integrated learning (experiential learning) forms an integral part of health science curricula. Experiential learning, as described by McKay (Ember & Ember, 2001) is a process that drives learning from experience. During work-integrated learning students can be persuaded to make links between their academic and clinical experience; students also use their clinical experience to contextualise their learning. Clearly, both action research and action learning are about learning from experience. This recurring process involves action and reflection on action taken.

Boud, Keogh and Walker (1985) indicate that reflection in the context of learning is a generic term for those intellectual and affective activities that individuals engage in to explore their experiences in order to guide them to new understandings and appreciation. When reflecting, one can make sense of the

environment only in ways, which build on one's prior understanding. In enhancing this understanding, we are better equipped to act on the environment.

Theories and assumptions inform critical review and development. These theories are derived intentionally from recent experiences and used to plan the subsequent experience. As an example, in radiography, the principle of gravitation can be applied when doing soft tissue radiography of the chest to demonstrate and evaluate the position of the diaphragm. From experience it is clear that the respiratory phase and age of the patient and not only the position of the patient, are of importance in evaluating the stance of the diaphragm. The appearance and position of the diaphragm is an indicator of possible pathology such as pleurisy, heart failure, hepatomegaly, etc. The following figure (Figure 1.1) demonstrates the importance of critical review and planning when performing radiographic chest radiography.

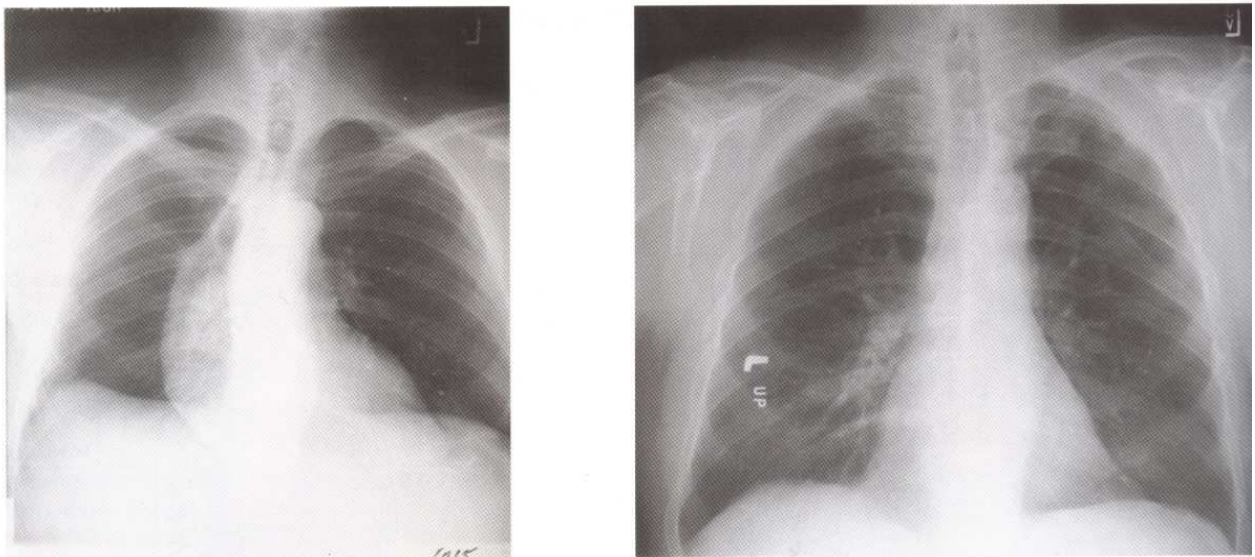


Figure 1.1. An example of chest images to demonstrate the stance of the diaphragm

The student and qualified health science practitioner need the ability to reflect critically on their experience, integrate knowledge and take action on insight gained. These abilities are considered critical aspects for students; furthermore, they prepare students to be lifelong learners when they focus on a holistic patient approach. The Continuous Professional Development (CPD) system, which is a prerequisite for annual professional registration with the Health Professions Council of South Africa (HPCSA), serves as proof of an accumulated number of points. This evidence reflects the fact that a certain level of knowledge, skills and competencies has been acquired in a prescribed time (HPCSA, 2006).

In the medical environment there is increasing demands from the Department of Health as well as employers for reflective clinical practice that will develop and enhance skills and attitudes appropriate to review, evaluation and professional revalidation. Maximising students' learning, especially in the applied sciences, is an ongoing challenge for lecturers and higher education researchers. Much has been published about the theory-practice gap when students are taught theory in an educational establishment and then discover that in the "real world" of practice, things can be very different (Salvage, 1998). For professional education this is a particular problem. Benner (1984) determined that while novice health science practitioners rely on theory-based principles to direct their decision-making, experts draw largely on intuition based on previous experiences. Learning from experience (experiential learning) is one of the values of critical reflection, therefore health science students should be well grounded in this

specific skill to maximise their learning both as a student and as a health science practitioner. Such added value should be seen as essential part and not as part of the “hidden curriculum”.

“Reflective practice is something more than just thoughtful practice. It is that form of practice, which seeks to problematise many situations of professional performance so that it can become a potential learning situation, so the health science practitioner can continue to learn, grow and develop in and through practice” (Jarvis, 1992). Increasingly health care professionals are required to utilise reflective practice within the initial learning programme, as well as within their continuing professional development.

A more reflective approach to learning and the facilitation of learning is called for in health sciences. Such an approach will “enable learners to achieve a deep approach to learning and equip learners to determine their own learning needs, set their own learning goals and monitor the occurrence of continuing progress” (Gravett & Geyser, 2004:24). Developing critical reflection is probably the ideal of the decade for many educators of adult learners, specifically in the context of higher education, who have long been searching for a form and process of learning that could be claimed to be distinctively adult. Evidence that adults are capable of this kind of learning can be found in developmental psychology, dialectical thinking, reflective judgment, post-formal reasoning and epistemic

cognition which all indicate how adults come to think contextually and critically (Brookfield, 1987).

Students are required to become reflective health science practitioners. To achieve this, critical reflection needs to be an integral part of the curriculum, as well as student support systems and professional development initiatives pertaining to academic staff development.

Advice from Johns (2000) states that in the reflective classroom, both teacher and student will appreciate the fact that some problems may forever remain a mystery. Those who are more 'outcomes-orientated' may find the reflective practice process challenging. However, its advocates see it as a very powerful tool to link theory to practice, using it to expand their own professional and personal zones of comfort continually. Reflective practice has become synonymous with professional practice and hence part of the discourse of professionalisation. According to Salvage (1998) the same applies to several other health science practitioners (e.g. nurses, paramedics and occupational health) who aspire to enhance holistic patient care.

Therefore action learning as such, can be a central part of many typically work based-learning programmes (e.g. radiography, nursing, pharmacy, etc.), and to be effective, requires the student to engage in reflective learning. Gray (2001) identifies how a reflective learning cycle can be incorporated with action learning

in the learning programme of nursing to create the dynamic of enhanced effectiveness and individual understanding. McKay (Ember & Ember, 2001) indicates the inter-relationship between the cycles in the radiography programme, where students are encouraged to keep for instance reflective journals and use clinical experience to inform tutorial discussions.

Many of the principles of interactive learning are derived from constructivism and arise from a notion of the Neapolitan philosopher, Giambattista Vico, that humans clearly understand only that which they have themselves built (Haigh, 2001). This statement contains the truth that making sense from the learning is, and should be, self-created by the learner.

In the South African context, the notion to encourage educators to create learning opportunities for learners to think creatively and critically is noteworthy. In section 7 of the National Education Policy Act, (1996), Norms and Standards for Educators are indicated in the policy with reference to the seven roles of an educator. Arising from these a practical competence for the “learning mediator” (facilitator of learning activities) is to create a learning environment in which critical and creative thinking is encouraged. The South African Qualifications Authority (SAQA) stipulates seven critical outcomes (SAQA, 2000) in addressing the relevance and quality of education. Killen and Spady (1999) indicate that the intention of these outcomes is to describe the characteristics that all citizens regardless of their profession should have. These outcomes should be built into

the curriculum. Of importance is the foundational competencies expected from a “leader, administrator and manager” and the understanding of various approaches to the organisation of integrated teaching programmes.

There is a need and urgency from my side as the researcher, given the substantiated background of health science education in general, that the study should focus on a conscious effort to move away from a technical-rational approach to one of a more learning-centred approach by developing a critical reflective learning approach.

According to Gravett and Henning (1998:61) dialogue teaching implies “a linking of educator, learner and knowledge in a dynamic reciprocal unity”. For the purpose of this research dialogue teaching is seen neither content-, learner-, nor teacher-centred, but consequently learning-centred. A learning-centred approach to teaching is graphically depicted in Figure 1.2.

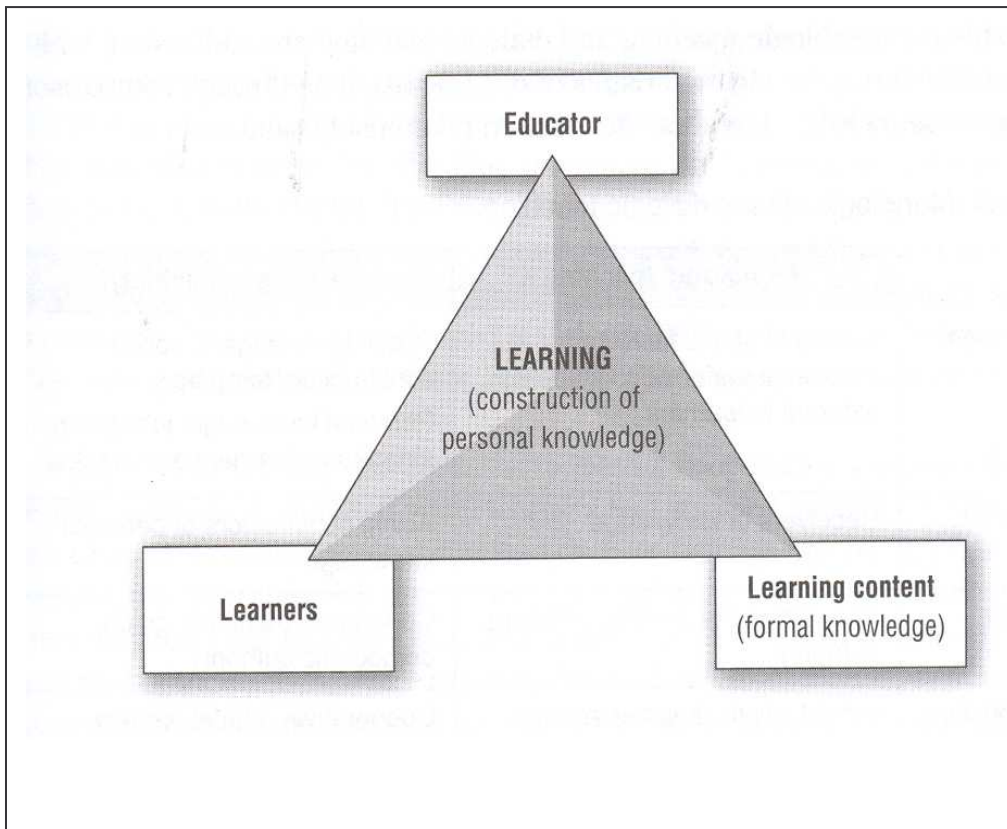


Figure 1.2. A learning-centred approach to teaching (Gravett & Henning, 1998)

1.2 PURPOSE AND AIM OF THE STUDY

The first obligation of educators according to Robin (2000) is the improvement of the cognitive ability to reason and make meaning of the world. In other words, the acquisition of critical reflective and creative thinking skills results in the development of competencies. Therefore students should acquire skills that will develop the “habit, based on intellectual commitment, of using those skills to guide behavior” (Shriven, 2000:1). The development of a student’s critical, creative thinking skills is of significance. Therefore strategies to facilitate the development of critical reflection need to be investigated and recognized.

The well known statement by Einstein (Copley, 2007) that the problems we face today cannot be solved at the same level of thinking we were at when we created them, is a stark reminder of the need to think and do differently. The importance of systemic or holistic thinking in which the emphasis is on contexts, relationships and wholes, is being increasingly acknowledged in the fields of science, medicine, psychology, business and education (Copley, 2007:30). This approach to teaching and learning will also prepare health science students for reasoning, for creativity and for having a professional vision, all of which are of paramount importance.

For metalearning, it entails that provision be made for various learning strategies in health science training as part of the establishment of a metacognitive learning approach. As part of a learning-centered approach, health science students should become competent in monitoring their own learning, as independent, self-regulating learners (Du Toit, 2007).

Copley (2007) highlights the fact that becoming fully able to respond or capable of responding to life experiences in both formal and informal learning experiences is a natural outcome of metalearning.

It is therefore important for every health science student to be critically attuned to the way(s) in which he or she enters into the relevant learning activities. In this regard Moelwyn-Hughes (1987:124) in this regard points out "...an individual

learner will have developed a unique combination of skills, attitudes and approaches to learning and knowledge of these will assist the learner in building his or her strengths”.

Learning opportunities in health science education have to be created to advance the students’ ability to synthesise new ideas, to explore assumptions and then to think of alternative solutions and to draw conclusions.

The researcher shares the view of Brower and Clay (2001) that how we as educators accentuate and exhibit the core values of our profession, is of central importance. What and how we teach illustrate the norms and values of the profession and introduce students to the opinions, arguments and debates about what constitutes knowledge, insight and appropriate behaviours.

We need to familiarise and organise ourselves as practitioners of honourable professions and focus on the challenges that Wegner (1998) writes about. These are to be inventive, creative and excited about what we love best, so that we engage our students to unlock their horizons, so that they can put themselves on learning trajectories that they can identify with, and to engage them in actions, discussions and reflections that make a difference to the communities that they value.

Pee et al. (2000) confirm that health science education has traditionally focused on the assimilation of vast amounts of knowledge and on clinical apprenticeship as the “hallmark“ of good training, and has undervalued reflection in learning. Today, however, health science education needs also to prepare students for lifelong learning (Frick & Kapp, 2006). To achieve this, a more reflective approach to learning is called for and for this reason the following research question and sub-questions have been formulated.

1.3 RESEARCH QUESTIONS

Taking the above-mentioned into consideration to achieve a more reflective approach in health science education, the following central research question has been identified and formulated:

How can health science training institutions integrate critical reflection through action learning to add value to in-depth, independent, self-regulating and lifelong learning?

This overarching research question is refined in the following sub-questions:

- What is the significance of integrating critical reflection in the outcomes of learning programmes in health science education?
- What is the correlation between learning styles and critical reflection?

- Which learning tools/methods can facilitate opportunities for reflective learning?
- Can critical reflection be applied to inform, develop and improve professional practice?
- Does critical reflection promote the principles of lifelong learning in health sciences?

The extent of this investigation is to determine whether a learning strategy such as critical reflection can be integrated in health science education to meet the needs, requirements and expectations essential to a competitive and changing educational and professional environment.

1.4 SCOPE OF THE STUDY

The study therefore focuses on evaluating strategies:

- of facilitating effective learning;
- for promoting the concepts of ownership and reflection on learning;
- for promoting a learning-centred approach;
- for integrating theory and practice through a reflective learning approach.

Brookfield (1998) mentions that the capability to reflect critically on one's experience, integrate knowledge gained from experience with prior knowledge and take action on insights, is considered by some educators to be a unique

attribute of the adult learner specifically. Critical reflection therefore blends learning through experience with theoretical and technical learning to result in innovative knowledge construction and insight.

Reflective practice may be a developmental learning process according to Williamson (1997), but for the aims of the study it is necessary to:

- determine the value of integrating critical reflection in the outcomes of the learning programmes,
- determine the relationship between the learner's learning style and critical reflection as a learning strategy,
- develop and implement different learning tools to create learning opportunities for reflective learning,
- evaluate whether critical reflection as an academic skill can be applied to stimulate and inform practice,
- promote the principles of lifelong learning for health science students through critical reflection, and
- create and promote critical thinking through reflective practice.

1.5 RESEARCH DESIGN AND METHOD

Against the background given in the previous paragraphs, the research design of this study is a mixed methods research in which qualitative and quantitative methods are utilised to gather data. "The combination of qualitative and

quantitative approaches to research within a single study has become an accepted technique for exploratory and evaluative research” as stated by Bazeley (2003:117). The nature of this research is to a certain extent, related to action research. According to Mouton (2001:150) action or participatory research “involves the research participants as an integral part of design”. Qualitative methods are mainly used to gain understanding and insight into life-worlds of the research participants.

The proposed application field for this research is institutions of higher learning involved in radiography education in South Africa. The commitment of educators, clinical tutors and students participating in the research process will be of the utmost importance. With reference to the title of this research, training in general refers to the training and education of radiographers.

A literature review involving current as well as other relevant literature is required to outline, explore, compare, verify and exploit understanding and insight into the application of reflective learning in health sciences in general.

Mainly a qualitative research approach supported by quantitative data is used. Qualitative research provides useful description when little is known about a group of people, an organisation, or some social phenomenon (Polit & Hunger, 1987). Qualitative forms of data gathering and analysis are used. The empirical

study includes sources of data gathering such as observation of participants, structured interviews and questionnaires.

Institutions of higher learning involved in radiography education were targeted to provide primary data through a pilot study questionnaire (base-line information) and a 10-week period of reflective practice with implementation of keeping a reflective journal and attending weekly reflective learning discussion groups. Thereafter focus group interviews (conversational analysis) were conducted and questionnaires completed. The interviews involving academic staff, clinical tutors and students were used to determine the groups' awareness and experience of and attitudes towards reflective learning. Furthermore, the qualitative research process was used to investigate the students' responses during reflective learning and to explore the consequences for individual and professional development. The students' feelings and thoughts were identified from the information gained from the observations during the 10-week reflective practice time-period and the data obtained from the structured focus group interviews. The characteristics and uniqueness of the students' affective status were recognised by means of the transcribed observation and interview data.

The learning experiences of the students were analysed through the implementation of learning tools, such as writing reflective journals and attending reflective learning group discussions. Reflective journal writing was used to support students to internalise their learning in all four quadrants of the brain according to the Herrmann Whole Brain Model (Herrmann, 1998).

Qualitative data gathering was further utilised in the implementation of different learning tools (e.g. reflective discussion sessions) to evaluate the effectiveness of reflective learning.

1.6 POPULATION

In South Africa a limited number of radiographers are educated at all levels (basic and post-basic) at universities and universities of technology.

Furthermore, the radiography learning programmes all form part of health science faculties. These learning programmes in principle deal with the wellness of the patient. The basic content of the different curricula with reference to Anatomy, Physiology, Pathology and Physics is fairly common and generic.

With regards to problem-based learning, it is worth looking into Argyris's (1985) comment that double-loop learning goes beyond simple problem solving. Clinical education forms a key part of all radiography learning programmes. In order to be able to support the students' integration of theory and practice through critical thinking and reflection, clinical tutors and academic staff members need to be committed to reflective practice. They need to be sensitive to the students' learning needs in these professional learning programmes. Richardson and Maltby (1995) indicate the vital role of the clinical mentor and lecturer in the

establishment of an open and supporting environment for reflective learning in the clinical situation.

Currently there are eight institutions involved in radiography education in the country and all of these institutions were approached to participate in this research project. The four institutions of higher learning, which were able and willing to participate, granted the necessary permission. The population in terms of the academic and clinical staff members is $N=68$ and the sample was $n=27$. With regards to the students the population is $N=788$ and the sample was $n=202$. The participating institutions were then targeted for the purpose of collecting data with regards to radiography education.

The following institutions participated: The University of Limpopo (Medunsa Campus), Tshwane University of Technology, Central University of Technology Free State and the University of Pretoria.

1.7 DATA GATHERING AND ANALYSIS

Data was primarily gained by means of a pilot study questionnaire, observations, structured focus group interviews and questionnaires.

Participants of the four institutions included academic and clinical staff members involved in radiography education, as well as radiography students. Research participants (students) were exposed to the reflective practice over a period of 10

weeks. During this time-period students had to keep a reflective journal (Addendum F) and had to attend and participated in the weekly reflective learning group discussions. Academic and clinical staff members and I observed these reflective learning group discussions. The academic calendar of each institution determined whether students were on campus for formal contact sessions or in the different clinical facilities for work-integrated learning. At the end of this phase focus group interviews were conducted and questionnaires completed. These were used to evaluate the acceptance, value and effectiveness of reflective writing and keeping a journal to accommodate reflective thinking and learning.

The observations were done to evaluate the students' attitude, commitment and overall discipline regarding keeping a reflective journal. The value of learning groups reflecting together and sharing learning experiences was also focused on. Students were observed especially with reference to their responses, expressions, attitudes, feelings and experiences during the application of keeping a journal and participating in reflective learning groups.

A wider and deeper perspective was gained through the different types of insights resulting from the quadrangulation of four different data collection methods employed. The use of the term triangulation subsumes both multiple techniques and multiple voices. The researcher created the word quadrangulation to point out that four different data collection methods were implemented.

A number of publications provide insight into learners' feelings (Duke & Copp, 1994; Holm & Stephenson, 1994) and numerous authors provide guidance on undertaking reflection (Wilkinson, 1999). However, with the data gained from the different data collection methods the emphasis was mainly on developing practice, but also on identifying the critical points that students encountered.

The questionnaires targeted the specific aspects listed by Williamson (1997) as guideline, and were used to gain data on critical aspects regarding the utilisation of reflective practice in learning programmes. This eventually contributed to the development of an applicable reflective learning process.

The study furthermore utilised structured focus group interviews to evaluate whether reflection as a learning strategy could be applied to direct and inform practice. The focus was also on promoting continuous professional development as well as ensuring lifelong health science students. Dempsey, Halton and Murphy (2001) state that the development of social workers-in-training and self-construction of the skills for reflective learning propagate successful learning. This is a constructivist, phenomenological approach to learning, which is also very pertinent to radiography.

Gathering data from a representative number of students to identify their preferences with regard to thinking and learning styles would have been tremendously valuable. For the purpose of this study only four academic staff

members' degree of preference for the four quadrants of the Herrmann Whole Brain Model could be determined. Learning opportunities ought to be constructed to accommodate and utilise the cognitive functions in all four quadrants of the Herrmann Whole Brain Model. Cognitive functions are accommodated when learning activities are constructed to comply with a student's preferred mode of thinking and learning. According to Knowles (1990) effective learning takes place if the whole brain is involved in learning. Lumsdaine and Lumsdaine (1995) documented four learning modes highlighting whether a learner is a whole brain person or not. The data regarding students' preferred learning styles was to be obtained from the different participating institutions of higher learning. Unfortunately very limited information at only one institution was available when permission was granted to access the brain profiles of students where the Neethling test was utilised. The cost involved in obtaining information regarding preferred thinking and learning styles of all participants using the Herrmann Brain Dominance Instrument would have been very high.

Because people learn differently it should be the aim of every educator to develop the full potential of all learners by providing learning opportunities that take them out of their preferred ways of doing. This could then be used to determine whether critical reflection as learning strategy complies with the students' preferred mode of thinking and learning. Students become flexible by strengthening the learning skills in which they are weak. Flexible learning implies

that a learner must be able to cope with problems of different kinds, and must be able to adapt, depending on the nature of the task at hand.

The general goal of the data analysis was to evaluate the information gained through different data collection methods introduced to integrate the data in a structured way to answer the research questions.

Utilising applicable and available computer aided software for analysis of the qualitative data supported this process. The computer program Atlas.ti was used to handle the large amount of qualitative data that was gathered. This software program categorises and compares data. Microsoft Word and Excel programs were also utilised to group information and to illustrate results graphically.

1.8 ETHICAL CONSIDERATIONS

In a written document to all deans of the identified institutions of higher learning, information regarding the participation in the research process was divulged. The following aspects were highlighted in the letter of consent (Addendum C):

- Nature and purpose of the research
- Description of who would be participating in the study
- What the participants would be expected to do

Participants were ensured of confidentiality and anonymity for their involvement in this research. It was also indicated to participants that involvement was voluntary. These issues were dealt with in face-to-face conversations during the

orientation sessions, prior to the start of the research (Addendum D). All the research participants were verbally informed with regard to the aim and objectives of research, as well as the anticipated outcome of the study.

The research data is kept at the Department of Curriculum Studies, University of Pretoria (Groenkloof Campus).

An application for ethical approval of this research involving human respondents had been submitted to and approved by the Ethics Review Board of the Faculty of Education, of the University of Pretoria (Addendum A).

1.9 CONCLUSION

This chapter provides the background to the study. The aim and objectives as well as the procedures followed through the research are outlined to provide the orientation to the project.

The next chapter looks into education in the South African context. This in turn highlights some aspects of learning and the nature of reflection is also investigated.