INNOVATIVE TEACHING STRATEGIES WITHIN A NURSING EDUCATION MODEL

by

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To Freddie and Ferdinand
with love

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SUMMARY

Recent nursing literature has repeatedly proclaimed the need for creativity in nursing. The complexity of contemporary nursing practice as a result of the explosion of knowledge and technology, changing human values and diverse health care systems, requires an innovative and creative nurse who can adapt to change and provide holistic, individualised, context-specific patient care. Higher levels of cognitive thought, creative thinking and problem-solving skills have been stressed as desirable qualities of student nurses. It is suggested in the literature that the evolution of innovative strategies and the ways to implement them into nursing curricula be explored in order to assist and encourage students to develop these higher cognitive skills.

From an analytical study of the literature which was undertaken with the aim of exploring the nature of creativity and the processes involved in creative thinking and learning, and of identifying innovative strategies particularly relevant to the teaching of nursing, it became apparent that the most significant determinants in teaching for creativity, are the learning environment, the educator-student relationship, and the provision of a variety of teaching strategies, which are student-centred with a problem-solving focus. It was established that stimulation of both the left and right hemispheres of the brain is essential for the development of creative thinking skills.

Based on the insights and knowledge gained in the study, a nursing education model for the fostering of creativity was developed. This model encompasses a wide variety of didactic considerations and is designed to stimulate whole brain learning. It is hoped that its use will be of value in the production of innovative and courageous nurse practitioners who will be better equipped to cope with the changes and challenges of their working environment and be able to provide context-specific nursing care.

Key terms:

creativity; innovative teaching strategies; problem-solving; student-centred learning; creative learning environment; nursing education model; creative thinking skills; whole brain learning; productive learning; science-art of nursing.

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CHAPTER 1

Orientation to the study

1.1 INTRODUCTION

The need for creativity in nursing has been the subject of active debate in recent years. Many nurse educators have expressed increasing concern regarding the development and expression of creativity in student nurses and proclaim that nurse practitioners need a variety of thinking, learning and behavioural skills which are not sufficiently emphasised in current nursing education courses. This quest for creativity must be viewed against a complex modern world marked by turbulence and change because of the explosion in knowledge and technology.

Contemporary health care delivery is confronted by diversity, uncertainty, conflict and instability as a result of changing human values, escalating health care costs, the shrinking half-life of knowledge and technology, and changing health problems. The contribution of the nursing profession is subject to change as society has become more

knowledgeable and more differentiated relative to the services it demands. The essence of nursing is only relevant to the society in which it exists; social change and concomitant changes in science and medicine have lead to a fundamental shift in the perception of the nurse's role. Nurses have to function effectively in technically complex environments and humanise their environments with caring and concern (Bevis & Watson 1989:18; Soothill, Henry & Kendrick 1992:201).

The present debate on the worth of creativity for nursing education and practice must be viewed against this expanding role of the nurse and the need for more effective ways to cope with contextually based patient problems in a diverse health care system. The maintenance-adaptation type learning which refers to acquisition of fixed outlooks, methods and rules, does not prepare the learner to reconcile value-conflicts under crisis conditions - it is regarded as ineffective during times of change and discontinuity. An alternative approach of anticipatory-innovative learning is suggested which encourages participation, dialogue, cooperation, imagination, open communication and the testing of operating rules and values. The needs of modern health care demand a well-educated and not just a well-trained nurse, and creative thinking is perceived to be the mark of the educated individual (Bevis & Watson 1989:5, 40-41).

The kind of nurse to be educated for the new age in nursing and health care must be one who can accept the ambiguities of the modern medical and health care world where no certainties or clear solutions prevail (Chaska 1990:101). The nurse no longer depends upon routinised behaviour, traditions or procedural manuals to guide clinical judgement and decision-making. The ability to make high level decisions based on a strong knowledge base and effective problem-solving strategies have become indispensable assets. The need for greater flexibility, sensitivity and expertise on the part of the nurse is clearly indicated (Chaska 1990:101; Klaassens 1992:28; Malek 1986:20; Soothill, Henry & Kendrick 1992:161).

The essential survival skills for successful adaptation in the 21st century appear to be

flexibility, innovative thinking and intellectual efficiency upheld through life-long learning. Nursing education courses should be adjusted to synthesise knowledge, technology and human values and to prepare students to solve the complex problems they face (Holbert & Thomas 1988:30).

1.2 EXPOSITION OF THE PROBLEM

The results of the following research studies support nurse educators' concern about the need for the development of creativity in student nurses.

Sullivan (1987:12-13, 15) conducted a study to determine if critical thinking, creativity and clinical performance improved during nursing programme enrolment. The sample consisted of 46 registered nurses enrolled in a four-year Bachelor of Science in Nursing degree at the University of Missouri - St Louis, from 1981 to 1985. The Torrance Tests of Creative Thinking, Verbal forms A and B, were used to determine scores of creative thinking ability. Entry and exit scores of the students were compared and the findings were that overall creativity decreased during the period under review.

Thomas (1979:117-118) studied the effect of a newly instituted process curriculum on the creative abilities of 152 students enrolled in a baccalaureate nursing programme. She wanted to determine whether there were any differences in creative thinking between those beginning the course and those graduating from it. She assessed the pretest - posttest differences between the two categories of students by using the t-test and found that beginning students scored significantly higher for originality, elaboration, and total creative thinking.

From these studies, therefore, it seems that nursing education today faces a great challenge if the outcomes of traditional education are reviewed. If creative thinking skills need to be developed in students, nurse educators will have to move away from unilateral teaching, such as lecturing, which promotes dependency and passivity (Pond, Bradshaw

& Turner 1991:22). The empiricist, behaviouristic curriculum paradigm which prescribed nursing education for the last forty years has cast nursing into a training modality which ignores all aspects of education not covered by observable behaviour. It is anti-thetical to the graduation of the kind of nurse needed in the present health care system. Nursing has emerged as a specialised clinical field with much of its practice independent of physicians. The present nursing model is humanistic-existentialistic, holistic, subjective, phenomenological and human experience oriented. The nurse of today must be a well-educated, creative and critical thinker capable of independent judgement and action, and a morally astute and courageous person (Bevis & Watson 1989:2, 17, 32, 155; Zerwekh & Claborn 1994:7).

Nursing's body of knowledge has to be learned convergently in a rational, logical and analytical manner as practice in any profession requires the processing of technical and scientific knowledge. The application of this knowledge, however, takes place in a context that is rapidly changing and uncertain, and this necessitates divergent thinking skills (Ferguson 1992:17; Saylor 1990:11). For example, cardiac resuscitation necessitates convergent thinking whereas the nursing care of the patient convalescing from a coronary thrombosis requires divergent thinking and innovative approaches because of the uniqueness of the patient-situation. It is thus essential for student nurses to develop divergent thinking processes which would equip them to deal with the ambiguities of the complex health problems they are continuously confronted with in practice. A study conducted by Davies (1993:627) has revealed the traits of creativity and flexibility posessed by experienced nurses who exhibit the ability to provide context-specific nursing care.

The tendency to overemphasise the convergent left brain modalities including logical, analytical, verbal and linear skills, while neglecting the important divergent processes of the right brain such as intuitive, holistic, synthesising, creative and artistic skills, has been found to produce an imbalance in education as it fails to develop both hemispheres of the brain (Holbert & Thomas 1988:30; Parfitt 1989:666). This has happened, and

continues to happen, in nursing education because of the inflexible adherence to the Behavioural Model.

The need for the development of the higher cognitive skills which include problem-solving, formal operational, reflective and divergent thought as well as creativity, is stressed by various nurse authors. Reilly and Oermann (1992:8, 29, 33, 241) focused attention on the need for the development of higher cognitive skills especially divergent thinking, to enable nurses to deal with ambiguities and risk-taking and to problem-solve more effectively. They explained that complex practice problems demand a reflection-in-action experience and that reflective thought fosters divergent thinking. Heliker (1994:45) advocated the need for the development of a critically thinking reflective practitioner. Demetriulias and Shaw (1985:13) emphasised the importance of problem-solving abilities in clinical practice but expressed concern because practical guidelines for encouraging divergent thinking in students are minimal.

Jones (1990:405) viewed problem-solving abilities as desirable attributes of nurses as they enable them to recognise and react to unique elements in an otherwise well-known and seemingly ordinary setting. Holbert and Abraham (1988:23) regarded problem-solving as central to the practice of nursing but question nurse educators' efficiency to teach problem-solving skills. It appears as though the concern expressed in the literature is justified as a study reported by Klaassens (1992:28, 30) showed that student nurses are not functioning at a level consistent with formal reasoning-abilities. She states that it should present a challenge to nurse educators to implement innovative teaching strategies to stimulate the higher levels of thought. A study done by Fredericson and Mayer as cited by Reilly and Oermann (1985:150) found that associate degree and baccalaureate student nurses lack skills in problem-solving especially during the evaluation stage of the proposed solutions.

The need for the implementation of more creative teaching strategies is explicitly indicated in the literature. Ferguson (1992:16) stated that nurse educators need to

examine methods which would enhance creative development as innovative and creative nurses are highly valued in the health care system. The need for more creative strategies to enable nurses to develop their critical skills is advocated by Parfitt (1989:666, 673). She refers to the results of an experiment showing that creative teaching strategies improved nurses' ability to identify patient problems and to suggest suitable interventions.

Pond, Bradshaw and Turner (1991:22) have revealed the need for educators to examine and implement strategies that will provide participatory, stimulating and meaningful learning for students. They encourage nurses to exercise their creative abilities and to use a variety of teaching-learning strategies. Stepp-Gilbert and Wong (1985:32) have suggested that divergent thinking can be promoted by offering students the freedom to explore, experiment, question and try out a variety of approaches to the same situation.

Bevis and Watson (1989:164) advocated that education must be creative, imaginative, supportive of learner maturity and independence - it should be liberating, active and thought provoking.

A recent study by Freitas, Lantz and Reed (1991:6-7) reported that a total of 425 questionnaires were mailed to 425 National League for Nursing (NLN) accredited schools of nursing to be completed by identified creative educators within the schools. The completed questionnaires (180) were divided into three groups and each group was independently rated by three researchers. Several similar descriptions of creative teaching were identified in the data and from these factors common to creative teaching were grouped into seven categories. The results showed creative teaching to be more student-centred and less inhibited than the traditional methods.

According to the NLN, research on existing methods on how to develop and teach creative problem-solving skills in nursing is relatively limited. Emphasis in teaching practice and research has been on convergent thinking processes and less attention had

been given to the divergent thinking processes necessary for the creative solving of problems. The NLN emphasises the need for nursing to focus on creative problem-solving in education and practice, and to discover and implement innovative patterns of practice in order to improve the delivery of nursing and health care (NLN 1990:79, 95).

The necessity for the development of creativity in nursing is recognised by the South African Nursing Council (SANC) in their policy statement with regard to professional nursing education. This body stipulates that the aim of the learning process in nursing education is to direct education towards the development of analytical, critical and creative thinking, and it continues to emphasise the concept of creativity in its programme objectives for the four-year course in nursing in which it states that student nurses should develop an enquiring and scientific approach to problems in nursing practice and be prepared to initiate and accept change (SANC 1993:2; South Africa 1985:3).

A study that was conducted by Makhathini (1992:90-91) on South African nurses enrolled for the diploma course in nursing, revealed that during the four years of the course no improvement had occurred in the problem-solving abilities of some of the students. There appeared to be a deficiency in the teaching of problem-solving skills. It was recommended that more attention should be given to it in order to challenge the students' critical and creative thinking abilities and that tutors should be given assistance in developing skills in the teaching of problem-solving.

1.3 STATEMENT OF THE RESEARCH PROBLEM

Although many nurse educators and authors do proclaim creativity to be a valued attribute of the nursing student, nursing education courses in general do not stimulate creative approaches to nursing in students. The literature indicates the educational paradigm over the past few decades as being teacher-centred with the student as a passive recipient. The lecture method still seems to be the predominantly used strategy to deliver

content in the highly formalised and time controlled curricula characteristic of nursing programmes. The result is that the newly graduate nurse in many cases fails to exhibit patient-oriented, critically thinking, problem-solving and creative qualities and in practice lacks adequate decision-making skills (Ferguson 1992:16; Heliker 1994:45; Jones 1983:402; Klaassens 1992:28).

It is evident that while research studies have shown a decline in creativity with advanced nursing education, there is an increasing demand for creativity in contemporary nursing practice and education. The need to teach student nurses creative thinking skills and to implement innovative teaching strategies has been emphasised repeatedly in recent nursing literature. This study is an attempt to address this problem. The following questions serve as a departure point:

- What does the concept *creativity* encompass?
- How can creative thinking skills be stimulated and developed in student nurses?
- What teaching strategies would foster creativity in student nurses?

1.4 ASSUMPTIONS

Assumptions are basic principles that are assumed to be true without proof or verification, and research studies necessarily build on a series of assumptions (Polit & Hungler 1993:13, 88).

The following assumptions serve as a departure point for this study:

- There is a pressing need for creativity in nursing education and practice.
- Creativity is essential to effective functioning in the contemporary diverse and complex health care setting.
- The current basic nursing education programmes do not develop creative thinking and problem-solving skills in student nurses.

1.5 AIMS OF THE STUDY

Deriving from the exposition and statement of the problem, and the assumptions, the aims of the study are to

- explore the concept *creativity* by analysing the existing definitions and theories of creativity
- analyse the whole brain theory of creativity
- establish the relationship between cognitive styles and teaching for creativity
- indicate the role of learning objectives in the development of creative thinking skills
- determine the relation between theories of learning and creativity
- identify educational models of specific relevance to nursing education which facilitate creative learning
- analyse the practice of nursing in order to indicate whether creativity is required
- identify and describe innovative teaching strategies applicable to nursing education
- develop a nursing education model which would foster creativity in student nurses

1.6 SIGNIFICANCE OF THE STUDY

According to Chaska (1990:406), contemporary nursing practice requires the extreme in adaptation, flexibility, innovation and creativity in addition to upholding the basis and foundation of nursing practice. Bevis and Watson (1989:15) pleaded for a curriculum that promotes education - critical thinking, creativity and engagement of students' minds in issues and questions that will educate, rather than train. These two viewpoints appear to indicate a need for achieving the outcomes of significant learning as advocated by Rogers (1967). This is a process which is more than an accumulation of facts, a deeply social process which makes a difference fundamentally to the actions, behaviour and personal growth of the learner. This type of learning is believed to result in an improved capacity to accept self and others more fully, and in becoming more flexible and less rigid in perceptions and more open to evidence.

The ability to make high level decisions based on effective problem-solving strategies is an expected behaviour of the professional nurse. The modern nurse practitioner has to respond to the patient as a unique individual, assist him/her towards maximum functioning and fully explore, experience and resolve his/her problems. According to Klaassens (1982:28), any nurse regardless of role who cannot solve problems, is a costly and risky practitioner who delivers a lesser quality of patient care.

It is believed that this study will provide knowledge that will lead towards a deeper understanding of what teaching for creativity entails. It is trusted that the implementation of innovative teaching strategies will assist in facilitating the fostering of creativity in student nurses and will produce professional nurses who will be capable of delivering context - specific care, nurses who will be self-actualised, mature, effective, independent, flexible and innovative practitioners.

1.7 RESEARCH METHODOLOGY

The methodology will comprise a descriptive analytical study of the relevant literature on creativity, the nature of the practice of nursing, and specific educational-related aspects.

1.8 THEORETICAL FRAMEWORK

The different theories on creativity as classified by Gowan (1972) and the whole brain theory proposed by Herrmann (1989), will be used as the theoretical framework for this study. The framework is presented in chapters 2 and 3.

1.9 DEFINITIONS AND DESCRIPTIONS OF TERMINOLOGY

The following definitions and descriptions are given to clarify the terms which will be used throughout this thesis:

1.9.1 Creativity

The word *create* originates from the Latin *creane* which means *to bring into being*. Creativity is a concept which has been defined and described by numerous authors and researchers which has resulted in a variety of perspectives on its meaning. It is therefore not plausible to give only one definition to explain its full meaning. Most definitions, however, describe creativity as bringing into being something original (new, unusual) and valuable (useful, appropriate) (Ochse 1990:2).

In order to clarify the meaning of creativity at this stage, Paul Torrance's definition is given since the principle components of his conception of it explains it explicitly. Several other definitions and theories of creativity are discussed in chapter 2 of this thesis.

Torrance defines creativity as

> *the process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies, testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results* (Ferguson 1992:16).

The principal components of Torrance's conception of creativity are sensitivity, fluency, flexibility, originality, elaboration, penetration, psychological openness, synergy, internal visualisation, synthesis and redefinition (Treffinger, Isaksen & Firestien 1982:6-9; Torrance 1979:46, 103, 116-117). These are explained in 2.5.1.1

Creativity requires both right brain and left brain processes (intuitive and rational types of thinking), it includes open-mindedness, tolerance of ambiguity, in-depth judgement, and openness to the ideas of others and to new experiences (Ferguson 1992:16-17). Creativity is a function of knowledge, imagination and evaluation (Parnes 1972:6).

1.9.2 Creative thinking

Creative thinking is defined by Demetrulias and Shaw (1985:12) as a divergent process marked by flexibility, fluency, originality, exploration, intentional ambiguity and problem-solving. Torrance (1979:73, 116) adds that creative thinking encompasses analysis and synthesis. The NLN (1990:79, 81) views creative thinking as an intensely subjective act of problem-solving, associating the commonplace with the unusual to produce an innovative and novel perspective product.

1.9.3 Divergent thinking

It is a mode of thinking which uses new directions, searching and seeking a variety of approaches to the same situation and reconstructuring new combinations of both old and new knowledge into complete new thought structures (Parnes 1972:35-36).

Guilford (1968) identified the factors of which divergent thinking consists as fluency, flexibility, originality, elaboration, sensitivity and redefinition (Olivier 1978:57).

1.9.4 Convergent thinking

It includes logical, linear, critical, analytical and sequential thinking with the goal of precision, exactness and correctness. Factual detail, process and procedure are emphasised (Demetrulias & Shaw 1985:12; Herrmann 1989:17, 121).

1.9.5 Creative problem-solving

It involves new ways of thinking, the use of divergent thinking processes, considering multiple alternatives, and nonroutine, unique approaches for solutions to problems (NLN 1990:80).

1.9.6 Teaching strategy

A teaching strategy comprises a set of teaching actions which are intended to attain specific desired outcomes. It implies that teachers must carefully plan and organise instruction in order to attain their goals and that there is an art and skill involved in the implementation of these strategies (International Encyclopedia of Education 1985:5148).

1.9.7 Innovative teaching strategies

Teaching strategies which use new and unique methods to motivate students, and facilitate and enhance learning, are referred to as innovative teaching strategies for the purposes of this thesis.

1.9.8 Model

A model is a standardised version which offers a description of a concept, structure or process. It is a representation against which something else can be compared or measured (Herrmann 1989:219).

According to Good (1973:371), a model aids in the understanding of a structure or a process and should describe phenomena in order to become comprehensible. Page and Thomas (1979:223) described a model as being a representation of a concept or system in a two- or three-dimensional diagram or mathematical or other analogous form.

The essential characteristic of a model is the proposed structure of the model which is used to investigate the interrelationship between the variables (International Encyclopedia of Education 1985:3382).

For the purpose of this study a model is presented in a two-dimensional diagram, with an accompanying description and explanation of the concepts and relationships within the structure of the model.

1.10 OUTLINE OF THE RESEARCH

Chapter 1 presents an introduction to the study, exposition and statement of the problem, assumptions and aims of the research, the significance of the study, and the definitions and a description of the terms used in this thesis.

Chapter 2 reviews different approaches, and various definitions and theories of creativity.

Chapter 3 offers an analysis of the whole brain theory of creativity.

Chapter 4 covers a discussion of the cognitive and affective domains of objectives, cognitive styles and, theories of learning relevant to the development of creativity.

Chapter 5 presents an analysis of the adult, mastery, experiential and open learning models depicting their congruency to the principles of creative learning.

Chapter 6 explores the nature of the practice of nursing to establish whether creativity is essential to practice.

Chapter 7 discusses various innovative teaching strategies which stimulate creative thinking skills and are of particular application to nursing education.

Chapter 8 presents a model for the fostering of creativity in student nurses.

Chapter 9 presents a summary, the conclusions and implications, recommendations and limitations of the study.

CHAPTER 2

The nature of creativity

2.1 INTRODUCTION

The word *creativity* has been both misused and overused, and the concept it stands for is vague, indefinite and confusing. Creativity means different things to different people. It refers to a very complex aspect of human behaviour which has been linked to intelligence, heredity and even psychopathology.

When we consider the concept of creativity we open ourselves to misunderstanding unless we define it and explain what our viewpoint of it is as there is no universally acceptable definition available. In fact, the vast variety of hypothetical ideas about its nature has lead to a diversity of definitions and theories concerning it. Various definitions and some of the more prominent theories of creativity are discussed in this chapter with the aim to explore and analyse common elements and interpretations in an attempt to arrive at a more thorough understanding of the subject.

2.2 MODERN CONCEPTIONS OF CREATIVITY

The literature on creativity generally discloses two opposing approaches. In the traditional view creativity is regarded as a special talent belonging to a few superior individuals, often referred to as *creative geniuses*. According to this view, the creative ability is unchangeable and exists only in individuals who have inherited it genetically. It is believed that this kind of creativeness cannot be fostered, nor can it be fully comprehended because of the eccentricity of the creative genius. The only way to partially understand it is through the results of the creativeness, the creative product, as exemplified by people such as Darwin, Einstein, Da Vinci and Poincaré.

A more recent approach towards creativity has resulted from contemporary research. In it creativity is viewed as an authentic human ability which manifests itself in different human activities. It is not the prerogative of a few selected human beings, but exists in all human beings and can be encouraged by education fostered in a suitable environment (Prinsloo 1973:44-45; Ochse 1990:3).

Whereas the traditional approach focuses on the creative product, the more recent approach emphasises the creative process. For the purposes of this study, the more recent approach towards creativity will be explored, since the aim of this research is not to investigate the creative genius or the creative product, but to explore the educational possibilities which would enhance creative behaviour. The focus will thus be on the creative process and the creative environment.

2.3 CRITERIA FOR DEFINITIONS OF CREATIVITY

Research, criteria and definitions of creativity can be classified into the following categories as distinguished by Rhodes (1961); person, product, process and environment (Treffinger, Isakson & Firestien 1982:5).

2.3.1 Person

Numerous research studies have been conducted on the creative personality. Definitions of creativity referring to the person emphasise personality characteristics which distinguish highly creative people from less creative people. Some of the specific personality traits attributed to the creative personality, are humour, non-conformity, self-confidence, independence, openness and flexibility. The question is, however, whether the same traits cannot be present (but not overtly manifested) in the (apparently) less creative person?

Complicating this issue are the results of recent research studies which refer to the concept of the unity of opposites which postulates that highly creative people are at the same time more dependent and more independent and more conforming and more non-conforming (Torrance 1979:7).

Ochse (1988) reports in her study of highly creative people that they tend to be extremely rigid, very independent and highly motivated in their ways. This is contradictory to the findings of others such as Guilford and Torrance who have found that the ability to be flexible is indeed a characteristic of the creative person. It must be taken into consideration, however, that Ochse focused on the traditional approach towards creativity and studied only highly creative people (ie individuals recognised by expert opinion as having contributed something of original value to our culture). She refers to these people as creative geniuses (Ochse 1990:4).

2.3.2 Product

The majority of definitions refer to creativity as the production of something new or original. Creative products may be, amongst others, artistic, theoretical, or literary in nature. Some researchers regard a product as creative when it is new for the person who created it. On the other hand, others differ and contend that a creative product must be

new and must contribute towards the culture within which the person functions. Parnes is of the opinion that the criteria of uniqueness and usefulness are required in a product before it can be considered creative (Klein 1973:22; Prinsloo 1973:51).

2.3.3 Process

Some definitions of creativity describe the stages of the creative process while others analyse and assess the abilities which influence creativity. Torrance describes the process occurring during creative thought while Guilford analyses various abilities such as spontaneous flexibility, elaboration and expressional fluency which are essential to the creative process. A more detailed description of creativity as a process is given below in this chapter in the discussion of the theories on creativity.

2.3.4 Environment

Various researchers focus on the influence of the environment on creativity. Social and cultural factors as well as the home and school environments are believed to play a role in the initiation and development of creativity.

There are two conceptions concerning the creative environment. The first is the assumption that a person's creativeness increases in a creativity-inducing environment as has been found by Parnes, Torrance and several others (Parnes 1972:14). While this may be true concerning creative production and creative problem-solving, the other concept is that the truly creative person is believed to be able to create his own environment by maximising his interactions with it through perceiving it more openly while purposefully eliminating his previous perceptions. Schachtel states:

> ... *perception is a selective and potentially creative act in which the individual consciously and unconsciously chooses those phenomena judged relevant from the standpoint of his unique personality* (Klein

1973:27).

A very common stand taken among contemporary creativity experts is that a person should be able to move outside his usual paradigms (ie personal frames of reference or preconceived perceptions) in order to see issues or problems from a different perspective, thereby facilitating creative thought.

Another point of view regarding the role played by the environment on creativity was raised by Golovin who theorised that creativity may be biologically determined through genetics, but enhanced through environmental conditioning. He discussed the possible involvement of built-in ability for novelty or creativeness found in the capacity of the variability that allows the neural pathway pattern in the human brain to be varied. Golovin refers to the more original person as follows:

> ... *in response to any particular stimulus, his stores of experience will produce a greater range of new engrams than will be forthcoming from the memory of the individual having more rigidly determined characteristic parameter values* (Klein 1973:28).

Golovin stated that although he believes that this may be genetically determined he still considers that variability in parameter values can be enhanced through environmental conditioning. This viewpoint is clearly illustrated in the following quotation by Boden (1992:215):

> *Mozart was different from the rest of us in that his mind contained more richly - detailed maps of musical structures, and more ways of negotiating them fruitfully, than other people's.*

Golovin's view corresponds with Jung's theory of creativity as both acknowledge the role of hereditary and environmental influences on creativity.

Jung believed that creativity originated from the *collective unconscious*, the storehouse of primordial experiences and social memories, which are passed on from one generation to another (Yau 1991:157). He viewed the creative process to occur in two modes when pertaining to art. The psychological mode draws from the realm of human consciousness which includes the *lessons of life*, whereas the visionary mode which does not derive from the reality of life, comes from the *collective unconscious* (Arieti 1976:26).

In Jung's theory, the psychological mode involves environmental influences as *lessons of life* refer to the interaction between man and his environment. His visionary mode, however, refers to genetic inheritance because it stems from the *collective unconscious.*

It is my own opinion that creativity can be stimulated by a creativity- inducing environment but that exceptionally creative people such as Einstein, Mozart and Da Vinci may have genetically inherited their creativeness. Some people are rigid in their ways of thinking throughout their lives, others become more open to different perceptions with experience and advanced education and still others seem to be born with open minds and use their minds and abilities to maximum capacity to make valuable contributions towards society. Golovin and Jung's viewpoints become very acceptable when one endeavours to explain this phenomenon.

2.4 DEFINITIONS OF CREATIVITY

One should not attempt to define creativity with the aim of describing the phenomenon but should only give some clarification of one's own stream of thought on it. A variety of definitions of creativity is given to illustrate its diversity:

(1) Fromm: *creativity is the ability to see (or to be aware) and to respond*

(2) Anderson: *creativity is affection for an idea, absorption, con-*

centration, intensity of encounter, peak experience, delight, ecstasy

(Prinsloo 1973:49)

(3) Barron: *the creative individual is one who has learned to prefer irregularities and apparent disorder and to trust himself to make a new order simply because in his own experience he has been confronted with interpersonal situations which made prediction on the basis of repetition extremely difficult*

(Klein 1973:3)

The above definitions focus on the person and although the definitions of Fromm and Anderson do not refer directly to personality characteristics they emphasise certain human abilities. In Fromm's definition the ability to see or become aware means much more than observing the obvious. In a creative sense, to see is to be open to all incoming sensory impulses, to free oneself from previous perceptions and to use all six senses. Responding creatively will not be possible before that which has been seen, has been analysed, evaluated and synthesised in order to provide a unique or new response. Anderson's definition emphasises the subtle blending of the affective aspect of creativity as apparent in the words affection, intensity, delight and ecstasy, as well as the cognitive aspect of the concept which is expressed in idea, concentration, encounter and experience. When he refers to the peak experience and to ecstasy, he also mentions the *aha*-experience, that sudden illumination which has been described by so many people during the emergence of a creative idea.

In Barron's definition there appears to be a combination of personality characteristics and abilities. The creative person is characterised by self trust and preference for irregularities and disorder which may imply flexibility and tolerance for ambiguity. The ability to synthesise is implied by *having to make a new order.*

(4) Plato: *bring into birth some new reality*

(Klein 1973:2)

(5) Bruner: *it's an act that produces surprise - this I shall take as the hallmark of creative enterprise*

(6) Murray: *the occurrence of a composition which is both new and valuable*

(7) Taylor: *creativity is that thinking which results in the production of ideas (or other products) that are both novel and worthwhile*

(Prinsloo 1973:47, 48)

Definitions numbers 4 to 7 refer to creativity as a product. A common factor in them is that creativity generates something (whether it be an idea, a composition, a product, a reality) but its nature is not specified and thus leaves the hint that it can be anything. Novelty and usefulness of the product are implied in all four above definitions. Even though Plato does not expressly mention usefulness it is implied in the phrase *new reality* since before a phenomenon can be called a reality it has to be experienced by more than one person and realities do have some degree of value. Bruner mentions *surprise*. This is generally experienced during the emergence of something new and different as people are not surprised by the familiar.

(8) May: *creativity is the encounter of the intensively conscious human being with his world*

(9) Allen: *creativity is the production of meaning by synthesis*

(Klein 1973:3-4)

(10) Getzels and Jackson: *conjoining elements that are customarily thought of as independent and dissimilar*

(11) Mednick and Mednick: *forming new combinations of associative elements which either meet specified requirements, or are in some way useful*

(Olivier 1978:50)

(12) Henle: *the creative solution, the creative idea, is one which the individual achieves by freeing himself from his own conceptual system, and by which he sees in a deeper or more comprehensive or clearer way the structure of the situation he is trying to understand*

(13) Maslow: *self-actualising creativeness - these people can see the fresh, the raw, the concrete, the idiographic, as well as the generic, the abstract, the rubricised, the categorised and the classified. Consequently they live far more in the real world of nature than in the verbalised world of concepts, abstractions, expectations, beliefs and stereotypes that most people confuse with the real world.*

(Prinsloo 1973:47, 49)

All the definitions from numbers 8 to 13 focus on creativity as a process. A common factor which refers to the individual as being in intensive encounter with his world is contained in the definitions of May, Henle and Maslow. Henle expresses the necessity for the individual to free himself from his own conceptual systems in order to enable himself to see deeper. This concept is reaffirmed by Maslow who considers that creative people can see the raw, the fresh, the real world while May refers to the intense

consciousness of the individual with his world. These definitions indicate a difference between an ordinary encounter with one's world and an encounter in which the individual is freed from any biases and previous perceptions, the latter being conditional to creativity. The definitions also imply that there is a process involved in creativity - certain steps are to be followed, and that creativity does not happen instantly.

The definitions of Allen, Getzels and Jackson, and Mednick and Mednick focus on another aspect of the creative process. They all refer directly to the ability to synthesise and indirectly to the ability to be flexible. Dissimilar elements can only be joined in the presence of flexibility proceeded by synthesis. The same applies in the formation of useful new combinations of associative elements.

It becomes obvious that these definitions focus on different aspects of creativity as a process.

(14) Nash: *the thesis to be proposed here is that genuine scientific creativity is ultimately a function of moral synthesis, a harmonious balance of the factors of freedom and discipline*

(15) Stein: *creativity is the resultant process that occurs within the individual* ... (because of environmental influences and personal events) ... *creativity is the resultant process of social interaction*

(Prinsloo 1973:50)

(16) De Bono: *creativity involves breaking out of established patterns in order to look at things in a different way*

(Herrmann 1989:193)

Definitions numbers 14 to 16 focus on the environment in relation to creativity. Both Stein and Nash mention the influence of the social and personal environments on creativity. Stein refers to the influence of social interaction and personal events. Nash refers to the delicate balance between freedom and discipline which means to be free, while at the same time adhering to authority. Freedom is always accompanied by responsibility as one has to live with fellow man.

In the use of the term *established patterns* De Bono may be implying those that are enstowed on us by education and cultural practices.

In all these definitions, however diverse, certain concepts associated with creativity emerge repeatedly. These include flexibility, freedom, openness, intensive involvement, analysis, evaluation, synthesis, originality, newness and usefulness.

2.5 THEORIES OF CREATIVITY

Several classifications on the theories of creativity are available. All show a remarkable comparability and for the purpose of this study, Gowan's (1972) classification is used as it offers a very comprehensive review of them. The categories include: cognitive, rational and semantic theories; personality and environmental theories; humanistic theories; psycho-analytic theories; and psychedelic theories.

2.5.1 Cognitive, rational and semantic theories

The theories in this group view creativity as being rational and largely set in the cognitive domain, and emphasise its verbal or semantic concepts or associations. They seek to define the stages of the creative process and many stress the products of creative thinking and problem-solving (Treffinger *et al* 1982:6).

2.5.1.1 Cognitive abilities

A major group within this first category is concerned with certain of the cognitive abilities involved in creativity. These are demonstrated in the work of JP Guilford and Paul Torrance.

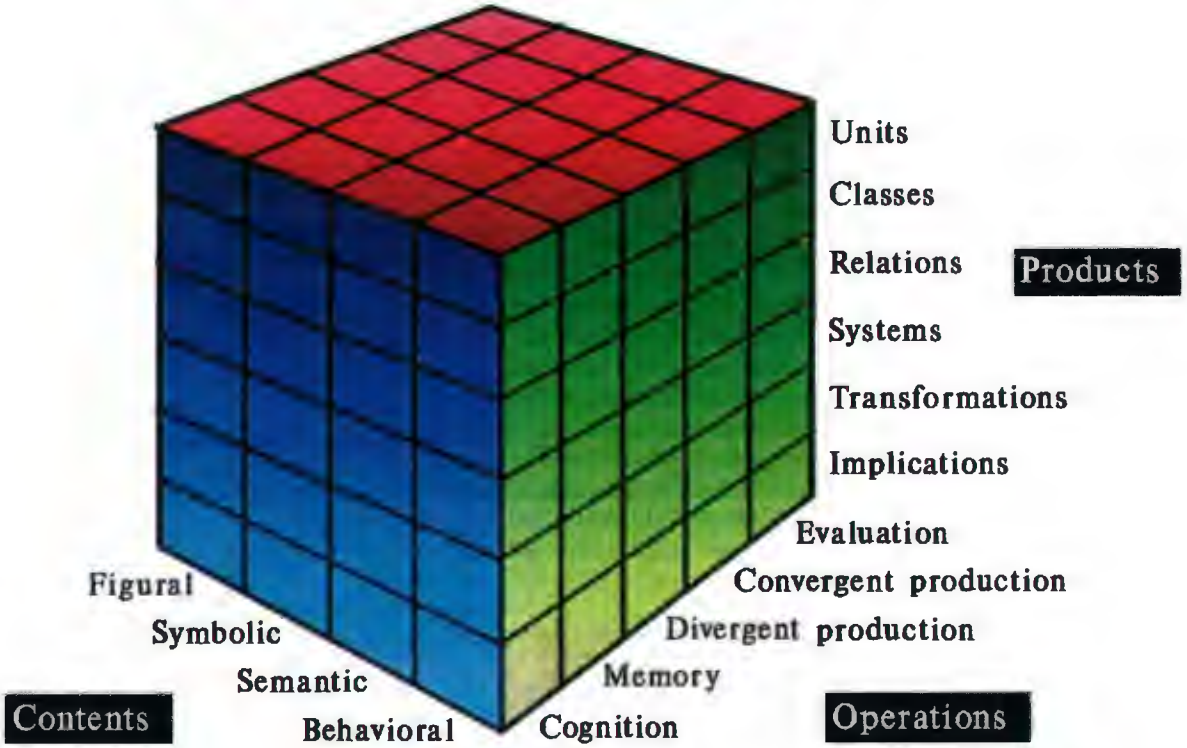
Guilford made a major contribution to the study of the nature and assessment of intelligence and creativity with his structure-of-intellect model. In it human intelligence is classified into three dimensions, namely, operations, contents and products, and each of a total of 120 unique abilities, is represented in one of the 120 cubes of the model. An ability in any cube is unique by virtue of its particular combination of one kind of operation, one kind of content and one kind of product. Two examples of such abilities are the memory for semantic relations, and the evaluation of behavioural systems (see figure 2.1) (Guilford & Hoepfner 1971:19).

Operations:	*major kinds of intellectual activities or processes; things that the organism does in the processing of information, information being defined as that which the organism discriminates*
Contents:	*broad, substantive, basic kinds or areas of information*
Products:	*basic forms that information takes in the organism's processing of it*

According to Guilford, an individual has to use many of the abilities in the model to be able to carry out effective problem-solving. It is, however, mainly the operations (see figure 2.1) involving divergent production and the products concerning transformations which are linked to creativity (Treffinger *et al* 1982:9).

Figure 2.1

The structure-of-intellect model



(Guilford & Hoepfner 1971:19)

Divergent thinking comprises the following abilities: word fluency, concept fluency, associational fluency, ideational fluency, expressional fluency, figural spontaneous flexibility, semantic spontaneous flexibility, originality, elaboration, symbolic redefinition, and semantic redefinition (Klein 1973:14-16).

Transformation includes changes of various kinds (redefinitions, shifts, transitions or modifications) in existing information (Guilford & Hoepfner 1971:21).

Guilford's structure-of-the-intellect model has delivered a valuable contribution towards the testing for creative ability. Abilities such as flexibility, fluency, elaboration and originality are evaluated in creativity tests and in addition, various methods which aim to stimulate creativity also focus on these factors. Guilford emphasises the cognitive abilities which come into being during the creative process.

Torrance, a well-known educational psychologist, has conducted an exceptionally large amount of research on creativity and its nurturance since 1958. He developed the Torrance Tests of Creative Thinking (previously known as the Minnesota Tests of Creativity) which measure creative talent, and test for several of Guilford's abilities. Torrance considers that the major reason for developing these tests was his belief that they provide a useful basis for adjusting teaching methods to individual learning styles. According to him, knowledge about creative thinking abilities provides clues about different preferences for ways of learning.

The process definition of creativity by Torrance (see 1.9.1) was formulated for research purposes. According to him, this definition describes a natural human process involving strong human needs during each stage. In his own words:

> *... if we sense some incompleteness or disharmony, tension is aroused. We are uncomfortable and want to relieve the tension. Since habitual ways of behaving are inadequate, we begin trying to avoid the commonplace*

> *and obvious (but incorrect) solutions by investigating, diagnosing, manipulating and making guesses or estimates. Until the guesses or hypotheses have been tested, modified, and retested, we are still uncomfortable. The tension is unrelieved, however, until we tell somebody of our discovery* (Rothenberg & Hausman 1976:217-218).

The above quotation illuminates not only Torrance's definition, but also his view of the creative process and thoughts behind the creative thinking abilities which he has identified. In addition, it has a message for the educator as it indicates the manner in which students should be approached which will give them the opportunity to be free to use their minds to discover for themselves the truths of reality.

Throughout his research on creativity, Torrance has emphasised the teacher's role in organising the classroom environment in order to encourage and allow creativity. According to him, the key-creative abilities are:

sensitivity: *the ability to see defects, needs and deficiencies or to see what needs to be done.*

ideational fluency: *the ability to produce a variety of ideas or hypotheses concerning possible solution to problems.*

flexibility: *the ability to adapt to changing instructions, to be free from inertia of thought, and to use a variety of approaches.*

originality: *the ability to produce uncommon responses, unusual or unconventional associations.*

elaboration: *it involves imagination and exposition of detail, it is a function of creative detail.*

penetration: *the ability to go beyond the obvious in seeking a solution.*

analysis: *the ability to analyse problem situations or to determine meanings.*

synergy: *the ability to put things into context, arriving at whole systems unpredicted by knowledge of its parts or subsystems.*

synthesis: *the ability to organise meanings by bringing together previously unrelated items in a meaningful order.*

redefinition: *the ability that makes thinking more productive than reproductive - to redefine or reorganise what we see, to shift the function of a familiar object, or to see something well known in a new context.*

internal visualisation: *to visualise beyond exteriors, to pay attention to the internal, dynamic workings of things.*

psychological openness: *to take time to understand a problem to consider a variety of factors and alternative solutions.*

(Klein 1973:17; Marriner 1977:58; Torrance 1979:64, 66, 73, 103, 116, 168)

When contemplating these creative thinking abilities it becomes clear that creativity can never be mere reproduction - these abilities lead to productive thinking. To reaffirm this statement Torrance's *artistic* and *survival* definitions are given.

His artistic definition of *creativity is* ...

wanting to know

digging deeper

looking twice
listening for smells
listening to a cat
getting in
getting out
having a ball
cutting holes to see through
cutting corners
plugging into the sun
building sandcastles
singing in your own key
shaking hands with tomorrow
(Sternberg 1988:49-55)

Torrance is of the opinion that the above definition has aided him in generating hypotheses, suggesting ideas, theorising, organising his thinking, and communicating the nature of creativity.

His *survival* definition of creativity is:

> *The truly creative is always that which cannot be taught. Yet creativity cannot come from the untaught. ... The elements of a creative solution can be taught, but the creativity itself must be self-discovered and self-disciplined* (Sternberg 1988:58).

This definition implies that knowledge is necessary before creativity can appear, and that creative elements become visible once the act of creativity has emerged and can thus be taught from examples. Creativity itself, however, cannot be taught because it is a unique experience which has to be self-discovered and self-disciplined.

For Torrance, the Japanese concept of *satori* is synonymous with that of creativity. According to the Japanese, the highest point attainable in *expertness* is *satori* which means a sudden flash of enlightment. It requires persistence, intense devotion, hard work, self-discipline, diligence, energy, effort and expertise. Torrance firmly believes that qualities such as persistence, creative thinking and problem-solving can be taught (Torrance 1979:ix, 9).

Although Torrance agrees with Guilford on many of the aspects involved in the creative process and has included many of Guilford's factors in the Torrance Tests of Creative Thinking, he elaborates on a greater variety of factors which he regards as essential to the creative process. He not only identifies certain cognitive abilities but also stresses the need for affective abilities and the urgent message that we receive from him is that creativity requires hard work, effort, persistence, devotion, self-discipline and self-discovery - qualities which are mentioned repeatedly by several people who are considered to be experts on creativity and which are discussed below in the sections dealing with the theories of creativity.

2.5.1.2 Creative problem-solving

Some theorists have approached creativity through the medium of experimental research involving complex reasoning and problem-solving processes. The Creative Problem-solving Approach which was pioneered by Wallas in 1926 but was further developed by Rossman in 1931 and Alex Osborn in 1963, and advanced by Sydney Parnes and his associates in 1977, is widely known. In his approach Wallas originally identified four stages of creative thinking, namely, preparation, incubation, illumination and verification and although he arrived at this conception through his own observations and introspection and not through systematic empirical observation, his view has been widely accepted by other theorists. Wallas made use of the experiences of Helmholtz (a great German physicist) and Poincaré (a reknown French mathematician) in order to clarify and augment his interpretation of the four stages.

Helmholtz described the way in which his most important new thoughts have come to him. He recorded that after thorough investigation of a problem *in all directions ... happy ideas come unexpectedly without effort, like an inspiration. So far as I am concerned, they have never come to me when my mind was fatigued, or when I was at my working table ... They came particularly readily during the slow ascent of wooded hills on a sunny day* (Rothenberg & Hausman 1976:69-70).

According to Wallas, Helmholtz actually describes three stages in the formation of a new thought. The stage during which the problem was investigated *in all directions* Wallas called preparation. The second stage during which Helmholtz was not consciously thinking about the problem, Wallas referred to as incubation, and the third stage, marked by the appearance of the *happy idea* together with the psychologic events preceding and accompanying that appearance, was called illumination. Wallas added a fourth stage, verification, not mentioned by Helmholtz, but derived from a description by Henri Poincaré.

Poincaré detailed the stages during which two of his great mathematical discoveries were made. Both discoveries came after a period of incubation during which no conscious mathematical thinking was done but, as he believed, much unconscious mental exploration took place. Incubation was preceded by a preparation stage of hard, conscious, systematic and fruitless analysis of the problem. The final ideas came to him *with the same characteristics of conciseness, suddenness and immediate certainty*, and in each case, their advent was followed by a period of verification in which their validity was tested, and the idea itself reduced to an exact form.

Poincaré wrote of the verification stage:

> *It never happens that unconscious work supplies ready-made the result of a lengthy calculation in which we have only to apply fixed rules ... All that we can hope from these inspirations, which are the fruit of un-*

conscious work, is to obtain points of departure for such calculations.

According to Poincaré, the calculations must be made in the second period of conscious work which follows the inspiration, and in which the results of the inspiration are verified. He also stresses that the calculations are complicated and that they demand discipline, attention, will, and consciousness (Rothenberg & Hausman 1976:70).

The manner in which Helmholtz and Poincaré arrived at their discoveries has been born out by many highly creative people who have themselves made exceptional contributions to society. Ochse (1988) in her study of the determinants of creativity has mentioned that the phenomenon of the *sudden illumination* does not only appear to the highly talented but that it is experienced by all people from time to time. The point to be made here is that those moments of *sudden illumination* appear when the mind is at rest or, in other words, during unconscious thought. It does not appear, however, without much previous conscious thought on the issue; and if not reconsidered again afterwards during conscious thought, usually nothing results from the sudden illumination.

The conclusion can thus be drawn that creativeness necessitates in-depth knowledge of an aspect, dedication, hard work and motivation in addition to unconscious and conscious thought processes.

After Rossman (1931) had examined the creative processes of 710 inventors, he extended Wallas's four stages to seven. These were reiterated by Osborn (1953) who although using slightly different terminology, described the creative problem-solving process as:

(1)	orientation	-	point out the problem
(2)	preparation	-	gather relevant data
(3)	analysis	-	break down relevant material
(4)	ideation	-	pile up alternatives through ideas

(5) incubation - *letting up* to invite illumination
(6) synthesis - put the pieces together
(7) evaluation - judge the resulting ideas
(Arieti 1976:15-16)

Sydney Parnes and his associates in turn, expanded the scope of Osborn's seven stage approach to creative problem-solving to one concerned with the practical problems of daily living. Unlike the theories of Wallas, Osborn and Rossman, application of Parnes' approach is not primarily restricted to the fields of art, science or writing. According to Parnes, creative problem-solving is comprised of five stages:

(1) fact finding
(2) problem finding
(3) idea finding
(4) solution finding
(5) acceptance finding

In the above discussion on theories of creative problem-solving both the creative process and the creative product are emphasised. In it the creative process is illuminated by the citations of conscious and unconscious thoughts which represent the entire creative problem-solving process while the creative product is realised through the verification stage (Wallas), the synthesis and evaluation stages (Osborn) and the solution finding and acceptance finding stages (Parnes).

2.5.1.3 Associative theories

Associative theories are related to psychological theories of associationism. Thoughts are believed to be the association of ideas, new ideas being deduced from old ideas. Creative thought is seen as the activation of mental associations and the conclusion is made that more associations imply more ideas which leads to increased creativity

(Olivier 1978:53).

Mednick (1962) defines creative thinking as *forming ... associative elements into new combinations which either meet specific requirements or are in some way useful. The more mutually remote the elements of the new combination, the more creative the process or solution.* According to Mednick, highly creative people initially give conventional responses to verbal stimuli but, unlike most people, they continue to respond, probing deeper into the associative hierarchy until they find more remote associations which form the basis for creative ideas or solutions (Treffinger *et al* 1982:10).

Koestler (1964) has introduced the concept of *bisociation*, which according to him, underlies every creative process. *Bisociation* is the connecting of previously unrelated levels of experience; it is any mental occurrence which is simultaneously associated with two habitually incompatible frames of reference in the physical, psychological or social world. When two independent frames of reference interact, the result is a new intellectual synthesis (Arieti 1976:16; Klein 1973:6; Treffinger *et al* 1982:10).

Koestler distinguishes between associative and bisociative thought as follows. The association within the confines of a given frame of reference is viewed as a habit whereas bisociation of independent frames of reference is seen as originality (Rothenberg & Hausman 1976:113).

The associative theories reflect many of the principles expressed by the cognitive and problem-solving theories. Fluency and flexibility are implied by increasing mental associations and the association of old and new ideas (as cited by Mednick). Originality is characterised by the remoteness of the elements in a new combination and penetration is applicable when *probing deeper into the associative hierarchy*. Synthesis comes into being during the merging of two independent frames of reference. Originality, synthesis, flexibility and elaboration are essential during *bisociation*. The possession of previous

knowledge and the ability for dedication and hard work are among those attributes which are highlighted as being extremely important during problem-solving and are prerequisites to the design of new combinations and the synthesis of previously unrelated frames of reference.

Koestler mentioned a very important aspect when he referred to the *association of two habitually incompatible frames of reference*. This is supported by many contemporary creativity experts who emphasise the essentiality of moving out of well known frames of reference or perceptions, to new and different ones to enable creative thinking to take place. It has also been restated by many theorists that creative genius stems from hard work and a deep knowledge of one's subject.

2.5.1.4 Gestalt theories

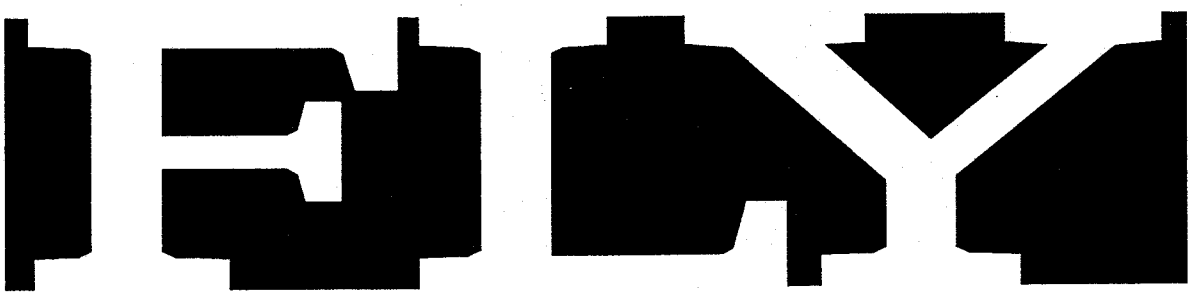
The Gestalt psychologists believe that creative thinking begins in problematic situations. The thinker's aim is to reconstruct the gestalt or pattern which appears incomplete in order to restore the equilibrium of the whole. According to the Gestalt, this focus on pattern identification is closely related to the negative role of habit, mental set, fixation and rigidity (Treffinger *et al* 1982:10-11).

Pattern identification, as related to habits, mental sets and rigidity, refers to the tendency that people display in focusing on certain elements of the whole, forming their own personal perceptions and thinking within certain frames of reference. People find it extremely difficult to change their perceptions or to change from one frame of reference to another. This phenomenon is illustrated in figure 2.2.

Whether an old lady or a young lady has been recognised in the top picture of the figure and whether the word **fly** could be read on the bottom picture all depend on the individual's own perception.

Figure 2.2

Pattern identification



The Gestalt's reference to the negative role of habits, mental sets, fixations and rigidity is an important issue when dealing with creativity. It is this tendency to look at problems from a certain mental set and to search for solutions among those which proved satisfactory in the past (although they were not necessarily the most effective solutions) which hinders creative thought. If the individual can loosen himself from previous perceptions and habits to look at a problem with an open mind, to view it from an unfamiliar perspective, and to allow his mind to wander and search for uncommon solutions amongst a great many possibilities, the chances for more effective solutions increase. This kind of situation asks for openness, freedom, penetration, fluency, flexibility and originality - the very qualities essential to creative thinking. These attributes are directly opposed to fixed mental sets, habits and rigidity.

Wertheimer (1945) focuses on slightly different aspects during pattern identification and problem-solving. He regards the problem-solving process as a consistent line of thinking because throughout the process, the thinker attempts to satisfy what he calls *an inborn urge* to grasp the whole pattern and to restore it. He describes creative thinking as follows: *The entire process is one consistent line of thinking ... each step is taken surveying the whole situation* (Olivier 1973:54). Wertheimer also relates productive thinking to creative thinking. He describes the creative process as moving from a structurally unsatisfactory situation to one which offers a solution. During this process, grouping, organisation and structuralisation take place to form a better Gestalt, and these cognitive operations are inherent in all productive thinking (Arieti 1976:17).

Whereas the Gestalt emphasises the reconstruction of a problem situation and the ability to focus on pattern identification freed from previous perceptions, Wertheimer elaborates on this principle by linking creative thinking with productive thinking. To him, the problem-solving process is marked by grouping, organisation and structuralisation which actually encompass cognitive abilities such as analysis, evaluation and synthesis - abilities already identified as crucial to creative thinking by other theorists. His linkage of productive thinking to creative thinking is a very acceptable one since the creative

process is not compatible with reproductive thinking but specifically requires those cognitive abilities (evaluation and synthesis) which are marked by productive thinking.

From the above discussion it is obvious that the Gestalt theorists focus on the creative process.

2.5.2 Personality and environmental theories

Within this group of theories of creativity the focus is on the nature of the creative person and not on the processes or products of creative thinking. This is a shift from the cognitive abilities emphasised in the first group of theories to the affective nature of creative talent.

2.5.2.1 Personality theories

Crutchfield's (1955) research on conformity and character revealed some interesting information on non-conforming and conforming behaviour. He identified the following characteristics in individuals who exhibit extreme non-conforming behaviour: intellectual effectiveness, leadership ability, rigid and excessive self-control, self-reliance, independency, maturity of social relations, authoritarianism, the ability to think for themselves, ego strength and an absence of inferiority feelings. In sharp contrast to this group, is the characterisation of those who exhibit highly conforming behaviour: a narrow range of interests, lack of insight into their own motives, submissiveness, compliance, conformity, inhibitedness, inability to adapt under stress, and overly responsive to other people's evaluations. According to Gowan, Demos and Torrance (1967:131) conformity and creativity are essentially antithetical because conformity is believed to restrict freedom, expression and experimentation. The creative person is thus one who encompasses the characteristics of the non-conforming individual.

Anderson's (1959) perception of creativity and personality development is that creative

growth stems from confronting differences, differentiating the self from others and integrating many complex factors into a self-concept. He sees the development of the creative personality as positive, open and constructive, rather than negative, closed and defensive (Treffinger *et al* 1982:11).

Barron and MacKinnon (1961) found that creative people tended to be self-accepting, flexible, independent, intuitive and perceptive (Rothenberg & Hausman 1976:197, 198). Subsequent studies by MacKinnon (1978) and Barron (1969) and their associates showed that highly creative individuals are more successful than their less creative counterparts in reconciling the opposites of their nature. The concept of unity of opposites was demonstrated in their research. Highly creative persons are at the same time more masculine and more feminine, more independent and more dependent, more conforming and more non-conforming and are more self-acting, receptive and open. According to Torrance (1979:7), less creative people are puzzled by these conflicting characteristics because they do not fit logically, and they are therefore unable to grasp the synthesis of these opposing characteristics.

During a 32-year longitudinal study Torrance identified eight qualities of creative individuals which he refers to as the *beyonders*. His research subjects were followed from their primary school years to adulthood. He found these *beyonders* were all learnable and teachable, and identified in them the following common qualities or abilities: vision, knowledgeable, inquisitiveness, rediscovery, creativity, persistence, passion (includes drive, enthusiasm, high energy level) and utilisation of both the left and right hemispheres of their brains (Torrance 1993:132-134).

In the literature theories on personality attempt to identify personality characteristics, qualities and abilities, attitudes and behaviour patterns in order to characterise the creative person. There are obvious similarities with regard to the characteristics of creative persons. These include an openness to experience, ego strength, independence, a positive attitude, flexibility, sensitivity and intellectual effectiveness. The abilities of

openness to experience, sensitivity, intuitiveness and freedom of perception belong together and are emphasised by both the cognitive and the Gestalt theorists. Anderson's reference to the ability of the creative personality to integrate many complex factors into a self-concept corresponds with the concept of the unity of opposites found in creative persons, as reported by Barron and MacKinnon and Torrance. This leaves the impression that the creative personality is a strange synthesis of dichotomies.

2.5.2.2 Environmental theories

The investigations which focus on the influence of environment on creativity are addressed to specific problems and issues and the conclusions reached do not include comprehensive theories postulations on the nature and origin of creativity. The influence of aspects, such as social and cultural expectations, classroom environments, teacher attitudes, rewards and motivation, are reported in the results of various research studies.

2.5.2.2.1 Social and cultural influences

Research conducted by Sydney Parnes during creative problem-solving courses offered at the University of Buffalo, New York, show that cultural and emotional blocks hamper creativity. Emotional blocks interfere with clear thinking and may even *freeze* it. Emotions which may play a role are anger, fear, anxiety, hate, love, fear of failure, fear of being different, fear of ridicule, fear of rejection, and poor self-concept. The exaggerated emphasis being placed on conformity, competition, perfectionism, logical thinking; a servile dependency on authority; and a fear of making mistakes, are also detrimental to creativity. The latter has been reaffirmed by Torrance who, in addition, claims that social pressures encountered at home and in the community also interfere with the creative process. He refers to the excessive emphasis being placed on the attainment of success and the exaggerated fear of making mistakes. There is a tendency to emphasise the finished product and to give credit only to verbal skills. Not recognised are the struggles through which achievements come into being, and the amount of

thinking which takes place that cannot be expressed in verbal form. Great emphasis is being placed on what a person knows but not on what the person can do with what he knows (Davis 1986:9-10; Prinsloo 1973:129; Torrance 1967:54-55).

According to Tumin in Parnes (1992), the individual will strive towards creativity, self-expression and individual uniqueness in an amount proportional to that of the safety status he brings with him. *Safety* prevails when the individual has reassurance regarding his worth as measured by others - viewing him as desirable and significant and a worthy member of society. The obstacles to creativity lie in the very nature of society itself. If a society is competitively-oriented, the individual will not feel status secure if others are judged more worthy than he and the fate of the majority would be status-insecurity. The *competitive grading system* of traditional secondary education systems is a barrier to the nurturing of creativity. Children are socialised with greater concern about their *whatness* as marked by external criteria, and lesser concern about their *whoness* as marked by the subjective sense of integrity and individuality. Tumin also refers to the reliance on *habit* as a basic instrument for social control - to habituate to the norms of conformity which yield social safety (Parnes 1992:108-110).

2.5.2.2.2 Learning environment

A psychologically secure and free environment is essential for the nurturance of creativity. The nature of such an environment is explained in greater detail in the discussion of Carl Roger's theory of creativity in this chapter. A classroom environment which promotes the fostering of creativity must, amongst other things, be free from external evaluation, quick judgement and criticism, and must be organised to allow for the experience of both cognitive and affective processes.

According to Parnes, the principles of deferred judgement and extended effort are crucial to the creativity inducing environment. Deferred judgement means to postpone judgement and is seen to be conducive to the release of creative behaviour. Students

should not be restricted but should be allowed to voice their ideas. Extended effort implies that obvious solutions to problems should not be accepted immediately but that the opportunity to search for a variety of solutions must be granted in order to increase the likelihood of considering more alternatives. Twelve out of fourteen studies found that more ideas, many of which were of good quality, were produced by students when deferred judgement was applied (Parnes 1972:16-20).

Carl Rogers (Torrance 1979:74-75) has stressed the hazards of external evaluation, a process which often produces defensiveness, and emphasised that a person should maintain his own locus of evaluation. The negative influence of expected evaluation on creative production has been reaffirmed by Amabile. Individuals generate significantly more creative products when they know they will not be evaluated on their quality than those who know beforehand that whey will be evaluated (Sternberg 1988:25).

The need for the integration of both cognitive and affective aspects of creativity in the classroom was indicated by Williams (1970, 1982) who developed a three dimensional model which emphasises this. While planning and applying learning and instruction processes, allowance should be made for the facilitation of the cognitive aspects (fluency, flexibility, originality and elaboration) as well as the affective aspects (curiosity, intuition, imagination and risk-taking) of the creative process in order to create a creativity-inducing learning environment (Treffinger *et al* 1982:12).

2.5.2.2.3 Teacher attitudes - the open teacher

An open relationship between teacher and student is regarded as essential to a creative relationship. Parnes (1972:17) views *open* teachers as those who are idea seeking persons and *closed* teachers as those who give all the ideas and information. Studies show that the environment created by the *open* teacher is more conducive to growth in student creative behaviour, and that a caring and trusting teacher is important for nurturing creativity (Ellison 1993:12-13).

According to Goodale (1970:94-95), teachers who are rigid and compulsive cannot tolerate deviations from their lesson plans and do not allow students to explore and experiment on their own. Hallman (1967:325-327) lists the obstacles to creativity which are cited in the literature and which might well typify the attitudes of the *closed teacher*. Teacher-chosen goals and activities, standardised routines and authoritarian attitudes, repress the creative potential of students as they inhibit self-directive and self-responsible learning. Ridicule and domination of students, hostility towards the divergent personality (curious, individualistic, non-conforming), and threats, freeze any latent creative potential. Rigidity of personality which may manifest itself in inflexible defense mechanisms and compulsive fears which tend to shield teachers' ego-centred interests, dampen the exploratory and risky ventures which characterise creative activities. The over-emphasis of rewards such as grading systems, external evaluation and excessive quest for certainty instilled by teachers who demand only correct answers, suppress the creative urge. Teachers who over-emphasise success cause student energies to switch from the creative process to focus upon outcomes. Teachers who do not tolerate a *play* attitude in the classroom, stifle creativeness, as innovation requires freedom to toy with ideas and materials, and permission to indulge in fantasy.

In contrast to the fore-going negative aspects of creativity inducement, research has provided the principles by which a creativity inducing environment can be organised and these have a direct bearing on the way the *open teacher* creates a learning environment. The *open teacher* is one who provides opportunities for self-initiated learning while encouraging self-activity, exploration, experimentation, and hypothesising. This helps to keep alive the motivational forces for learning within the individual learner. The creative teacher organises a non-authoritarian learning environment which provides psychological freedom (established by accepting each student as being unconditionally worthy, by understanding emphatically and by withholding external evaluation). This allows students the freedom to express themselves spontaneously and symbolically in order to promote creativeness. It also fosters responsibility because they are entrusted to make decisions. They are encouraged to over-learn so that the materials become

subject to restructuring. The teacher encourages creative thought processes by stimulating students to seek new relationships between concepts, and to associate, imagine, think up tentative solutions for problems, make wild guesses, build on the ideas of others, and combine materials into new patterns. A very important attribute of the creative teacher is that of deferred judgement. Outcomes and solutions are not provided; errors are expected and accepted; and the finalising of solutions is postponed. The result is that risk taking, exploration and flexibility are encouraged. Open-ended and operational questions which cannot be answered merely by the recitation of facts, are asked in order to foster curiosity, encourage exploration and stimulate connotative tendencies. Self-evaluation is encouraged while group norms and standardised tests are rejected because of their inappropriateness to, and detrimental effect on creative learning. Practice in self-evaluation increases self-activity, responsibility, and feelings of self-worth, because the individual's own powers of judgement serve as the final standard in determining the worth of newly created products. Students are provided with opportunities to manipulate materials, ideas, concepts and structures, as craftsmanship is an essential ingredient in the creative personality. The creative teacher assists the student to cope with frustration and failure since the creative personality never quits. Students are also assisted to become more sensitive as a person - to become sensitive not only to the moods and feelings of others, but also to external stimuli, social and personal problems, academic problems, public issues, and the commonplace and the unknown. The creative teacher encourages students to consider problems as wholes, perceiving total structures rather than additive elements as the greatest insight occurs when priority is given to structural patterns and principles (Hallman 1967:327-330).

2.5.2.2.4 Rewards and motivation

Research studies indicate that the promise of rewards decreases students' motivation. Non-rewarded students show a stronger preference for more complex and challenging tasks and deliver products of much higher quality, than those confronted with rewards (Sternberg 1988:19-20).

Hennessey and Amabile have found a strong positive link between an individual's state of motivation and the creativity of his performance. They emphasise the important role that the principle of intrinsic motivation plays during creative performance, because of interest, enjoyment, satisfaction and the challenge derived from of the task itself. According to them, people will be most creative when intrinsically motivated (Sternberg 1988:11).

According to Crutchfield (1961, 1962), task-involved intrinsic motivation will lead to higher levels of creativity than ego-involved extrinsic motivation. He found that high levels of intrinsic motivation are present while notably, creative persons are working. Deci and Ryan (1985) viewed intrinsically-motivated persons as those who would seek situations which interest them and which thus require the utilisation of their resourcefulness and creativity. Another view which emphasises this point is that of Lepper and Greene (1978) who suggested that the intrinsically-motivated person, as apposed to the extrinsically-motivated one, feels more free to take risks because risks carry no liability when self-imposed. Other studies have shown that aspects such as rewards, direct surveillance, deadlines for tasks, external evaluation, and a task being presented as the means, all tend to decrease intrinsic motivation and are, as a result, detrimental to creativity (Sternberg 1988:13-19).

The role of intrinsic motivation in creative performance is apparent in most studies about creative persons. Their intense involvement and unrivalled love for their work must be brought about by a deep interest and enjoyment. On the other hand, it appears that extrinsic motivation will lead a person towards the gaining of knowledge and completion of tasks, but it will not in itself stimulate creativeness.

2.5.3 Humanistic theories

The humanistic approaches to creativity emphasise self-realisation, personal growth and fulfilment. The humanists base their theories on the premise that man can create his own

life, and view this as the ultimate in creativity. This is illustrated rather clearly by Groch (1969) as quoted by Klein (1973:7-8):

> *What is required is the disposition and courage to encounter the world directly, rather than through the shop-worn thoughts and stereotyped emotions of others, to originate one's own acts rather than to perform by rote and habit, and to feel rather than think one's own feelings.*

Rollo May distinguished between pseudo creativity which he sees as a superficial artificial creativity (an aestheticism) and actual creativity which brings something new into birth, enlarges human consciousness and fulfils man's own being in the world (Klein 1973:8).

Actual creativity is defined by May as *the encounter of the intensively conscious human being with his world.* Encounter means to absorb something actual or something ideal and this refers to creativity whereas the escape from the idea by art, is viewed as talent. The difference between talent and creativity is that talent can be used or not, while creativity can only be seen in the act. Intensively means a heightened awareness (consciousness) leading to a feeling of joy. This heightened consciousness refers to absorption and abandon, but not to self-consciousness. According to May, human beings cannot will insight or creativity, but can will encounter with intensity and commitment. The intensity of encounter with the world is explained by May in terms of the Greek prototypes of passion and vitality (Dionysius) and form and order (Appollo). May considers that the combination of these prototypes produces a total person with the conscious and unconscious forming a unity, the conscious state being supra-rational rather than irrational. This bringing together of the volitional, emotional, and intellectual forces produces an ecstasy - this is creativity according to May (Klein 1973:8-9).

May is referring to creativity as a process and his use of the words encounter and intensively conscious concur with the Gestalt theorists' idea of viewing the real world

freed from perceptions. He also implies that creativeness can be developed to the ultimate if a person is willing to encounter his world with intensity and commitment - this signifies a passion to live a full and productive life.

Abraham Maslow distinguished between what he calls *special talent creativeness* (creative genius) and *self-actualising creativeness* which originates more directly from the personality. He viewed self-actualising creativeness as a special kind of perceptiveness, an openness to experience. People endowed with the latter *can see the fresh, the raw, the concrete, the idiographic as well as the generic, the abstract, the rubrisized, the categorised and the classified.* According to Maslow, they live in the real world of nature rather than the verbalised world of concepts, expectations, beliefs and stereotypes (Rothenberg & Hausman 1976:87-88).

Before formulating his two concepts of creativeness Maslow deviated from his stereotyped notion that health, genius, talent and productivity are synonymous, when he realised that some of the greatest geniuses of mankind such as Van Gogh, Wagner and Byron were not psychologically sound. Health and special talent are separate variables and on this basis he made the distinction between the two kinds of creativeness. Maslow focused on self-actualising creativeness and views the individuals possessing this form as being unfrightened of, and attracted to the unknown, the mysterious and the puzzling. He describes a resolution of dichotomies in self-actualising people. They can be very selfish in one way and very unselfish in another; most mature in some sense and yet strongly childlike in another; they can merge work with play, duty with pleasure. These opposites, however, are not incompatible, but fuse together in a dynamic unity or synthesis. Maslow views these self-actualising people as integrators because they bring separates and opposites together into unity (Ochse 1990:21; Rothenberg & Hausman 1976:86-87).

Maslow identifies certain personality traits in self-actualising people and proposes that while creativeness is constructive, synthesising, unifying and integrative, its manifestation

depends on the inner integration of the person. Such people are more self-accepting than the average person, and are less controlled and inhibited. The self-acceptance implies greater wholeness and integration. Maslow referred to self-actualising creative people as follows: *More of themselves is available for use, for enjoyment, and for creative purposes. They waste less of their time and energy protecting themselves from themselves* (Klein 1973:10). Self-actualising people demonstrate an openness to experience; an increased spontaneity, expressiveness, courage, freedom, integration and perspicuity - these characteristics compose the self-actualising creativeness which is expressed in the creative life, creative attitude or creative person (Rothenberg & Hausman 1976:89-91).

Maslow's theory of self-actualising creativeness is supported by the work of others including Buckmaster and Davis (1985) and Craig (1966) who reported that people who score high in self-actualisation also score high in creativity (Davis 1986:6).

There appear to be certain commonalities between Maslow's theory and some of the views already mentioned. Special talent creativeness can be linked to the traditional view that creativity is inherited. This type of creativity is evident in the lives of creative geniuses. Self-actualising creativeness includes the Gestalt and Cognitive theorists' references to a special kind of perceptiveness and an openness to experience. Maslow affirms the personality theorists' description of the phenomenon of a *resolution of dichotomies*, which he identifies in self-actualising people.

Carl Rogers, a noted clinical and research psychologist, stresses the uniqueness of the individual in his theory of creativity when he states that man's tendency to actualise himself and to achieve his potentialities, as illustrated in the urge to expand, extend, develop and mature, is evident in all organic and human life. He sees this not only as the curative force in psychotherapy but also as the primary motivation for creativity. According to him, the capability to develop one's fullest potential, exists in every human being, but in many cases becomes *deeply buried under layers of encrusted psychological*

defenses (Rothenberg & Hausman 1976:296, 198).

Rogers specifies three internal conditions for constructive creativity:

(1) Openness to experience - this is the opposite of psychological defensiveness. It signifies a lack of rigidity and a permeability of boundaries in concepts, beliefs, perceptions and hypotheses, as well as tolerance of ambiguity where it exists. The ability to receive much conflicting information without forcing closure upon the situation (which means not to perceive in predetermined categories) is emphasised. The complete openness of awareness to what exists at any specific moment, is an important condition of constructive creativity and is present in all creativity. Openness to experience, includes a receptiveness to new ideas and an attraction to new experiences and interests in the real world.

(2) Internal locus of evaluation - this means that the basis of evaluation lies within the individual. The value of his product is established by the creative individual himself and not by the praise or criticism of others. He regards this as the most fundamental condition of creativity.

(3) The ability to toy with elements and concepts - this is the ability to play spontaneously with ideas and relationships, to explore, to formulate a variety of hypotheses and to make a given situation problematic. From this, he believes, one or two evolutionary forms with more permanent values will emerge (Davis 1986:29-30; Rothenberg & Hausman 1976:300-301).

Rogers considers that an external climate of psychological safety and freedom is a prequisite for the fostering of the internal climate for constructive creativity. This can be attained by the three associated processes of:

- **accepting the individual as being unconditionally worthy** - the in-

dividual will experience a climate of safety when he senses that his potentialities are recognised and that he is thus accepted and appreciated, regardless of his present state.

- **providing a climate in which external evaluation is absent** - evaluation is always seen as a threat and this creates defensiveness. In the absence of external judgement, a person opens up to his experience and senses his own likes and dislikes. Rogers views exposure to evaluation and the setting of standards, as the most dangerous enemies of the development of creativity (Ochse 1990:25).

- **understanding emphatically** - to understand what another person is seeing and feeling from his point of view, and still to accept him, provides complete safety.

Psychological freedom means to permit an individual complete freedom of symbolic expression (to think and feel and to be what is most inward within the individual himself). It is, however, a freedom with responsibility since behaviour may be limited by societal constraints, and this is why only symbolic freedom (for example to destroy a symbol of a hated object and not the object itself) is allowed (Klein 1973:9; Rothenberg & Hausman 1976:303-304).

Rogers views creativity as an ability existing in all human beings and describes it as an urge not only to develop but to excel in life. He emphasises *openness to experience* and one can conclude from his writings that the opposite of openness is brought about by defensiveness and inhibitions, which not only hamper man's development towards his fullest potential, but also his creativeness. Roger's internal conditions for constructive creativity and his external conditions which foster it have very important implications for the educator, particularly with regard to the organisation of the learning environment.

The most prominent similarities in the humanistic theories of creativity are the concepts of full encounter with the real world through an unlimited openness devoid of inhibitions and preconceived ideas and attitudes, and the passion to develop one's capabilities to the ultimate. This, to the humanists, is creativeness. It is evident that the humanists regard creativity as a process since they describe the prominent elements inherent during the developing of creativeness. The fact that both May and Maslow distinguish between an artificial or special talent creativeness and an actual or self-actualising creativeness, confirms their view of creativity as process.

2.5.4 Psychoanalytic theories

The psychoanalytic theories of creativity originated from the work and influence of Freud and established the foundation for contemporary research on creativity.

In his analysis of the personality structure, Freud distinguishes between the *id* (which stems from the unconscious and is comprised of emotional and sexual drives), the ego (which refers to the conscious mind and is influenced by the norms of the social environment), and the super ego (which is the ethical, spiritual and religious dimension of man). To Freud, creativity develops from conflict which arises as a result of tension between the unconscious power of the id and the controlling power of the conscious (ego and super ego). When the unconscious presents a solution which is not acceptable to the conscious, it is suppressed and neurosis results. If, however, a solution from the unconscious is approved by the ego, it is released and gives rise to a creative idea which can lead to a creative product. The creative person is thus able to slacken ego control over the *id* with the result that creative impulses generated by the unconscious, surface without conflict (Klein 1973:6; Prinsloo 1973:187-189). Freud also relates the first traces of creative behaviour as an extension of childhood play and fantasies. Whereas children display creativity in games and fantasy, adults display creativity in the arts of writing and painting. According to Freud, these are an outlet of daydreams and fantasies of which the individual is ashamed (because of social norms or pressures), but, by

presenting it in an aesthetically artistic form, he makes it acceptable and enjoyable to himself as well as to other people (Davis 1986:22; Rothenberg & Hausman 1976:49, 54).

The significance of Freud's theory today is that he directed attention to the fact that creative thought is linked, not only to the conscious mind but also to the unconscious. His reference to the unconscious laid the foundation for further research on that basis. It was Freud who described primary-process thinking as the expression of emotional urges generated by the *id*. He also indicated that there is structure, meaning and purpose in this type of thinking process. Primary-process thinking is usually experienced when on the verges of sleep or when in a febrile state. It can be described as drifting, fragmented images, ideas and concepts, which may become fused or may be displaced from their usual contexts to fuse with formerly unrelated ideas or concepts. Emotional attitudes and desires may become displaced from one object only to be added to another, and objects may become symbolised by others. Primary-process thinking involves specific mental processes such as divergent thinking, analogical thinking and remote associations. The experience of unconsciously generated creative inspirations occur under these conditions. Secondary-process thinking on the other hand, is a conscious, logical, purposeful and realistic process (Davis 1986:22; Ochse 1990:220-221).

Freud did not elaborate extensively on the creative process as such, but focused on the creative writer and childhood play and fantasies, in order to explain the creative process. His view that creativity already manifests during childhood, corresponds with the general view amongst many creativity experts that all children are creative. According to Torrance, children's creativity is illustrated in their open and inquiring attitudes towards the real world and their spontaneous and imaginative responses to their environment. Torrance regards the contemporary westernised educational system as detrimental to the development of creativity.

The neo-psychoanalysts or neo-Freudians which include Schachtel, Rank, Kris and Kubie, have departed from the traditional Freudian view to place the locus of creativity

in the preconscious, rather than the unconscious (Treffinger *et al* 1982:15). The preconscious differs from the unconscious in *being open to recall when the ego is relaxed.* The relaxed attitude of the ego is regarded as extremely important. According to the neo-psychoanalysts, creative thought is only possible when the ego can draw ideas from the preconscious. The preconscious is more free to form new associations and can even replace wrong associations with new ones. The preconscious can also make comparisons and produce new ideas. The creative person can thus derive thoughts from the preconscious more freely than the non-creative person and can use these thoughts in the conscious mind to complete a product or to find a solution to a problem. Kubie (1958) emphasises the importance of the preconscious (material which can become conscious very easily and under conditions which frequently arise) in the creative process and ignores ids, egos, libidos and super egos. To him, creativity requires a temporary release of the preconscious from both the conscious and the unconscious. He views both the conscious and the unconscious as rigid and not flexible or creative at all. Since conscious processes are anchored in reality, flexibility and imaginative free play are not likely to occur. The unconscious processes are even more fixed and rigid and can only be brought to consciousness by special techniques such as drugs, hypnosis or psychoanalysis (Davis 1986:24; Olivier 1978:56; Prinsloo 1973:191-192).

Kris (1952) emphasises *regression in the service of the ego* by which he refers to regression to primary-process thought which unlike the regression in dreams or pathological cases, is controlled by, and in service of, the ego. This regression to primary-process thought (which permits the discharge of the repressed impulses mentioned by Freud) takes place in fantastic free-wandering thought processes (under a condition of ego weakness) and in creative processes (in the service of the ego). However, according to Rothenberg and Hausman (1976) regression to primary process thought is not typical of the creative process. Although the early stages of the creative process have the free wandering of thought (without being bound by rules and the conventional every day world) in common with daydreams and reveries (characterised by primary-process thought), the creative process is marked by the focusing of these free-

wandering thoughts on a specific object, idea or problem. Thus, what distinguishes regression to primary-process thought, from the creative process, is not a drive discharge function, but the openness in the encounter with the object (Rothenberg & Hausman 1976:159-160).

The above explanation of the creative process is clearly illustrated in Helmholtz and Poincaré's descriptions of their experiences of the *sudden illumination* as discussed in 2.5.1.2.

The neo-psychoanalysts contributed towards a better understanding of the creative process and Freud's approach, by elaborating on the functions of the preconscious. Their descriptions of the role of the preconscious in the creative process are confirmed by the reports of many creative people as well as ordinary people about original ideas or *sudden inspirations* being experienced when they have been on the brink of wakefulness during a time that their minds were totally relaxed. The neo-psychoanalysts, however, do not explain all the facets of the creative process, since a lot of conscious, cognitive and affective thinking takes place after *sudden inspirations*.

2.5.5 Psychedelic theories

The word *psychedelic* derives from the Greek and means *mind-manifesting*. The psychedelic theories on creativity focus on the importance of expanding the consciousness of one's mind - and help a person to be more creative through opening new horizons of untapped experiences. The assumption underlying these theories is that most people never reach the most creative dimensions of their minds since they learn from childhood to restrict their experiences. There is, however, much controversy on how altered states of consciousness could and should be attained because of the ethical considerations, legal aspects, and safety of some of the various methods used to induce them. Theorists who have investigated psychedelic approaches have employed methods such as those incorporating the use of hallucinogenic drugs, meditation, biofeedback (*brain wave*

training), and imagery training through music (Treffinger *et al* 1982:16-17).

As these theories are subject to much controversy and the methods used only accessible to experts in the field, they will not be discussed in detail for the purposes of this study.

2.6 SYNTHESIS

The various definitions and theories of creativity discussed in this chapter give an indication of the diversity of ideas and explanations of this phenomenon. Notwithstanding this divergence, certain similarities can be traced throughout. It is apparent that most of the more recent theories focus on the creative process, and although it is approached from several different viewpoints there are marked resemblances in ideas and concepts. There is consensus that while certain personality types tend to be more capable of expressing creative behaviour, creativeness can be developed or enhanced in a creativity inducing environment.

The theories of creativity should not be viewed as being contradictory with each other, but rather that they are complementary. Abilities such as flexibility, openness, penetration, originality and fluency which are described as essential to creativity by the cognitive theorists, are emphasised by the Gestalt and the humanists. The Gestalt proponents give much attention to the ability of *openness to experience* (of being able to look at things freed from previous perceptions), and the humanists stress both openness to experience and intensive encounter with the real world. Even the personality theorists confirm that abilities or characteristics, such as openness, independence, tolerance of ambiguity, drive, enthusiasm, perceptiveness and self-acting are identified in creative people. These characteristics bear a great resemblance to those mentioned by the cognitive theorists. The psychoanalysts' contribution towards creativity is found in their description of the role of the unconscious or preconscious during the creative process - an explanation of the *sudden illumination* experienced when a creative idea emerges. In contrast with this, many theories focus on the conscious processes necessary

during the creative process which eventually lead to the finished creative product.

What emerges from all the definitions and theories discussed is that creative behaviour needs certain cognitive and affective abilities and that, within the right environment, creativeness can be fostered and developed.

CHAPTER 3

Whole brain creativity

3.1 INTRODUCTION

The *split brain* studies which commenced during the 1960s demonstrated significant differences between the functions of the left and right hemispheres of the brain. These studies, together with the vast amount of research studies initiated since, have led to the psychophysiological approach, the analysis of mental functioning which has subsequently gained great impetus. The new knowledge generated through this approach, which includes the concept of cerebral dominance and implies that in each individual one hemisphere tends to play a more important role than the other, has resulted in a new understanding of the nature and process of learning. This has had far-reaching implications in the field of education.

Originating from the split brain theory is the myth that the right hemisphere is the only one responsible for holistic, intuitive and creative imaginative operations, while the left is the seat of logical, linear and verbal operations. Recent research studies have,

however, found this not to be valid. The contemporary view on the nature of creativeness is summarised in the following quotation by Williams (1983:4):

> *... the differences between the hemispheres should not obscure the fact that it is their complementary functioning that gives the mind its power and flexibility.*

The whole brain creativity model which was derived from a synthesis of the triune brain and left brain/right brain theories, will be described and discussed in this chapter, and its relationship to creativity learning, explored.

3.2 THE *SPLIT BRAIN* STUDIES

Speculation about the cerebral asymmetry of the human brain took on new dimensions during the 1960s as a result of the brain operations carried out on patients suffering from intractable epileptic seizures. During these operations the corpus callosum (a mass of nerve fibres connecting the cerebral hemispheres) was split in order to reduce the severity of the seizures. The first operation, performed by Roger Sperry (Nobel Prize Winner for Physiology and Medicine, 1981), Joseph Bogan and Michael Gazzaniga, proved successful and the patient responded to medication afterwards. This initiated research into the split brain phenomenon in human subjects at the California Institute of Technology, which comprised the same surgical procedure on similar patients, followed by various brain function tests (Corballis 1980:286; Zdenek 1985:10).

These split brain studies revealed that after the corpus callosum was bisected one cerebral hemisphere could not communicate with the other. Each functioned separately in isolation. Thus the separate functions of the left and right hemispheres of the brain could be studied through sophisticated testing procedures. Results showed that the left and right hemispheres had their own areas of specialisation and subsequent tests showed that, in a normal brain, the corpus callosum enables the cerebral hemispheres to work together

although one hemisphere predominates for a specific task (Zdenek 1985:11-12).

The results of the early investigators, who based their conclusions about hemispheric specialisation on studies of brain-damaged subjects, were queried by others who doubted that these findings could be generalised for the entire population. The answer came during the 1970s when Robert Ornstein was one of the first to demonstrate that hemispheric specialisation was not limited to abnormal people but could be measured in all people. Data gathered through electro-encephalographic techniques showed that when subjects were engaged in specific tasks, brain waves indicated that only one hemisphere was engaged while the other was idling (Herrmann 1989:13).

3.3 LEFT AND RIGHT HEMISPHERIC SPECIALISATION

The research on split brain patients and, more recently, on normal subjects, reinforces the conclusion that the two hemispheres of the brain are indeed specialised for two different modes of thinking. The left one has been attributed with linear (Efron 1963), verbal (Gazzaniga 1970), and analytic (Milner 1971), thinking processes, whereas the right has been described as the one responsible for the exhibition of non-verbal (Kimara 1967), synthetic (Levy-Aggresti and Sperry 1968), and holistic (Nebes 1974) processes (Harpaz 1990: 161). Table 3.1 is a synopsis of several researchers' findings on brain specialisation (Kolb 1984:49; Sisk 1987:291; Williams 1983;26; Zdenek 1985:13-14).

Current consensus of opinion on brain asymmetry and creativity is characterised by the assumption that the source of creative behaviour resides in the right hemisphere (Bogen & Bogen 1969; Olson 1977; Ornstein 1977; Torrance & Reynolds 1978; Gowan 1979), there is, however, agreement that creativity can originate in both hemispheres but that it does require interaction between the two hemispheres (West 1975; Brandwein & Ornstein 1977; McCallum & Glyn 1979) in Harpaz (1990:161).

Table 3.1

Functions of the left and right cerebral hemispheres of the brain

LEFT HEMISPHERE SPECIALISATION	RIGHT HEMISPHERE SPECIALISATION
• Verbal: encoding and decoding speech, reading, writing, spelling, mathematics, musical notation	• Non-verbal: knowledge is achieved through images
• Analytic: things are figured out part-by-part	• Synthesis: things are put together to form wholes
• Linear: think in terms of linked ideas, process information sequentially, often leads to a convergent conclusion	• Holistic: perceive the overall patterns and structures, can process many kinds of information simultaneously, often leads to divergent conclusions
• Convergent thinking	• Divergent thinking
• Logical: draw conclusions based on logic, one thing follow another in logical order	• Intuitive: make leaps of insight, often based on incomplete patterns, feelings, hunches or visual images
• Conscious reasoning	• Subconscious or preconscious reasoning
• Symbolic: use symbols to indicate something	• Analogic: understand metaphoric relationships and imagery, see likenesses between things
• Abstract: take out a small bit of information and use it to represent the whole thing	• Concrete: relate to things as they are at the present moment
• Rational: draw conclusions based on reason and facts	• Non-rational: do not require a basis of reason or facts, willing to suspend judgement
• Digital: use numbers as in counting	• Visio-spatial: see the relationship between things and how the parts go together to form a whole
• Controlled	• Emotional: a product of the limbic system, but the right hemisphere is more in touch with these feelings

According to Zdenek (1985:15, 17), most creative work requires the combined abilities of intuitive awareness and logical thinking - a scientist needs his logical left hemisphere for analytical reasoning but it is his intuitive right hemisphere which provides that leap of insight that solves a complex problem. This concept is confirmed by Rubenzer in the following quote:

> ... *the most productive and creative intellectual functioning is theorised to occur when there is cooperation between hemispheres* (Gowan, Khatena & Torrance 1981:280).

3.4 TWO DIFFERENT THEORIES OF HOW THE BRAIN IS ORGANISED PHYSIOLOGICALLY

In order to understand the theory of whole brain creativity it is necessary to investigate two current theories of brain organisation - the triune brain theory and the left brain/right brain theory.

3.4.1 The triune brain theory

The triune brain is an evolutionary model of the brain in which it is envisaged as a three layered structure. It is proposed that it developed over a period of time from three separate brains, with each successive entity being superimposed over the earlier one or ones. This theory of how the brain is organised physiologically has been developed by Paul MacLean, Head of the Laboratory for Brain Evolution and Behaviour, at the National Institute for Mental Health, Maryland, United States of America.

The first or oldest brain is the primitive reptilian brain (found in prehistoric as well as present-day reptiles such as alligators and lizards) comprising the brain stem, mid-brain, basal ganglia and reticular activating system. It is driven by instinct and governs vital body functions.

The second oldest is the limbic part of the mammalian brain which encircles the reptilian brain. The limbic brain is the centre for instinct and feeling and is responsible for maintaining the body's internal equilibrium.

The third brain (newest part of the brain), lies over the limbic brain and is known as the cerebrum or neocortex. The neocortex (which, in a human being, makes up approximately five-sixths of the total) consists of a convoluted mass of grey matter (nerve cells) and is responsible for the higher thought processes which enables the human to think, perceive and speak (De Meneses 1980:442; Herrmann 1989:31, 435) (see figure 3.1).

3.4.2 The left brain/right brain theory

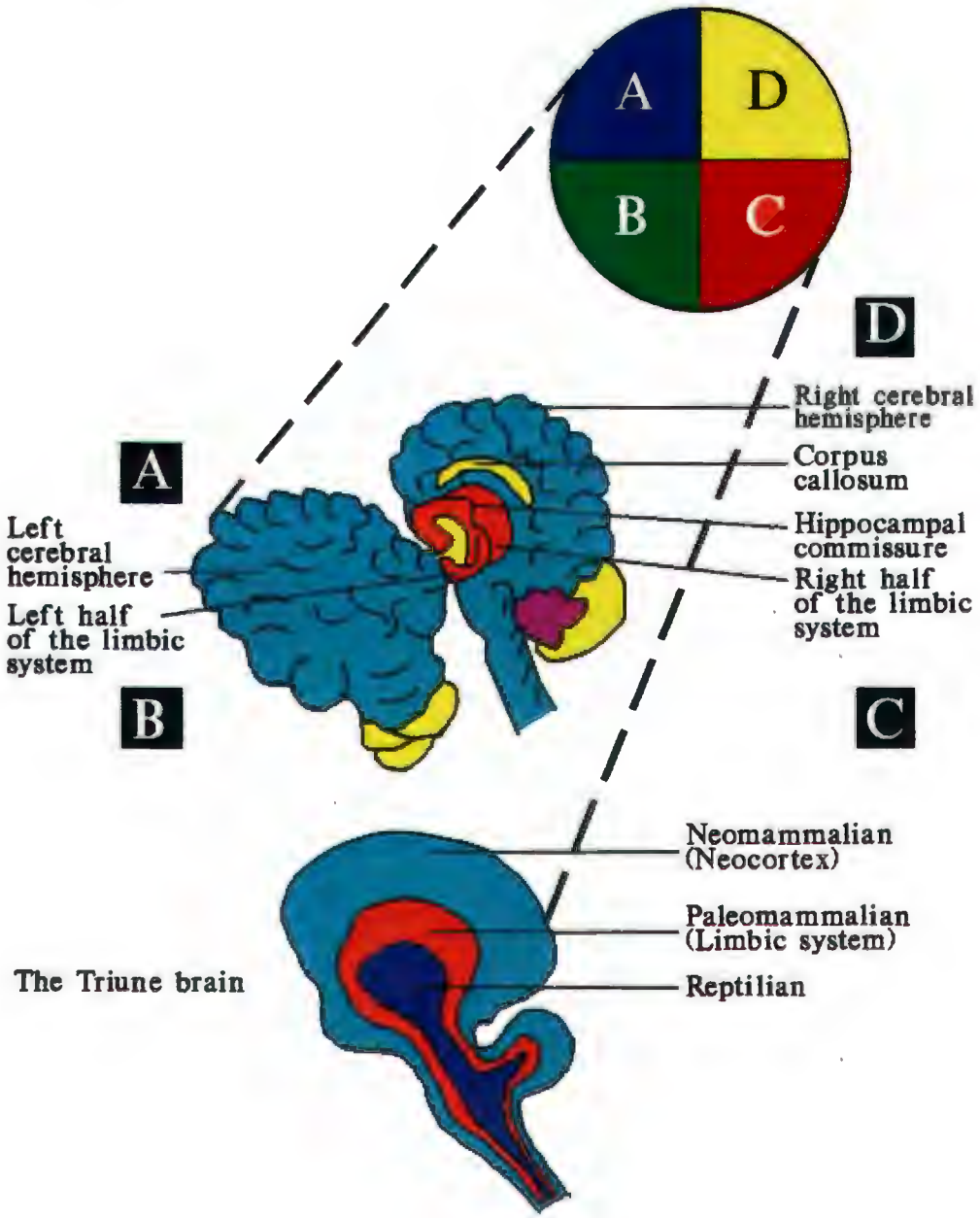
The key-aspects of the left brain/right brain theory comprise the organisation of the left and right cerebral hemispheres, the left and right halves of the limbic system, the interconnecting fibres and two patterns of brain functioning: situational and iterative.

The brain is divided anatomically into two halves, referred to as the left and right hemispheres. The greater portion of the left and right hemispheres consists of the left and right cerebral hemispheres which are responsible for the higher thinking processes: vision, hearing, intentional motor control, purposeful behaviour, language and non-verbal ideation.

The left and right halves of the limbic system, located between the cerebral hemispheres and the brain stem, are much smaller than the cerebral hemispheres (neocortex).

Figure 3.1

The four quadrant concept: a synthesis of the Triune- and left brain/right brain theories



(Adopted from Herrmann 1989:40)

The limbic system comprises, inter alia, the thalamus and hypothalamus, and is believed to control the inner being of the person. Apart from regulating emotions, metabolic functions, involuntary aspects of behaviour and the autonomic nervous system; it is also actively involved with the sensory, short-term and long-term memories (Herrmann 1989: 32-33; Marieb 1989:389-390).

The interconnecting nervous fibres in the brain, which connect the different parts of the brain, provide the physiological basis for wholeness in mental functioning. The corpus callosum connects the two cerebral hemispheres, providing a channel for hemispheric communication. Sperry and Gazzaniga's famous split-brain studies during the 1960s demonstrated that without this connection the left or right cerebral hemisphere has no way of integrating one specialised mode of knowing with that of its complement; the brain cannot, for example, develop a concept from a visual experience and then translate it into spoken words.

The left and right halves of the limbic system are connected by the hippocampal commissure which facilitates inter-limbic communication, whereas the cerebral hemispheres are connected to the limbic system through the projection fibres (Herrmann 1989:36-37; Marieb 1989:386) (see figure 3.1).

- **Situational functioning**

Situational functioning of the brain refers to the phenomenon that occurs if a region of the brain, specialised to perform a task called for in a particular situation, is activated, then the regions not required for the task go into a resting state. Research has demonstrated that the activated region of the brain sends out beta waves (high frequency waves indicating working mode) while the regions of the brain that are relaxed exhibit alpha (lower in frequency than beta) or theta (low frequency) waves. The intensity of brain waves is measured by electro-encephalogram (EEG). When a person is painting, for example, his language centre idles in alpha waves while his visual and spacial processing

centres emit beta waves. The ability of the human brain to function situationally is crucial to a person's effectiveness. The region of the brain needed to function in a particular situation must be able to do so without competition or interference from other regions (Gowan, Khatena & Torrance 1981:275-276; Herrmann 1989:37).

- **Iterative functioning**

Iteration refers to the back-and-forth movement of signals among the brain's specialised regions when performing a task. It can occur within or between hemispheres. The following is an example of iteration through the corpus callosum. A film conveying a complex idea in visual metaphors is shown to a group of people who are expected to write down their interpretations of its meaning. Signals are sent from the non-verbal region in the brain to the language region, where the pictures are translated into words. During this process iteration occurs between the right and left cerebral hemispheres. When rational thought is overwhelmed by emotional energy, iteration has taken place between the left cerebral hemisphere and the right half of the limbic system (Herrmann 1989:38-39).

Edward de Bono (a British physician) also refers to the brain's iterative behaviour and adds that it is biased and self-maximising (Parnes 1992:247). This explains why individuals viewing the film in the above-mentioned example will have different interpretations whose nature is dependent on perceptual differences (which include the involvement of emotions residing in the limbic system).

3.5 THE WHOLE BRAIN CREATIVITY MODEL

The whole brain creativity model as developed by Herrmann (1989) explains how the brain functions while engaged in the creative process. Wallas' four stages of the creative process (preparation, incubation, illumination and verification) plus the addition of interest and application, are related to the four brain quadrants which Herrmann derived

by integrating the triune and the left brain/right brain theories (see figure 3.1) (Parnes 1992:237).

3.5.1 From the split brain theory to the four quadrant model

The research that has been done on brain functioning and specialisation has clarified why certain people tend to approach problems logically, analytically and factually (left brain mode); whereas others tend to approach problems intuitively using images, concepts and patterns (right brain mode). This dominance in brain functioning determines people's cognitive styles (preferred modes of knowing). According to Herrmann (1989:17), a person's preferred mode of knowing correlates strongly with what he prefers to learn and how he prefers to learn it. This has crucial implications for human learning and thus for the organisation of teaching programmes and methods. Information which is presented in pictures, will get through to a student whose preferred mode of knowing is visual, whereas information presented in a lecture or book with text only, will not appeal to him/her.

During his search for a brain dominance - measuring technique, Herrmann started with one day seminars, *Brain Update Workshops*, in which he shared the results of the split-brain research of the 1970s with others. He designed a simple questionnaire containing questions on educational background, job focus, preferred academic subjects and hobbies, and choices between adjectives describing different functions of the specialised brain in which the subjects had to select those pertaining to themselves. The Herrmann Brain Dominance Instrument (HBDI) was developed from the data he gathered through the questionnaires (Herrmann 1989:50-53).

The early version of the instrument revealed a linear profile which reflected the basic dichotomy between left brain related modes of mental processing and those of the right brain. However, as more people completed the questionnaire, the data base grew to show four distinct clusters. Two clusters appeared at the ends of the continuum while the other

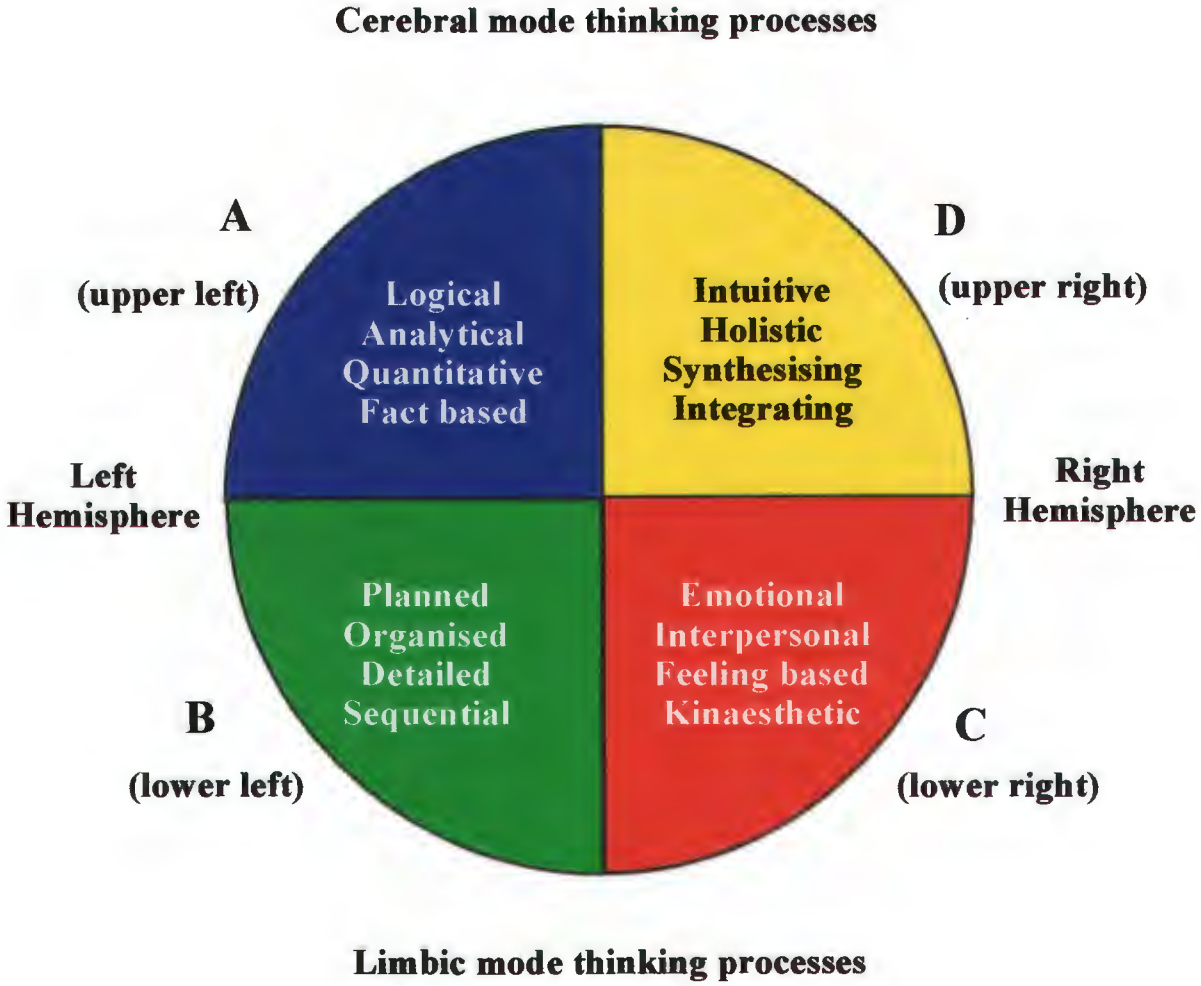
two centred between the extremes - the latter two being referred to as left centre and right centre. This phenomenon of the four clusters finally came together for Herrmann after much contemplation, when he merged the triune brain theory and the left brain/right brain theory. The limbic system of the triune brain theory was the link he was looking for. The four quadrants concept included the left and right cerebral hemispheres and the left and right halves of the limbic system (the two centre clusters) (see figure 3.1). The validity of both the design of the instrument and the data it produces has since been tested repeatedly and confirmed (Herrmann 1989:63).

Herrmann (1989) presented the four quadrant model of preferred modes of knowing and brain dominance as a whole brain creativity model. The brain is depicted by a circular diagram, divided into four conscious modes of knowing and behaviours. Although Herrmann originally thought of the whole brain model as a physiological map, he moved away from this interpretation to present the model as a metaphor. He ceased to use the terms cerebral hemispheres and limbic system in order to soften the relationship between the physiology of the brain and the metaphoric model, and renamed the four quadrants, A, B, C and D (see figure 3.2) (Herrmann 1989: 63-65). In the figure the similarities between the whole brain model and the classification of the left and right hemispheric functions as mentioned in table 3.1 are brought into perspective. Herrmann attributed a specific colour to each quadrant. These colours are illustrated in some of the figures representing the whole brain model in this thesis.

The metaphoric model is regarded as being more appropriate since determining precisely which part of the brain is doing what has become more difficult and less important - researchers have discovered that brain laterisation is not clear cut, but much more subtle, complex and versatile than they thought, as is indicated by the following research findings:

Figure 3.2

The whole brain model



(Adopted and adjusted from Herrmann 1989:411)

Studies conducted during the 1970s indicated that verbal processing is not exclusively the function of the left hemisphere but that the right hemisphere is also capable of processing language if the discriminations are uncomplicated (Nebes & Sperry 1971; Gazzaniga & Hillyard 1971), although it takes twice as long to process the same information (Moscovitch, Scullion & Christie 1976) in Gowan Khatena and Torrance (1981:273). Similar findings have been reported concerning the brain's ability to respond to music - previously believed to be exclusively a right hemispheric function. Garrett (1976:241) cites research findings which indicate that non-musically trained individuals hear music better with the left ear (right brain) whereas musicians hear music better with the right ear (left brain) because they have learned to perceive music both analytically and as a total impression. Edwards refers to research conducted by Benton (1980) who has found that the left hemisphere governs the ability to read music, whereas the right hemisphere with its holistic pattern, controls the ability to recognise, appreciate and remember melodies (Kolb 1984:48).

The metaphoric model (figure 3.2) has been proved a reliable replica of human brain specialisation when considering the results of the implementation of the HBDI. More than 500 000 people have completed the questionnaire and the study of the profiles indicates the distribution of brain dominance as follows:

Single dominant	=	7%
Double dominant	=	60%
Triple dominant	=	30%
Quadruple dominant	=	3% (Herrmann 1989:85)

According to Herrmann, the HBDI measures preference for a mental activity but this does not necessarily mean competence in performing it. Competence comes through training and experience, but world class competence can only be achieved in an area of preference. Herrmann also says that profiles tend to remain constant, but that they can, and do, change (Herrmann 1989:76).

3.5.2 The whole brain model in relation to creativity

The four quadrants of the whole brain model represent the four phases of the creative process as described by Wallas (see 2.5.1.2). The preparation and verification phases are represented by the A- and B-quadrant (left brain). These are the phases during which information is gathered, the problem is defined, and the results are measured and verified. The incubation and illumination phases are represented by the C- and D-quadrant (right brain). During these phases subconscious idea generation takes place and imagination is allowed to take over. The creative process is delicate and the correct quadrant should thus be activated during each phase. Excessive dominance in any one of the four quadrants is believed to upset the inherent balance which, according to Herrmann, makes whole brain applied creativity so powerful (Herrmann 1989:192, 276).

Herrmann views people who are creative as having a primary preference for the D-quadrant, but says that they are supported by strong secondary preferences in other quadrants which enable them to function situationally in order to complete a creative task. Supporting capabilities, when strengthened, often enhance the original preference (Herrmann 1989:197). This concept is affirmed by Wenger who states that in order to improve any area of the brain, an individual should first work in the language of that part of the brain, and then combine the behaviour with the language of another part of the brain (Parnes 1992:254).

The premise that creativeness is a product of whole brain functioning has been expressed by many authors and researchers. Rubenzer quotes several, including Chiselin (1952), Gilchrist (1970), Kraft (1976) and Norman (1977), as having suggested that *creative geniuses are most adroit at utilising both the left and the right hemispheric processing modes* (Gowan, Khatena & Torrance 1981:280). Herrmann expresses his view on this matter as follows:

> *What becomes clear when one studies the lives and writings of scientific and artistic geniuses is that what made many of them extraordinary was their use and trust of modes that are non-dominant in their particular fields* (Herrmann 1989:196).

The distinction between artistic and scientific creativity is made on the basis of the difference in primary processing modes. The artistic creative process is regarded as stronger right mode (C- and D-quadrant) oriented, relying on non-verbal, visual, imaginative and spatial abilities, whereas scientific creativity relies on the left mode (A- and B-quadrant) processes which include logic, analytical, verbal and mathematical skills.

The relation between the four quadrant model and creativity can be illustrated by the examples of creative geniuses such as Da Vinci, Einstein and Kekulé. Leonardo da Vinci has been regarded as a multiple dominant scientific and artistic giant as a result of his art works and scientific designs. Albert Einstein and August Kekulé are perceived to have been double dominant in the A- and D-quadrant with the ability to move back and forth between these two specialised modes through iteration. This enabled them to bring two different mental processes into a synergistic whole (Herrmann 1989:196-197). Einstein conceived his theory of relativity after he had a dream of himself riding on a light beam. He regarded his gift for fantasy as much more important than his gift for logic and analysis. Kekulé, a Dutch chemist, discovered the molecular structure of benzene, the benzene-ring, through a dream after struggling with this problem over a very long period. Koestler (1964) cites Kekulé's experience during his effort to synthesise benzene:

> *I turned my chair to the fire and dozed. Again the atoms were gambolling before my eyes. The smaller groups kept modestly in the background. My mental eye, rendered more acute by visions of this kind, could now distinguish larger structures, of manifold conformations, long rows sometimes more closely fitted together, all twining and twisting in snake-*

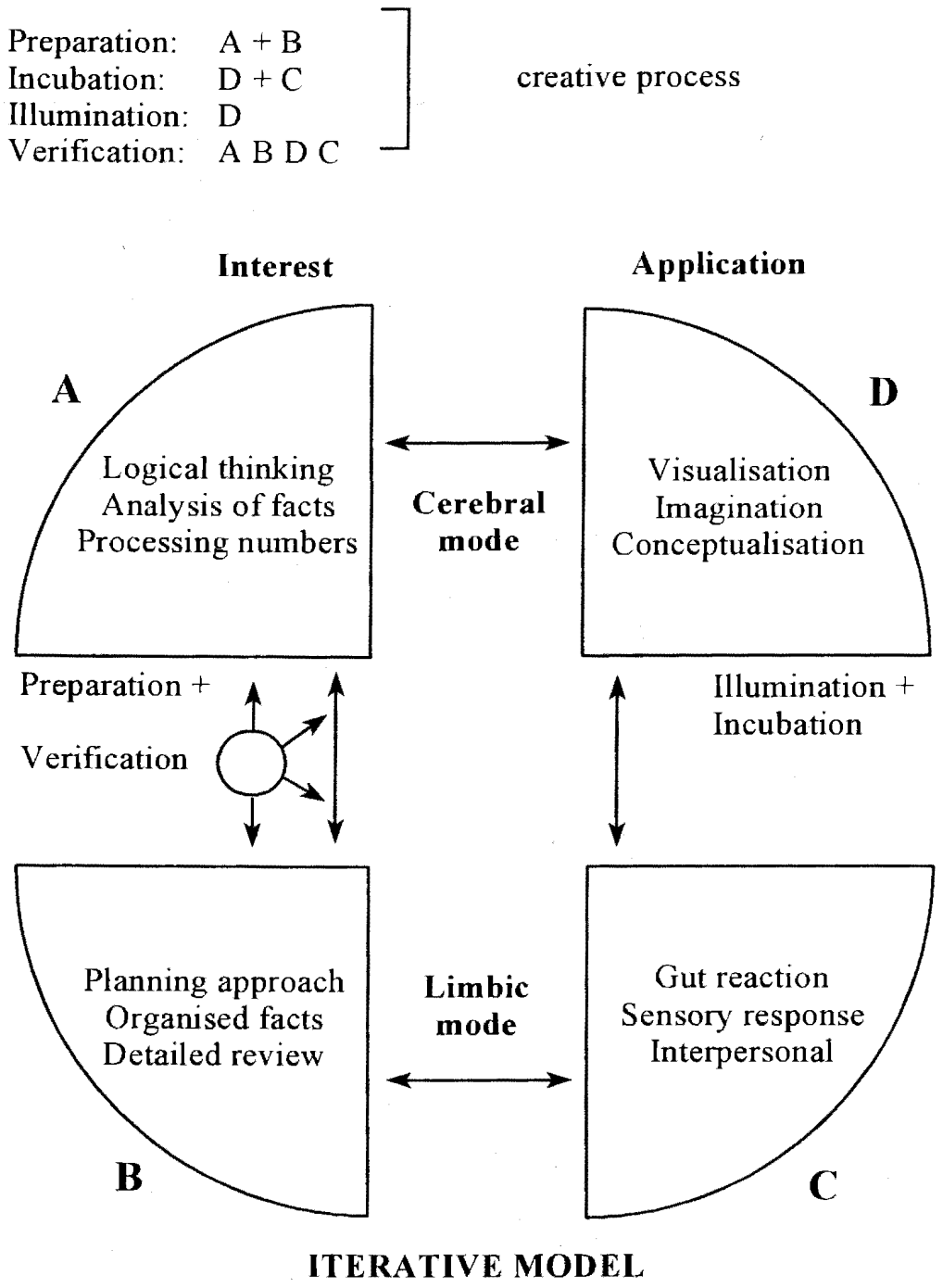
> *like motion. But look! What was that? One of the snakes had seized hold of its own tail and the form whirled mockingly before my eyes. As if by a flash of lightning I awoke* (Gowan, Khatena & Torrance 1981:250).

The above examples correspond with the descriptions of the creative process as cited by the two creative geniuses, Helmholtz and Poincaré (see 2.5.1.2). The preparation phase in these examples had taken a long period of intense study, comprising the gathering of information in order to define the problem, critical and logical thought, analysis, and verbalisation of the problem, all of which are A-quadrant processes. The organisation and sequential planning of steps, and the detail needed during this phase, refer to B-quadrant processes. During the incubation phase when the person is in a relaxed state and not consciously thinking about the problem, the right mode processes take over. The D-quadrant processes are evident in imagery, idea generation and visualisation of the problem. The person's intense interest and involvement with the problem prevents emotional distance from the problem, and allows feelings and emotions which are C-quadrant related, to play a role during this phase. It is speculated that the dreams and daydreams which give rise to the illumination phase, may originate as a result of the emotional involvement during the incubation phase. The illumination phase is dominated by D-quadrant processes as evident in the visual experiences, and conceptual, metaphoric and synthesising processes which are active during dreams and sudden insights.

The verification phase is again strongly dominated by the A-quadrant (logical, critical and factual presentation of the solution) and the B-quadrant (structured, sequential and detailed presentation of the end product). The D-quadrant is, however, also active during this phase especially in the synthesizing and integrating processes of the end product or solution. The role of the C-quadrant during this phase can be seen in the expressive, aesthetic and personalised finish of the end product (see figure 3.3).

Figure 3.3

The whole brain creativity model



ITERATIVE MODEL

(Adopted and adjusted from Herrmann 1989:218)

Apart from Herrmann's metaphor, the interactive effects of the left hemisphere and right hemisphere processes have been emphasised by other recent cognitive-oriented metaphors for the creative process. Parnes (1977) regards the integration of the special abilities of both the left and right hemispheres as essential for creativity. Torrance (1978) supports this concept as manifested in his words:

> *In creative thinking, it is especially important to understand the specialised functions of the right and left hemispheres, since almost by definition both kinds of functioning are required* (Elliott 1986:204).

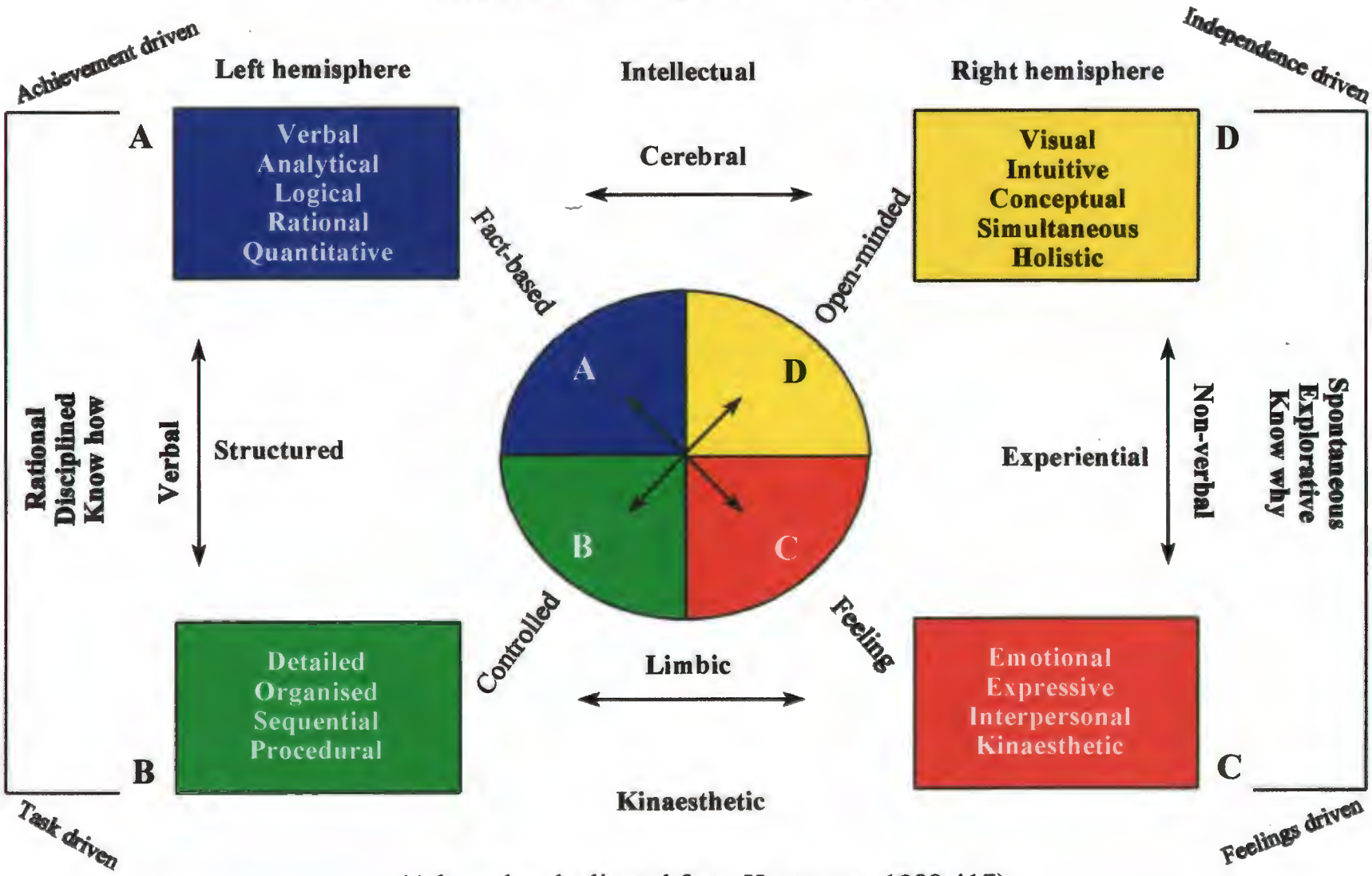
3.5.3 The whole brain teaching and learning model

In addition to the whole brain creativity model, Herrmann (1989:218-219) developed a whole brain teaching and learning model. The learning process is divided into the four brain quadrants which are placed in two categories; structured and unstructured. The structured modes (A- and B-quadrant) focus on logical, rational, analytic and quantitative activities as well as the planned, organised, sequential and procedural elements of the learning process. These are in sharp contrast with the unstructured modes (C- and D-quadrant) which focus on non-verbal, visual, conceptual and simultaneous processes, involving emotional, interpersonal and expressive activities (Herrmann 1989:220-221) (see figure 3.4).

The expanded whole brain teaching and learning model (figure 3.4) based on Herrmann's research, can serve as a guide for those who wish to improve nursing and possibly other forms of education. This model, together with Herrmann's whole brain learning and design considerations which are discussed below, can serve as a guideline for the organisation of the teaching/learning situation in order to stimulate and facilitate whole brain learning.

Figure 3.4

Whole brain teaching and learning model



(Adopted and adjusted from Herrmann 1989:417)

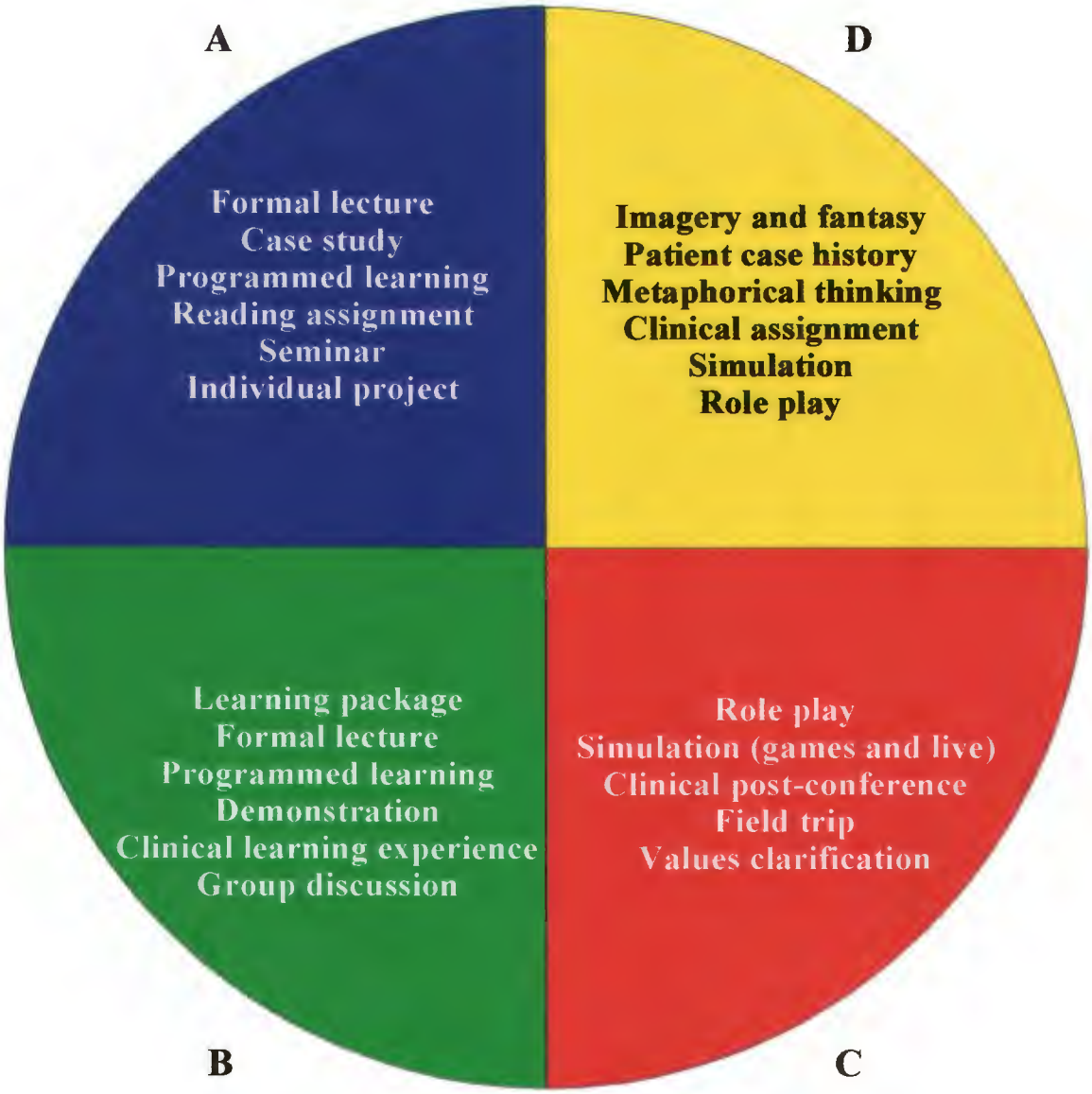
According to Herrmann (1989:419), A-quadrant dominated individuals learn by acquiring and quantifying facts, applying analysis and logic, thinking through ideas, building cases and formulating theories. They respond to formal lectures, fact-based content, case studies, programmed learning and textbooks. When the left hemispheric functions (based on split brain research and summarised in table 3.1) are taken into consideration it becomes evident that the A-quadrant processes correspond to most of these functions. Teaching strategies including seminars, individual projects and reading assignments, can be added to Herrmann's list to assist A-quadrant dominated learners as they stimulate the verbal rational and abstract processes of the left hemisphere (see figure 3.5).

The B-quadrant dominated individuals learn by organising, structuring and sequencing content, evaluating and testing theories, acquiring skills through practice and implementing content (Herrmann 1989:419). They respond, like the A-quadrant individuals, to formal lectures, programmed learning, case studies and textbooks but thorough planning and sequential order are emphasised. Because of a stronger focus on organisation and practical application in the B-quadrant, learning could be assisted by providing opportunities for demonstrations, practice sessions in a simulation laboratory, clinical learning experiences and group discussions (see figure 3.5).

The whole brain teaching and learning model (figure 3.4) leads to the conclusion that the A- and B-quadrant of the left hemisphere have a lot in common. This is evident in the need for a structured teaching-learning environment wherein the learners are disciplined, rational and verbally oriented, and are concerned with the "know how" of information. The differences between the A- and B-quadrant result from the differences between the left cerebral hemisphere (perceived as intellectual and fact based) and the left half of the limbic system (kinaesthetically oriented and controlled). This explains the phenomenon that A-quadrant dominant individuals are achievement driven whereas B-quadrant dominant individuals are task driven.

Figure 3.5

Teaching strategies for whole brain teaching and learning



In contrast to the left hemispheric thinking processes are those of the right which are divided into the D- and C-quadrant. Herrmann (1989:419) views the D-quadrant dominated individuals as those who learn by taking initiative, relying on intuition and self-discovery, exploring hidden possibilities, constructing concepts and synthesising content. He suggests that they respond to visual displays, experiential opportunities, aesthetic qualities, and future oriented case discussions. They tend to be spontaneous, playful, individualistic and enjoy being involved in the learning process. Compared to the right hemispheric functions (see table 3.3) the preference for non-verbal information and analogy or metaphor (knowledge achieved through images, visual displays), as well as holistic perception, synthesising abilities and intuitiveness are evident in D-quadrant functioning. Teaching strategies which could assist learning include individual patient case history, formal lecture combined with transparencies and posters, imagery and fantasy, simulation, role play and challenging clinical assignments, such as the development of health education brochures for individual patients (see figure 3.5).

The C-quadrant dominated individuals prefer to learn by feeling, moving and emotional involvement, integrating experiences with the self and harmonising with the content, and listening and sharing ideas. They tend to respond to sensory movement and music, experiential learning, people oriented case discussions and group interaction (Herrmann 1989:419). It can be deduced that, because of the emphasis on the affective aspects in the C-quadrant, learning could be assisted by teaching strategies which include group discussions, values clarification, role play, simulation, clinical post-conferences and field trips (see figure 3.5).

Considering the whole brain teaching and learning model (figure 3.4), it is obvious that the right hemispheric oriented individuals prefer experiential learning opportunities which allow for an unstructured teaching-learning environment which provide opportunities for spontaneous and explorative learning. They are good at non-verbal learning and are concerned with the "know why" of information. The differences between the D- and C-quadrant result from the specialisation of the right cerebral hemisphere which

is more intellectually oriented and open-minded, in contrast with the right half of the limbic system, which is kinaesthetically oriented with a strong emphasis on feelings and emotions. This elucidates the reason why the D-quadrant dominant individuals are independence driven while the C-quadrant dominant individuals are feelings-driven.

3.6 SYNTHESIS

The insights into personality differences and preferred modes of knowing provided by the whole brain creativity model, based as it is on the triune brain theory and the left brain/right brain theory, can in many respects be employed to clarify some of the major concepts in the different theories of creativity.

Considering the cognitive theories, Guilford's structure-of-intellect model comprises convergent production which can be ascribed to left brain processes and divergent production which refers to right brain processes with special emphasis on D-quadrant processes. Although Guilford only links the divergent thinking operations and the products involving transformations to creativity, it is not possible to produce a creative product without involving convergent production as becomes evident through the work of Poincaré and Helmholtz (see 2.5.1.2).

When analysing Torrance's key-creative abilities it becomes clear that sensitivity to problems can be linked to C-quadrant processes since it is only through emotional involvement that needs and deficiencies can be detected. Flexibility refers to divergence which is a D-quadrant process, and penetration involves both A- and D-quadrant processes because factual knowledge is a prerequisite for penetration of a situation and intuition is necessary to distance oneself from the obviousness of it. Synthesis refers to a D-quadrant process. Elaboration requires B-quadrant processes in order to describe the detail, D-quadrant processes to show appreciation for aesthetics, and C-quadrant processes which show the intense emotional involvement and enjoyment in finishing the creative end product.

The Gestalt theories focus on pattern identification which refers directly to a D-quadrant process (see 2.5.1.4). In linking creative thinking to productive thinking, Wertheimer regards the problem-solving process as marked by grouping, organisation and structuralisation. Grouping requires analysis (A-quadrant process) whereas organisation and structuralisation are B-quadrant processes. The problem-solving process also requires evaluation and synthesis (B- and D-quadrant processes) which are considered productive thinking skills.

The humanistic theories especially emphasise the affective dimensions of creativity (see 2.5.3). Rollo May includes both cognitive and affective aspects when he says that the bringing together of the emotional and intellectual forces produces creativity - thus referring to both right brain and left brain processes. Maslow emphasises self-actualising creativity which involves greater wholeness and integration, and implies a willingness to live one's life to its fullest capacity, the assumption being that self-actualisation cannot be reached if all the processes of the human brain are not developed and utilised.

The personality theories which indicate that certain personality types are more capable of expressing creative behaviour (see 2.5.2.1), concur with Herrmann's view that already creative people who have a primary preference for the D-quadrant, are supported by strong secondary preferences in the other quadrants and that development of the supporting quadrants enhances the original preference (see 3.5.2). This provides a strong argument for the development of whole brain learning and education.

The psycho-analytic theories contribute towards the concept of creativity by emphasising the role of the unconscious and pre-conscious (see 2.5.4). Freud's description of primary process thinking as the expression of emotional urges generated by the unconscious, and the fact that this mode of thinking also involves divergent and analogical thinking, indicate the involvement of the C- and D-quadrant of the right hemisphere. However, mental functioning and whole brain functioning are much more complex and involved, and scientific research has not yet provided a full understanding of the human brain and

its processes. As Gowan comments: *Sub-conscious mental processes in ordinary creativity may be somewhat better defined in the extreme cases* (Gowan, Khatena & Torrance 1981:290).

3.7 CONCLUSION

Split brain research has been responsible for increasing scientific advances in our knowledge of the human brain and has lead to a new understanding of the nature and process of learning. Traditional education has been criticised for over-emphasising left brain thinking skills while neglecting right brain thinking skills, but recent research findings have provided a basis for a new approach towards whole brain education. This new concept has enormous potential for nurse educators who wish to guide their students towards self-actualisation and self-development so that they will be able to realise their fullest capacity and thereby function more effectively.

It should, however, be remembered that any model, including the whole brain creativity model, does not present absolute truth but is merely a way of ordering information and explaining new knowledge. The whole brain creativity model presents the two halves of the cerebrum but does not include the cerebellum, the pons and the medulla oblongata - all the regions of the brain and the relationships between them, are thus not accounted for.

The whole brain creativity model can assist educators to implement a more holistic approach towards teaching, but the uniqueness of every human being should never be totally ignored. Roger Sperry emphasised this concept in his Nobel Prize lecture:

> *The more we learn, the more complex becomes the picture for predictions regarding any one individual and the more it seems to reinforce the conclusion that the kind of unique individuality in our brain networks makes that of fingerprints or facial features appear gross and simple by comparison* (Zdenek 1985:23).

CHAPTER 4

The nature of creative learning

4.1 INTRODUCTION

Analysis of investigations into learning styles and theories of learning reveal they have one element in common - they attempt to explain and describe how individuals learn. When learning styles and theories of learning are analysed, finer distinctions can be made as to the when, where and how of learning. The circumstances and conditions under which rote learning, meaningful learning and productive learning take place are explored and described. Instructional objectives serve as guidelines for the individual in the learning process, as they usually indicate whether rote learning, meaningful learning or productive learning is required. The nature of creative learning becomes explicit if elements related to creativeness are identified in various learning styles. Theories of learning and instructional objectives should serve as guidelines for creative outcomes.

4.2 COGNITIVE STYLES (LEARNING STYLES)

In the literature the phrases cognitive styles and learning styles are used interchangeably. Research on cognitive styles, which commenced during the 1940s with the *new look* movement in perception, attempted to re-establish a focus on the person in perceptual studies. Cognitive styles refer to consistent individual differences in the manner in which information is organised and processed. These differences have some roots in personality structure (Witkin & Goodenough 1981:1).

Cognitive styles are defined by Kogan in Garity (1985:12) as the individual variations in modes of perceiving, remembering and thinking, or as distinctive ways of apprehending, storing, transforming and utilising information. Woolfolk (1990:147) explains them as being the different ways of perceiving and organising information, whereas the view of Herrmann is that they are the preferred modes of knowing, which are concerned with the how and what individuals choose to learn. An individual's preferred mode of processing information is regarded as his predominant learning style.

According to Witkin, Moore, Goodenough and Cox (1977:15) cognitive styles refer to individual differences in how individuals perceive, think, learn, solve problems and relate to others. Cognitive styles indicate individual differences, not only in the way that people perceive, learn and think, but also in the way that they relate to others and to their environment - the concept of cognitive styles is thus comprehensive and encompasses both the conscious and unconscious mind of the human being.

Amongst the number of cognitive styles which have been identified, several researchers, including Floyd (1976), Wilson (1981), Messick (1984) and Witkin and Goodenough (1981), single out the field-dependent/independent dimension as being of particular significance for the teaching-learning situation as it is considered to have the widest application to educational problems (Joughin 1992:4). It is for this reason that the field-dependent/independent cognitive styles are discussed and related to whole brain

creativity in this thesis. This discussion includes Kolb's model of four different learning styles. As this model emphasises both cognitive and affective aspects, it reflects a holistic picture which relates to whole brain creativity and for this reason it is of particular relevance to nursing as a humanistic, practice-oriented profession.

4.2.1 The field-dependent/independent cognitive styles

Field-dependency refers to a cognitive style in which patterns are perceived as wholes. Individuals who display this cognitive style, find it difficult to separate specific aspects of a pattern or situation. They also experience difficulty in learning material which lacks inherent structure and benefit when externally defined structure and salient cues are provided. They tend to be unable to reorganise information and need more explicit instruction on how to solve problems. Smith (1982) in Joughin (1992:7) reports that when problem-solving involves analysis, field-dependent individuals are not at their best and rely on applying rules and using intuition.

Field-dependent individuals rely more on external referents for self-definition and require externally defined goals and reinforcement. They perform better in learning tasks when feedback is given on a regular basis. These individuals are good at learning and remembering social material and are oriented towards people and social relationships. They work well in groups, are sensitive to the feelings of others and are highly affected by both positive and negative criticism (Slavin 1991:281; Witkin, Moore, Goodenough & Cox 1977:18-19, 21; Woolfolk 1990:148-149). Field-dependent people prefer subjects such as history, literature and social sciences. According to Witkin *et al* (1977:11-13), they favour educational-vocational areas in which involvement with others is a central feature. Research has shown that they are sensitive to social cues and that they are drawn to other people by their extreme interest in the sayings and doings of others. They are perceived as warm, tactful, considerate, socially outgoing and affectionate. They prefer courses which emphasise interpersonal skills, enjoy working in groups and prefer the group discussion as a teaching method (Garity 1985:13).

A study conducted by Koran, Snow and McDonald (1971) indicated that field-dependents are visual learners. While examining teachers for their ability to acquire a teaching skill from video modelling and written procedures, they found that those who were field-dependent benefited more from the video modelling, whereas the field-independent teachers did as well with the video modelling as with the written procedures (Witkin *et al* 1977:22, 26).

Field-independency refers to a cognitive style in which separate parts of a pattern are perceived and analysed. Individuals exhibiting this cognitive style have the ability to recognise the parts that make up a large pattern and are good at analysing and reorganising situations. They can impose their own structure on unstructured material and are able to solve problems without explicit instructions and guidance. Field-independent individuals have internalised frames of reference to which they adhere as guides to self-definition and they tend to have self-defined goals and reinforcement. They learn more under conditions of intrinsic motivation and are motivated by meeting challenges. Their performances are not influenced by feedback. Field-independent individuals are governed by general principles which they actively abstract from their experiences and they apply these as mediating structural rules to facilitate learning. They have a greater self-nonself segregation which enables them to function with greater autonomy. They assume leadership functions, and readily test out their ideas and opinions. They work well on their own and are less affected by criticism. Field-independent individuals appear to be impersonal and are more interested in the abstract and theoretical. They need assistance with materials containing social information because they are less sensitive to social cues. They are good at numbers, science and problem-solving tasks, do well with written material and prefer the lecture method of teaching (Garity 1985:13; Slavin 1991:281; Witkin *et al* 1977:12-13, 19, 20, 21, 23; Witkin & Goodenough 1981:50; Woolfolk 1990:148-149).

4.2.1.1 Field-dependency/independency in relation to whole brain learning

From the description of the field-dependent cognitive style, it appears that this mode of thinking and perceiving is right brain dominated with a strong emphasis on the C-quadrant, which is the emotional, interpersonal and feeling-based quadrant (see figure 3.2). This explains the field-dependent individuals' positive orientation towards people and social relationships, their sensitivity towards the feelings of others and their vulnerability to criticism. Their warm, tactful, considerate and affectionate attitude towards others is also related to C-quadrant functioning. The slightly lesser emphasis on D-quadrant modes of thinking (holistic, intuitive, synthesising and integrative thinking) is evident in their tendency to perceive patterns as wholes and to solve problems by using intuition. They may, however, experience a problem with synthesis as this can only be accomplished after the ability to analyse has been mastered. Those research studies which do refer to the field-dependent's lack of ability to analyse, organise and structurise information, ascribe it to an under utilisation of left brain (A- and B-quadrant) processes.

In order to provide field-dependent students with opportunities which facilitate the development of whole brain learning and creativity, the educator should both strongly support right brain thinking processes and assist and stimulate the development of those of the left brain. According to Messick (1984:69), matching of cognitive style is required when the aim is to enhance immediate subject-matter achievement, but mismatching may be essential when the aim is to promote flexible and creative thinking. Conflict, opposition, obstacles and challenge are needed to stimulate individual development and creativity.

It is my view that the individual preferring the field-independent cognitive style is left brain dominated. Both the A-quadrant processes (logical, analytical, fact-based and quantitative thinking) and the B-quadrant processes (planned, organised, detailed and sequential thinking) appears to be equally emphasised (see figure 3.2). The field-

independent persons' tendency to analyse information, and to perceive the parts of a pattern, as well as their preference to work with numbers, their affinity for problem-solving and their interest in the theoretical, all refer to A-quadrant thinking processes. Their tendency to organise and structurise material, and their preference for the lecture method, indicate the utilisation of B-quadrant thinking processes. The preference of field-independent persons for subjects such as science and mathematics (ie those characterised by factual detail and sequential order which require logical, analytical thinking) also refer to A- and B-quadrant thinking processes. These individuals' lack of sensitivity for social cues, their apparent impersonal attitude and seemingly indifferent attitude towards criticism and peer pressure, indicate that they neglect the C-quadrant thinking processes. It appears as if they do make use of integrative thinking (D-quadrant processing) because they tend to impose their own structure on unstructured material, but there is, nevertheless, no indication of holistic thinking, synthesis or intuitive thinking. Noppe (1985:95) reports, however, that creativity is facilitated by a mobile field-independent cognitive style.

Apart from supporting field-independent students' left-brain processes during the organisation of the teaching-learning environment, it is also necessary to provide opportunities for the stimulation and development of right brain processes to enable them to develop whole-brain functioning.

4.2.1.2 Educational implications of the field-dependent/independent cognitive styles

Cognitive styles as preferred modes of perceiving, thinking and knowing, have crucial implications for human learning and thus for education. Witkin *et al* (1977:15) have found cognitive styles to be stable over time, but this does not necessarily imply that they are altogether unchangeable. The aim of the educator should be to organise his teaching methods to facilitate learning for both field-dependent and field-independent students, and also to stimulate those thinking processes not utilised by these two groups

in order to move towards whole brain creativity. The value of integrating and applying knowledge on cognitive styles in nursing education is highlighted in the following reports.

Skipwith (1982) found that student nurses who were aware of their own cognitive styles experienced more success in their course work. Smith and Frazier reported that when teaching methods were compatible with cognitive styles, learning and achievement were enhanced. These studies emphasise the advantage of an educator knowing his students' cognitive style so that his teaching methods may be correspondingly organised (Garity 1985:14).

In another investigation cited by Garity (1985:14) it was found that when, in certain specific courses in a nursing curriculum, teachers and students were matched according to learning styles, the failure-withdrawal rate appeared to be less than otherwise was the case.

In the light of these research findings and the available information on the differences in the field-dependent/independent cognitive styles, the following suggestions are made for the facilitation of learning by students possessing one of the two respective cognitive styles:

(1) **Field-dependent cognitive style**

The field-dependent student will not need special assistance with social content which in the nursing curriculum comprises subjects such as psychology, sociology, the history of nursing, community nursing science, psychiatric nursing science and ethos and professional practice. She will benefit from teaching strategies which include role play, group discussions, simulation, games, values clarification, panel discussions and group projects. These strategies provide opportunities for human interaction as well as visual learning (role play and simulation) and should be complemented by creative teaching

techniques which enhance right brain learning - visualisation, fantasy, poetic writing, metaphorical thinking, synectics, and sociodrama (discussed in chapter 7) (Davis 1986:142; Williams 1983:30-34).

As field-dependent individuals rely heavily on feedback and extrinsic motivation, the teacher should consistently provide feedback and only offer criticism very carefully. Clear objectives should be provided and students must be assisted to formulate their own short- and long-term goals. Reinforcement must be given in the form of praise, appreciation, encouragement and moral support as they are motivated by social approval and acceptance.

The teacher should provide extra assistance to this group of students in subjects such as biophysics, biochemistry, anatomy, physiology and pharmacology by presenting well structured lectures complemented wherever possible by analogies and visual presentations. Transparencies, posters, diagrams, video material, anatomy models and laboratory sessions should accompany formal lectures.

Field-dependent students need assistance in solving problems and it is therefore suggested that the case study method be used with the teacher giving structured guidelines while leading students by way of divergent questioning (see table 7.1).

Apart from assisting field-dependent students with their preferred mode of right brain thinking they need to receive left brain stimulation to enable them to develop whole brain learning. They should be provided with the opportunity to analyse and structure material. Small projects can be given to students divided into groups of two and four, or field-dependent students can be paired with field-independent ones to enable them to learn how to analyse and structure material from the examples set by their fellows.

(2) **Field-independent cognitive style**

The field-independent students should be approached differently from those who are field-dependent. They will not need extra assistance in subjects such as anatomy, physiology, biophysics, biochemistry, microbiology or pharmacology as these subjects are factually-oriented and necessitate logical, analytical and sequential thinking. Effective teaching strategies for this group include formal lectures, learning packages, individual projects, reading assignments, programmed learning and problem-solving, because they work well on their own, prefer to participate actively, and can analyse and give structure to learning content. It is not crucial that visual material be included as a teaching aid as these students are not oriented towards visual learning, but rather to the written and spoken word.

Field-independent students will need additional assistance with subjects such as ethos and professional practice, psychiatric nursing, community nursing, sociology and psychology because these disciplines are socially oriented. The students should therefore be involved in role play, simulation and the case study method to stimulate their right brain thinking processes and to learn to work in groups together with other individuals. The practice of nursing requires that individuals work and collaborate with all other health professionals and function within a health team. The field-independent student should be provided with challenges such as leading group projects, and sending them out on field trips, eg visits to health clinics, to do individual projects. They should, however, also be subjected to creative teaching techniques such as brainstorming, creative problem-solving, and metaphorical thinking in order to lead them towards whole brain creativity (see chapter 7). This group of students should be additionally exposed to sociodrama, values clarification, and particulary personal analogies as these strategies will provide them with opportunities to become aware of and sensitive to the feelings of others.

It is essential for nurse educators to organise their teaching in order to facilitate and

enhance learning for both field-dependent and field-independent students, and also to provide stimulation for the opposite sides of the brain of both these groups. Certain nursing specialities such as intensive care nursing, surgical nursing and operating-theatre nursing depend strongly on left brain modes of thinking, whereas psychiatric nursing and community nursing require right brain modes because of the psychological and social aspects involved. A study conducted by Quinlan and Blatt (1972) on student nurses, reported that psychiatric student nurses who were regarded as *good* by their tutors, were field-dependent whereas surgical nurses described as *good* by their mentors, tested field-independent (Witkin *et al* 1977:16).

4.2.2 Kolb's experiential learning model

Kolb (1976) identifies four learning styles in his theory of experiential learning. He views these as acquired, consistent patterns of learner-environment interaction (Laschinger & Boss 1984:375). Each of the four is a combination of two of the four learning modes of the learning process, as described by him.

Kolb considers his model of learning to be a theoretical one which integrates perception, cognition, behaviour and experience (Holbert & Thomas 1988:31). It has considerable potential for guiding the design of whole-brain learning and creativity in nursing.

According to Kolb (1984:64), people programme themselves by their choices of experience to perceive reality through varying degrees of emphasis on apprehension or comprehension (the two different modes of knowing about the world).

In relation to the whole brain model, comprehension is congruent to left brain thinking processes - abstract, symbolic, analytical, verbal, linear and sequential; whereas apprehension concurs with right brain thinking processes which include concrete, holistic, spatial, analogic, synthesis, and intuitive processes. Kolb explains that people transform these prehensions through extension (behavioural actions) and/or intension

(intellectual operations), and concludes that this self-programming determines the extent to which individuals utilise the four modes of the learning process (Kolb 1984:48-49, 52, 64) (see figure 4.1).

4.2.2.1 The modes of the learning process

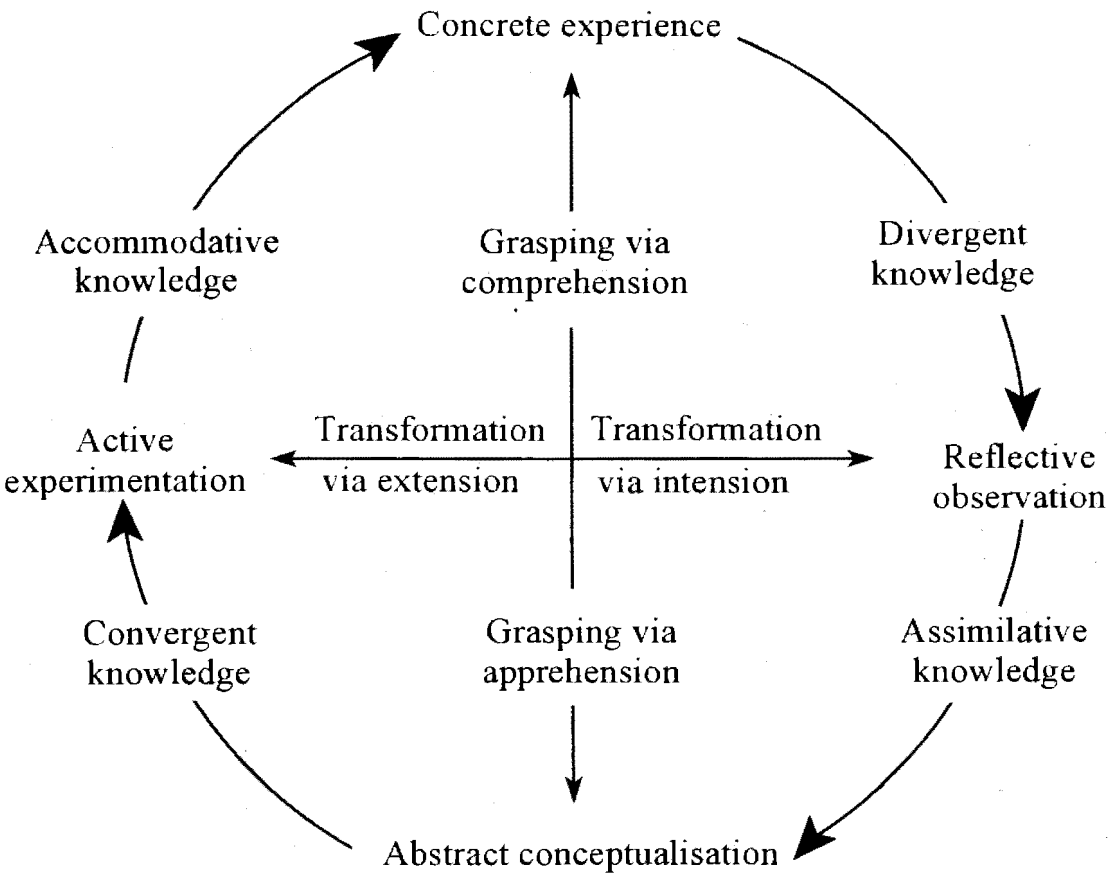
(1) *Concrete experience* focuses on being involved in experiences and immediate human situations while dealing with them in a personal way. The emphasis is on feeling as opposed to thinking. It involves being concerned with the uniqueness and complexity of present reality as opposed to theories and generalisations. Problem-solving is approached in an intuitive *artistic* way. Individuals with a concrete experience orientation enjoy and value relating to other people. They are good intuitive decision makers, function well in unstructured situations and have an open-minded approach to life (Kolb 1984:68).

Concrete experience appears to be right brain oriented with a strong preference for the C-quadrant processes because of the emphasis on feeling, interpersonal aspects, and the kinaesthetic nature of real life situations. A lesser utilisation of D-quadrant processes is indicated by the reliance on intuition during problem-solving and decision-making.

(2) *Reflective observation* focuses on understanding the meaning of ideas and situations by observing and describing them. Understanding is emphasised as opposed to practical applications. Reflection is emphasised as opposed to action and the concern is about truth and how things happen as opposed to what will work. Individuals with a reflective observation orientation enjoy intuiting the meaning of ideas and situations, are good at seeing the implications and look at situations from different perspectives while appreciating different viewpoints. They prefer to rely on their own thoughts and feelings to form opinions, and value patience, impartiality and thoughtful judgement (Kolb 1984:68-69).

Figure 4.1

Kolb's experiential learning model indicating the basic knowledge forms, the cycle of learning modes and the learning styles



(Adopted from Kolb 1984:42)

This learning mode relies on right brain functioning with a strong emphasis on D-quadrant thinking processes as indicated by the preference for understanding (a neocortex function, not limbic), intuiting, divergence in considering different perspectives, and the ability of vision. A lesser preference for C-quadrant processes is manifested by the reliance on feelings and observation, which are kinaesthetically oriented.

(3) *Abstract conceptualisation* focuses on the use of logic, concepts and ideas and emphasises thinking as opposed to feeling. There is a concern for developing general theories in contrast to intuitively understanding unique specific phenomena. Problems are approached in a scientific way rather than an artistic way. Individuals with abstract conceptualisation orientation are good at quantitative analysis, manipulation of abstract symbols and systematic planning. They value precision, analysis of ideas, and the aesthetic quality of a neat conceptual system (Kolb 1984:69).

Abstract conceptualisation is related to left brain thinking processes. The tendency towards quantitative analysis, logic, the use of abstract symbols and concern with theories, indicate A-quadrant functioning. A lesser emphasis on B-quadrant thinking processes is shown by their preference for systematic planning, precision and discipline.

(4) *Active experimentation* focuses on changing situations and actively influencing people. The emphasis is on practical applications as opposed to reflective understanding, and on doing in contrast to observing. A pragmatic concern towards what works is relevant as opposed to the absolute truth. Individuals with an active experimentation orientation are good at getting things accomplished and are willing to take risks in order to achieve their goals. They value having an influence on their environment and enjoy seeing results (Kolb 1984:69).

Active experimentation refers mainly to left brain functioning. A particular emphasis on B-quadrant thinking processes is indicated by the preference for doing, the need for practical application of knowledge and ideas, the goal-directedness and the need for accomplishment and active involvement. A slight preference for D-quadrant processes (right brain related) can, however be seen in the willingness to take risks.

Kolb describes human learning as a four stage cycle moving from concrete experience to reflective observation and then on to abstract conceptualisation and to active experimentation (figure 4.1). All four modes of learning are needed for effective learning but it has been shown that people usually prefer two modes of learning above the other two and that this is reflected in their learning styles (Hodges 1987:341).

4.2.2.2 Kolb's four learning styles

According to Kolb, learning style refers to the way an individual masters content and skills as well as the way he adapts to reality. Its peculiar manifestation for an individual depends on his hereditary equipment, his particular past life-experience and the demands of his present environment (Highfield 1988:30; Kolb 1984:77). Kolb designed the Learning Style Inventory (LSI) to assess individual orientations towards learning. It measures an individual's emphasis on each of the four modes of the learning process as well as two combination scores indicating emphasis on abstractness over concreteness and emphasis on action over reflection. Although this instrument has been tested for reliability and validity, the latter have been questioned by Fox (1984) and Sewall (1986), and Kolb has been criticised for using unnecessarily complex language in its protocols by Smith (1982) in Joughin (1992:7). However, Kolb's model is based on a holistic framework because it includes the cognitive, affective and psychomotor domains of learning and it emphasises both theoretical and experiential learning. It is therefore a particularly appropriate model for a humanistic, practice-oriented profession such as

nursing. The four learning styles are:

(1) **Convergent learning style**

Individuals who exhibit this learning style rely primarily on the learning modes of abstract conceptualisation and active experimentation. Their greatest strength lies in problem-solving, decision-making and the practical application of ideas. Convergers are good in situations where a single correct answer or solution to a problem is required and they organise knowledge to focus on specific problems through hypothetical-deductive reasoning. They prefer dealing with technical problems rather than social and interpersonal issues and are relatively unemotional (Kolb 1984:77; Partridge 1983:247).

(2) **Divergent learning style**

This learning style relies on the concrete experience and reflective observation modes of the learning process. The greatest strength of this style is found in imaginative ability and awareness of meaning and values. These learning strengths are viewed as being the opposite from convergence. The divergers adapt by viewing concrete situations from many perspectives and tend to organise many relationships into a meaningful *gestalt*. Adaptation through observation rather than action, is emphasised. These individuals perform well in situations that require the generation of alternative ideas and implications. They enjoy relating to other people and are emotional and feeling-oriented (Kolb 1984:77-78; Partridge 1983:247).

(3) **Assimilative learning style**

The learning modes preferred by individuals exhibiting the assimilative learning style, are abstract conceptualisation and reflective observation. Inductive reasoning, creating theoretical models, and assimilating dissimilar observations into integrated explanations, are the strengths of this learning style. Assimilators are more concerned with ideas and

abstract concepts although ideas are judged less by their practical value because it is more important for them that theory be logically sound and precise. These individuals are less focused on people, and therefore have some aspects in common with convergers (Kolb 1984:78).

(4) **Accommodative learning style**

This learning style emphasises the use of concrete experience and active experimentation as learning modes. The greatest strengths are opposite to those of the assimilation style. Accommodators adapt through opportunity seeking, risk taking and action. They find it easy to adapt to rapidly changing circumstances. Plans or theories are easily discarded in situations where they do not fit the facts. Problems are solved in an intuitive trial-and-error manner and these individuals rely more on others for information than on their own analytic ability. Accommodators are at ease with people but are sometimes perceived as impatient (Kolb 1984:78).

4.2.2.3 Educational implications for whole brain learning and creativity

Whole brain education has a dual purpose. It is the task of the educator to organise the teaching-learning situation in such a way as to provide learning activities which are congruent with the student's cognitive style not only to enhance learning, but also to stimulate the student to use his less preferred modes of learning in order to achieve whole brain functioning. According to Holbert and Thomas (1988:32), Kolb suggests that students also be taught to develop skills in their less preferred learning modes, so that they become more flexible holistic learners.

The educational implications of Kolb's model for whole brain learning and creativity, are discussed below according to the four learning modes. The researcher has not found it feasible to categorise the four learning styles within the four brain quadrants as identified by Herrmann (1989). Kolb's learning styles do not appear to be merely left

brain oriented or right brain oriented, but seem to comprise a combination of left and right brain processes (see figure 4.2).

(1) **Concrete experience** (divergers and accommodators)

As concrete experience refers to immediate personal involvement in human situations with an emphasis on the affective domain, teaching strategies which would enhance this mode of learning include role play, simulation, individual case studies, values clarification, sociodrama, group discussions, ward rounds, and assigned patient interviews in the clinical situation. These strategies provide students with opportunities to learn about human emotions since they facilitate engagement in interpersonal relationships with peers and patients.

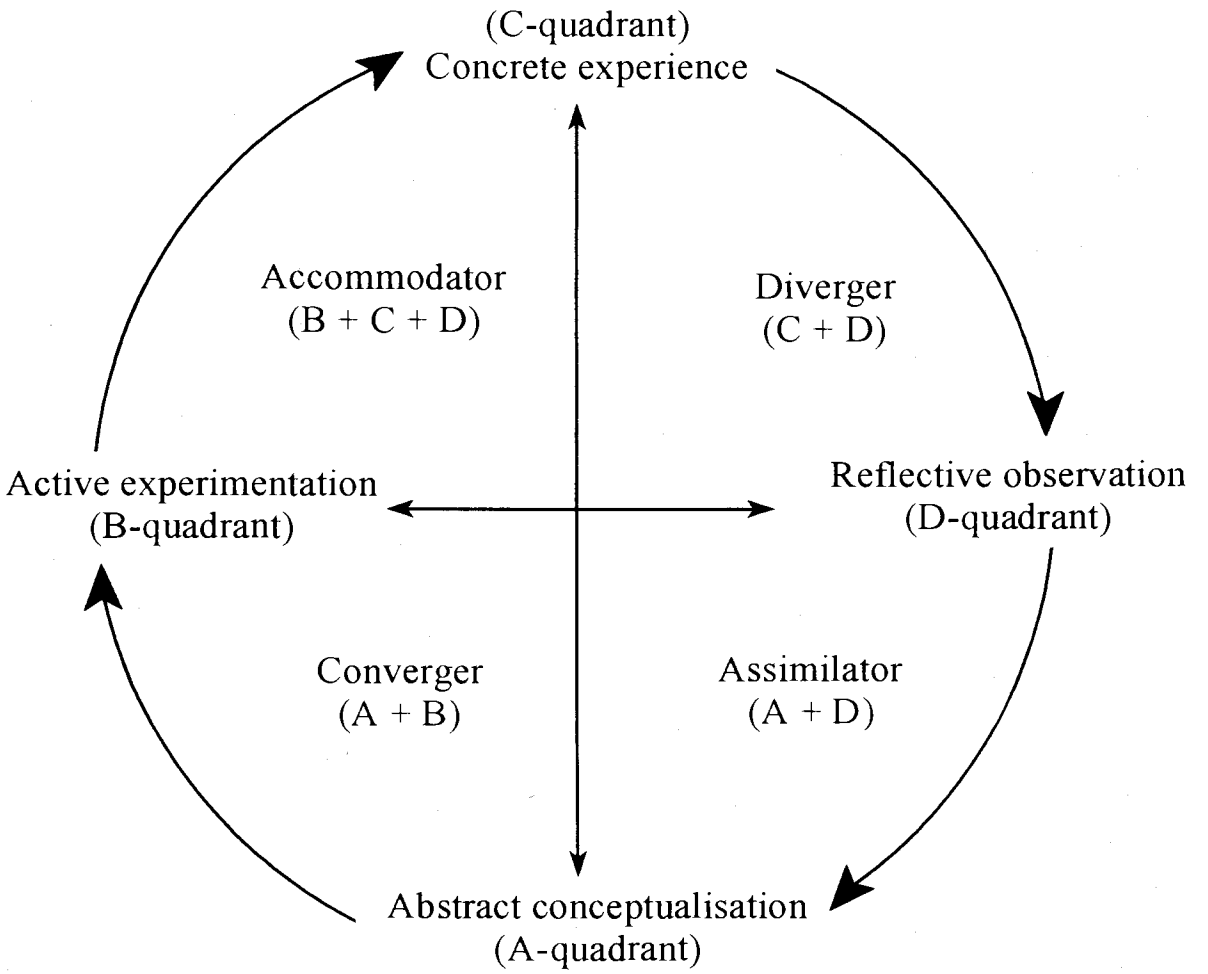
Sociodrama can be used to teach students more about the role of emotions, values and attitudes during conflict situations, and synectics can be implemented to stimulate imagination, divergent thinking and kinaesthetic awareness, and to increase concentration, and evoke a sense of humour (Davies 1986:142; Parnes 1992:394).

Patient case histories and patient interviews give students the opportunity for a concrete experience in the real-life situation wherein they can discover first hand information themselves. Values clarification, role play and group discussions allow students to become aware of a diversity of feelings, values and viewpoints and to learn how to express their own views. The above-mentioned teaching strategies allow for unstructured learning situations and are feelings-oriented.

Clinical learning experiences such as ward-and-unit placements, involve both concrete experience and active experimenting and are therefore valuable learning opportunities (Hodges 1988:344).

Figure 4.2

Kolb's learning cycle and learning styles in relation to the four quadrants of the whole brain model



(2) **Reflective observation** (divergers and assimilators)

The focus in this learning mode is on observing and reflecting (understanding and intuiting the meaning of ideas and situations) and not on active doing. Holbert and Thomas (1988:32) suggest teaching strategies including observational experiences followed by structured group discussions. Assignments to visit clinical departments to observe certain procedures (for example a specific operation in theatre, a gastroscopy being performed, blood tests being done in the laboratory) will result in more effective learning. Students can be asked to discuss their impressions afterwards during a group discussion. They can also be prompted during these discussions to report on incidents in the clinical situation in order to express their views and impressions on how these situations were handled and how they think they could have been handled more effectively. Visual displays, eg films, videos or pictures, can be presented to students, followed by divergent questioning (see details in table 7.2) to stimulate creative thinking. Demonstrations of clinical procedures can be given with students being encouraged to ask questions and suggest improvements while the teacher is demonstrating and afterwards. Opportunities should, however, also be given for individual projects on issues which require personal opinions and understanding, such as ethical issues and complicated problems which require intuitive thinking. According to Hodges (1988:344), most seminars and paper-written assignments provide for the reinforcement of reflective skills as they are perceptually and symbolically complex.

Creative thinking techniques such as metaphorical thinking, guided fantasy and expressive writing (discussed in 7.4, 7.6 and 7.8) can also provide opportunities for reflective thinking, intuiting the meaning of ideas and situations and enhanced learning.

(3) **Abstract conceptualisation** (convergers and assimilators)

This mode of learning emphasises thinking as opposed to feeling. Hodges (1988:344) regards formal lectures and textbook reading as exemplifying symbolically complex

situations which expand one's capacity for abstract conceptualisation. To this list can be added written assignments, case studies and learning packages, as they all provide for analysis, abstract conceptualisation and the development of theories.

The teaching-learning environment must be structured since factual information, detail, systematic planning, analysis and abstract thought are emphasised. This mode of learning corresponds with the left hemisphere A-quadrant thinking processes. Herrmann (1989:56) reports on the necessity of structure and detail required by individuals preferring this mode, in order to be comfortable with a new learning experience. Additional learning experiences whereby these individuals will benefit are health team conferences and group discussions where students and lecturers can discuss and analyse concepts and theories. Problem-solving should involve crucial problems in nursing which necessitate a direct scientific approach and not a divergent approach. As individuals who prefer this mode of learning may oppose most creative thinking techniques, brainstorming might provide a challenge to them and can enhance their ability to present more creative end products.

(4) **Active experimentation** (accommodators and convergers)

This learning mode focuses on active doing as opposed to observation and reflection. Students should be allowed to practice procedures in the simulation laboratory and to adjust procedures when necessary to improve them. Self initiated projects in the clinical situation should be encouraged. Students should be assigned to take charge of hospital wards to allow them the opportunity to take risks and influence their environment, and to challenge their abilities for systematic planning and pragmatic application of relevant aspects. Demonstrations and clinical learning experiences should be emphasised since they provide opportunities for practical application of student knowledge.

Creative thinking techniques, including synectics and creative problem-solving, may appeal to this group of students since these may assist them to find practical solutions

to problems.

4.2.2.4 Synthesis

After analysing Kolb's four learning styles an attempt was made to relate them to the thinking processes of each of the four quadrants of the whole brain model. This did not, however, appear to be possible since no learning style proved to be single quadrant oriented. On the other hand, after examination of his learning modes it did appear that these could be related to the four quadrants, and, on comparison, the following pattern emerged:

concrete experience	-	C-quadrant thinking processes
reflective observation	-	D-quadrant thinking processes
abstract conceptualisation	-	A-quadrant thinking processes
active experimentation	-	B-quadrant thinking processes

A cross comparison between the learning preferences of the four learning styles, as represented by a combination of two of the four learning modes and the thinking processes of the four quadrants of the whole brain model, revealed the following:

divergers	-	preference for C- + D-quadrant thinking
assimilators	-	preference for A- + D-quadrant thinking
convergers	-	preference for A- + B-quadrant thinking
accommodators	-	preference for B- + C- + D-quadrant thinking

(see figure 4.2)

This picture concurs with Herrmann's (1989:85) findings of the distribution of brain dominance which can either be single-, double-, triple- or quadruple dominant.

4.2.3 Cognitive style, brain dominance and professional occupation

Kolb (1984:88) reported that his research has shown that undergraduate education is a major factor in the development of an individual's learning style. It is not clear, however, whether this is because individuals are shaped by the fields they enter or whether people choose fields that are consistent with their learning styles. Kolb states that in case of a mismatch between the field's learning norms, and the individual's learning style, people will either change or leave the field. This view is congruent with Herrmann's findings of occupational patterns related to brain dominance (Herrmann 1989:100-101) (see figures 4.3 and 4.4).

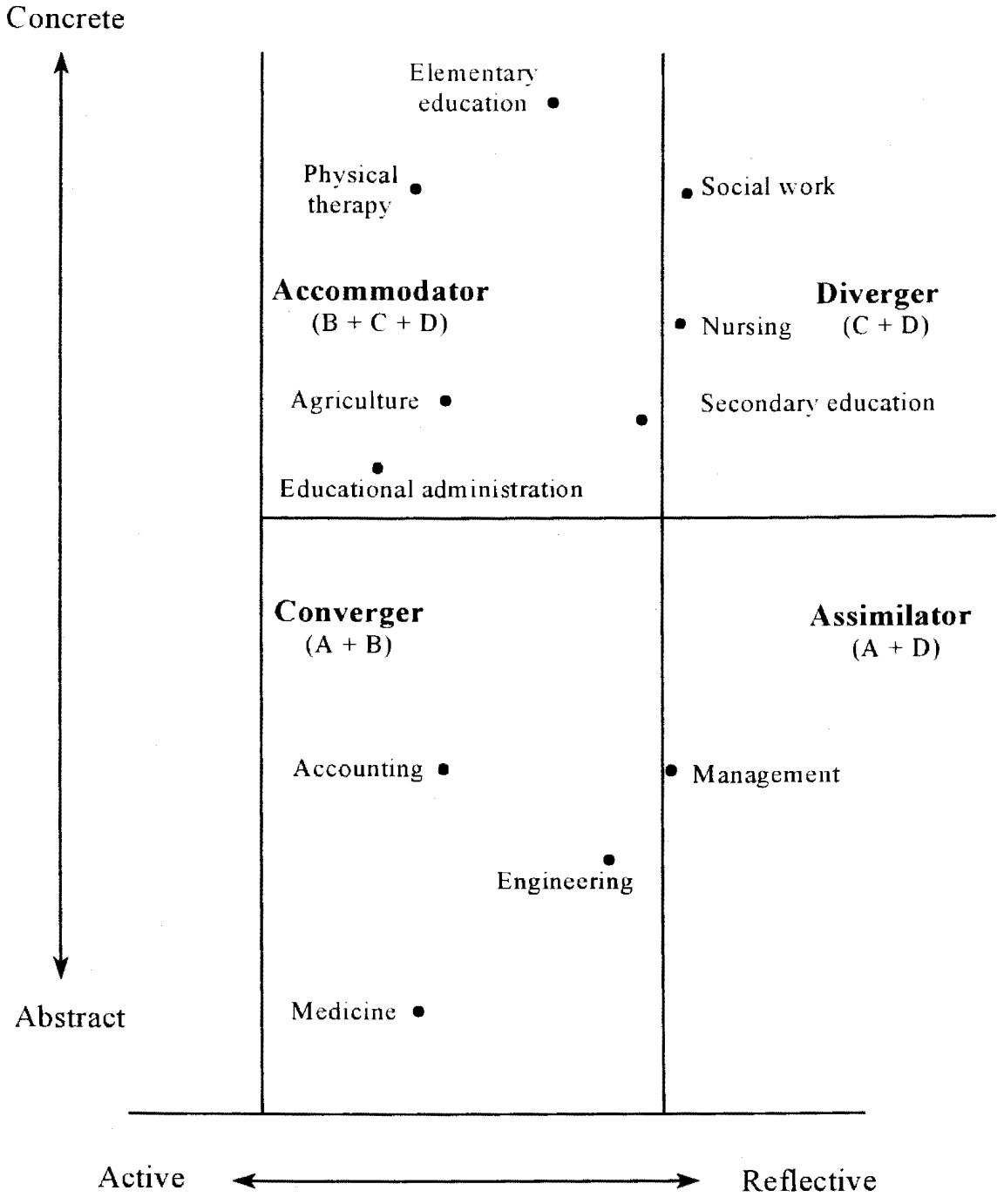
Research studies have repeatedly reported student nurses to be either accommodators or divergers. These include reports by Laschinger and Boss (1984:378), Highfield (1988:30), Christensen and Bugg (1979) and Bennet in Kolb (1984:89).

Figures 4.3 and 4.4 show interesting similarities between Herrmann's distribution of occupational patterns according to brain dominance, and the distribution of professional groups according to Kolb's learning styles.

According to Herrmann (1989:100-103), multiple dominance can be detected in occupations requiring the ability to rely on more than one mode. He has found triple dominants occurring in nursing and social work, and reports that in the typical nursing profile the greatest preference is in both the B- and C-quadrant. Figure 4.3 shows nursing hovering between accommodator and diverger - which include the B-, C- and D-quadrant as found by the researcher after analysis of Kolb's learning modes (compare figure 4.3 to figure 4.2).

Figure 4.3

Scores of various professional groups



(Kolb 1984:89)

Figure 4.4

Occupational patterns

(Herrmann 1989:100)

Similarities between Herrmann's and Kolb's findings are also illustrated with reference to engineers (A- or A- + B-quadrant), bookkeepers (B- or A- + B-quadrant) social workers (C- or C- + D-quadrant) and educators (C- or C- + D-quadrant) (figures 4.3 and 4.4).

4.3 INSTRUCTIONAL OBJECTIVES

Instructional objectives determine what is to be taught and what is to be learned. Specific behavioural objectives describe precisely the required terminal behaviour of the student after a specific learning experience. When teaching for creativity, objectives which require creative thinking should be clearly set as these are quite distinct from objectives which demand mere reproduction of knowledge.

Bloom's taxonomy, the most used and well known taxonomy of instructional objectives, provides two distinct levels in the cognitive domain which are associated with creative thought. These are opposed to those in the affective domain in which all levels are involved during the creative process (Bloom 1974:89).

De Corte and co-authors' classification of instructional objectives provides an interesting combination of behaviours, referred to as productive operations, which are directly linked to productive thinking and creativity (De Corte, Geerlings, Lagerweij, Peters & Vandenberghe 1981:51).

4.3.1 Bloom's taxonomy

Bloom's taxonomy of instructional objectives comprises three domains: cognitive, psychomotor and affective, subdivided into hierarchical levels. For many years educators have been accused of emphasising and evaluating only the lower levels of the cognitive domain which rely on recall and reproduction of information. Treffinger, Isaksen and Firestien in Parnes (1992:93) comment that contemporary educators and

theorists have identified the need to go beyond fact-finding and recognition or recall, and to move to more complex and creative outcomes of learning and instruction. Creativity experts view the higher levels of Bloom's cognitive domain, synthesis and evaluation, as creative skills, and conclude that these are the productive operations which are absolutely essential to creative problem-solving and creative production (Neethling 1993). The cognitive and affective domains are discussed to illustrate their relationship to creativity.

4.3.1.1 Cognitive domain

Knowledge, as the lowest level of the cognitive domain, involves the memorisation of information which makes recollection the main learning skill. **Comprehension**, the second level, refers to the understanding of the meaning of the learning material and is the ability to recall information from memory and to use it in a context similar to that in which it was learned. Comprehension includes translation (to put a communication into other terms), interpretation (reordering of ideas into a new configuration), and extrapolation (the making of predictions based on the understanding of conditions described in a communication). **Application** which follows, is the ability to use learned material in a new situation where no solution is given (Bloom 1974:89-90; Steyn 1991:17-19). These first three levels of the cognitive domain do not stimulate creativity, as behaviour involving knowledge, comprehension and application, represent mere reproduction. They are, however, essential to develop the body of knowledge on which creativity is based.

Analysis, the fourth level of the cognitive domain, refers to the ability to break down learning material into its elements and to perceive the existing relationships between the parts in order to see the organisational structure. Analysis includes the ability to recognise differences and similarities between aspects and the identification of the parts that make up the whole (Steyn 1991:19). Although analysis by itself cannot produce a creative product, it serves as a pre-requisite for synthesis and evaluation, the two levels

of the cognitive domain involved during creativity. Analysis is a distinct phase of the creative problem-solving process as described by Osborn (1953) (see 2.5.1.2).

Synthesis, the fifth level, refers to the ability to create something new from existing elements. It comprises the putting together of elements and parts to form a whole or a pattern not clearly there before. Synthesis involves a re-combination of aspects from previous experience with new material, reconstructed into a new and well-integrated whole (Bloom 1974:162). This level is the one that most clearly provides for creativity, as it brings something new and novel into being.

As comprehension, application and analysis also involve the putting together of elements and the construction of meanings, they tend to be more partial and less complete than synthesis. They do not require originality and uniqueness as do synthesis. They involve studying a given whole in order to understand it better, but synthesis depends on the ability to draw upon elements from many different sources and to construct a new pattern not clearly there before. Bloom (1974:162) refers to the tendency among educators to place questions requiring the composition of essays in the synthesis category. These do, however, very seldom fit into this category as they generally require only comprehension and analysis in their compilation and very seldom is something new and original produced.

Torrance (1979:117) regards synthesis as the highest level of thinking in Bloom's taxonomy and considers that this category has been neglected by educators. Synthesis, as a right brain process, cannot be accomplished without knowledge, comprehension, analysis, internal visualisation and openness to experience.

Evaluation, the sixth level of the cognitive domain, involves making a judgement about the value of something while at the same time substantiating the judgement by referring to criteria, facts or principles. Evaluation presents a major link with the affective behaviours where valuing is one of the central processes involved. Although evaluation

is placed last in the cognitive domain and includes all the preceding levels, it is not the last step in the problem-solving process. Evaluation must take place during each phase of the problem-solving process in order to provide a better end product or solution (Bloom 1974:185).

Evaluation is present throughout the creative process. It is employed, for example, when ruling out irrelevant elements during the preparation phase, considering and selecting the best ideas during the incubation phase, assessing ideas during illumination, and guiding logical thought and creative thought when these combine during the verification phase in order to produce a creative end product.

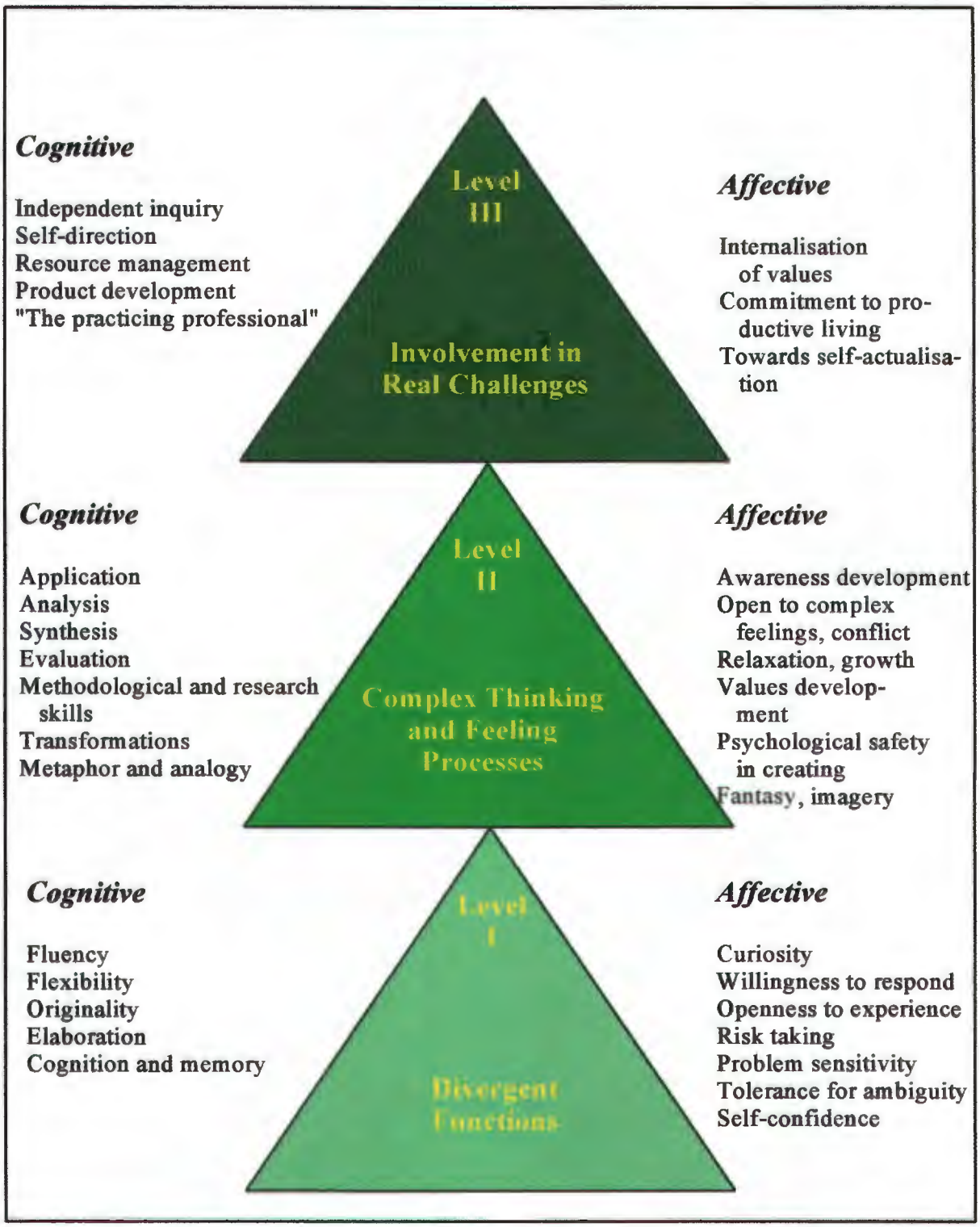
Educators who wish to grant their students the opportunity to develop their creativity should focus more on challenging learning activities which stimulate thinking on the analysis, synthesis and evaluation levels of Bloom's cognitive domain (see figure 4.5, Treffinger's creative learning model, which shows Bloom's six levels of the cognitive domain in relation to creative learning). Isaksen reports that many curriculum planners and facilitators rely most heavily on the lowest levels of the creative learning model, thereby stressing the cognitive techniques (Parnes 1992:95).

4.3.1.2 Affective domain

The affect refers to reactions rising from feelings or emotions. In the past, the latter have been regarded as a block to the creative process, and no facilitating role could be determined either for them or for feelings except in some types of creative expressiveness. This view has been replaced by a widespread acceptance of the important role that the affect plays during creative thinking. Emotional factors must be understood and used for breakthrough ideas - the *ahas, satori* or illumination - to occur (Klein 1973:122; Torrance 1979:86).

Figure 4.5

Creative learning model



(Treffinger *et al* 1982:19)

The role of the affect in creativity is demonstrated in several definitions and theories of creativity. Anderson's definition of creativity refers to affection for an idea, intensity of encounter, delight and ecstasy - all of which encompass feeling and emotion. Helmholtz has mentioned the happy ideas which came to him unexpectedly and without effort during the incubation phase of a creative process. His conclusion is that these ideas did not appear without emotional involvement. Torrance considers that a sensitivity to problems is one of the key-creative abilities. Sensitivity, according to Klein (1973:123), represents an awareness of your immediate environment, and the use of your perceptions to make cognitive statements and identifying feelings. The distinction between sensitivity and perception is that sensitivity demands an emotional reaction.

The affect is regarded by psychologists as an essential part of a well-balanced personality and an essential ingredient of a creative person. Treffinger includes affective dimensions on all three levels of his creative learning model (see figure 4.5).

The affective domain of Bloom's taxonomy of objectives, as categorised by Krathwohl (1964), encompasses emotions, attitudes and values which can be developed and changed during the learning process. The development of the affective domain depends heavily on the simultaneous acquisition of knowledge (cognitive domain).

Receiving, as the lowest level in the affective domain, involves becoming aware of stimuli (sights, sounds, events) and a willingness to receive and give selected attention to stimuli. The concept of increasing emotional awareness to facilitate creative learning has been addressed by the Creative Education Foundation's creative problem-solving courses and is in their 1977 guidebook on creative problem-solving. Parnes, Noller and Biondi discuss various affective techniques to increase awareness of internal and external stimuli. These include altered states of consciousness, awareness training, deep relaxation, fantasy, and meditation (Steyn 1991:22; Torrance 1979:88).

The second level of the affective domain, **responding**, refers to the active participation

of the student in the learning situation. Responding may be voluntary or involuntary according to a pattern which is consistent with the particular value a student holds. No element of commitment is, however, present at this level. A student may, for example, play a voluntary role in a role play by taking a role that portrays attitudes he/she complies with. Emotional involvement and expressiveness are regarded as extremely important for success in all the creative expressive arts, as well as for creative work in the helping professions, such as social work, psychotherapy and counselling. According to Torrance, a high level need for the skills of empathy (an imaginative kind of understanding of another person that transcends cognitive, intellectual and rational boundaries) is associated with these professions. Nursing as a humanistic science views empathy as an all important skill during the interaction between nurse and patient (Steyn 1991:23; Torrance 1979:93).

Role play (discussed in 7.9) can be beneficial for the development of the first two levels of the affective domain, receiving and responding. It increases awareness and concentration, sharpens the senses, enhances the discovery and control of emotions and increases empathic understanding of others. Role play can assist students to become sensitive to situations and problems, and to become open to experience - the concept which is regarded as essential to creativeness by several theorists (see figure 4.5 for the two levels mentioned which are included on the first level of the creative learning model).

Valuing, the third level of the affective domain, involves the recognition of the worth of a situation, object or behaviour, and the ability to assess situations, objects and behaviour. Students become capable of accepting values and displaying a preference for certain values, and they show a willingness to commitment. According to Torrance (1979:12, 93), the perseverance and deep involvement required to achieve *satori* or eureka level thinking, requires a very high degree of commitment, which he refers to as creative motivations. This kind of commitment is referred to as love of one's work, a deep emotional attachment that goes beyond reason and logic. Torrance has identified

this characteristic in his thirty year study of the beyonders, and many of history's creative geniuses have commented that they *fell in love with something* at an early age and retained this emotional attachment. Amabile (1986), one of the foremost creativity researchers, says that extraordinary talent, personality and cognitive ability appear not to be enough but that it is the *labor of love* which determines creativity (Steyn 1991:23-24; Torrance 1993:131, 133).

Organisation, the fourth level of the affective domain, comprises the investigation of attitudes and values together with the organisation of various values relevant to a specific situation. Organisation requires the conceptualisation of a value in a certain form. Organisation comprises interaction between the affective and cognitive domains as conceptualisation is a higher cognitive function, comprising analysis, synthesis and evaluation. Role play and sociodrama can be used to assist students to develop the affective skill of organisation. Conflict situations can be enacted in a sociodrama and the students who act as the audience can be asked what values, attitudes and emotions were displayed by which characters. They can then further debate on the relevant importance of different values and attitudes in specific situations. Both valuing and organisation appear on the second level of the creative learning model (see figure 4.5) (Parnes 1992:398; Steyn 1991:24).

Characterisation, the fifth and last level of the affective domain, involves the perception of ideas, attitudes and beliefs as a coherent whole. When a student has characterised a value system, he/she will behave in a predictable manner, displaying certain values as a behaviour pattern (Steyn 1991:25). Values clarification as a teaching strategy can assist student nurses to explore their own values, attitudes and beliefs and to realise the importance of characterisation of a value system which will enable them to act consistently when dealing with ethical issues or patient problems. According to Perkins in Sternberg and Smith (1988:331), distinctive fields require distinctive values, and expertise means that the potencies and values which are distinctive to a field discipline (mathematics, physics, nursing, etc) have been internalised. Over and above

the mastery of the cognitive and psychomotor skills, the characterisation of the values pertaining to the nursing profession are essential in order to develop into a creative nurse practitioner (see figure 4.5).

The importance of the affective nature of creative talent has been emphasised by many creativity experts including the personality theorists and the humanistic theorists. Edward de Bono has declared emotions as more important than anything else in thinking and explained that emotions precede thinking and give it its power (Torrance 1979:87). Herrmann (1989) emphasises the importance of emotions (seated in the limbic system of the brain) in whole brain creativity.

In conclusion it can be said that the aesthetic quality of creative products speaks for itself in the language of the affect.

4.3.2 De Corte's classification

De Corte and co-authors view the categorisation of objectives as the concretisation of more general aims of education but their taxonomy is less explicit than that of Bloom and co-workers. Two major categories are distinguished; **receptive-reproductive operations** and **productive operations**. Each of the seven categories included presents a determined intellectual behaviour pattern. The receptive-reproductive operations are functional when information is available or can be obtained to reproduce. The productive operations become functional when students are confronted by a problem which cannot be solved merely by reproducing information (De Corte *et al* 1981:51; Steyn 1991:35).

It is the productive operations which are related to creativity. Aschner and Bish view *productive thinking* as embracing the operations of creative thinking and problem-solving. They compare the seven stages of the creative process as described by Rossman (see 2.5.1.2) to the five stages of problem-solving according to John Dewey which

comprise: recognition of a problem, analysis of the problem, suggestion of possible solutions, testing of the consequences, and judgement of the selected solution. According to them, a problem for an individual does not exist unless there is a need for novel thinking. If no change in behaviour is needed to cope with a problem, there is no problem. They conclude that all problem-solving which is genuinely problem-solving, is creative; and they find the term *creative problem-solving* redundant (Aschner & Bish 1965:8-9).

4.3.2.1 Receptive-reproductive operations

Apperception of information refers to the discovery of new information in specific given material, by selective and comparative observation, based on existing information obtained earlier. **Recognising information** involves the recognition of previously learned material when it is presented again in a similar or different context. **Reproduction of information** is actively recalling information from memory and reproducing it in a similar form to that in which it was stored. It includes the reproduction of procedures (De Corte *et al* 1981:51-52; Steyn 1991:35-36).

These categories in De Corte's classification include the knowledge and comprehension levels of Bloom's taxonomy and reproduction of information also includes the application level. The receptive-reproductive operations are not congruent to creative thinking but they are pre-requisites for creative thought since creativity cannot emerge without thorough knowledge of a subject.

4.3.2.2 Productive operations

The productive operations are related to creative thinking and problem-solving since they rely on the presentation of something new to solve a problem and not on mere reproduction of already known information.

Interpretive production of information refers to the explanation, paraphrasing, exposition or summarising of given new information. The student is supposed to recognise relationships between components and must be able to abstract the most important content from the material (Steyn 1991:37). This category includes the comprehension and analysis levels of Bloom's taxonomy, as material must be comprehended and analysed in order to be able to abstract the most important content from it. This operation also comprises some of the key-creative abilities as described by Torrance. It includes internal visualisation - visualising beyond the exterior to pay attention to internal dynamic forces in order to expose hidden aspects. Penetration is applied to get underneath the problem and away from the obvious in order to explain and paraphrase, and sensitivity to problems is required to be able to understand and abstract the most important material.

Convergent production of information refers to problem-oriented thought. The student is presented with a problem which he has to solve by using available information from the problem itself as well as by actualising appropriate knowledge from memory. The previously learned information may include principles, concepts, rules and techniques. Convergent production means that there is only one solution to the problem, logically determined by the data given - information included in the problem itself (De Corte *et al* 1981:55; Steyn 1991:38). This category involves the knowledge, comprehension, application and analysis levels of Bloom's taxonomy. The student has to recall appropriate and applicable information from memory. Analysis of a problem is necessary to break up the given data into smaller parts and to determine from there what data are still needed before the problem can be solved. Convergent production is included in Guilford's structure-of-intellect-model and refers to giving the right answers based on factual information (Aschner & Bish 1965:27). This operation is part of the creative process; convergent thought, as a left brain process, includes rational and logical thought and is present during the preparation and verification phases of the creative process as described by Wallas (see 2.5.1.2).

Evaluative production of information involves the evaluation of information by making a value judgement based on the testing of the information according to specific criteria. The criteria can be either internally based on the logical structure, consistency and composition of the information or they can be externally based on the purpose or efficiency of the material for a specific goal and generally accepted norms for the evaluation of such material. This operation meets the criteria of critical thought (De Corte *et al* 1981:55-56; Steyn 1991:38). It includes the knowledge, comprehension, application, analysis and evaluation levels of Bloom's taxonomy. Evaluation relies heavily on cognitive processes but it can never be totally dissociated from the affect. It involves left and right brain processes and is present during all phases of the creative process.

Divergent production of information involves a problem situation in which there is more than one solution. Apart from relying on pre-learned information, students also have to think in divergent directions in order to come up with different solutions to the problem. This operation is directly linked to creative thought and gives them an opportunity to be flexible in their thinking (De Corte *et al* 1981:56; Steyn 1991:39). It includes all the levels of Bloom's taxonomy with special emphasis on evaluation and synthesis. Torrance's key-creative abilities (2.5.1.1) are strongly represented during divergent production.

Sensitivity to problems and penetration are needed to see deficiencies and the unusual, and to get underneath the problem and away from the obvious. Internal visualisation can contribute to a wider understanding of, and an insight, into the problem if the student is able to visualise beyond the exterior in order to pay attention to the internal dynamics of the problem. Once this is established, psychological openness accompanied by fluency and flexibility (which require practice and patience) can contribute towards a variety of possible solutions. This creates the right atmosphere for the emergence of originality, synthesis, elaboration and redefinition. A unique solution can be synthesised from many alternatives and elaboration and redefinition can produce a more effective

and original end product.

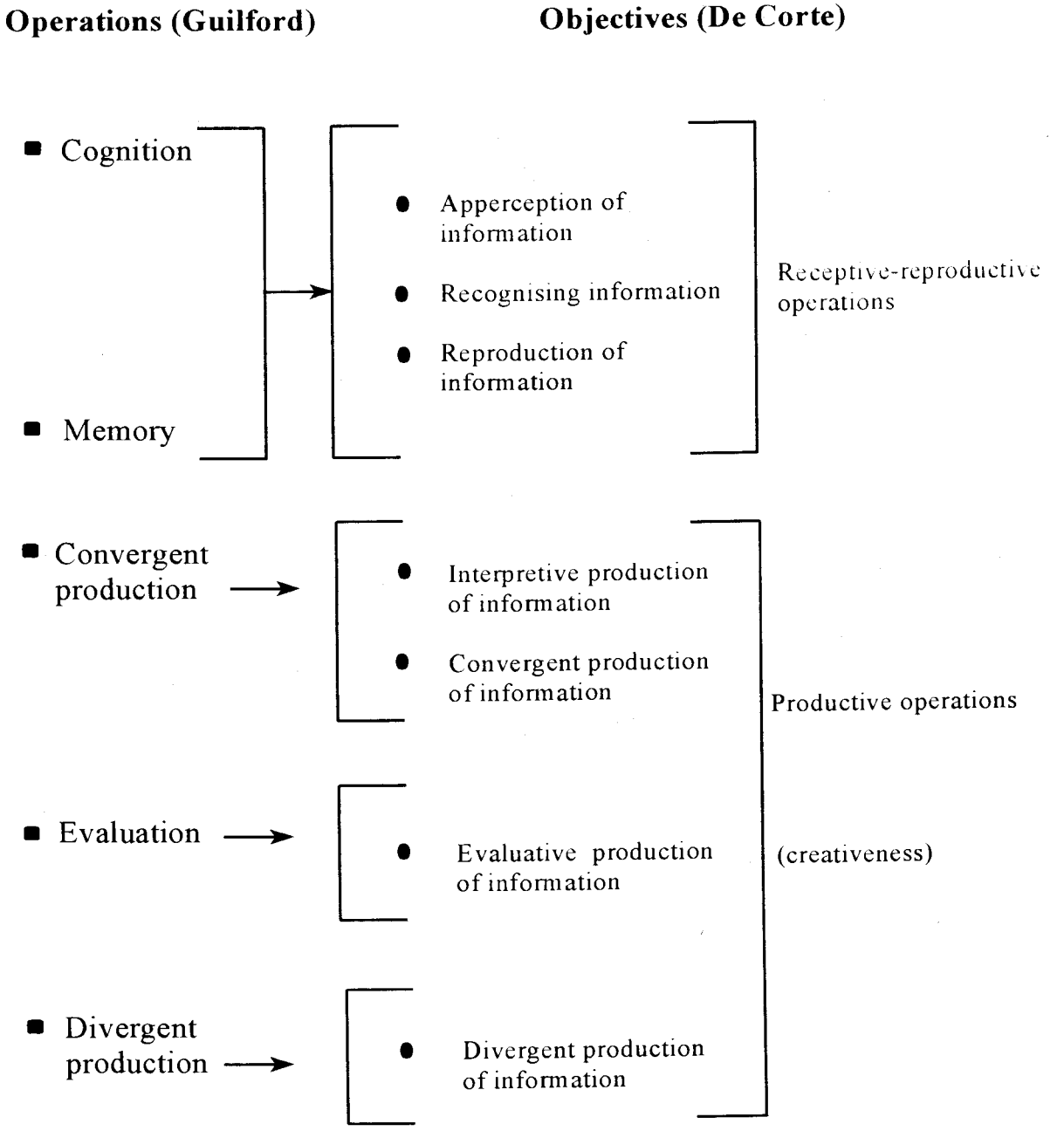
Figure 4.6 shows the relationship between De Corte's classification of objectives and the operations of Guilford's structure-of-intellect model. Guilford's operations comprising cognition and memory concur with De Corte's receptive-reproductive operations which do not require creative thought. It is the productive operations as identified by De Corte which are required for creative thought and these concur with Guilford's operations involving convergent production, evaluation and divergent production.

4.4 THEORIES OF LEARNING

Learning as a process which causes a permanent change in knowledge and behaviour, has been studied in various schools of psychology. The behavioural learning theories which focus on observable behaviour, do not have a significant influence on creativity as these theories postulate a controlled, authoritarian and rigid teaching-learning environment where emphasis is placed on external motivation. This is directly opposed to a creativity inducing environment which requires an unstructured teaching-learning situation that allows active involvement, psychological freedom, exploration, deferred judgement, humour and enjoyment. The cognitive learning theories which focus on mental processes and emphasise intrinsic motivation, and the humanistic learning theories which focus on affective learning, have much more in common with creative learning. As creativity involves a combination of cognitive and affective processes, some cognitive and humanistic theories and concepts are discussed below in relation to creativity. The cognitive and humanistic theories of learning are of particular relevance to nursing science as nurse practitioners have to develop, apart from their technical skills (psychomotor abilities), both cognitive and affective skills in order to render holistic care to mankind.

Figure 4.6

The relationship between De Corte's classification and Guilford's structure-of-intellect model



(Adopted and adjusted from De Corte *et al* 1981:51)

4.4.1 Cognitive theories of learning

The cognitive perspective on learning is a generally agreed upon philosophical orientation. Cognitive psychologists are interested in how people learn concepts and solve problems. They view people as active processors of information who initiate experiences that facilitate learning and seek out information to solve problems. Cognitive psychologists are concerned with the structures of knowledge and they study memory, perception, attention, problem-solving, comprehension, concept learning and meta-cognition (Woolfolk 1990:160, 228-230).

Cognitive learning theory seeks to explain unobservable factors, such as knowledge, meaning, intention, feeling, expectations, creativity and thought. Cognitive psychologists regard intrinsic motivation as very important and emphasise the need to stimulate students' curiosity, involve them actively in the learning situation and offer interesting and enjoyable learning experiences (Woolfolk 1990:303). This view is congruent to that of the personality theorists (see 2.5.2.1) who cite that creative people are intrinsically motivated and find a deep enjoyment in their work.

4.4.1.1 Problem-solving and creative thinking

Problem-solving is a very important concept within the cognitive perspective as it indicates transfer of learning. Ordinary problem-solving as an analytical step-by-step process requires careful reading and thought, but not necessarily creative thinking. Many problems can, however, be solved more effectively if creative thinking is applied.

Frederiksen (1984) in Slavin (1991:187-188) proposes six elements to be applied when teaching creative problem-solving. These include:

(1) allow time for incubation (to pause and reflect on the problem and consider many alternative solutions)

(2) suspend judgement (all possibilities are accepted before ideas are evaluated)

(3) establish an appropriate climate (creative problem-solving is enhanced by a relaxed, playful environment)

(4) analyse and juxtapose elements (to list the characteristics of a problem)

(5) teach the underlying cognitive abilities (generating many ideas and unusual ideas)

(6) provide practice with feedback (an important aspect of creative problem-solving is to offer students many opportunities to practice on a wide variety of problems)

The need for incubation, ideational fluency and flexibility, penetration, psychological freedom, and freedom of perception during the creative process, is once again emphasised in Frederiksen's explanation.

4.4.1.2 Metacognition and creative thinking

Metacognition is knowledge about thinking and refers to a person's ability to think about his own thinking, and to exercise control over his thinking and learning activities. Metacognition has been linked to creative thinking by several researchers who claim that metacognition is an essential ingredient of creative thinking. Creative thinking techniques are directly related to metacognition as these techniques assist individuals to monitor and regulate their thinking and behaviour (Pesut 1990:105-107; Woolfolk 1990:252).

According to Woolfolk (1990:252), metacognition involves two separate components:

(1) an awareness of the skills and strategies necessary to perform a task effectively, ie knowing what to do, and

(2) the ability to use self-regulatory mechanisms to ascertain successful completion of a task, ie knowing how and when to do what.

The strategies of the first component include identification of the main idea, forming associations and images, organising new information, and note taking; whereas the regulatory mechanisms include predicting outcomes, evaluating effectiveness of attempts, testing strategies, and switching to other strategies if necessary. When these two components of metacognition are compared to Pesut's definition of creativity, several similarities can be determined. Pesut (1985:5) defines creativity as a metacognitive process which *generates novel and useful associations, attributes, elements, images, abstract relations, or sets of operations and better solves a problem, produces a plan, or results in a pattern, structure of product not clearly present before.*

The reference to identification of the main idea indicates holistic viewing as well as penetration because a problem must be understood in its overall context which necessitates going beyond the obvious. Generation of images, associations, attributes and abstract relations refer to the utilisation of both left and right brain processes (see table 3.1). The final production of a structure or product not clearly there before, can only be brought about after evaluation of the effectiveness of several attempts has taken place. The processes preceding final production involve openness to experience, flexibility, synthesis, redefinition, elaboration and novelty - the key-elements of the creative process as identified by Torrance. The presence of metacognition is also evident in the descriptions of the two creative geniuses, Helmholtz and Poincaré, as a deep understanding of the what, where and when of their cognitive processes becomes noticeable in their descriptions of their experiences (see 2.5.1.2).

Herrmann indirectly refers to the important role of metacognition when he postulates that once people acquire knowledge of their own brain dominancy they can start developing the lesser used processes of their brain which will enable them to move towards whole brain creativity.

Pesut (1985:5) regards the development of nursing theory as a creative process that requires metacognitive flexibility which facilitates the process of analysis, synthesis, induction, deduction and reproduction. He regards this as essential to the creation and verification of concepts describing the phenomenon of concern in nursing. Pesut concludes that nurses with metacognitive knowledge can self-regulate creative thought which enables them to practice more effectively and to develop and synthesise concepts that enhance the development of nursing science.

4.4.1.3 Piaget: formal operational thought

Jean Piaget's theory on how thinking develops, has had an enormous influence on developmental psychology. His theory of cognitive development comprises four stages - sensorimotor, pre-operational, concrete operational and formal operational. It is the formal operational stage which is related to creativity.

According to Piaget, formal operational thought involves abstract thinking, testing hypotheses and forming concepts which are independent of physical reality. It is the ability to deal with potential or hypothetical situations, to consider alternatives and to analyse one's own thinking. Formal operations include what is normally referred to as scientific reasoning - formulating hypotheses, setting up and testing mental experiments and controlling variables. Individuals capable of formal operational thought can imagine ideal worlds, think beyond the information presented to them and determine in an organised way the number of different possibilities that exist within a limited framework (Slavin 1991:35, 37 & Woolfolk 1990:54-56).

Formal operational thought, as a higher cognitive ability, relates to various key-elements of creative thinking. It concurs with Torrance's definition of creative thinking with respect to the formulation and testing of various hypotheses and the consideration of many alternatives in a given problem situation. The abilities of abstract, analytical, linear and rational thinking, characteristic of formal thought, refer to left brain processes

whereas divergent thinking and analogical thinking which are also implied, refer to right brain functioning. Ideational fluency (the ability to produce a variety of ideas or possible solutions to problems), flexibility (to use a variety of approaches) and penetration (to get underneath the problem and away from the obvious) seem essential during formal operations.

The role of formal thought in creativity was reported by Saarni (1973) who tested young adolescents on two of the standard Inhelder and Piaget tasks. He found that formal operational students obtained significantly higher ratings on two productive thinking problems. Arlin (1975) examined the relationship between cognitive development and creativity and found a significant correlation between formal thought tasks and scores obtained in a divergent questioning task (according to Guilford's structure-of-intellect model) as performed by a sample of female college seniors. He concluded that formal thought was a necessary but not an adequate condition for creative problem-solving (Noppe 1985:89). This conclusion appears to be realistic as creative problem-solving and creativity do require more than formal thought. The illumination phase of creative problem-solving, with all its processes, has not been described as part of formal thought, and the intense emotional involvement, dedication and love for the task which are characteristic of creative endeavour are certainly not present in all situations depending on formal thought. As many adults achieve formal operational thought in only a few areas (according to Piaget and others) there is a possibility that perceptual frameworks in these areas might hinder psychological openness (as described by the Gestalt theorists) which is so crucial to creativity.

Anderson (1975) refers to formal thought when he describes the creative thinker as being a logical, intuitive and cognitively complex person who is interested in the possibilities *behind* the facts, rather than just the facts themselves. He adds that both formal operational logic and a deep repertoire of experimental structures are required for creativity as exclusive dependence on logical processing does not allow for sufficient material to facilitate creativity (Noppe 1985:94-95). This concept is congruent with

Herrmann's view of whole brain creativity and the emphasis he places on structured as well as experiential learning settings (see figure 3.4).

Noppe (1985:89, 95) is of the opinion that present research identifies the achievement of formal operational thought (probably for a specific domain and mediated by a flexible cognitive style) as the hallmark of creativity. Noppe's own research indicates that creativity is facilitated by a mobile field-independent cognitive style and formal operational thought.

Nursing science needs nurse theorists who can enhance nursing's body of scientific knowledge and it appears as though this level of thinking and functioning necessitates formal operational thought. The South African Nursing Council's policy with regard to professional nursing education states that the goal of nursing education is to develop the abilities of analytical, critical-evaluative and creative thought in students (SANC 1993:4). These abilities necessitate the development of formal operational thought.

4.4.1.4 Bruner: Discovery learning

Bruner, one of the foremost cognitive psychologists, follows an eclectic approach to psychology. Eclectic theorists reject large-scale theorising (system building) and selectively borrow ideas and concepts from existing systems and arrange them in eclectic bodies of knowledge that exhibit more or less internal consistency (Bigge & Hunt 1980:21, 392). Bruner views the different modes whereby a person acquires knowledge as examples of a problem-solving process, and proposes that students must learn through inquiry and discovery. His discovery learning model, based on problem-solving, is regarded as one of the most influential cognitive instructional models. Discovery learning can be directly related to creative learning as most of the internal concepts are interrelated.

According to Bruner, the most fundamental principle of learning is the understanding of

the structure of a field of knowledge. The structure of subject matter comprises the fundamental framework of ideas, relationships or patterns - the essential information. Bruner suggests that the structure must be discovered by the students themselves through inductive reasoning. Teachers should provide students with many examples to enable them to discover interrelationships which will lead to general principles and eventually to the structure of the subject matter.

An important concept within Bruner's cognitive eclectic approach is that of coding systems which he believes constitutes the structure of one's knowledge. He defines a coding system as *a set of contingently, related, non-specific categories* and describes coding as a process during which concepts are combined into generalisations or knowledge structures. Formal codes are subsumed under principles of logic, whereas informal (probabilistic) codes are generalisations acquired inductively or intuitively (Bigge 1982:242-243). According to Bruner, it is a person's coding system that enables him/her to go beyond given information in order to develop inventive or creative behaviour. An individual goes beyond given information by placing available empirical facts into a more generic coding system and then, based on previously learned principles of related material, he deduces additional information from his coding system. As an ever increasing number of concepts and generalisations are related and code upon code is built, the individual achieves a deeper understanding of the problem situation or subject material (Bigge & Hunt 1980:403- 404). Going beyond given information, relates to some of the key-creative abilities as described by Torrance. Penetration - getting underneath the problem and away from the obvious, internal visualisation - visualising beyond exteriors to pay attention to internal dynamic workings, psychological openness - taking time to understand a problem and consider alternatives, synthesis - forming relevant associations into new configurations and redefinition - reorganising in new ways, are all involved when going beyond given information.

Bruner views the various modes whereby individuals acquire knowledge as examples of problem-solving and identifies the two major steps as:

(1) an intuitive leap from available sense data to a tentative hypothesis by relating incoming information to a coding system, and

(2) a confirmation check whereby the tentative hypothesis is tested against further sense data, after which the hypothesis may be maintained or altered (Bigge 1982:247; Bigge & Hunt 1980:399).

The involvement of both intuitive and analytical thinking indicates the utilisation of a combination of left and right brain processes. Bruner regards intuition as a much neglected but essential feature of productive thinking, and suggests that teachers should encourage students to make guesses based on incomplete evidence and then subsequently to confirm or disprove these guesses systematically. He accuses traditional educators of discouraging intuitive thinking by rewarding safe and uncreative answers and punishing wrong guesses. According to Bruner, teachers should not tell students how to solve problems, but should only provide the appropriate materials and then encourage them to make observations, formulate hypotheses and test solutions (Bruner 1977:14; Woolfolk 1990:289-290).

Discovery learning encourages students to have experiences, conduct experiments and solve problems on their own or in groups; it arouses their curiosity which stimulates intrinsic motivation (an important aspect during creative performance (see 2.5.2.2.4); and it helps them to gain independence. Students are encouraged to consider many alternatives during problem-solving and time should be allowed before assistance with solutions is given - this implies deferred judgement which is crucial to a creativity inducing environment as explained by Parnes (see 2.5.2.2.2). Questioning techniques which stimulate the development of fluency and flexibility are advocated (Slavin 1991:192, 194; Woolfolk 1990:290-291).

When the nature of discovery learning, as described by Bruner, is related to Herrmann's whole brain teaching and learning model (figure 3.4), this form of learning is seen to

lean heavily towards right hemispheric functioning. The focus is on experiential, explorative and spontaneous learning, and open-mindedness and independence are advocated. Left hemispheric functioning is, however, not neglected as the problem-solving process during discovery learning also depends on logical, rational, organised and sequential thought. Discovery learning seems to provide ideal opportunities for the development of creativity.

The South African Nursing Council requires that student nurses be able to solve problems effectively in order to apply a scientific approach to nursing (SANC 1993:10) and identifies in their teaching programme the objective (SANC 1985:2) that students should be encouraged to evince an enquiring and scientific approach to the problems of practice. Discovery learning would be an appropriate strategy to stimulate and develop these abilities.

4.4.2 Humanistic theories of learning

4.4.2.1 Humanistic psychology

Humanistic psychology, which started as a reaction against Behaviourism and Freudian psycho-analysis, has certain basic tenets which are deeply rooted in Existential philosophy. Humanistic psychologists view man as a unique, integrated whole, who is free to make his own choices. They see man as *becoming*, striving towards fulfilness and self-actualisation. Man is self-determined and has creative potential (Hjelle & Ziegler 1987:366-367). The basic tenets of Humanistic Psychology are of specific significance to nursing science as a human health science. Man is regarded as a physical, psychological, spiritual and social being and must be approached and cared for in his totality. Each individual, including the nurse and her client, has freedom of choice, but this is a freedom with responsibility. Student nurses are specifically guided towards developing responsibility, accountability and personal and professional autonomy in nursing and they can only reach this level of development if they are self-determined and

have reached self-actualisation. It is the nurse educator's responsibility to guide students towards attaining their full potential as individuals and as professional nurses. This concept includes developing their creative potential - self-actualised creativity, as Maslow has defined it (self-actualisation is on the highest level of Treffinger's creative learning model - figure 4.5).

Humanistic education protests against the overuse of drill and rote memorisation in education. It focuses on the affective outcomes of learning, such as feelings, attitudes, beliefs, purposes and values and is concerned with learning how to learn and with enhancing creativity and human potential. Humanistic psychologists stress the importance of intrinsic motivation and regard the role of needs, especially the need for self-actualisation, as central to motivation. Students must explore and experiment and learn to think for themselves; they must be self-directed and self-motivated. This could be accomplished in the educational situation by focusing on students' existing interests and needs, providing opportunities for problem-solving and allowing flexibility, spontaneity and informality in the classroom. Humanistic psychologists stress student-centred learning and favour discovery learning. They advocate that these approaches stimulate students' curiosity, sharpen their reasoning powers and allow them to become self-reliant and responsible. Learning through discovery is more satisfying and meaningful and more fun (Gage & Berliner 1992:479-481; Kolesnik 1975:32, 53, 57, 60, 61; Slavin 1991:264; Woolfolk 1990:305).

The development of the student nurse's affect is of the utmost importance to effective nursing practice. The patient's feelings, beliefs, attitudes and values must at all times be taken into consideration. Student nurses need to internalise their own feelings, attitudes and values before they can take care of their patients' psychological and social needs as well as make decisions on ethical issues which are of benefit to the patient. The South African Nursing Council requires that the professional nurse masters the skill of moral-ethical reasoning when studying the subject Ethos and Professional Practice of Nursing (SANC 1992:13). The values emphasised by humanistic education, such as

consideration, cooperativeness, mutual respect and honesty (Slavin 1991:365) are essential to effective nursing practice. Honesty and cooperativeness between the nurse practitioner and her patient, as well as all the other members of the health team, are important for the total well being of the patient and the effective deliverance of health care. Consideration and respect must be highly valued by nurse practitioners who wish to act persistently on the best behalf of their patients.

The essential role of the affect in creativity has been acknowledged in definitions of creativity and the creative process (illumination phase), and in the personality and environmental theories on creativity. Personality theories focus on the affective nature of creative talent and emphasise the abilities of openness to experience, sensitivity, self-control and self-reliance (see 2.5.2.1)

Torrance (1993) in his study of the beyonders comments on the passion, drive, dedication and enthusiasm which he identified repeatedly in creative people - all aspects which refer to the affect. Herrmann (1989) emphasises the role of the affect in his whole brain creativity model (figure 3.3) and refers specifically to the right half of the limbic system as the seat of emotions.

The concepts of intrinsic motivation, self-directedness, flexibility, curiosity, problem-solving and discovery learning which are emphasised by humanistic education, are congruent with the requirements for creative learning. Many creativity theorists, including Hennessey and Amabile, Crutchfield (1962), Lepper and Greene (1978), have stressed intrinsic motivation as essential to creative learning (see 2.5.2.2.4). Self-directedness, curiosity and being needs (Maslow) are deeply involved in intrinsic motivation. Problem-solving and discovery learning provide opportunities for productive thinking, personal growth and meaningful learning, all of which contribute towards the development of creativity. Problem-solving and discovery learning are of special importance when teaching the health and social sciences in the nursing curriculum. The complexity of contemporary health and patient problems necessitates

divergent thinking skills and creativity in order to find effective solutions.

The flexible, spontaneous, experimental, psychologically free and informal learning environment advocated by the humanistic psychologists is congruent with Parnes' concept of the open teacher and the relevant concepts pertaining to the facilitation of creative learning (see 2.5.2.2.3). The application of humanistic educational concepts can contribute towards the development of especially the right brain processes as is evident in Herrmann's whole brain teaching and learning model (see figure 3.4).

4.4.2.2 Rogers: Student-centred learning

Rogers formulated a student-centred approach to learning which relates to the concepts of creative learning and which is of particular significance to nursing education.

According to Rogers (1969), significant learning takes place when information has relevance for the student's own purposes and is acquired through responsible participation in the learning process. He regards self-initiated learning which involves the intellect as well as feelings, as more lasting and pervasive and states that independence, self-reliance and creativity are facilitated when self-criticism and self-evaluation are applied. External threats and threat to the self should be kept low in order for learning to proceed. Rogers emphasises the importance of the relationship between educator and student and singles out genuineness, trust, acceptance and emphatic understanding, as being the essential qualities for this relationship (Gage & Berliner 1992:479, 483; Quinn 1989:43-44).

When the requirements of a creativity inducing learning environment are taken into consideration, it becomes apparent that Rogers' principles of student-centred learning comply with these requirements.

Active participation in the learning process and self-initiated learning involving both

intellect and feelings are imperative in creative learning. The love for one's work, dedication, intrinsic motivation, independence and self-reliance emphasised by Torrance and the personality theorists (see 2.5.2.1) are all concepts which are advocated by Rogers as important to facilitate meaningful learning. The concepts of self-criticism, self-evaluation and the lowering of external threats, are imperative in a creativity inducing learning environment, as are discussed under the *open teacher* (see 2.5.2.2.3). The affective abilities of trust, genuineness, and emphatic understanding directly relate to the nurturing of creativity as students need to experience a psychologically safe environment before they are willing to experiment and take risks. Openness to experience, as a key-element of creativeness, has been emphasised by all creativity theorists. The principles of student-centred learning, as advocated by Rogers, are represented in Herrmann's whole brain teaching and learning model (see figure 3.4).

In nursing education, one way of lowering external threats and threats to the self is attained by giving students opportunities to practice psychomotor skills in the clinical laboratory before they perform procedures on patients. This lowers the risk for the patient and allows for the development of psychomotor skills in a physical and psychologically safe environment. The kind of relationship between educator and student, as described by Rogers, is of special importance in nursing education. Students need to develop a relationship characterised by genuineness, respect and trust with their patients in order to provide optimum nursing care. Nursing practice needs self-reliant, independent, responsible, knowledgeable and compassionate practitioners to render effective, holistic care to patients.

4.4.2.3 Maslow: Self-actualisation

Maslow's theory of human motivation relates to many aspects which are essential to creativity. He distinguishes between deficiency needs (physiological, safety, love, and esteem) and growth or being needs which include the need to know, understand things and appreciate beauty, and the need for self-actualisation.

Maslow advocates that deficiency needs must be satisfied before the individual will strive towards fulfilling the higher needs, the being needs. He regards self-actualisation as congruent with creativity, and advocates that the goal of education should be to assist the student to achieve self-actualisation in order to become the best one that is able to become (Gage & Berliner 1992:479; Quinn 1989:42; Slavin 1991:321-322).

Maslow's theory can be applied to nursing education with the aim of nurturing creativity in student nurses. The organisation of a psychological learning environment that takes care of safety needs and the needs for love and self-esteem, can be attained in an open and trusting relationship between educator and student. This reflects mutual acceptance and emphatic understanding. Students need to feel loved, appreciated and capable before they are able to strive towards the higher being needs, such as the search for knowledge and understanding, creativity and openness to new ideas, which are characteristic of the self-actualising person. The ideal for the student nurse is to reach the level of self-actualisation as this will enable her to act as a more effective practitioner. The characteristics of the self-actualised person, as identified by Maslow, are the characteristics that the nurse educator would like to recognise in the graduating student nurse.

In 1971 Maslow made the following scientifically cautious statement which has promising implications for nurse educators who wish to nurture creativity in their students: ... *The concept of creativeness and the concept of a healthy, self-actualising, fully human person seem to be coming closer and closer together, and may turn out to be the same thing.* Maslow identified those characteristics of self-actualised people which support this statement. These are that self-actualised people accept themselves and others, and are spontaneous, self-sufficient, independent, autonomous and democratic. They are strongly ethical and moral in individual ways, are capable of detachment from their culture and can objectively compare cultures. These people express deep feelings of brotherhood with all mankind, have a zest in living, a high sense of humour and an ability to handle stress. They perceive reality more objectively and

accurately, tolerate ambiguity and are problem-centred, not self-centred. Self-actualised people are inventive and original and tend to do most things creatively, although they do not necessarily possess great talent (Davis 1985:4-5).

The South African Nursing Council stipulates in the programme objectives for the course leading to a registered nurse (SANC 1985:2), that the newly qualified nurse should show respect for the uniqueness of man in his sociocultural context and that man be understood as a psychological, physical and social being. It is stipulated further that the nurse practitioner should maintain the ethical and moral codes of the profession, interact with patients emphatically, practice independently and accept responsibility thereof, and evince an enquiring and scientific approach to the problems of practice while initiating and accepting change.

The professional nurse needs to possess the characteristics of the self-actualised person in order to comply with all of the abovementioned requirements.

4.5 CONCLUSION

The nurse educator who wishes to nurture creativity in her students needs to have a thorough knowledge of individual learning styles and theories of learning supplemented by a sound background knowledge of the theories of creativity. She must be able to identify her students' learning styles and adjust her teaching approaches accordingly. She must know what theories of learning are applicable when creating a creativity inducing learning environment. She must be skilful at setting objectives on the higher levels of Bloom's cognitive and affective taxonomies and on De Corte's productive operations level, in order to stimulate creative thought in her students.

CHAPTER 5

Educational models and creativity

5.1 INTRODUCTION

The literature on instructional design contains various definitions for educational models. Joyce, Weil and Showers (1992:1) view models of teaching actually as models of learning, as they assist students to acquire information, ways of thinking, skills, values and ideas. Reigeluth (1987:2) refers to models of instruction as sets of strategy components that have been combined to optimise the quality of instruction. Maker (1982:1) describes a teaching-learning model as a structural framework which guides the development of specific educational activities and environments. As education is a more comprehensive concept which encompasses aspects concerned with both teaching and learning, the term educational models will be used.

Educational models have in common an identified purpose; underlying assumptions about the characteristics of learners and the teaching-learning process; guidelines regarding specific learning experiences; requirements for these learning activities and

evaluation of their effectiveness (Maker 1982:1).

Adult learning, mastery learning, experiential learning and **open learning** are discussed in this chapter. These four models have been selected because of their student-centred approach in which the student's needs are of primary concern. Each of these educational models is in its own special way applicable to nursing education, as nursing is a humanistic science and a professional discipline with an overall practice component. There are other educational models such as Gagné and Briggs' prescriptive model of instruction, Bruner's social learning and Ausubel's reception learning which are also useful in the teaching of nursing. The four selected models, however, are more comprehensive in nature and more widely applicable in nursing education.

The specific relevance of each of these models to nursing education will be elaborated on during the discussion. In order to better understand what teaching for creativity encompasses, elements relating to creativity will be identified and explored as the models are analysed.

5.2 ADULT LEARNING

5.2.1 Nature of adult education

Adult education includes all forms of education which treat the participants as adults - capable, experienced, responsible, mature and balanced people. Adult education is viewed as a purposeful effort towards self-development, as adulthood is marked by a growing awareness of self and by a readiness to make existential choices (Brookfield 1991:91). The concept of *existential* includes being individually involved, committed, open and individually valuing.

Adult education is viewed as being liberal as it is value-laden and culturally bound, and embraces liberal, technical, religious and community education as well as literacy and

degree programmes (Hake and Morgan 1989:16-17; Rogers 1989:19). Its comprehensiveness is evident in William Allen Nielson's view of it: ... *Effectiveness in work, in citizenship and the enjoyment of life depends on the persistence of the effort to grow in breadth and depth, and to bring more of the universe within the scope of our individual organised thinking* (Kahler, Morgan, Holmes & Bundy 1985:18).

Brookfield's reference to growing self-awareness and a readiness to make existential choices, and Nielson's view of the individual's growth in breadth and depth, relate to Maslow's concept of self-actualising creativeness. According to Maslow, self-actualised individuals are self-sufficient, independent and autonomous; they demonstrate an openness to experience and tend to be problem-centred. He associates self-actualising creativeness with growth and health and the willingness to live one's life truly and to its fullest capacity (see 2.5.3 and 4.4.2.3).

Knowles (1986:29) views adult education as presenting *a challenge to static concepts of intelligence, standardised limitations of conventional education and to the theory which restricts educational facilities to an intellectual class.* Russel in Kahler *et al* (1985:18) states that the aim of adult education is to *inspire grownups to be something more than they are now and to do their work better than they now do it.* Both these opinions indicate a resistance to accept things as they are and a need to move towards self-development and excellence.

Adult education is essentially student-centred and built upon the assumptions of andragogy. These assumptions form the fundamental tenets of adult learning (Nielsen 1992:149-150). Patterson (1986:99) pointed out that there are remarkable parallels between creative learning and learning by using andragogical principles. He states that andragogy fosters creativity which in turn promotes effective adult learning. This issue is explored further in the last section (5.6) of this chapter.

5.2.2 Assumptions of adult learning

The assumptions of adult learning, originally identified by Knowles, are:

5.2.2.1 The need to know

Adults want to know why they need to learn and how they can use the knowledge in real-life situations. According to Knowles (1986:55-56), it is the function of teachers to raise their students' level of awareness of the need to know. He suggests that real or simulated experiences must be provided to enable them to discover for themselves the gaps between where they are and where they want to be.

If the learner perceives the learning material as being meaningful and applicable in his/her situation, learning will be enhanced. Steyn (1994:7) points out that learning material should be presented in a pattern that the learner is able to perceive and in a way that is compatible with the learner's experience, in order to establish meaningfulness.

5.2.2.2 The learner's self-concept

Through the ability to form abstract ideas man is allowed to think about himself and how he appears to others, and this knowledge defines the self. All new experiences and knowledge are organised into some relationship to the self. Adults with a positive self-concept are more ready to learn and to accept change. Adults have an independent and responsible self-concept which allows them to be self-directed. Self-directedness refers to the adult's ability to independently plan, conduct and evaluate learning abilities (Brookfield 1991:40; Brundage & Mackeracher 1980:23-24).

Smith (1982) regards skills, such as the ability to identify one's own learning style and to use one's intuition, as essential for self-directed learning. Cheren (1983) remarks that there is a whole-person aspect to self-directed learning. The self-directed learner is

viewed as the humanistic ideal, the self-actualised person. Houle (1961) describes this person as someone who *approaches life with an air of openness and an inquiring mind* (Oddi 1987:27).

Studies conducted by Brookfield (1981) and Gibbons *et al* (1980) show that self-directed learners acquire knowledge through inquiry, and that they use experimentation, problem-solving, casual encounters and informal conversations to develop their expertise in areas of interest (Oddi 1987:23, 27). Vygotsky, a cognitive psychologist, refers to self-directed learning as a *higher mental function, a tool of thought* (Grow 1991:128). These findings and viewpoint indicate that self-directed learning involves productive learning, the emphasis being on the higher cognitive skills.

Bell and Bell (1983:27) comment that self-directed learning is criterion-referenced and allows and encourages students to work together in a cooperative manner. It thus facilitates interaction and the exchange of viewpoints which challenge the higher cognitive processes as well as affective development.

Various research studies have revealed that there are varying degrees of self-direction. Grow has developed a model on how to facilitate learning for students in the different stages of self-directed learning. He has found that self-direction can be situational, meaning that students may have it in one, but not all, subjects (Grow 1991:126, 132).

5.2.2.3 The role of the learner's experience

Adults enter the educational situation against a background of a great variety of experience which serves as a rich resource of learning for fellow students. According to Knowles (1985:10; 1986:57), adults feel rejected when their experience is ignored because they derive their self-identity from it. He suggests that experiential techniques, such as group discussions, problem-solving activities, the case study method and laboratory methods, be used to draw from the experience of adults. Knowles, however,

also draws attention to the negative effects of experience - the tendency to develop mental habits, biases, and presuppositions that tend to cause us to close our minds to new ideas, fresh perceptions and alternative ways of thinking. He suggests that adult educators should discover ways of helping students to open their minds to new approaches, and that techniques such as sensitivity training, values clarification and mediation, could be useful (Knowles 1986:58).

According to Brundage and Mackeracher (1980:33), adults use transformations when they incorporate new knowledge into existing knowledge. During transformations, individuals become aware of both figure and ground, and learn to move some of the ground forward while at the same time moving some of the figure back. In this way some of the relationships are reorganised on a new basis. Wertheimer (see 2.5.1.4) refers to this process as the formation of a better gestalt, which indicates the formation of new perceptions.

Feringer (1978) and Ornstein (1972) suggest that experience should be used as the basis for analogy and metaphor. According to them, transformation of knowledge can be facilitated more effectively if students are exposed to analogies, synectics, brainstorming, simulation, games, case studies and mythology. When these divergent, non-sequential, cognitive processes are combined with convergent sequential cognitive processes, adult learning based on past experience can become more productive (Brundage & Mackeracher 1980:34).

5.2.2.4 Readiness to learn

Adults become ready to learn when they experience a need to know, or when they realise that their existing knowledge is deficient to cope effectively in real-life situations. Coping involves dealing with change and, when in doing this, we need to innovate, creativity is the vehicle for innovation (Patterson 1986:102). Aspects such as curiosity, mastery and challenge would thus influence readiness to learn. According to Knowles

(1986:58-59) readiness can be induced through exposure to simulation exercises or to models exhibiting superior performance.

5.2.2.5 Orientation to learning

Adults' orientation to learning is life-centred and problem-centred. They learn in order to be able to complete a task, solve a problem or live in a more satisfying way. Knowles states that adults acquire new knowledge and skills more effectively when these are presented in the context of application to real-life situations. He suggests that a curriculum should be organised around life situations and the acquisition of coping skills. Teaching should not emphasise memorisation of rules and facts, but should rather focus on the extraction of principles from examples given to students. Walklin states that problem-solving is a very complicated form of learning behaviour and that it *leads to the formation of new principles of a higher order* (Walklin 1990:12; Knowles 1985:12; Knowles 1986:59-60).

5.2.2.6 Motivation to learn

Although adults do respond to external motivators, the more potent motivators are internal and include quality of life, job-satisfaction, recognition, self-esteem and self-actualisation. All normal adults are considered to be motivated to keep growing and developing but according to Knowles (1986:61), this motivation is frequently blocked by barriers such as a negative self-concept, time constraints, inaccessibility of opportunities or resources, and programmes that violate the principles of adult learning.

Walklin (1990:1) reports that factors, such as challenge, mastery and curiosity, can lead adults towards great efforts in order to attain a goal. Intrinsic motivation is thus a strong driving force in adult learning.

5.2.3 Learning environment and teaching strategies

Knowles (1985:14) regards climate setting in adult learning as extremely important. A comfortable physical environment with good lighting and ventilation, colourful decor and comfortable chairs is regarded as essential to facilitate optimum learning. An informal arrangement of chairs and tables is recommended to encourage group participation.

Regarding the psychological environment, Knowles (1985:15) and Brookfield (1991:120) agree that a climate of collaborativeness is necessary to enable adults to learn from each other's experiences. Paterson (1970) states that adults discover their whole beings when presenting their interpretations of their experiences in a group discussion. Open discussion is regarded by both Paterson and Brookfield as essential to adult learning. Brookfield states that *to participate in this authentic form of mutual address, in this collaborative search for meaning, requires personal courage and analytic ability of a higher order* (Brookfield 1991:139-140). In order to establish collaborativeness, the group discussion can be advantageous in adult learning as well as in creative learning. Brookfield (1991:136) illustrates this clearly with his statement: *But it is when one's nascent, inchoate ideas and concepts are tested out in the company of others that a certain creative tension comes into play.* This view is supported by Rees and Reilly (1990:76) who regard discussion as a powerful tool for adult learning as it allows the individual to explore, develop and refine his ideas and arguments, and in this way it encourages lateral thinking.

Mutual respect and trust are essential for the facilitation of adult learning. If adults are approached authoratively or if their experiences are ignored, they tend to spend an excessive amount of time dealing with negative feelings. They must be acknowledged as individuals with their own unique contributions. It is the educator's duty to ensure that trust is established as this contributes towards students' feelings of self-worth and independency (Brookfield 1991:13; Knowles 1985:16).

According to Knowles (1985:16) and Seaman and Fellenz (1989:18), adults learn better when they are supported than when they are being judged or threatened. This implies the need for a non-threatening and non-judgemental environment. A climate of openness and authenticity is essential. Knowles (1985:16) states that when individuals feel free to be open and natural, they say what they truly think and feel, and are more willing to examine new ideas and risk new behaviours. Brookfield (1991:14) agrees with Knowles that the educator should model openness and authenticity, and adds that, when this climate setting is applied, it encourages adults to feel free to challenge one another and to feel comfortable when they themselves are challenged.

Knowles' conviction that a climate of pleasure should be established to facilitate adult learning, is supported by Tough (1971) in Seaman and Fellenz (1989:17) who states that most adults engage in learning to satisfy curiosity and to enjoy the content and the pleasure of learning. Knowles believes that learning should be spiced with the excitement of discovery, and that it should be a pleasant and gratifying experience as this is the way that individuals achieve their fullest potential (Knowles 1985:16).

Teaching methods appropriate for adults include those which encourage active participation/cooperative-learning/problem-solving/independent learning. Strategies, such as the case study method, role play, simulation, games, workshops, group discussions and learning packages, are all considered to be conducive to adult learning (Foster 1990:24).

5.2.4 Significance of adult learning to nursing education

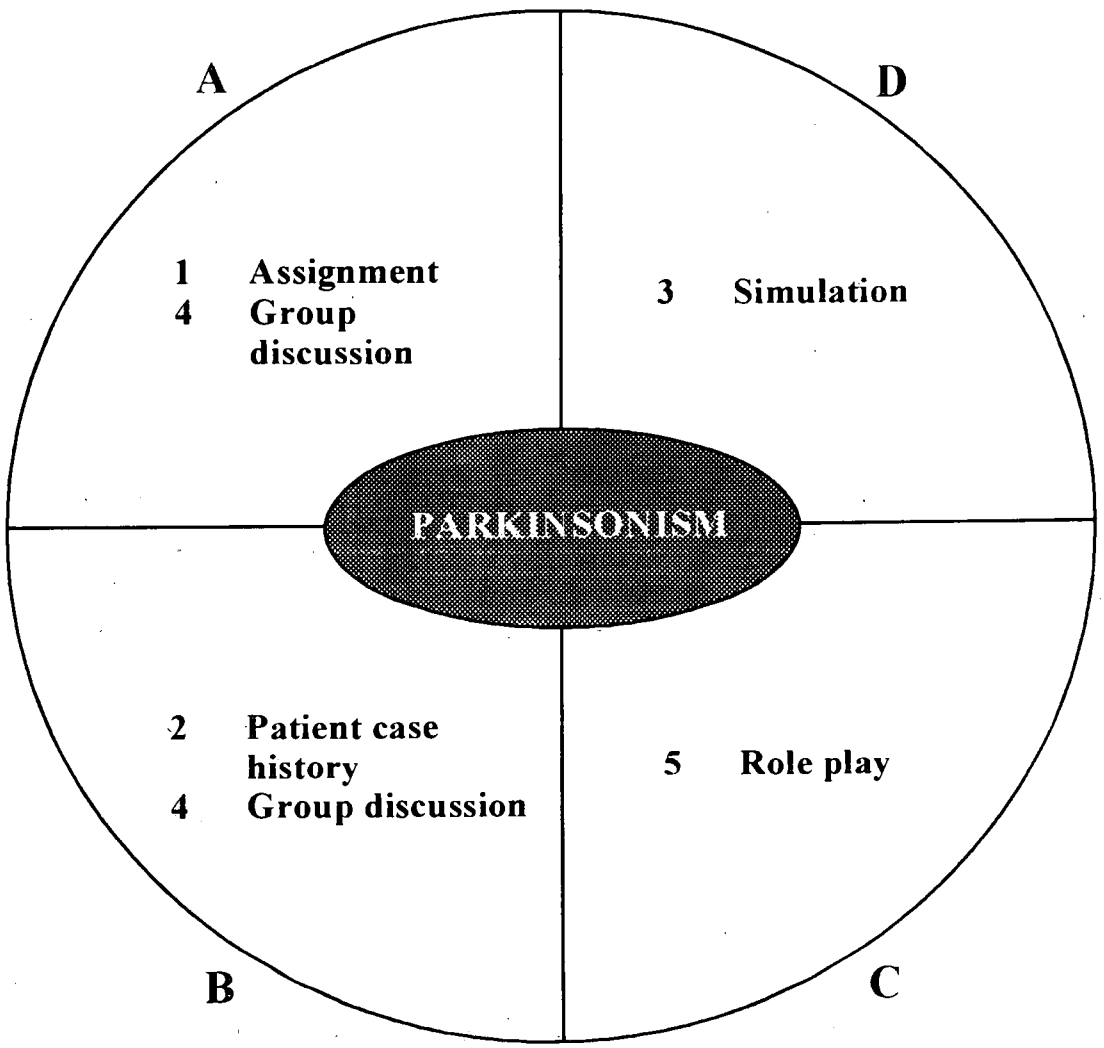
As adult learning is life-centred and problem-centred, it is especially applicable in nursing education. Both the theory and practice of nursing require the knowledge and skill of problem-solving. Student nurses need problem-solving skills to enable them to make effective decisions in practice. Holbert and Abrahan (1988:23) regard problem-solving as an essential dimension of the nursing process.

The following is an example of how adult learning can be applied to nursing education in order to establish whole brain learning:

Knowledge of the many different disease patterns is essential to enable nurse practitioners to deliver safe patient care. When a teacher is required to teach students about Parkinsonism, she may proceed as follows. Students are given a written assignment on the topic which is to be completed within a two-week time period. Relevant text references are given as well as an opportunity to visit a geriatric unit or an old age home in order to do a patient case history should they wish to do so, and they are supplied with an outline of what is expected of them and of the objectives of the exercise. After the two-week period has expired, a class session is held in which an interview between a physician and a patient suffering from Parkinsonism is simulated. The students are required to estimate the severity of the patient's condition, make a diagnosis and substantiate their conclusions. A group discussion then follows during which they discuss their findings and experiences (if any) with patients suffering from Parkinsonism. The teacher can provide any missing details and information. Students with past experiences with individuals or relatives suffering from Parkinsonism can be asked to role play certain scenarios in order to demonstrate interpersonal relationships between the nurse and the patient as well as the patient's experience of his/her condition. This will enhance affective learning and deepen the students' understanding of the impact of this disease on the individual's quality of life. Students should subsequently be assigned to clinical practice in a geriatric ward, old age home or an out-patient clinic where they will have, inter alia, the opportunity to care for patients suffering from this particular condition (see figure 5.1).

Figure 5.1

Example: Adult learning versus whole brain learning



Characteristics of adult learning	Teaching strategies
Student-centred	(numbers 1, 2, 3, 4 and 5)
Problem-centred	(numbers 1, 2, 3, 4 and 5)
Active participation	(numbers 1, 2, 3, 4 and 5)
Excitement and enjoyment	(numbers 2, 3, 4 and 5)
Cooperative learning	(numbers 3, 4 and 5)

■ **Figure 5.1**

The written assignment with a selection of reading options will appeal to the A-quadrant dominant students (discused in 3.5.3) as they tend to be highly verbal, analytic and rational. This group will also enjoy the group discussion where they can exchange their information. The B-quadrant dominant students may choose the written assignment with the option to include a patient case history as they tend to prefer action. They will also benefit from the group discussion as they would want to ascertain that they have all the necessary detail. The simulation might appeal to the D-quadrant dominant students because of their highly visual, holistic and conceptual orientation. The C-quadrant dominant students may benefit from the role play as they tend to be expressive, emotional and kinaesthetic (see 3.5.3 and figure 3.4).

The given example encompasses many of the principles of adult learning. The teaching methods are student-centred and involve problem-centred learning, inquiry and active participation. Past experiences can be shared during the group discussion and the role play. Excitement and enjoyment may specifically be experienced during the simulation and role play and to a lesser extent during the group discussion and the taking of the patient case history. The simulation, group discussion and role play, facilitate cooperative learning.

Adult learning is specifically applicable to nursing education because of its problem-centredness and because most student nurses are in that stage of their lives in which they are in the process of becoming mature, responsible adults and independent professional practitioners.

5.3 MASTERY LEARNING

5.3.1 Nature of mastery learning

Mastery learning is based on the assumption that most students can master a subject or attain learning objectives provided they are given sufficient time and appropriate instruction. This stands directly opposed to the assumption held by many authorities that the degree of learning achievement is primarily a product of students' intelligence or abilities. Mastery learning attempts to accommodate individual differences among learners in order to promote the fullest development of each learner. The main focus in the mastery learning approach is the attainment of specific objectives (Kulik, Kulik & Bangert Drowns 1990:265; Slavin 1991:233; Woolfolk 1990:339).

One of the strongest arguments supporting mastery learning is its capacity to ensure that each student will, at the end of a course, have a history of successful and rewarding learning experiences. This contributes towards shaping positive affective development, especially the development of self-confidence and a positive self-concept. Research has revealed that students following a mastery learning approach exhibit a markedly greater interest in and positive attitude towards the subject learned as compared to non-mastery learning students. Dramatic cognitive and affective outcomes were reported (Block 1971:9-10).

According to Bloom (1987:508), mastery learning is essential in order for schools to improve the educational effects for the majority of students. This supports Slavin's view of the underlying assumption of mastery learning, which is that almost all students are capable of learning the essential skills in a curriculum. Slavin emphasises the appropriateness of this form of learning when high levels of mastery are needed to form a basis for later learning (Slavin 1991:296, 298).

Bruner in Reilly and Oermann (1992:44) gives a strong argument in favour of mastery

learning. *The pursuit of excellence must not be limited to the gifted student. ... The quest is to devise material which will challenge the superior student, while not destroying the confidence and will to learn of those who are less fortunate.*

5.3.2 Assumptions of mastery learning

Several models for mastery learning exist. The more influential of them include Carroll's model (1963) which identifies three major factors in learning, namely, student aptitude, student motivation and task difficulty, Bloom's Learning for Mastery (LFM) which is teacher controlled; and Keller's Personalized System of Instruction (PSI) which requires written material for monitoring purposes and is self-paced by students (Gage & Berliner 1992:460; Kulik *et al* 1990:265).

Although the various models for mastery learning differ slightly from each other, they are all based on the same assumptions which include the following:

(1) The aptitude of the learner for a particular learning task influences learning. This refers to the amount of time required by the learner to attain mastery of a learning task. Some students require more effort and time to achieve a high level of mastery. The time allowed for learning will differ from student to student, depending on his or her aptitude. According to Bloom (1976), students should be given as much time and instruction as necessary to obtain mastery of a subject (Block 1971:54-55; Slavin 1991:293). Mueller (1976) and Cox and Dunn (1979) believe that mastery learning and PSI cause faster learners to *wait around* while slower learners catch up. Slavin acknowledges that mastery learning can have a Robin Hood effect: *stealing from the rich to help the poor,* but disagrees that this effect occurs in PSI (Gage & Berliner 1992:462, 464).

(2) The quality of instruction has an effect on the outcome of learning. Quality refers to the degree to which the presentation, explanation and organisation of elements

for the learning task approaches the optimum for a particular learner. In mastery learning, the quality of instruction and learning time allowed are more appropriate to the characteristics and needs of each learner. Different types and qualities of instruction are needed by individual students because of the variety of students. Some students need more concrete instructional cues, more practice and more reinforcement than others (Block 1971:50, 52).

(3) The learner's ability to understand instruction influences the outcome of learning. This refers to the ability of the student to understand the teacher's communications, the nature of the task and the procedures to be followed. According to Block (1971:52-53), in our highly verbal educational institutions, verbal ability and reading comprehension are highly correlated with achievement and attainment of grade points.

(4) Perseverance is an important factor in successful learning. It refers to the amount of time the learner is willing to spend in learning. Perseverance will depend on the attitude towards, and the interest in, the learning task. If past efforts in a similar task were successful, a student will spend more time in learning. Perseverance is mainly a product of the student's motivation to learn. Intrinsic motivation is the underlying concept in this case (Block 1971:54; Slavin 1991:233).

(5) Mastery learning requires the breaking down of content into smaller units for study purposes. Specific objectives must be set for each unit. Keller's PSI uses several behavioural principles which include specific objectives and small steps.

(6) A variety of learning activities and materials must be offered which enables students to recycle them until the objectives have been met.

(7) Several tests (formative evaluation) must be set for each unit and frequent

feedback, immediately followed by corrective instruction, must be given.

The Keller Plan (PSI) allows students to move through units at their own pace, after completion of which they are obliged to undergo oral or written tests administered by proctors (students who have already successfully completed the unit) who provide immediate feedback. Students must master the unit (levels of mastery are pre-determined) and if unable, repeat the unit and take another test (Woolfolk 1990:185-186, 339).

5.3.3 Learning environment and teaching strategies

A variety of instructional methods is suggested in order to accommodate individual differences such as lecture discussions, small group discussions, peer-tutoring, computer-assisted instruction, workbooks and programmed instruction. The latter two are of special benefit to students who have difficulty in learning from highly verbal types of instruction. Programmed instruction has the additional advantage of being comprised of small learning steps with immediate and frequent reinforcements. The use of examples, pictures, diagrams and demonstrations are advocated in order to upgrade the quality of instruction which is such an important principle in mastery learning (Block 1971:53; Slavin 1991:234).

Formative and summative evaluation instruments must be prepared for each study unit. Evaluation of the results of formative evaluation (tests achieved by students) provide an in-depth picture of what skills each student has or has not learned and should be continually used to develop ways in which instruction can be improved or supplemented. These instruments are not graded but marked with either *mastery* or *more work needed.* This kind of *mastery* marking may generate interest and positive feelings and attitudes towards learning. Summative evaluation instruments have to define mastery as this is necessary to establish an absolute performance standard against which the sufficiency of each student's learning can be judged and graded (Block 1971:68-70).

The criterion referenced evaluation used in mastery learning, is useful for diagnosing student difficulties and estimating students' ability in a particular area, when mastery of a skill is of primary concern and when certification of competence is necessary. It also encourages student cooperation (Gage & Berliner 1992:576). Criterion-referenced evaluation promotes extended effort, persistence and cooperation between students rather than competition.

The learning environment for mastery learning is open in the sense that self-pacing is allowed, judgement is withheld and students are encouraged and supported and provided with immediate and constant feedback, until they are ready to take the tests.

Several research studies conducted on mastery learning have indicated that self-pacing by students, the use of proctors, mastery requirement, immediate feedback and frequent testing over relatively small study units, lead towards higher student achievement. A study done on Keller's PSI showed raised examination scores for students engaged in PSI as opposed to conventionally taught students (Gage & Berliner 1992:578).

5.3.4 Significance of mastery learning to nursing education

In nursing education, achievement of a mastery level in subjects such as anatomy, physiology and biochemistry is essential in order to establish a sound basis for the understanding of subjects such as pharmacology, pathology and nursing science.

Mastery learning is, however, especially relevant to teaching the psychomotor skills of nursing practice. Procedures such as catheterisation, palpation, wound irrigation, administration of injections, application of sterile dressings and monitoring vital signs, necessitate a certain level of mastery and competency before they can be safely performed on patients. Reilly and Oermann (1992:285) view psychomotor learning as an egocentric process which requires that the learner feel comfortable with her-self/himself in the performance, before the skill can be performed on a more sophisti-

cated level in nursing practice.

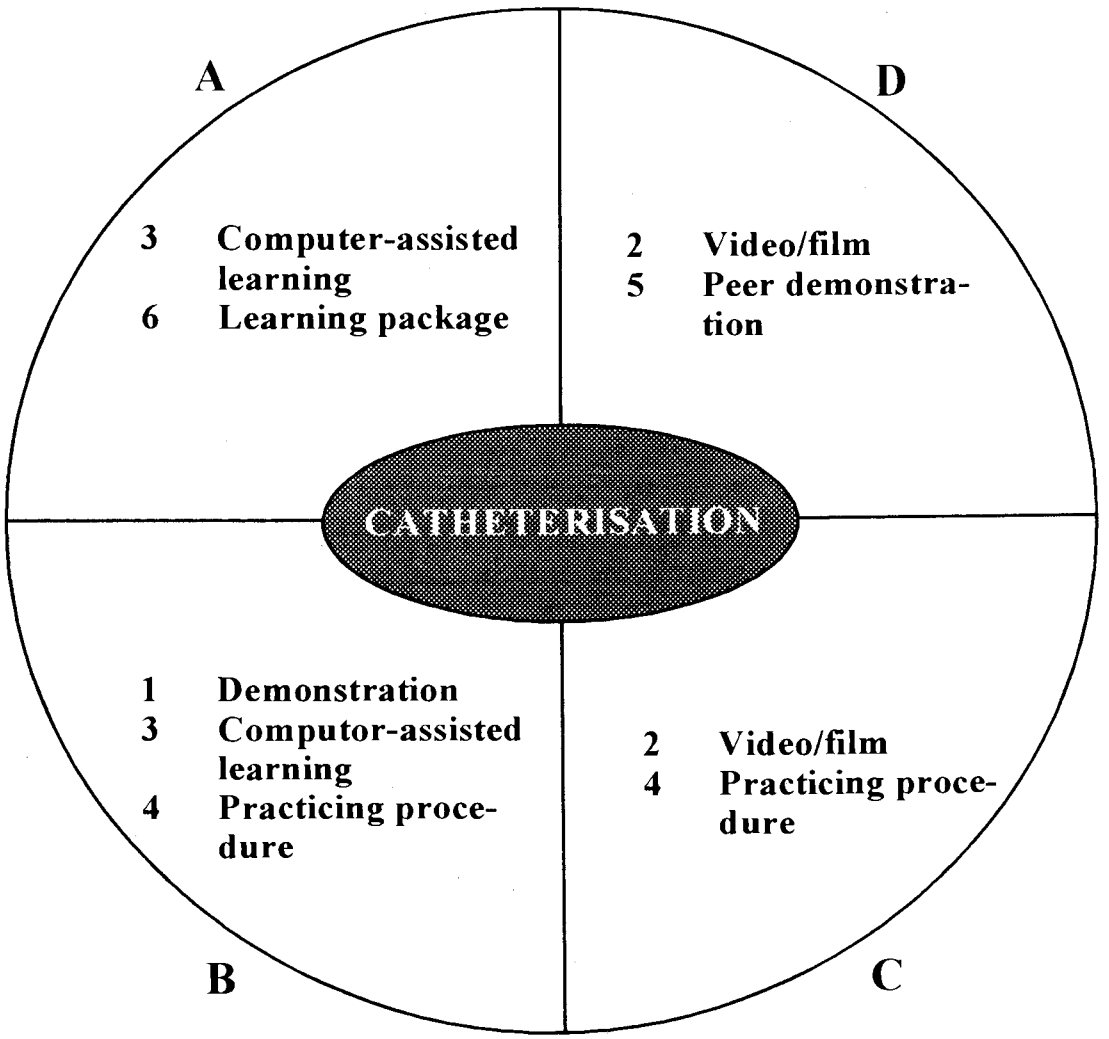
The following is an example of how mastery learning can be applied in nursing education in order to establish whole brain learning (discussed in 3.5.3). When students are taught the psychomotor skill of catheterisation, a demonstration on a model is given in the clinical laboratory. Each step is explained by the teacher and students are encouraged to ask questions while they observe the procedure. A film or videotape presentation is shown afterwards to give a holistic view of the procedure and to enable the students to get an overall view of the action pattern. Additionally, programmed learning in the form of computer-assisted instruction can be offered to provide the students with combinations of verbal and visual cues in order to facilitate cognitive learning. Students then practice the procedure in the clinical laboratory until mastery is achieved. During this period the teacher and peers give feedback. When the students are ready and confident they formally demonstrate the procedure to the teacher for evaluation purposes. Only when they have perfected the skill in the clinical laboratory, and after they have witnessed at least one real catheterisation on a patient are they allowed to perform the procedure on a patient under supervision. In cases where sophisticated educational media are not available, the film or video tape presentation can be replaced by a senior student repeating the demonstration (peer-teaching) and the computer-assisted programme by a learning package (see figure 5.2).

■ **Figure 5.2**

The demonstration would appeal to the B-quadrant dominant students as these individuals tend to be organised, sequential and procedural (discussed in 3.5.3). They will enjoy practising the procedure. They will also benefit from the programmed learning because of the verbal nature and sequential steps which appeal to left brain oriented individuals. The A-quadrant dominant students will benefit mostly from the programmed learning or learning package, as they are highly verbal, analytic and logically oriented.

Figure 5.2

Example: Mastery learning versus whole brain learning



Characteristics of mastery learning	Teaching strategies
Self-pacing	(numbers 2, 3, 4 and 6)
Cooperative learning	(numbers 1 and 5)
Reflective observation	(numbers 1, 2, 4 and 5
Small steps and feedback	(numbers 1, 3, 4 and 5)
Aptitude and perseverence	(numbers 2, 3, 4 and 6)

The film or videotape presentation would be a significant learning opportunity for the right brain oriented students. The visual display and holistic picture provided will specifically appeal to the D-quadrant dominant students. The C-quadrant dominant students will concentrate on the emotional, expressive and interpersonal aspects which are conveyed by film and videotape presentations and on kinaesthetic aspects during the practicing of the procedure.

Several of the principles of mastery learning are illustrated in the example. Self-pacing is allowed as students can practice the procedure in the clinical laboratory as many times as they wish. They may review the film or videotape in their own time and also work through the computer-assisted programme a few times. Through peer interaction cooperative learning is established during the demonstration as well as during the peer demonstrations. The demonstration, film or videotape presentations, peer demonstrations and practice sessions stimulate reflective observation and thinking. Small steps followed by feedback are provided by the computer-assisted programme, during the demonstration, and again during the practice sessions. Student aptitude and perseverance are accommodated as the students themselves decide when they are ready to demonstrate the procedure to the teacher for evaluation purposes.

Mastery learning is essential to teaching the psychomotor skills of nursing practice in order to produce technically competent nurse practitioners.

5.4 EXPERIENTIAL LEARNING

5.4.1 Nature of experiential learning

Experiential learning is the learning that results from experience. It encompasses personal experience, reflection on the experience, and the transformation of knowledge and meaning as a result of the experience and action (Burnard 1989:3). The role of reflection and metacognitive approaches in experiential learning is emphasised by Caine

and Caine (1990:67) and Ellison (1993:15).

Experienced-based education has become a widely accepted form of instruction since the focus of educational methods shifted from that of the mere transmission of content to the bringing of theory and real-life experiences closer together. The development of the skills of inquiry, problem-solving, and critical and creative thinking are regarded as extremely important in order to increase the effectiveness of individuals in coping with future situations.

The experiential learning approach has roots in Humanistic psychology, Gestalt psychology, Phenomenology and Pragmatism. Dewey, Lewin and Piaget are regarded as the intellectual ancestors of experiential learning theory. Dewey's influence is from his philosophical perspective of pragmatism as illustrated in his words: *I take it that the fundamental unity of the newer philosophy is found in the idea that there is an intimate and necessary relation between the processes of actual experience and education* (Kolb 1984:5). Lewin's influence is from the phenomenological perspective of the Gestalt psychology. Experiential learning ... *involves direct encounter with the phenomenon being studied rather than merely thinking about the encounter or only considering the possibility of doing something with it* - as quoted by Keeton and Tate (1978) in Kolb (1984:5). Piaget's theory describes how intelligence is shaped by experience where action is the key. According to him abstract reasoning and the power to manipulate symbols arise from actions in exploring and coping with the immediate concrete environment (Kolb 1984:8, 12).

The focus in these three approaches is on the bringing together of concrete experience and abstract thinking which characterises experiential learning. It does not occur through accidental casual encounter with the real phenomenon - it is the combination of actual experience and the purposeful reflective thinking about the experience that results in this form of learning.

Most experiential learning methods emphasise the uniqueness of human experience and interpretation of the world and pay particular attention to the affective aspects of the individual's experience. The humanistic influence becomes explicit in the student-centeredness and the personal learning nature which contribute towards the development of the self-concept (Burnard 1989:7, 14).

Pendleton and Myles (1991:146) view experiential learning as the keystone of humanistic education theory. It provides a holistic, integrative perspective on learning because it combines experience, perception, cognition and behaviour (Kolb 1984:21).

5.4.2 Assumptions of experiential learning

The assumptions of experiential learning derive from Lewin's, Dewey's and Piaget's models on the subject.

5.4.2.1 Learning is conceived as a process

Ideas are never fixed - they are formed and reformed through experience just as concepts are derived and continuously modified by experience. Freire (1974) cites that knowledge emerges only through invention and reinvention and through the continuing inquiry men pursue in the world and with each other. According to Bruner, the purpose of education is to stimulate inquiry and skill in the process of attaining knowledge. He encourages students to have experiences during discovery learning as it arouses curiosity which stimulates intrinsic motivation. Learning is thus viewed as a process in which continuing inquiry and the formation and reformation of ideas takes place by way of discovery and experience (Kolb 1984:16, 26-27).

5.4.2.2 Learning is a continuous process

Learning is a continuous process grounded in experience. This implies that all learning

is relearning. Dewey explains the continuity of experience as a powerful truth of human existence, and central to the theory of learning: ... *The principle of continuity of experience means that every experience both takes up something from those which have gone before and modifies in some way the quality of those which come after* ... (Kolb 1984:27).

Piaget describes this phenomenon through the concepts of integration (ideas which become highly stable parts of the person's conception of the world) and substitution (which means changing the content of a concept) (Kolb 1984:28).

Learning is thus an ongoing process which results in increased knowledge and a better understanding of the world as the content of learned concepts are changed as past and present insights are compared.

5.4.2.3 Learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world

According to Kolb models of experiential learning describe conflict between opposing ways of dealing with the world, and learning results as a resolution of these conflicts. Dewey regards the major dialectic as between the impulse which gives ideas their *moving force* and reason which gives desire its direction. Paulo Freire demonstrates the dialectic nature of learning and adaptation in his concept *praxis* which he describes as *reflection and action upon the world in order to transform it.* Lewin's model of experiential learning emphasises two dialectics - the conflict between concrete experience and abstract concepts and the conflict between observation and action (Burnard 1989:9; Kolb 1984:29-30).

The questions that arise are how can one act and reflect at the same time, and how can one be concrete and still be theoretical? This can perhaps be explained by the iterative function of the human brain which refers to the back and forth movement of signals

among its specialised regions which can occur within (A <---> B or C <---> D quadrants) or between (A <---> D or B <---> C quadrants) of the hemispheres (see 3.4.2 and figure 3.1).

Learning which results from experience as described above is productive learning (rote learning is excluded). This refers to the higher categories of Bloom's taxonomy of cognitive objectives and the productive operations in De Corte's taxonomy of objectives which are linked to creative thinking (see 4.3.1 and 4.3.2).

5.4.2.4 Learning is a holistic process of adaptation to the world

Experiential learning implies the central process of human adaptation to the social and physical environment and as it involves the integrated function of the total organism - thinking, feeling, perceiving, behaving, it is a holistic concept. Kolb (1984:31-32) views learning as the major process of human adaptation which encompasses other more limited adaptive concepts, such as creativity, problem-solving and decision-making. He advocates that creative research emphasises the divergent (concrete and reflective) aspects in adaptation, for example, ambiguity, flexibility and metaphorical thinking, whereas research on decision-making emphasises convergent (abstract and active) adaptive aspects, for example, rational evaluation.

Kolb's view of experiential learning as a holistic process can be compared to Herrmann's whole brain creativity model as the different processes mentioned by him are represented by all four quadrants of the brain as proposed by Herrmann (see figure 4.2).

5.4.2.5 Learning involves transactions between the person and the environment

In experiential learning theory, the transactional relationship between person and environment is symbolised in the dual meanings of the term experience which refers to the person's internal state (subjective, personal) as well as the external state (objective,

environmental). Kolb (1984:35-36) prefers transaction to interaction, as interaction involves unchanged, separate entities that become intertwined - but the separate identities are retained. Transaction implies a more fluent, interpenetrating relationship between subjective experience and objective conditions resulting in change, once these become related. Kolb's description of transaction implies that productive learning takes place. The skills of analysis, synthesis and evaluation are essential when separate entities are changed and brought into a new relation to each other.

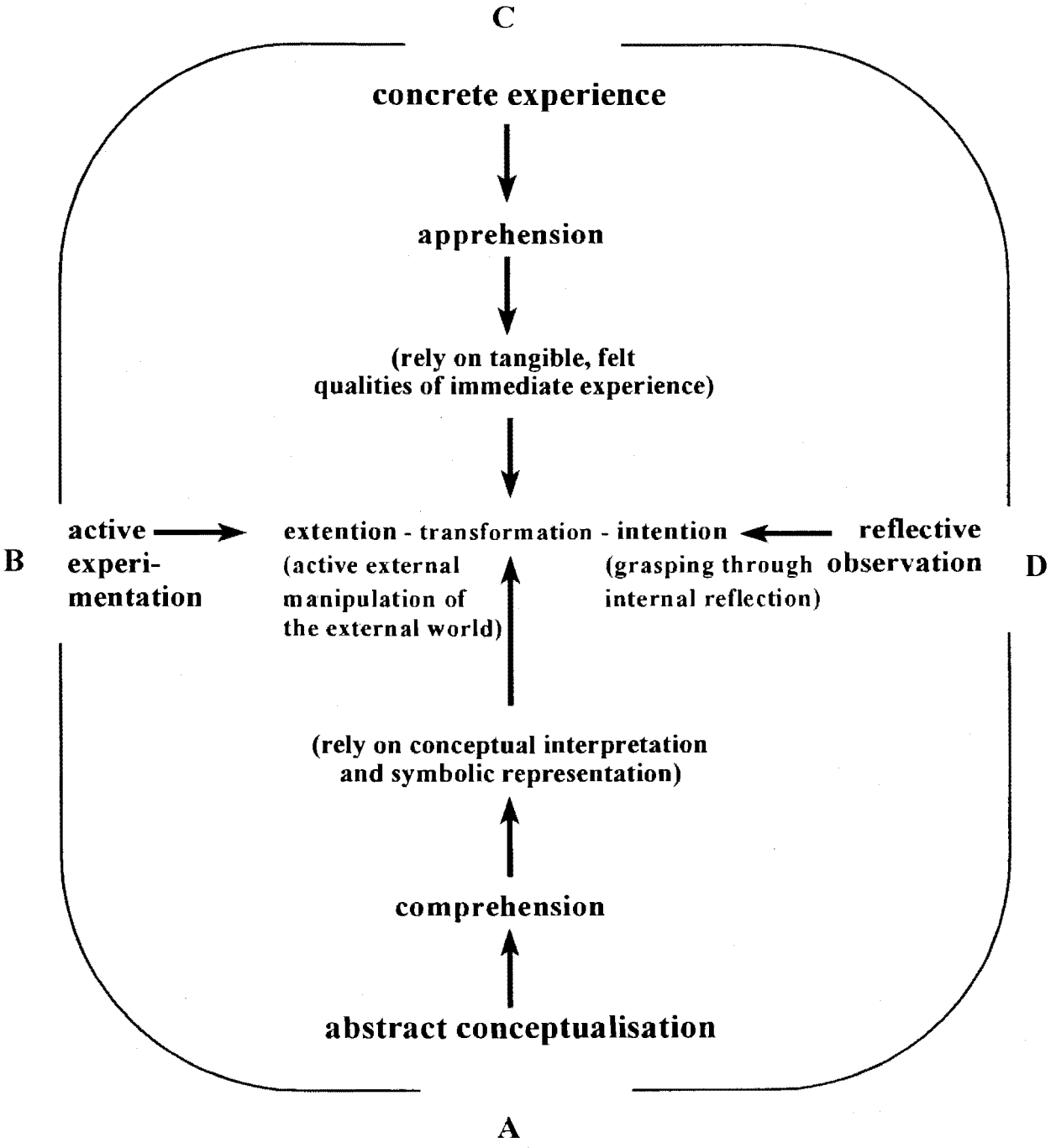
5.4.2.6 Learning is the process of creating knowledge

Knowledge is created through the transaction between objective (social knowledge) and subjective (personal knowledge) experiences during a process called learning. Kolb suggests two different ways in which knowledge is created from the conflicts between the adaptive modes of concrete experience versus abstract conceptualisation, and active experimentation versus reflective observation. Learning through the concrete/abstract dialectic occurs through apprehension (reliance on tangible felt qualities of immediate experience) or comprehension (reliance on conceptual interpretation and symbolic representation). Learning through the active/reflective dialectic occurs via transformation which represents either intention (grasping through internal reflection) or extension (active external manipulation of the external world) (Kolb 1984:37-38, 41) (see figure 5.3 and figure 4.1).

The relationship between whole brain learning as a process of creating knowledge, is illustrated in figure 5.3 wherein apprehension is represented by C-quadrant processes, comprehension by A-quadrant processes, intention by D-quadrant processes and extension by B-quadrant processes.

Figure 5.3

The relationship between learning as a process of creating knowledge and the four quadrants of the whole brain creativity model



(Adjusted from Kolb 1984:42)

Kolb (1984:16) refers to the relevance of brain research to experiential learning by indicating that the modes of knowing associated with the left and right hemispheres of the brain correspond directly to the distinction between abstract cognitive and concrete experiential approaches to learning. Holbert and Thomas (1988:31) indicate that Kolb's model emphasises the critical role that experience plays in the process of learning and human development. It links education, work and personal development.

5.4.2.7 The experiential taxonomy: experiential learning involves five stages, initially proposed by Steinaker and Bell (1979)

(1) **Exposure** means consciousness of an experience. Sensory stimuli are very important during this stage. The teacher should stimulate in the learner a desire to pursue the experience by evoking interest and curiosity which leads to intrinsic motivation. This could be achieved by presenting a puzzle, problem or challenge, together with effective audio-visual media. The teacher's role is that of motivator.

Cain and Caine (1990:68-69) refer to the brain's spatial memory which does not need rehearsal but allows instant memory of experiences. This system is motivated by novelty and drives the search for meaning. Spatial memory is best evoked through experiential learning and this promotes the transfer of learning and the development of understanding.

(2) **Participation** involves the decision to physically become part of the experience. Representation can be covertly (private, vicarious) by imagination or analogy or it can be overtly which refers to real interaction in a group. Modification takes place when the individual reflects on past experience. Fluency is important during this stage. The use of analogies and imagination can enhance learning during the participation stage. The teacher acts as a catalyst.

(3) **Identification** indicates the union of the learner and what is to be learned. This

encompasses emotional and intellectual involvement. Several researchers have reported that the ability of the human brain to perceive and generate patterns seems to be important during this stage. Life relevant approaches to learning are emphasised because of the personal involvement of the learner. The brain apparently resists having meaningless patterns imposed on it and the involvement of emotions is regarded as critical to patterning (Caine & Caine 1990:67; Ellison 1993:15). Experiential learning thus supports patterning as real-life experiences are involved. The teacher acts as moderator during this stage.

(4) **Internalisation** means that the experience continues to influence the individual's lifestyle in order to increase effectiveness. Changing attitudes and activities are important during this stage and depend on changing perspectives as explained by the Gestalt (see 2.5.1.4). According to Reilly and Oermann (1992:321), the essence of affective learning appears to be internalisation and continuity. During this stage the teacher plays the role of sustainer.

(5) **Dissemination** goes beyond internalisation in that the individual starts influencing and motivating others to have an equivalent experience. This may indicate a joy and enthusiasm in the individual, a total cognitive and emotional involvement which leads to the need to share the experience with others. The teacher is both critic and evaluator during this stage (Quinn 1995:151, 156; Steinaker & Bell 1979:10-15, 112-116).

5.4.3 Learning environment and teaching strategies

Quinn (1995:153) describes the ideal environment for experiential learning as characterised by support, trust, a climate of acceptance, consideration of students' needs, an element of negotiation, and encouragement of students to take responsibility for their own learning. Kolb (1984:10-11) emphasises an open atmosphere, where individuals can be challenged and stimulated by each other's perspectives, as a learning environment

which is marked by vitality and creativity. To this he adds the necessity for a spirit of inquiry, expanded consciousness, and choice and authenticity in relationships (the basic values of a humanistic scientific process).

Brink emphasises that the learning environment should encourage students to discover knowledge for themselves, and that the teacher, as facilitator, should also provide opportunities for learning. She considers that when experiential learning is implemented in nursing education, a caring relationship should be established between teacher and students (Mashaba & Brink 1994:158).

A wide variety of teaching methods suitable for experiential learning have been reported in the literature. These include guided fantasy, field work, role play, case studies, counsellor workshops, computer simulations, self-awareness activities, small group discussions, psycho-drama and values clarification. Experiential learning methods especially used in nursing education have been reported by Burnard (1991). Amongst these are the practising of clinical nursing skills, problem-solving activities, empathy-building exercises, Gestalt exercises and structured group activities (Mashaba & Brink 1994:157; Pendleton & Myles 1991:149, 157, 158).

5.4.4 Significance of experiential learning to nursing education

The practical aspects of nursing have been taught experientially for decades through the actual nursing process, role play, patient case histories and patient-centred group work. These enable the students to acquire the necessary affective skills. The essence of affective learning appears to be internalisation and continuity. In addition, Reilly and Oermann (1992:320-321) regard experiential learning opportunities as essential when the ethical, moral and value issues of the profession are addressed.

Bradshaw (1978) attributes the justification for the use of experiential learning in nursing education to the phenomenon that most nurses are of the sensing-feeling type. Such

individuals perceive their world to a major extent through their senses - touch, feel, smell, sight and taste. They are categorised as concrete thinkers because they determine the reality of an object by whether it can be taken in by the senses - in other words, experiencing, which thus becomes the key-word and major activity (De Tornay & Thompson 1987:31).

Miller and Rew (1989:86) plead that greater attention be given to experiential forms of learning in the nursing curriculum, with the emphasis being placed particulary on the problem and process, rather than on the solution.

The application of experiential learning to nursing education, with the aim of establishing whole brain learning, is illustrated in the following example.

In order to teach students how to care for and support the terminally-ill patient, each is given a clinical assignment in the form of an interview with a patient suffering from cancer, AIDS or other fatal disease). Written notes must be made during or after the assignment. The interview provides a concrete experience to the students during which exposure, participation and identification take place. When they return to the classroom with their notes, a role play session is held during which several students take turns in playing the roles of the patients they have interviewed. Scenarios between patients and nurses or relatives are, in this way, acted out and, it is hoped, the different emotional phases through which the majority of terminally-ill patients pass through, for example, denial, aggression, and eventual acceptance will be illustrated. During these role play scenarios, the identification stage of experiential learning is reinforced, while analysis and reflective thinking take place. The scenarios are succeeded by a values clarification session during which the students explore the prevailing values of the patients and identify their own values regarding terminal illness and dying. Abstract conceptualisation occurs during this stage and internalisation is accomplished. After this initial form of exposure to experiential learning concerning terminally-ill patients, the students are assigned to wards or out-patient clinics where they are required to broaden their clinical

experience by giving special attention to the affective care of such patients. This affords them the opportunity for active experimentation and application of their knowledge, and it also completes the internalisation phase of experiential learning. On completion of this clinical experience, a post-clinical conference is held to discuss the students' individual experiences with the aim of stimulating further reflective thinking and abstract conceptualisation which actualise the dissemination phase of experiential learning (see figure 5.4).

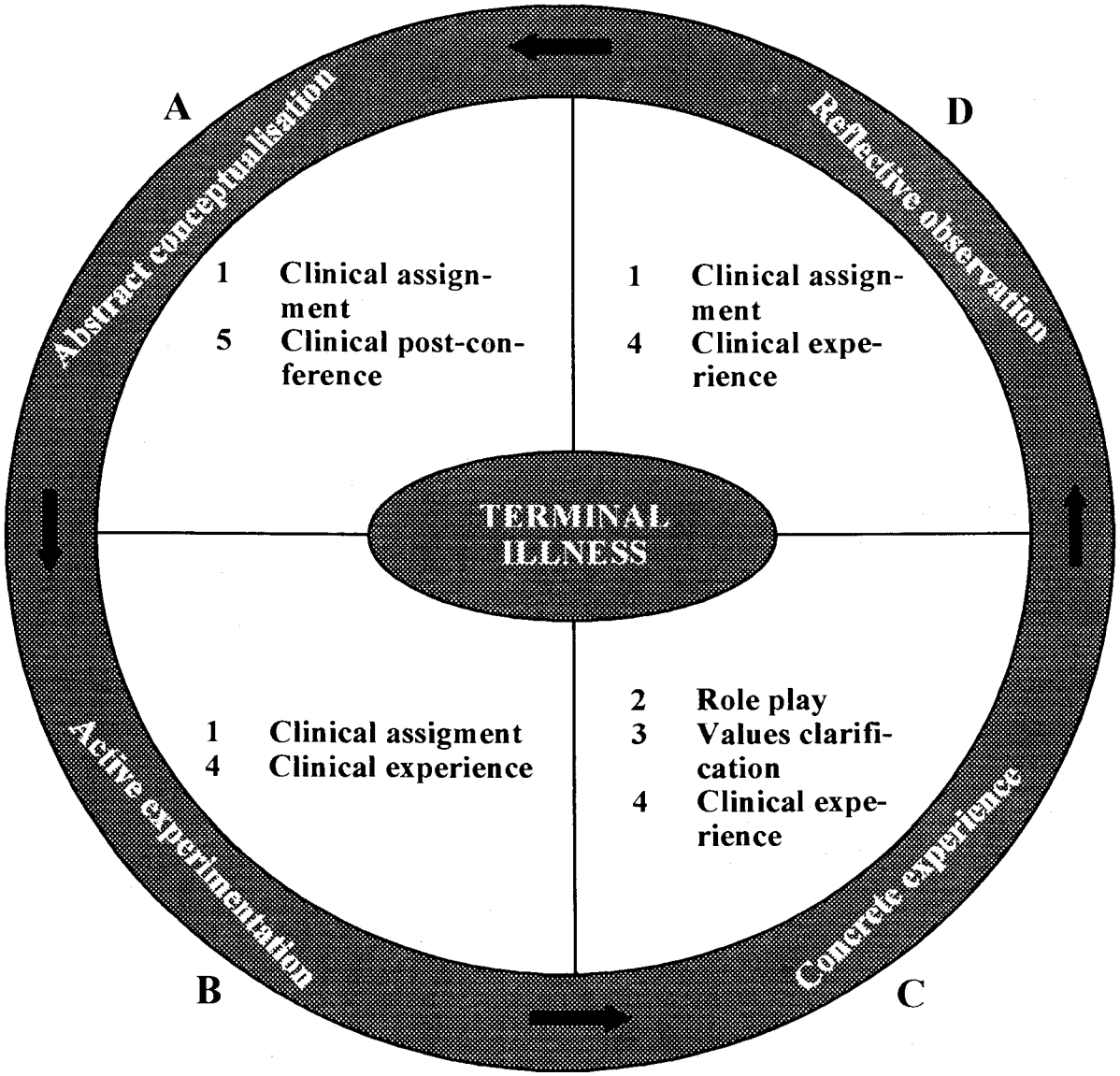
■ **Figure 5.4**

The clinical assignment will appeal to the A-quadrant dominant students (discussed in 3.5.3) as verbal and analytic skills are required during patient interviews. This group will also benefit from the post-clinical conference where reason and rational thinking are required. The B-quadrant dominant students will benefit from the clinical assignment as they are detailed and sequentially oriented. They may also benefit from the clinical experience as they tend to enjoy active experimentation. The C-quadrant dominant students will benefit from the role play, values clarification and the clinical experience as they are emotional, expressive and kinaesthetically oriented. The D-quadrant dominant students will benefit from both the clinical assignment and the clinical experience because of the holistic nature of these activities. This group is visually, intuitively, conceptually and holistically oriented and derive their cues and knowledge from the overall situation.

In the above example teaching strategies are presented which, in the clinical assignments and experiences, role play scenarios and values clarification session, emphasise self-directed learning, problem-solving and active participation. In addition cooperative learning is facilitated during the role play scenarios, values clarification session and post-clinical conference. It is essentially student-centred and the affective domain is involved in each teaching strategy mentioned.

Figure 5.4

Example: Experiential learning versus whole brain learning



Characteristics of experiential learning	Teaching strategies
Self-directed learning	(numbers 1, 2, 3 and 4)
Problem-solving	(numbers 1, 2, 3, 4 and 5
Active paticipation	(numbers 1, 2, 3, 4 and 5)
Cooperative learning	(numbers 2, 3 and 5)
Student-centred	(numbers 1, 2, 3, 4 and 5)
Affective domain	(numbers 1, 2, 3 and 4)

Experiential learning is vital to nursing education as nursing is a humanistic, practice discipline.

5.5 OPEN LEARNING

5.5.1 Nature of open learning

The general shift in educational research trends from those of teaching and instructional design to learning and the particularity of individual students' responses, which commenced during the 1970s, led to the development of the concept of open learning. It became evident that differences in social and educational background, life experience, intelligence, ethnic origin, personality and learning styles influenced learning. Individualised instruction became a key-word in education and open learning practices were instituted as a result. These offer a flexible response to the changes which are taking place not only in society but also in the purposes and values of education (Thorpe & Grugeon 1987:1, 3).

Open learning is a flexible and student-centered approach to learning with less focus on the educational establishment and greater emphasis on how the learner studies which includes the physical and social conditions that facilitate study. It incorporates tutorial guidance and support, multimedia learning materials and a wide range of teaching strategies especially those emphasising independent and individualised learning. Open learning encompasses individualised instruction, and self-directed learning. It should be kept in mind that distance education is not synonymous to open learning, as it is but one variant of open learning, planned on the geographical separation between students and teachers (Jeffries, Lewis, Meed & Merritt 1990:iii; Quinn 1995:330)

Open learning is grounded in the humanistic movement which focuses on metacognition, creativity and enhancement of human potential. It is based on the premise that students should actively participate in directing their own education. Humanistic educators value

affective goals as highly as cognitive goals and are opposed to letter grades, standardised testing and other formal methods of evaluation. A meta-analysis performed by Giaconia and Hedges (1982) on 150 research studies on comparisons between traditional and open classrooms showed that open education improved creativity, cooperativeness and independence, to a moderate degree (Gage & Berliner 1992:489; Slavin 1991:272).

Hodgson, Mann & Snell (1987:164, 166) have further revealed the humanistic influence in open learning by distinguishing between open learning as dissemination and open learning as development. In the former, the emphasis is on creating open access to education to ensure an adequately prepared and updated workforce, while the latter stresses the development of the whole person and his ability to construct meaning in and throughout his life.

Openness in open learning means that the system is more readily accessible than conventional courses with the same learning objectives. It implies the removal of the barriers of time, place and pace, and the facilitation of access to educational programmes. According to the Further Education Unit (FEU) open learning should be considered as a continuum rather than a category, as educational programmes vary widely in the degree of control that students have over their learning (Pendleton & Myles 1991:169; Spencer 1980:19; Thorpe & Grugeon 1987:4).

The hidden philosophy behind the open learning concepts appears to be the idea that people should be offered the opportunity to develop by themselves - as Maslow has stated, to develop to their fullest potential, self-actualising creativity.

5.5.2 Assumptions of open learning

Open learning systems have the capacity to meet national educational priorities on a large scale. They are attractive to governments and communities as they are cost-effective and have relatively short time-scales (Tait 1991:2). A variety of courses can be offered

which may include certificate and diploma courses and/or undergraduate and postgraduate programmes. According to Daniel (1991:5), the Open University in England has introduced *glasnost* (the Russian word for openness) to the academia, by making degree-level knowledge accessible to everybody.

The basic assumptions of this form of education are universal although there are differences in the ways that it is being offered.

(1) The two key-principles of open learning are access and control. Access refers to the opening of doors to further education to a large number of the population with or without the normal university matriculation requirements. It also serves to overcome barriers such as geographical distance, and personal or work commitments. Control refers to the degree of control exercised over the organisation; pacing and timing of curricular content and processes (Pendleton & Myles 1991:169).

(2) The student has a high degree of control as he/she can decide what, when and how to study. Its degree does, however, vary from programme to programme. A student can negotiate about the curriculum and its objectives, pattern of attendance, utilisation of learning materials, assessment and pace. The system offered by the Open University provides for student representation on senate level - students have thus the opportunity to influence decision-making (Pendleton & Myles 1991:169; Quinn 1995:330; Unisa 1995:34).

(3) Open learning is essentially student-centered as the focus is on the needs of the student as an individual with unique qualities and preferences for learning (Slavin 1991:267).

(4) The provision of multimedia and a variety of learning activities is essential and students must have the opportunity to choose among these in order to satisfy their

own individual needs and preferences (Gage & Berliner 1992:489; Quinn 1995:330).

(5) In the provision of learning programmes, teaching models must be adaptable and focused on the needs of students. Thorpe and Grugeon (1987:71) state that the strength of open learning lies in its flexibility and ability to meet quickly specific short term needs for education quickly and efficiently.

(6) Student support is a very important aspect. This is provided for by tutors, counsellors, study centres, compulsory summer schools, individual contact or face-to-face tutorials. Open learning does not mean unsupported and marginalised learning; it is, in essence, supported self-study (Jeffries *et al* 1990:vi; Unisa 1995:11).

(7) Personal growth is one of its outcomes as it is an individualised, student-centred and active learning approach which emphasises experience, practice, feelings and attitudes (Thorpe & Grugeon 1987:5).

(8) A team approach in the preparation of courses and material is currently being preferred. This enhances quality in the presentations of study material and provides built-in student support because students are included in the team (Unisa 1995:6).

The openness and accessibility that characterise open learning, which includes a wide variety of choices and accommodates individual student needs, stand in direct contrast to traditional education with its over-controlled teacher-oriented approach. Open learning thus provides an opportunity for the development of the self in a creative way, as the barriers that stifle creativity in traditional education, are largely removed.

5.5.3 Learning environment and teaching strategies

The open learning environment is flexible, open and student-centred. Although students engage in self-study (often alone in their own homes) they are not totally isolated from fellow students.

Slavin (1991:268) emphasises the role of guided discovery and the use of cooperative learning and discussion among students in open learning systems. Jeffries *et al* (1990:29) focus on the important role of counselling which, in an open learning system, involves encouragement, induction, advice, information, negotiation and feedback. The teacher has thus a supportive and facilitating role.

Another important aspect is the flexible time-table which permits students to set their own pace for learning. This contributes towards decreased anxiety and allows sufficient time for explorative and productive learning rather than rote learning (Jeffries *et al* 1990:29).

Most open learning systems offer a variety of learning activities which may include weekend courses, short courses, part-time day and evening classes, group or individual tutorial arrangements, learning packages, workshops, laboratory work and media such as audiotapes and videotapes (Spencer 1980:94). Students, for example, may be given a choice to attend a two-week course or to use materials and media in their own homes supplemented by individual or group tutorials at the educational institution.

Open learning systems which are offered through distance education make use of the written word, radio and television broadcasts, telephone communication, CD-rom based learning, and video and computer conferencing, as well as annual residential schools and class teaching at study centres (Quinn 1995:331; Stewart 1993:3; Unisa 1995:21).

Evaluation in open learning is done frequently in order to provide ongoing feedback to

students. A variety of evaluation methods from which the student can choose is usually available, but only criterion-referenced evaluation systems in the form, for example, of seminar papers, projects, dissertations, or checklists, are used (Hodgson *et al* 1987:10; Thorpe & Grugeon 1987:5).

Open learning is becoming central to education and training across the world. An increasing number of educational institutions are viewing it and distance education as a way of expanding their provisions and are diverting their resources into these systems. The demand for continuing professional education for nurses, has prompted many colleges in the United Kingdom, as well as the Open University, to offer continuing nurse education programmes (Quinn 1995:330, 332).

5.5.4 Significance of open learning to nursing education

Open learning models provide opportunities for registered nurses to continue their education. All nurse practitioners need refresher courses in order to keep abreast of new developments in health care delivery. Open learning offers the ideal opportunity to nurse practitioners, tied by work and family commitments, to develop themselves and further their education.

The following example illustrates the application of open learning in continuing nursing education and shows how whole brain learning is facilitated through open learning.

If an advanced diploma in midwifery is offered, I suggest that the learning activities include reading assignments with definite referrals to specific textbooks and journal articles, and that audio-visual material is made available to provide students with a choice of relevant audiotapes, videotapes, films and computer programmes. They must have access to learning centres with well equipped libraries and audio-visual facilities. Week-end courses or periodic workshops or group tutorials are to be held at a variety of venues to provide for cooperative learning and support and guidance by teachers and clinical

supervisors, the latter being specifically appointed for these tasks. It is essential for students from remote rural areas to attend these organised workshops and tutorials as well-equiped learning centres are not available in such areas. The students are required to undertake and complete several assignments, projects and seminars, and given a workbook to complete on pertinent clinical procedures. These learning activities serve at the same time, as a part of the evaluation system. Oral or written examinations which offer students a choice as to when they want to do the examination (when they feel they are ready) form the final part of the system of evaluation (see figure 5.5).

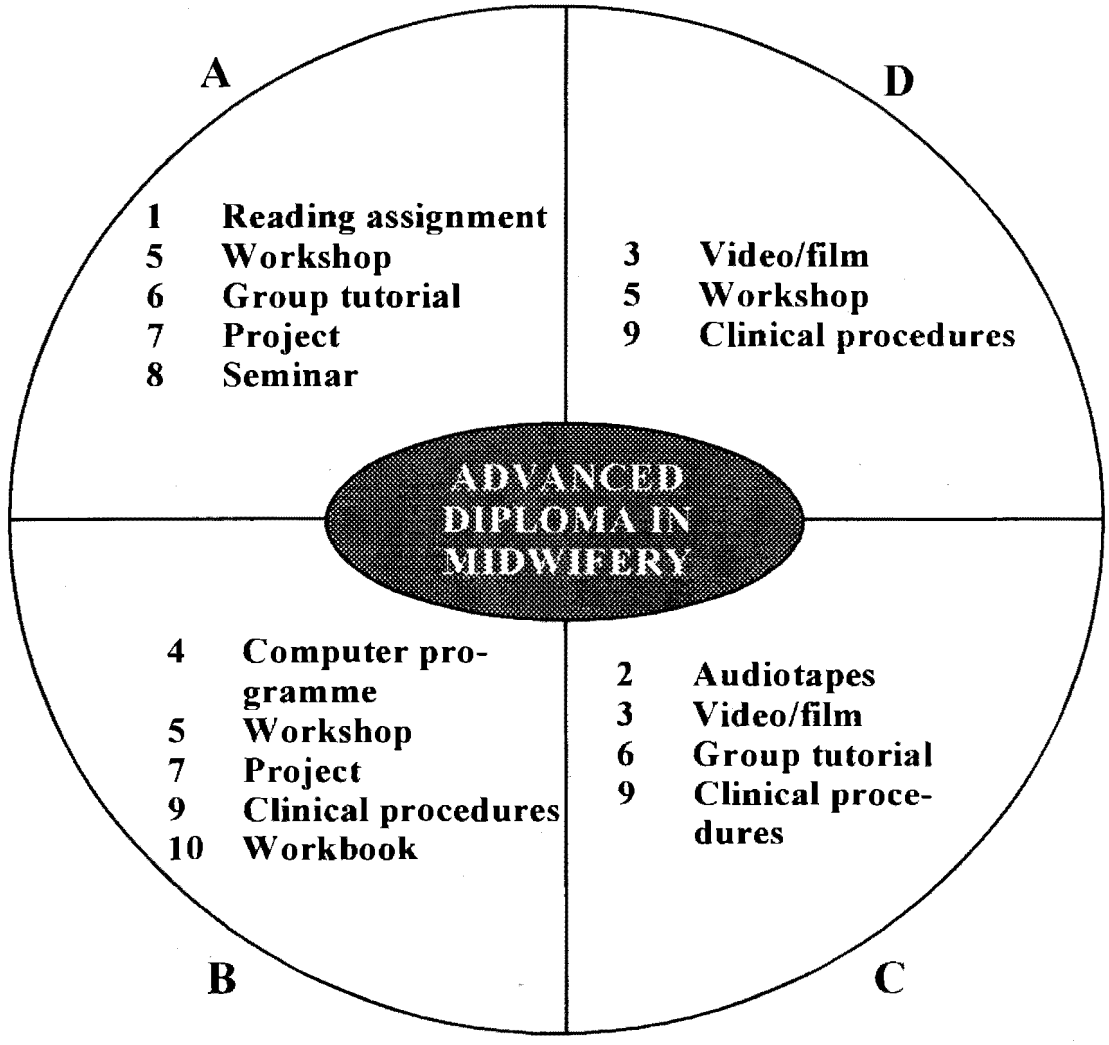
■ **Figure 5.5**

The A-quadrant dominant students will benefit from the reading assignments, projects, seminars, group tutorials and workshops as they have a preference for verbal, analytical, rational and logical processes (discussed in 3.5.3). The B-quadrant dominant students will prefer the projects, computer programmes, workshops, clinical procedures and completion of the workbooks since they are procedural, detailed and sequentially and actively oriented. The C-quadrant dominant students will benefit mostly from listening to audiotapes, watching the films, participating in the group tutorials and clinical procedures as they are expressive, emotional, interpersonal and kinaesthetically oriented. The D-quadrant dominant students will benefit from the videos and films, workshops and clinical procedures as they tend to be holistic, visual, intuitive and synthesising.

Many of the principles of open learning are evident in the example. The teaching strategies and learning activities are essentially student-centered while facilitating active participation. Flexibility is assured by the great variety of activities and media. Cooperative learning is provided for by the group tutorials, workshops and seminars, whereas individualised learning is accommodated by reading assignments, projects workbooks and clinical procedures. Student support is provided by teachers and clinical supervisors.

Figure 5.5

Example: Open learning versus whole brain learning



Characteristics of open learning	Teaching strategies
Student-centred	(numbers 1, 4 to 10)
Active participation	(numbers 4 to 10)
Flexibility	(variety of learning activities)
Cooperative learning	(numbers 5, 6 and 8)
Individualised learning	(numbers 1 to 4, 7, 9 and 10)
Student support	(numbers 4, 5, 6, 8 and clinical supervisors)

Open learning provides nurses with opportunities to develop themselves and continue their professional education in a manner that is compatible with their lifestyles. According to Lewis (1986:12), this method of tuition is a breakthrough for nursing as it has always been difficult to combine nursing and higher education.

5.6 THE RELATION BETWEEN THE FOUR EDUCATIONAL MODELS AND CREATIVITY

The exploration of the nature of the four educational models reveals remarkable similarities with reference to the principles of creativity and the creativity stimulating environment.

5.6.1 The relation between the four educational models and creativity

Table 5.1 illustrates the congruence of the aims and assumptions of the four educational models and creativity.

(1) The common aim of adult, mastery, experiential and open learning models, is to facilitate the **fullest development of the individual** to enable him/her to cope more effectively in life and work. This concurs with the humanistic theories of creativity, which view the individual's tendency to develop, expand, extend, mature and actualise himself to achieve his potentialities, as the primary motivation for creativity (see 2.5.3). Maslow specifically associates self-actualising creativeness with growth. According to Litterst and Eyo (1993:273), growth encompasses the abilities of rhetorical sensitivity, interpersonal competency, awareness, transformation, self-esteem, self-confidence, motivation and empowerment. Growth occurs within oneself and in interaction with others, and involves three dimensions - cognitive, affective and behavioural. The abilities associated with growth have also been mentioned by Torrance and the personality theorists, as essential to creativity.

Table 5.1

Relation between the four educational models and creativity

	ADULT LEARNING	MASTERY LEARNING	EXPERIENTIAL LEARNING	OPEN LEARNING	CREATIVITY
(1)	**Aim:** self-development, growth, effectiveness in life and work	fullest development of each individual, achievement of objectives	roots in humanistic psychology, focuses on unique human experience, growth	grounded in humanistic movement, development of whole person	self-actualising creativeness
	Assumptions				
(2)	**Student-centred:** towards self-direction, independent	individual needs considered, self-paced, corrective instruction · positive self-concept	experience involved, develop self-concept, independence, self-confidence	students' needs considered, self-directed, flexibility, accessibility	self-directed, self-reliable, self-discipline, ego-strength
(3)	**Active participation:** broad existential experience, prefer doing and immediate application	direct prescribed experience, guided discovery, practice until mastery is achieved	immediate segmenting experience situation, cognitive, affective, and psychomotor involvement	guided discovery, explorative	variety of experiences, individual can only be creative in a well-known area
(4)	**Problem-centred:** life-centered, inquiry, experimentation, discovery	focuses on mastery of skills and objectives	emphasis on problem and process, reflective thought, metacognition	problem-solving, reflective thought, productive learning	creativity as process, creative problem-solving, reflective thought, life-long
(5)	**Cooperative learning:** learn from each other's experiences, explore, develop and refine ideas	corrective instruction, peer feedback, correct each other's learning errors	reflective observation, learn from other's ideas, feelings, perspectives	reflective thought, metacognition, social development	creative growth stems from exchanging ideas, flexibility, fluency, elaboration
(6)	**Intrinsic motivation** self-esteem, self-actualisation, recognition, job satisfaction	successful learning → greater interest; frequent feedback → positive attitudes	interest, curiosity, challenge	self-development, interest, challenge	curiosity, enjoyment, passion
(7)	**Variety of learning activities:** to accommodate different learning styles	corrective instruction - to assist individual preferences	whole person involvement, cognitive, affective and psychomotor domains	individual needs considered, includes independent and cooperative activities	facilitate whole brain learning
(8)	**Self-evaluation:** enhances self-esteem	criterion-referenced evaluation: promotes effort, persistence and self-evaluation	self-evaluation: continuous reflective thought	criterion-referenced evaluation and self-evaluation	self-evaluation, increases responsibility and self-esteem

(2) **Student-centredness** is a key-assumption in all four models. It refers to the self-directedness and independence of the learner. The learner takes responsibility for his own learning and decides what, when and how he wants to learn. This contributes towards increasing self-confidence and the development of a positive self-concept. In mastery learning, consideration of individual students' needs specifically indicates student-centredness, whereas in open learning, student-centredness is emphasised by accessibility and flexibility. Freitas, Lantz and Reed (1991:7) report that creative teaching is more student-centred and less inhibited than the traditional methods. Creative people display the traits of independence, self-reliability, self-discipline and ego-strength (discussed in 2.5.2.1). Sedlak (1992:27) emphasises the ever-increasing need for nurses who are independent and critical thinkers to provide present and future competent nursing care.

(3) **Active participation** in the learning experience is an integral part of the adult learning model as adults draw from previous experiences, prefer active participation and want to apply knowledge immediately. They rely on broad existential experience. Mastery learning focuses on guided discovery and self-practice in order to achieve objectives. Direct, prescribed experiences are involved during mastery learning. In experiential learning the learner is totally involved in an immediate concrete experience. Cognitive and affective learning take place through direct discovery. Open learning focuses on explorative and discovery learning through individualised and cooperative learning activities. Variety of experience contributes towards creativity - an individual can only be creative in a field he knows well. Torrance (1993:134) states that diversity of experience is dominant in creative people's lives. Wonder and Blake (1992:173) believe that a considerable period of preparation is necessary before a person can display creativity in a particular field. This principle is exemplified by the diligence and hard work in their areas of interest of creative people such as Helmholtz and Poincaré (discussed in 2.5.1.2).

Saylor (1990:10) refers to nursing as an applied science that cannot be fully developed in the classroom or clinical laboratory. The complexities of the clinical setting necessitate learning through immediate concrete experience. It is here that creative thinking is often required as each situation is unique and has to be approached contextually.

(4) **Problem-centred learning** is stressed in the four educational models: inquiry, discovery, experimentation and concrete experience. According to La Belle (1974:57), problem-solving fosters the kind of intellectual activities which lead to productive and/or creative thinking. Holbert and Abraham (1988:23) affirm that problem-solving fosters both convergent and divergent thinking.

Productive thinking includes the higher cognitive skills of analysis, synthesis and evaluation. These skills are necessary for creative thinking (discussed in 4.3.1) and are listed on the second level of Treffinger's creative learning model (figure 4.5). Effective problem-solving requires the student to think at a formal operational level (Piaget). The link between formal operational thought and creative thought has been discussed in 4.4.1.3. Pickard (1990:7) states that, according to Piaget, a person has to be a formal operational thinker in order to think creatively. It is thus clear that problem-solving, productive thinking, and formal operational thought are related and that they are linked to creative thought.

According to La Belle (1974:59), a problem-solving approach to patient care situations is a means of teaching for reflective thinking which is a vital part of the problem-solving process and experiential learning. Dewey (1933) states that reflective thinking involves *a state of doubt, hesitation, perplexity, mental difficulty in which thinking originates, and an act of searching, hunting, inquiring, to find material that will resolve the doubt, settle and dispose of the perplexity* (Farra 1988:2-3). Dewey links reflective thought to creativity when he states that training in reflective thought is necessary to produce creatively rigorous

thinkers. The relation between reflective thought and creativity is well illustrated in Dewey's view that reflective thought makes an intuitive grasp for something not directly perceived or for a new combination of things coming into existence. Reflective thinking encompasses whole brain creativity as it involves left brain processes (hypothesising, analysing, testing, checking) and right brain processes (intuition, suggesting, inference, forecasting). Farra (1988:3, 5) reports that reflective thought should always be flexible in order to maintain creativity. As creative people can tolerate ambiguity their reflective thinking leads to intelligent action. Those who find ambiguity and searching and insecurity uncomfortable, forsake reflective thought and make hasty decisions.

According to Saylor (1990:9, 11), the ability to reflect upon one's practice is essential for competency in nursing. During reflective thinking new questions, strategies and objectives are formulated which are based on the professional nurse's repertoire of theoretical principles, technical knowledge and experience. Saylor views reflection as the artistry of combining a professional repertoire with current clinical problems, in order to invent unique responses to a unique situation.

The development of problem-solving skills is of vital importance to student nurses. Klaassens (1992:30) affirms that the complexity of nursing practice requires of students a high level of these skills and abilities. She adds that it is imperative to use innovative strategies to stimulate or enhance the higher levels of cognitive thought. Holbert and Abraham (1988:23) view problem-solving skills as essential in order to cope with a rapidly changing health care system.

(5) **Cooperative learning** is advocated and emphasised in all four educational models. Adult, experiential and open learning generally make use of cooperative learning activities whereas mastery learning especially uses cooperative learning activities during corrective instruction. Cooperative learning involves small

groups of students who work together to maximise their own, as well as each other's learning. Several research studies have reported that cooperative learning produces higher achievement and promotes a higher level of cognitive and moral reasoning than competitive or individualised learning (Davidson & Worsham 1992:122).

During cooperative learning individuals share their ideas, knowledge, perspectives and approaches to learning with peers. Through vocalising, explaining and elaborating their own ideas, while listening to those of others, and after summarising the knowledge gained, the individual proceeds to a higher level of understanding and reasoning. This is viewed by Torrance (1988) and Sternberg (1977) as an ideal opportunity for the development of divergent and creative thinking. Cooperative learning has been said to be a training ground for metacognitive skills (Davidson & Worsham 1992:16, 123-124). The link between metacognition and creative thinking, is discussed in 4.4.1.2.

As cooperative learning provides diversity of ideas and social and intellectual interaction among peers, students become more precise, persistent, flexible, curious, thoughtful, creative, self-aware and emphatic towards others (Davidson & Worsham 1992:42, 64). These qualities have been identified as key-abilities of creativity by Torrance and Rogers (discussed in 2.5.1.1 and 2.5.3). Sternberg (1977) suggests that metaphor or analogical thought can be developed through the dialogue between peers during cooperative learning, whereas De Bono (1970) expresses the same idea about lateral thinking (Davidson & Worsham 1992:3).

From the above discussion it is evident that cooperative learning promotes reflective thinking, metacognition and creative thinking. Cooperative learning is vital to nursing education as the diversity of nursing practice (each patient case is a unique situation) necessitates that students learn from each other's experiences, ideas and perspectives. According to Ellison (1993:14) student nurses learn more

when interacting in a caring, non-threatening environment. Miller and Rew (1989:86) suggests that cooperative learning through brainstorming sessions, group visualisation and group discussions focuses on questions rather than answers, and in this way encourages reflective and intuitive thinking which are essential to competent nursing practice. Caine and Caine (1990:67) affirm that cooperative learning provides support and facilitates metacognitive and reflective thinking.

(6) **Intrinsic motivation** appears to play a key-role in the four models. Adult learners strive towards self-actualisation, a higher self-esteem, recognition and job satisfaction. Mastery learning students show greater interest and positive attitudes on receiving frequent feedback and achieving success. Experiential learning stimulates interest and curiosity by providing challenges and opportunity for total involvement. Open learning stimulates interest and provides challenges because of its accessibility and flexibility - these learners strive towards self-development.

Intrinsic motivation has been identified by several researchers as the driving force behind creativity (see 2.5.2.2.4). Intense involvement, deep interest, passion, enjoyment, and a willingness to accept challenges and take risks, have been singled out as intrinsic motivational forces which lead to creative performance.

It is essential that an individual who enters a nursing programme, be intrinsically motivated by the need to serve mankind. Nursing is a dynamic and demanding profession, and therefore requires total involvement and dedication from the nurse practitioner. Real caring in nursing practice can only be realised when the nurse practitioner is intrinsically motivated which implies an affective involvement and a humanistic orientation. Sedlak (1992:26) has found that junior student nurses are extrinsically motivated by patient feedback, but that the more experienced student nurse is internally motivated through self-evaluation of her accomplishments.

(7) **A variety of learning materials and activities** is propagated by all four educational models. These include individualised and cooperative learning activities as well as audio-visual media. Individual needs and differences in cognitive style (discussed in 4.2) and specifically the four cognitive styles described by Kolb in his experiential learning model (see 4.2.2.2) are thus accommodated. Treffinger, Isaksen and Firestien (1983:13-14) emphasise the need for the individual to be familiar with and skilled in drawing from many different theoretical and practical perspectives, in order to facilitate creative learning.

The variety of learning activities offered by the four educational models concur with the concept of providing a diversity of activities in order to facilitate whole brain learning and creativity (discussed in 3.5.3). Summers, Carty and Hoffman (1993:38) quote Herrmann (1988) who suggests a variety of teaching-learning strategies according to brain dominance profiles. Caine and Caine (1990:66) affirm this concept when stating that no one method or technique can by itself adequately encompass the variations of the human brain. According to Holbert and Thomas, (1988:31) research suggests that educational approaches which use a wide variety of teaching-learning strategies are essential to nursing education.

(8) Either self-evaluation or criterion-referenced evaluation or both, are emphasised by the four educational models. Self-evaluation is specifically important in adult and experiential learning. In adult learning it focuses on objectives achieved, whereas in experiential learning it occurs through continuous reflective thought. Mastery learning emphasises criterion-referenced evaluation with frequent feedback, whereas open learning uses mainly criterion-referenced evaluation. Self-evaluation protects the learner from the fear of failure and rejection and provides information as to what extent objectives have been achieved. Self-evaluation is encouraged in creative thinking and creative production (see 2.5.2.2.3), and, according to Sedlak (1992:26), it contributes towards motivation

and self-confidence. Effective nursing practice demands constant self-evaluation from the nurse practitioner as the patient's progress is of utmost importance in health care delivery. Saylor (1990:9) emphasises the need for reflection during self-evaluation.

Criterion-referenced evaluation promotes extended effort, persistence and cooperation among students, rather than competition. This contributes towards a creativity stimulating environment. The negative influence of external and norm-referenced evaluation on creativity has been reported by several researchers (see 2.5.2.2.2 and 2.5.2.2.3).

Criterion-referenced evaluation is important in nursing education as a certain level of competency must be achieved before certification. It is especially relevant when teaching the psychomotor skills of nursing practice. Self-evaluation in nursing practice involves constant reflective thought because of the nurse's continuous direct involvement in complex patient care situations. According to Saylor (1990:9), self-evaluation is essential to professional autonomy.

A reflection of the four educational models discussed can be found in Treffinger, Isaksen and Firestien's (1983:13) reference to the major *movements* in education which provide support for concepts of creative learning. These include individualisation and learner-centred instruction, experiential curricula, democratic education (Dewey), humanistic and affective education and process education.

5.6.2 The relation between the learning environments of the four educational models and creativity

Table 5.2 shows the congruency in the ideal learning environments for adult learning, mastery learning, experiential learning, open learning and creative learning.

Table 5.2

Relation between the learning environments of the four educational models and creativity

	ADULT LEARNING	MASTERY LEARNING	EXPERIENTIAL LEARNING	OPEN LEARNING	CREATIVITY
(1)	**Openness:** challenges one another	**Open environment:** self-pacing	**Open atmosphere:** challenging and stimulating	**Openness:** choice, self-pacing	**Psychological openness:** psychological safety, emphatic understanding
(2)	**Authenticity:** trust, respect, risk-taking	**Authenticity:** respect, value every student's abilities	**Authenticity:** mutual trust	**Authenticity:** acceptance of the individual's worth, respect, trust	**Authenticity:** trust, respect, acceptance
(3)	**Collaborativeness:** individual and mutual discovery	**Collaboration:** during corrective instruction - peer interaction	**Collaborativeness:** reflective observation - peers	**Collaborativeness:** during cooperative activities	**Collaborativeness:** brain storming, flexibility
(4)	**Non-judgemental:** criticism not allowed	**Non-judgemental:** each individual a chance to achieve objectives	**Non-judgemental:** each student experience in his/her unique way	**Non-judgemental:** criterion-referenced evaluation	**Deferred judgement:** relaxed atmosphere
(5)	Relax, enjoy, pleasure	Enjoy because of achievement	Enjoyment because of affective and cognitive involvement	Enjoy because of availability of choice	Humour, enjoyment, playfulness
(6)	**Student-support:** encouragement, non-threatening environment, allow spirit of inquiry	**Student-support:** frequent feedback, corrective instruction	**Student-support:** respect and acceptance, spirit of inquiry	**Student-support:** advice, counselling, encouragement	**Student-support:** acknowledge all contributions, encouragement
(7)	**Student-controlled:** self-directed, enters with a wealth of experience	**Student-controlled:** consider individual student needs, adjust teaching	**Student-controlled:** direct involvement, expanded consciousness, choice	**Student-controlled:** accessibility, flexibility	**Individually-controlled:** curiosity, persistence, risk-taking

(1) **Openness** in the learning environment is regarded as essential to the optimal facilitation of learning and understanding. The following existential concepts come into play in an open learning environment: honesty, responsibility, commitment to freedom, respect, self-directedness and self-discipline (McDaniels 1983:63). These existential concepts establish psychological safety which encompasses a sense of acceptance, respect for other's opinions, willingness to listen attentively to others, and knowing how to disagree without attacking (Davidson & Worsham 1992:11). This contributes towards developing emphatic understanding, a concept regarded by Rogers as essential to a creativity stimulating environment (see 2.5.3). When these elements exist in a learning environment, a spirit of inquiry is established where students feel free to take risks and challenge each other. This type of learning environment is referred to by Kupfer (1983) as the aesthetic classroom, where students learn to listen to each other and take part in conversations. Dialogue, opinion giving and argument are allowed, contributions are modified and integrated, and conceptions are reconstructed (Litterst & Eyo 1993:72, 273).

(2), (3), (4) and (5)

Authenticity implies mutual trust, respect and acceptance, and contributes towards **collaborativeness** in the learning environment. Students feel safe to explore and discover together and exchange ideas and opinions. Authenticity and a **non-judgemental** environment enhance learning because of the absence of threat. According to Orenstein and Sobel (1987), research indicates that stress and threat affect the brain, and that the brain is influenced differently by peace, challenge, boredom, happiness and contentment (Caine & Caine 1990:66). Fear decreases brainpower as the limbic system influences long-term memory (Ellison 1993:12). There is considerable evidence in the literature that laughter reduces stress and anxiety. Laughter and humour relax individuals and relaxed people are more open to learning (Watson & Emerson 1988:89). Adult learners engage in learning to **enjoy** the content and the pleasure of learning - a **relaxed** and

humorous environment will thus enhance learning. In mastery learning, students experience joy and pleasure because of the reward of success in the end. Experiential learning experiences provide pleasure and enjoyment because of the total involvement of the student - affectively, and cognitively, and with psycho-motor involvement. The open learning environment provides enjoyment because of its flexibility, accessibility and wide variety of choices. The creativity stimulating environment is characterised by playfulness, humour, pleasure, enjoyment and spontaneity (see 2.5.2.2.3).

(6) **Student-support** is an important aspect in all four models although there are subtle differences. Adult learning focuses on encouragement in a non-threatening environment and stimulation of a spirit of inquiry. Mastery learning focuses on frequent feedback and corrective instruction, whereas experiential learning emphasises acceptance of, and respect for students' interpretations of their learning experiences. In open learning student support is extremely important and encompasses advice, counselling, encouragement, negotiation and feedback. Student support in creative learning involves acknowledging all contributions and encouraging flexibility, fluency and persistence; assisting students to cope with frustration and failure; and assisting students to become more sensitive to other's feelings, and social, personal and academic problems (discussed in 2.5.2.2.3).

(7) The learning environments in the four educational models are **student-controlled**, while the role of the teacher is that of facilitator. In adult learning student-control is characterised by self-direction and the wealth of experience the learner brings with him to the learning situation. Mastery learning recognises individual differences and provides corrective instruction to meet the students' needs. In experiential learning the student has direct control because of total involvement in the learning experience. In open learning student-control is emphasised by the accessibility and flexibility which provide opportunities and choices. This concurs with the creativity stimulating environment where the individual is in

control. Freedom to explore, experiment, hypothesise, investigate, imagine, make wild guesses, take risks, and manipulate materials, ideas and concepts, are allowed. The teacher displays an open attitude and has a guiding, facilitative and supportive role (see 2.5.2.2.3).

5.7 SYNTHESIS

Adult, mastery, experiential and **open learning** all show remarkable similarities in aims, assumptions and learning environments. These similarities indicate a close relationship to the principles of creativity and the creativity stimulating environment.

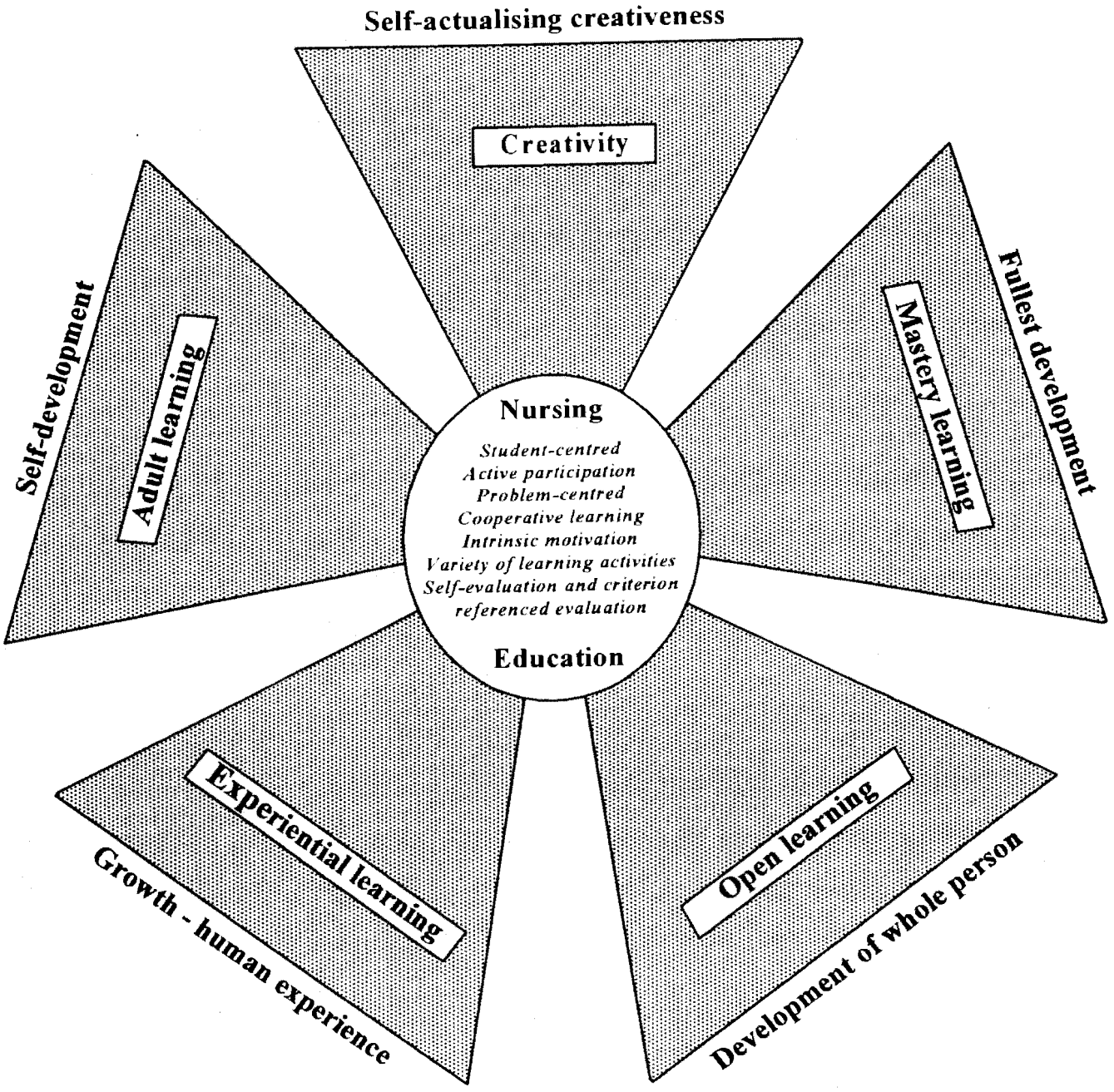
These models have a flexible approach, and attempt to match teaching methods and learning activities to cognitive styles. They accommodate individual differences and focus on the personal and academic development of the student. Self-direction, independence, responsibility and the development of a positive self-esteem are encouraged. Students are supported by the teacher who acts as facilitator, co-explorer, counsellor and guide in a learning environment characterised by freedom, challenge, risk-taking, trust, openness, liveliness, playfulness and humour. This type of learning environment facilitates debate, conflict and idea support. It provides the opportunity for the development of the higher cognitive skills - metacognition, reflective thinking, productive thought and formal operational thought - as well as affective skills.

Adult, mastery, experiential and **open learning** support whole brain education, as has been indicated in the examples discussed. The application of a combination of these models to nursing education can thus contribute towards a fuller development of the potential abilities of student nurses in order to produce innovative nurse practitioners who are life-long learners and effective problem-solvers.

Figure 5.6 provides an instant picture of the relationships between the four educational models and creativity indicating their relevance to nursing education.

Figure 5.6

Synthesis: The four educational models and creativity



CHAPTER 6

The practice of nursing

6.1 INTRODUCTION

Nursing is a profession which serves the health needs of mankind. It defines itself as a scientific field comprising components which make it both a profession and a discipline. The professional dimension is concerned with the practice of nursing whereas the disciplinary dimension relates directly to the science (knowledge and theory) of nursing. These two dimensions cannot be isolated from one another; they provide a challenge to be melded in such a way that both enrich and complement each other (Oermann 1991:1, 217).

Nursing as an evolving and maturing professional discipline is experiencing a major paradigm shift as a result of rapid changes in health care delivery throughout the world. The increasing depersonalisation of health care due to specialisation and advances in scientific, medical and technological knowledge, is threatening to submerge nurses into a progressively bureaucratic and technologically oriented industry. Nursing's greatest

dilemma is the commitment to care in a society that refuses to value caring since it has moved from the traditional scientific medical model (with the emphasis on diagnosis and treatment of physical disease) to a holistic, humanistic-existential, phenomenological paradigm (Johnson 1990:129; Kurtz & Wang 1991:4).

The need for innovative nurse practitioners who will be able to cope in a continuously changing society and health care setting, is clearly indicated.

This chapter focuses on the practice of nursing and the foundations on which it is based.

6.2 DEFINITIONS OF NURSING

Nursing has been defined and redefined for many years and, although no single definition exists on which all nurses agree, there is consensus that the basic concern of nursing is caring for the ill and injured, with the emphasis being placed on the prevention of disease and promotion of health.

The word nursing derives from the Latin, *nutrire*, which means "to nourish", whereas the word nurse originates from the Latin, *nutrix*, meaning "nursing mother". Care of the sick has been provided by the women in a family since the beginning of mankind. During the early Christian era deaconesses and other designated groups of women rendered care to the ill which comprised mainly the provision of nourishment and spiritual support. Nursing thus evolved as a service performed by women out of humility and love (Donahue 1985:4; Zerwekh & Claborn 1994:33).

Since nursing has changed through the years as a result of societal, philosophical and scientific influences, definitions of nursing have varied considerably. The following definitions of nursing have been selected on the basis of their comprehensiveness as well as their relevancy for modern nursing practice:

(1) Harmer (1922)

> *Nursing is rooted in the needs of humanity and is founded on the ideal of service. Its object is not only to cure the sick and heal the wounded but to bring health and ease, rest and comfort to mind and body, to shelter, nourish, and protect and to minister to all those who are helpless or handicapped, young, aged or immature. Its object is to prevent disease and to preserve health. Nursing is, therefore, linked with every other social agency which strives for the prevention of disease and the preservation of health. The nurse finds herself not only concerned with the care of the individual but with the health of a people.*
>
> (George 1995:71)

Harmer indicates the humanistic foundation of nursing when she emphasises service to the individual and society and the holistic nature of nursing is elucidated by the need to care for both body and mind. A modern day comprehensive approach is embraced in the definition by including the curative, preventive, and promotive and rehabilitative (preservation) dimensions of nursing care. She also clearly mentions the function of nourishing. Harmer's view that nursing is linked to every other social agency involved with the preservation of health, indicates the close relationship between nursing and other health professions and agencies.

(2) Henderson (1966)

> *The unique function of the nurse is to assist the individual, sick or well, in the performance of those activities contributing to health, or its recovery (or to a peaceful death) that he would perform unaided if he had the necessary strength, will or knowledge. And to do this in such a way as to help him gain independence as rapidly as possible. This aspect of her work, this part of her function, she initiates and controls; of this she is*

master.

(Hunt & Wainwright 1994:13)

Henderson's definition is still one of the most popular definitions of nursing. By emphasising the supporting role of the nurse, which aims to guide the individual towards independent functioning and self-care, she illustrates the humanistic-existential elements of nursing. She also refers to the nurse's role of advocacy, that is to act on behalf of the patient (which is discussed and explained below in 6.4.2). Her reference to the nurse as master of the function of assisting the patient, and of the initiation and control of this part of her work, is a direct shift from the concept of the nurse as being the physician's assistant to the nurse as being the assistant to the patient. This is a departure from the medical model in which nurses mainly react to the physician's orders to one in which there is a more humanistic-existential approach where nurses accept responsibility and accountability for their decisions and actions as well as the consequences thereof.

(3) The South African Nursing Council (SANC) (1978)

Definition of nursing:

Nursing is a caring profession which enables and supports the patient, ill or well, at all stages of life, to achieve and maintain health or where this is not possible, cares for the patient so that he lives in dignity until death. Accompaniment is fundamental to all nursing.

Definition of nursing science:

A clinical health and human science that constitutes the body of knowledge for the practice of persons registered or enrolled under the Nursing Act as nurses, midwives or nursing auxiliaries.

> *Within the parameters of nursing philosophy and ethics, it is concerned with the development of knowledge for diagnosing of health states, treatment and personalised health care of persons exposed to, suffering or recovering from physical/spiritual/mental ill-health. It encompasses the study of preventive, promotive, curative and rehabilitative health for the nursing of individuals, families, groups and communities and covers man's life-span from before birth.*
>
> (SANC 1993:1, 2)

In its brief definition of nursing, the SANC regards the nurse as assistant to the patient, as the most important aspect of nursing. The supporting role of the nurse is thus emphasised. This concurs with Henderson's view.

The more explanatory definition of nursing science, acknowledges nursing as a human science and mentions a scientific body of knowledge. A holistic approach is indicated by the reference to physical, spiritual and mental ill-health. Service to society is mentioned explicitly in the last sentence.

In the definitions portrayed, service to mankind is the central focus. This stresses the humanistic tendency of nursing. The influence of holism is evident in each definition's view of the individual in totality. It is, however, only the SANC's definition which refers to nursing's scientific body of knowledge. As nursing has only developed as a science since the beginning of the 1970s, Harmer and Henderson did not mention nursing as a science, but defined it as an activity. The more recent definition of the SANC indicates the significance of science in the contemporary era of scientific and technological advances.

According to Oermann (1991:2), definitions of nursing have been influenced throughout history by the social context within which nursing was practiced. This statement is well illustrated in the above three definitions.

6.3 PHILOSOPHICAL FOUNDATIONS OF NURSING

Florence Nightingale's philosophical heritage to nursing has persisted regardless of the diverse philosophies that have accompanied the changes in nursing through the years. Her belief in the dignity and value of human life and health, her religious conviction and Judeo-Christian ethic, together with the classical education she received, made her a classical humanist, a humanism which continues to be a force in contemporary nursing (Bevis 1987:3).

Nursing was influenced by Asceticism from its inception until the 1920s, when Romanticism took over. It probably provided a welcome escape from the drudgery of self-denial and the narrow confines of Asceticism's religious and spiritual goals. Romanticism was characterised by values of personal glory, pride in devotion and loyalty to physicians. The acceptance of the medical model for nursing can be attributed to the influence of Romanticism. One of the romantic notions was that the physicians and hospital administrators knew best what nursing should encompass. During the era of Romanticism nurses lacked autonomy, independence and assertiveness (Bevis 1989:37-38).

It was only after World War II that the influence of Romanticism was replaced by Pragmatism. Nursing during the war was no romantic adventure and neither were the post war nurse shortages. It was Pragmatism with its emphasis on the practical consequences of acts and the practical application of all ideas that lead to physician-specialty areas and the habit of referring to patients as *the appendicectomy in room 4* or the *cerebral incident in ward B*. The focus was on the disease or problem, not on the person who suffered from the disease.

During the early 1960s the pragmatic values eventually gave way to Humanism and holism. Nurses became concerned about the individual, the family and the community, as non-hospital settings for nursing care of patients began to increase. They realised that

the patient was not only a person with a physical ailment but an integrated human being with physical, psychological, social, and spiritual dimensions (Bevis 1989:38-39).

Classical humanism remains the humanism of world nursing today. It values the full participation in the richness and variety of human relationships. People are morally committed to elevate the human condition as part of the divine will. As nurses from all over the world hold in common a belief in the worth of human life regardless of their religious beliefs, they are committed to serve humans in their strive towards health. Contemporary nursing has moved away from the limitations of positivism (the physical world of science and medicine) towards a new paradigm of humanism in which the spiritual and existential significance of human life is valued. Nursing has adopted elements of Existentialism and incorporated them into Classical humanism. This has caused a shift from an occupation based in self-sacrifice, obedience and dependence, to a profession that emphasises individualism, accountability, autonomy, logic and other existentially related ideas (Bevis 1987:4; Fitzpatrick & Whall 1989:371)

Humanism emphasises the power and dignity of human beings, the worth of personality, freedom with responsibility, and the development of human potential. Humanistic philosophy draws from Existentialism the concern with human longing and search for meaning within the self (Leininger & Watson 1990:237).

Humanism derives primarily from the existential-phenomenological philosophies. The I-thou dialogue which requires mutual respect, dignity and appreciation for the uniqueness of every individual is emphasised. The phenomenological philosophy asserts that reality lies in a person's perception of an event and not in the event itself. Humanism is concerned with the individual as a human being; his thoughts, feelings, attitudes, values and experiences. Humanistic existentialism is concerned with human growth, individual fulfilment and self-actualisation, and with people as individuals (Leininger & Watson 1990:236; Quinn 1995:9).

Existentialism focuses on the individual as he experiences the actuality of his existence, his own world. Every person is viewed as unique, worthy and responsible to shape his own life. Human beings have freedom of choice and are forever *becoming*, always in transit and never complete. The uniqueness of man is regarded as inexplicable by scientific or metaphysical systems. This forms a natural part of the philosophy of holism which proposes that the whole of a human being is different from its parts (Bevis 1989:41; Mellish & Brink 1990:16; Quinn 1995:100).

Holism derives from *holos* which means complete, entire, total. The central tenet of holism is that living organisms are unified and indivisible units. The parts are interrelated and interdependent and form a unique quality (the individual) which is interrelated to larger systems - the family and the community. The whole cannot be understood by the examination of the parts because the whole is greater than the sum of the parts. Unique behaviour is characteristic of unified wholes and this is called synergy (Chaska 1990:246).

Today's nursing model is humanistic-existentialistic, holistic, subjective, intuitive, phenomenological and human-experience oriented. The patient is viewed from a holistic contextual perspective.

6.4 PROFESSIONAL PRACTICE

6.4.1 Professionalism

The word *profession* derives from the Latin *profiteri* which means to make a public statement of one's beliefs and intentions. The concept was copied from the medieval guides wherein the members of highly skilled trades bonded together to train neophytes in particular crafts, socialised them into brotherhoods and protected them. The associations that were formed, professed particular levels of knowledge, specific skills and beliefs, upheld high standards and eventually became known as professionals. The

modern definitions of a profession, as given by various dictionaries, are less descriptive, for example:

(1) Webster's New Collegiate Dictionary, 1980:

> *A calling requiring specialised knowledge and often long, intensive academic preparation.*

(2) The Shorter Oxford English Dictionary, 1973:

> *A vocation in which a professed knowledge of some department of learning is used in its application to the affairs of others, or in the practice of an art founded upon it.*

(Pyne 1992:4; Searle 1982:4)

The underlying concepts which can be deduced from the above-mentioned descriptions are that a profession possesses a special body of knowledge, declares specific beliefs and mastery of particular skills and therefore maintains high standards, and offers a service to others.

Throughout the years the concept of a profession has, however, expanded. Nursing complies with the seven characteristics of a profession as cited by Kay (1993:116, 117). The criteria for professionalism include:

(1) services that are vital to humanity and the welfare of society
(2) a special body of knowledge which is continuously enlarged through research
(3) practitioners who are motivated by service
(4) a code of ethics that guides decisions and conduct of practitioners
(5) an organisation that encourages and supports high standards of practice
(6) a service that involves intellectual activities and individual responsibility and

accountability

(7) independent practitioners who control their own policies and activities - autonomy

Nursing's main concern is the welfare of the patient, to assist him/her in maintaining optimal health, as is highlighted in the definitions given in 6.2. Its special body of knowledge is based on a broad foundation of theoretical knowledge drawn from the biological, physical, medical and social sciences, the empirical knowledge accumulated from the instrumental (cognitive and psychomotor skills) and expressive (affective skills) functions of the nurse, and the ethical and legal foundations whereupon professional practice rests.

Nursing is a demanding profession (psychologically and physiologically) and only those who are truly motivated to serve mankind, remain in the profession. The nurse practitioner's conduct and decisions are guided by a code of ethics, and the profession is controlled by a legalised body that regulates and prescribes high standards of practice while at the same time, protecting the public against misconduct.

This endorses the nurse's responsibility, accountability and autonomy in the execution of her duties. The professional nurse in South Africa is prepared over a period of four years by a specialised programme of education at a recognised tertiary education institution. Licensure to practice follows after successful examination at the end of that period by way of registration with the South African Nursing Council, the legal controlling body of the nursing profession in South Africa (Mellish & Brink 1990:6).

The modern day professional nurse practitioner is well described in Darley's (1961) words:

> *The truly professional person is one, who, by virtue of intellectual capacity, education and moral outlook, is capable of the exercise of intellectual and moral judgement at a high level of responsibility.*
>
> (Searle & Pera 1992:73)

6.4.2 Code for Nurses

A profession's values, beliefs, goals and moral concerns are expressed in a code of ethics. It is regarded as a system of rules and principles by which a profession regulates its members and demonstrates its responsibilities to society. The present Code for Nurses was adopted by the International Council for Nurses in 1953, from the American Nurses' Association. It is recognised by the World Health Organisation and is in worldwide use. The Code guides curriculum development, nursing practice, legislation and licensing (Bandman & Bandman 1990:24, 31, 32; Searle & Pera 1992:73).

Briefly summarised, the Code for Nurses makes provision for the nurse to

(1) provide services with respect for human dignity and the uniqueness of the client

(2) safeguard the patient's right to privacy by protecting information of a confidential nature

(3) act to safeguard the patient when health care is affected by incompetent, unethical or illegal practice of any person

(4) assume responsibility and accountability for individual nursing judgements and actions

(5) maintain competence in nursing

(6) exercise informed judgement and use individual competence and qualifications as criteria to accept responsibilities and delegate nursing activities to others

(7) participate in activities which contribute to the ongoing development of the profession's body of knowledge

(8) participate in efforts to implement and improve standards of nursing

(9) participate in maintaining conditions of employment conducive to high quality nursing care

(10) participate in the profession's effort to protect the public from misinformation and misinterpretation

(11) collaborate with members of the health professions and community members to promote community and national efforts to meet the health needs of the public

(Bandman & Bandman 1990:24-30)

The key-concepts which derive from the Code for Nurses are discussed below:

- **Advocacy**

The professional nurse has a central role as the patient's advocate because her primary commitment is to her client's care and safety. She has a duty to listen to patients, understand their wishes and take appropriate action within her competence. The patient's rights and autonomy as an individual have to be respected and taken into account. It is the nurse's duty to protect the patient against incompetent, illegal or unethical practices from other members of the health team. Nurses have a professional right to advocate patients' rights against physicians if their orders are medically or scientifically contra-indicated or against their patients' wishes (Bandman & Bandman 1990:26, 36, 147; Hunt & Wainwright 1994:189; Perry & Jolley 1991:157).

The following example highlights the advocacy role of the nurse:

Example 1

An experienced nurse gave an account of a 17-year-old male admitted with a C-spine fracture. The patient was quadriplegic but alert with stable vital signs. He was intubated after 24 hours in the intensive care unit as a result of poor ventilatory efforts. As he was extremely apprehensive about his intubation his respiratory rate increased into the 40s while his PCO_2 dropped. He was unable to decrease his respiratory rate because of his anxiety. The physicians wanted to repress his respiratory drive through stronger sedation in order to have his ventilation controlled by the respirator. The nurse realised that this message increased the patient's anxiety and that the complications which could arise would add to the young man's already monumental problems with recovery and rehabilitation. According to the nurse, she had a *gut feeling* that the respiratory problem could be resolved in a different way. She intervened on the patient's behalf and asked the physicians for more time. The nurse sat down with the patient and started explaining what was happening to him and reassured him that the health personnel cared about him as an individual. She described his dilemma as follows: *He could not speak, as he was intubated. He could not write, as he was quadriplegic, and we didn't allow him to nod his head due to his unstable neck fracture. His only method of communication was with the use of his eyes and his amazing ability to mouth words clearly and understandably.* It took three and a half hours before he began to relax and when his respiration rate was in the 20s, his words to the nurse were: *Thank you. You've really helped me a lot. I don't want to imagine what would have happened to me if you weren't here and hadn't cared* (Benner 1984:52).

■ Accountability and responsibility

Professionalism is linked to accountability. The Code for Nurses is formulated to bring about good and minimise harm or injury and, by providing guidelines to practice, holds nurses accountable for professionally acceptable standards of nursing care. The nurse is answerable to the patient, her professional colleagues for standards of practice, the

employer with whom she holds a contract and, finally, to the law (Bandman & Bandman 1990:24, 35; Perry & Jolley 1991:23).

The professional nurse assumes responsibility and accountability for individual nursing judgements and actions, or failure to act in a particular situation.

Nurses are subject to statutory regulation and disciplinary action by the SANC or prosecution by a court of law. The SANC promulgates regulations regarding the scope of practice of registered nurses, acts and omissions and the conditions of practice. Together, these documents underline the accountability of the nurse (Bandman & Bandman 1990:27; Searle & Pera 1992:127, 128).

The most basic pre-requisites for accountability are knowledge, skill and attitude. Other requisites are responsibility and authority, which means legitimised power to carry out the responsibility (Perry & Jolley 1991:23).

The following exemplifies the meaning of accountability and responsibility in nursing practice:

Example 2

An experienced nurse and midwife appeared before the Nursing Council as a result of incidents that occurred following the admission to an antenatal ward of a young woman at 29 weeks gestation with antepartum haemorrhage.

The allegations against the nurse were that

- she performed a vaginal examination when it was contraindicated
- she administered a drug (Yotopar) intravenously without a written prescription

or other authority from a doctor

- she should have known that the drug was contraindicated by the patient's condition (the drug delays premature labour but is contraindicated in antepartum haemorrhage) (Pyne 1992:87, 164)

The controlling body found the nurse guilty of misconduct on three charges and removed her from the register.

■ Autonomy and authority

Autonomy relates to independence of action, which means that a person can perform his/her total professional functions on the basis of his/her own knowledge and judgement. To the professional nurse, it implies the freedom to make choices and decisions about nursing care without interference, even if those decisions are not in agreement with those of the health care team. The principle requires rational thinking from the professional and may be challenged when the rights of others (in this case the patients) are infringed upon. Both autonomy and accountability require a sound knowledge basis for practice (Perry & Jolley 1991:24; Zerwekh & Claborn 1994:283).

Responsibility, authority, autonomy and accountability are inextricably linked, the first two concepts mentioned, being necessary conditions for the latter two. Authority refers to the rightful (legitimate) power to fulfil a charge. Nurses have the authority and freedom to make legitimate decisions about the care and management of their patients (Bowman 1995:74-75).

Example 2 illustrates the link between autonomy, authority, responsibility and accountability. In this case the nurse's autonomy was challenged because she put the patient's life and that of her unborn baby in jeopardy.

- **Competence**

Nurses are expected to be competent and remain informed of new knowledge as effective nursing care often is a major determinant of a patient's survival or death, recovery or continued ill health. Continuing education and advanced formal education are essential in order to keep ahead of scientific, technological and professional developments. The task of maintaining competence is regarded as self-initiated and self-directed. The professional nurse needs to assess ancillary personnel's competence before she delegates nursing functions to them as she will be held accountable. The professional nurse is accountable for all her actions and has to justify her acts of omission and commission when called to account. If a nurse is found guilty of incompetence, she will have to face sanctions or penalties, for example, disciplinary action by the registration body (SANC), dismissal from service, or civil actions (Bandman & Bandman 1990:28; Searle & Pera 1992:92, 93).

Incompetence and ignorance are no excuses for practising professional nurses. Open learning offers the ideal opportunity to all practitioners to participate in continuing education in order to keep informed and competent (see 5.5.4).

- **Respect for patients' rights**

Every patient who receives health care is entitled to legally and ethically safe nursing care. Patients have the moral right to be informed about their health status and the proposed treatment. Information must be conveyed to them in a manner which will ascertain their full understanding of detail and consequences to enable independent and responsible decision-making. Patients have the right to be respected. This includes the right to be told the truth in so far that it is known, and the right to accept or refuse treatment. For example, health personnel have to provide competent, compassionate care while a patient is dying enven if he/she refuses further medical treatment. The nurse has to work with the patient and others to arrive at the best decision when caring for the

dying patient. The nurse has a right to withdraw from a situation if she opposes the nature of health care delivered (Bandman & Bandman 1990:25, 244-245; Searle & Pera 1992:62).

The responsibility of the professional nurse to respect patients' rights, is illustrated in examples 3 and 4.

Example 3: A patient's right to know the truth

A 21-year-old young woman is dying of leukemia. She wants to know what is happening to her and repeatedly asks about her worsening signs and symptoms. Her devoted mother, who is a wealthy and influential woman, wants to shield her from the prognosis and threatens to sue the hospital if her daughter finds out that she is dying. This moral issue leaves the nurses in conflict as whether to support the young woman's right to know or whether to acquiesce to the mother's wishes (Bandman & Bandman 1990:242).

The solution to this dilemma is for a nurse to inform the young woman about the diagnosis of leukemia and her imminent death as she has the right to know the truth.

Example 4: Honouring a patient's wishes for a *do not resuscitate* directive

A 52-year-old woman with a possible malignancy of the brain asked not to be resuscitated before going into surgery. Her order was written on her chart. An inoperable cancer was found during surgery and when she suffered a cardiac arrest following surgery, the nurse resuscitated her. The outcome of this situation was that after three days her kidneys which she wished to donate for transplantation into another person became unusable for this purpose. She was thus prevented from aiding another person (Bandman & Bandman 1990:243).

The nurse acted incorrectly when she resuscitated the woman because she should have

respected the patient's wish not to be resuscitated.

- **Confidentiality**

The relationship between the nurse and patient should be one of trust and mutuality. If the patient discloses intimate information in confidence, the nurse is obliged to keep it confidential. However, any data related to the patient's health status needs must be shared with other members of the health team as the common goal is patient welfare. The patient's consent must be obtained before any information is used for research or other purposes (Bandman & Bandman 1990:25).

The keeping of confidence is one of the fundamental requirements of professional health care ethics. Some form of confidentiality has been included in virtually all the codes of ethics (Searle & Pera 1992:92).

The rights to confidentiality and privacy are crucial autonomy rights and merit high moral consideration. There are, however, extenuating circumstances in which the paramount right to the prevention of harm overrides even the right of confidentiality and privacy, such as when withholding the truth can bring harm to innocent people (Bandman & Bandman 1990:204).

- **Collaboration**

The delivery of health care is beyond the capacity of any single profession. Interdisciplinary team effort where members share knowledge, skills and responsibilities for total patient care requires the nurse's recognition of her limitations of expertise in all the required fields. It is not possible for any one profession to possess all the knowledge, skills and resources, required to meet the total health care needs of society (Bandman & Bandman 1990:28; Pyne 1992:64).

This implies that the nurse has to work together with the physician, physiotherapist, social worker, speech therapist, occupational therapist, psychiatrist, and possibly others to fulfil all the patient's health needs. Example 7 illustrates collaboration between the nurse and the physiotherapist.

6.4.3 Scope of practice

The practice of a profession requires knowledge of its scope of practice which is an authorisation of what a professional in the particular field concerned may do. The professional nurse is autonomous and self-directing and maintains this position because society is convinced of her trustworthiness, knowledgeable skill and ethical conduct as well as of the status of the profession as being the most reliable authority on nursing care (Hunt & Wainwright 1994:9).

A theory of nursing provides a framework for the definition of a scope of practice. In South Africa this framework is founded on Nightingale and Henderson's definitions of nursing and the SANC's definition of nursing science. A scope of practice consists of broad concepts and is legitimised in South Africa by regulations promulgated under the Nursing Act, 1978 (Searle & Pera 1992:124, 126).

The practice of nursing is discussed in relation to the concepts (marked a, b, c, etc) included in the regulations relating to the Scope of Practice of Registered Nurses, Regulation R2598 of November 30, 1984, as amended (South Africa, 1984:2-3).

(a) *the diagnosing of a health need and the prescribing, provision and execution of a nursing regimen to meet the need of a patient or group of patients or where necessary, by referral to a registered person*

This is a very comprehensive concept as it encompasses the coordinating, collaborating, and patient advocacy functions of the nurse; execution of physicians' prescriptions;

preventive, promotive, curative and rehabilitative care; and the nursing process.

The **nursing process** is the methodology of nursing practice. It encompasses sequential, interrelated and interdependent actions which aim to meet the patient's health needs to the level of optimum wellness, and provides a framework for individualising nursing care. The actions inherent in the process include the cognitive, affective and psychomotor domains. Concept formalisation, inference reasoning, judgement, decision-making, application of theories, ideas and concepts, and value judgements based on respect for human dignity and the worth of the individual, are involved during the process. It is based on a philosophy of holism, as wholeness is acknowledged by keeping in mind all the phenomena (physical, psychological, spiritual, social, environmental) acting upon an individual in the health/illness spectrum (Reilly & Oermann 1992:55-66, 85, 95).

The sequence of the phases in the process does not suggest a rigid, linear and mechanistic pattern of actions as closure of one action is not a criterion for the onset of the next series of actions. There is a dynamic interaction among the various phases which accommodates new cues, insights and meanings. The sequence of the nursing process is comparable to the problem-solving process but other processes are involved which, through synthesis, result in a unified whole of action, namely, nursing care (Reilly & Oermann 1992:59-61).

The four phases constituting the nursing process are assessment, planning, implementation and evaluation.

- **Assessment**

This phase includes problem recognition, data gathering and analysis, and nursing diagnosis. It involves observations on the physical appearance of the patient as well as hidden cues, history taking (family and personal), a physical examination and the

collection of specimens for laboratory analysis. The nurse relies heavily on cognitive skills, such as problem-solving, inference, judgement, perceptions, intuition, decision-making, communication, and critical thinking during this phase.

The nursing diagnosis made at the end of this phase consists of a clinical judgement that includes a statement of the health problem of the patient, aetiological factors, and a description of signs and symptoms (Reilly & Oermann 1992:62, 65).

- **Planning**

Short- and long-term goal setting, priority determination and intervention strategies are the major functions during this phase. It is imperative that both the nurse and the patient have the same perception of the desired goals (Reilly & Oermann 1992:73).

- **Implementation**

This phase encompasses cognitive skills, such as observation, decision-making, clinical judgement, perception and continuous evaluation as well as affective and psychomotor skills (Reilly & Oermann 1992:77).

- **Evaluation**

This is mainly a cognitive phase applied continuously throughout the nursing process and comprises the total care programme of the patient. Evaluation necessitates continuous adjustments in assessment, planning and implementation (Reilly & Oermann 1992:96).

The continuous interaction amongst the phases of the nursing process is elucidated in examples 5 to 8 and 10.

(b) *the execution of a programme of treatment or medication prescribed by a registered person for a patient*

(c) *the treatment and care of and the administration of medicine to a patient, including the monitoring of the patient's vital signs and of his reaction to disease conditions, trauma, stress, anxiety, medication and treatment*

(i) *the supervision over, and maintenance of fluid, electrolyte and acid base balance of a patient*

(m) *the supervision over and maintenance of elimination of the patient*

The concepts in the above four phases are all realised in the following incident which required considerable knowledge and skill from one of the nurses who was principally involved.

Example 5

An experienced nurse described a crisis situation which developed in an intensive care unit where she was required to care for a patient who had undergone open heart surgery. When the patient was returned to the unit from the operating theatre she was connected to a respirator, intravenous catheters, chest tubes and a foley catheter, and, as a result of the routine treatment of sick patients to reduce body temperature during the operation, she was hypothermic. In order to re-establish normal blood volume, the usual procedure following an operation of this nature was initially to administer relatively large volumes of intravenous fluid and then gradually over a period of time to reduce them, as well as to warm the patient up. Generally, as the body temperature increases towards the normal 37,4°C, the blood pressure, which is invariably higher than normal, drops and then stabilises to a more acceptable level. This particular patient, however, despite the treatment, continued to be hypovolaemic with a low blood pressure and low central

venous pressure, and, as a result of continued diuresis, was losing large volumes of fluid. The nurse increased the volume of the intravenous fluid she was administering, but she was unable to balance its volume with that being excreted. At that stage the body temperature had returned to normal (and the blood pressure should have been within acceptable limits), but the blood pressure was not within acceptable limits. In order to receive assistance on what further steps she should take to stabilise the condition of her patient, the nurse attempted unsuccessfully to contact telephonically the surgeon and his assistant. In the meantime she continued, on her own initiative, to administer intravenous fluid because the diuresis continued unabated. In her assessment of the likely causes of the patient's deteriorating condition, she considered that hyperglycaemia was a strong possibility. She therefore ordered that a blood glucose level test be conducted and the result of it confirmed her suspicion - the blood glucose level was more than 600 mg per cent. By then she had managed to contact the assistant surgeon who, with the help of the information received from the nurse, prescribed a course of treatment which eventually stabilised the patient (Benner 1984:116-117).

(d) *the prevention of disease and promotion of health and family planning by teaching to and counselling with individuals and groups of persons*

This concept refers to the communication and counselling skills of the nurse and her health education functions. For example, a patient who has suffered a coronary thrombosis requires health education regarding his future lifestyle which should include advice on diet, daily exercise and recreation, adequate rest, and kinds of activities to be avoided, and discouragement from smoking. These measures can prevent chronic heart failure and are promotive in the sense that the patient adjusts to a more healthy lifestyle. The nurse needs to use her communication and counselling skills because she has to convince the patient and gain his cooperation. Patients must be involved in their own care and objectives must be set together with the nurse.

Another example, which endorses the above-mentioned concept, is the offering of health

education regarding family planning to groups of patients at post-natal clinics and family planning clinics.

(e) *the prescribing, promoting or maintenance of hygiene, physical comfort and re-assurance of the patient*

The following example illustrates the realisation of this concept in nursing practice:

Example 6

A nurse cited a situation in which an 86-year-old woman who had suffered from chronic obstructive pulmonary disease for many years was admitted to hospital in a very serious condition. Her son discussed her situation with the attending physician who made the decision that the health personnel would not continue to provide her with further medical support but that she should be made confortable and allowed to die peacefully. The nurse in whose care she was placed knew her from her previous admissions to hospital and was aware that she was a very neat and meticulous woman. The nurse is quoted:

> *She was my patient. And you know, just because they are not going to do anything else for her doesn't mean that I stop caring for her. So I gave her a bath. She had a little suitcase there with all her little things ... so I put her in one of her gowns and propped her up all around in her bed with pillows. I didn't feel that I was doing anything special for her. But her son told me at the end how much it meant to him to see that the nurses still cared for his mother* (Benner 1984:55-56).

(f) *the promotion of exercise, rest and sleep with a view to healing and rehabilitation of a patient*

(g) *the facilitation of body mechanics and the prevention of bodily deformities in a patient in the execution of the nursing regimen*

(n) *the facilitation of communication by and with a patient in the execution of the nursing regimen*

These concepts are realised in the following account given by an experienced nurse:

Example 7

A nurse described her experience concerning a concert pianist who, while recovering from a mild cerebral incident, was depressed about the continued weakness in her right hand. She was, however, reluctant to take the necessary steps which might help her regain full use of the affected hand. The nurse realised that unless she herself took the initiative the patient would not take the necessary steps of her own accord. One day she had an intimate conversation with the patient with the intention of persuading her to undergo a course of physical therapy, but while listening and talking to the patient she did not divulge this intention. Instead, she drew her attention to the fact that she could move her fingers a little more than she had been able to two days previously, and focussed on the positive aspects of her condition by telling her that this progress was the result of exercise and reminding her that when she had been admitted to the hospital she had even needed a lot of help to eat. Now, however, she could hold a cup by herself, raise the arm above her head and even move her fingers - movements she could not master a few weeks previously. By the end of the conversation the patient of her own accord had realised that continued improvement depended on herself and she subsequently undertook a course of physical therapy (Benner 1984:59-60).

(k) *the facilitation of the maintenance of bodily regulatory mechanisms and functions in a patient*

(s) *the provision of effective patient advocacy to enable the patient to obtain the health care he needs*

The following example illustrates how these two concepts are implemented in practice and shows that the nurse does not use blind intuition, but senses subtle changes in the patient's appearance and behaviour and stands in as the patient's advocate.

Example 8

An experienced nurse gave an account of a 60-year-old woman whose vital signs were satisfactory when she was returned to the ward after undergoing an oesophageal dilatation procedure in the radiology department. A short while later, however, she developed nausea and streaks of a very light pink material appeared in the fluid being drained from her oesophagus. The latter could be accounted for as a result of the dilatation procedure. However, the nurse had a feeling that something more significant was wrong. Despite the fact that the patient's vital signs were stable, the nurse summoned the physician and requested that blood for transfusion be ordered. The nurse pointed out to the physician that the patient's nail beds were cyanotic. The physician was unimpressed and a transfusion was not administered. When the patient started having shills a short while later and developed a fever, the nurse once again called the physician and persisted in her request that something positive should be done for the patient. It was subsequently determined that the patient was suffering from a rupture of the oesophagus and aspiration pneumonia as a result of the procedure, but by this time her pulse rate had increased to 150. The physician afterwards praised the nurse for her persistence in requesting that early treatment be instituted - something which eventually made a significant contribution to the patient's eventual recovery (Benner 1984:100-101).

(r) *the coordination of the health care regimens provided for the patient by other categories of health personnel*

The example below not only illustrates the nurse's coordination function but also the holistic picture gained by the nurse as the key-person in the health care delivery system:

Example 9

The nurse in charge of an emergency department described the occurrence of a typical scenario that had occurred within the space of two hours one particular Sunday evening: At 21:00 there was only one medically urgent patient present in the large treatment room. Suddenly a man suffering from chest pain arrived by private transport, followed almost immediately by a severely asthmatic person. Soon afterwards another two patients arrived by ambulance, one with chest pain and the other bleeding internally. At that stage all the four nurses on duty at the time were engaged assessing these patients and initiating treatments. Another ambulance arrived bringing in it a young girl suffering from insulin shock. The nurse in charge sent this patient to the trauma room as two nurses were immediately required to care for her. When a 17-month-old baby manifesting a febrile seizure arrived soon afterwards, the head nurse called the supervisor and requested that she comes and lends a hand. Then a drunk man who had also taken an overdose of drugs arrived. As he was very belligerent while in the treatment room he had to be moved to the trauma room. In order to cope with this sudden influx of patients, the head nurse had to move the asthmatic person and the patient bleeding internally to the holding room in the care of one of the nurses. The latter then was sent to the radiology department for arteriograms to be taken. The supervisor by that time, together with one nurse, were in the trauma room attending to the baby and young girl who were both becoming stabilised. The medically urgent case had been examined by a consultant and was ready for admission to the intensive care unit. The consultant then attended to the man suffering from chest pain who was sent to the cardiac care unit. The belligerent patient was placed in a private room and the baby was allowed, after treatment, to go home.

The nurse in charge reported that this scenario in an emergency room was typical and

that she, or whoever was in charge, had continually to assess the state of the unit in order to maintain the flow of patients in an orderly manner. She was the one who has to do this as the attending physician seldom knows the overall picture (Benner 1984:113-114).

(j) *the facilitation of the healing of wounds and fractures, the protection of the skin and the maintenance of sensory functions in a patient*

(p) *the establishment and maintenance, in the execution of the nursing regimen, of an environment in which the physical and mental health of a patient is promoted*

The latter concept refers to both the instrumental and expressive roles of the nurse. The instrumental role involves the acquisition and utilisation of scientific knowledge which includes observation, diagnosis, therapeutic planning and intervention. The expressive role refers to the establishment and maintenance of an effective therapeutic environment and assisting the patient to become receptive to therapeutic intervention. It encompasses organisation of a calm milieu, the administrative aspects of which relate to the establishment of a safe, pleasant and purposeful environment in which the patient is accepted unconditionally and supported through all stages of nursing care (Searle & Pera 1992:173-174).

According to Skipper (1965), we violate the caring concept if we make distinctions between the *instrumental role* and the *expressive role*. The expert nurse melds these two roles together (Benner 1984:170).

The following example illustrates Skipper's view:

Example 10

An experienced nurse returned to the bedside of a newly arrived patient after a group of physicians had discussed the case and departed. She removed all the dressings which had been applied to his abdomen, thus exposing six abdominal wounds. She then spent several hours clearning the area and dressing the wounds. This entailed removing the aluminium paste which had previously been applied as a skin protector. In some of the wounds irrigating catheters had been placed, and from one of them large clots of blood were oozing. Following this, she assessed the type of drainage, the tube placement and the most effective dressing that would be required for each of the wounds, and determined which of the skin protection strategies available would be most effective while taking into consideration the nature and location of the drainage. Although the patient was semi-conscious, she talked to him all through the procedure, reassuring him. She then wrote up a description and wound management plan for her patient. He said afterwards that he remembered her voice and her reassurance. After several months the patient improved enough to be able to be sent home (Benner 1984:130).

In this situation, skilled performance and assessment were critical. As a considerable range of products and materials is available for use in wound management, a nurse's competency includes keeping herself to date with the newest and most efficient technology available. A skilful integration of cognitive, psychomotor and affective skills is demonstrated in this case. The nurse's reassurance to the patient, as well as her competence and confidence which was sensed by the patient even in his semi-conscious state, is a clear example of the melding of the instrumental and expressive roles.

(h) *the supervision over and maintenance of a supply of oxygen to a patient*

Oxygen is usually prescribed by physicians and administered by nurses. The implications of its use must be understood by nurses when planning care related to medical prescription, and a knowledge of the patient's diagnosis is crucial. For example,

two patients may have difficulty in breathing, yet the concentration of oxygen which may be safely administered to a patient with bronchitis could kill a patient suffering from emphysema. The nurse also has to know, understand and be able to handle all the different devices of oxygen administration (Faulkner 1985:119, 189, 190).

The administration of oxygen requires a combination of cognitive, psychomotor and affective skills. Patients in need of oxygen are usually in an anxiety state because of the difficulty of breathing and require psychological support and reassurance from the nurse. The nurse has to integrate and apply the knowledge she has acquired from the biological sciences, such as physiology, pathology and biochemistry, in order to understand the complete picture and be able to act competently.

(l) *the facilitation of the maintenance of nutrition of a patient*

Disease may have an effect on the absorption of different foods or upon their action. The nurse's knowledge not only of normal physiology especially, in this context, of the gastro-intestinal system but also of the pathophysiology of various diseases, is of great significance when planning a patient's nutritional needs. In some cases ignorance regarding these aspects can place a patient's life in jeopardy, for example, a diabetic patient could lapse into a coma if given the wrong diet (Faulkner 1985:12).

(o) *the facilitation of the attainment of optimum health for the individual, the family, groups and the community in the execution of the nursing regimen*

This concept encompasses preventive, promotive, curative and rehabilitative care on an individual as well as on a community basis. For example, antenatal care and health education about the dangers of smoking is regarded as preventive care; health education on family planning and the offering of these services are promotive care; post-operative care is regarded as curative; and stoma care falls within the rehabilitative category.

(q) *preparation for and assistance with operative, diagnostic and therapeutic acts for the patient*

Pre-operative care, and diagnostic and therapeutic acts, necessitate a holistic approach. The patient needs to understand the procedures to which he will be subjected. Patients may ask numerous questions because of the fear for the unknown and the nurse will have to use all the communication skills she possesses in order to give them moral support. Skin preparation is often required, body temperature, pulse rate and blood pressure have to be monitored, and specimens for urine and blood analysis may have to be taken. Pre-operative care also includes the administration of a premedication (usually containing an analgesic and sedative) which is given intramuscularly (Faulkner 1985:269-272).

(t) *care of the dying patient and the care of a recently deceased patient within the execution of the nursing regimen*

The focus of care of the dying patient will be on alleviating symptoms where possible and in minimising other symptoms as they arise. Pain relief is very important as pain can be a more consuming problem than the actual thought of death. Many patients need reassurance that they will not die in pain and it is the nurse's duty to let the patient know that adequate pain control will be available (Faulkner 1985:348).

The patient's sense of self-respect, dignity and choice must be supported until the last moment of life. The nurse has to provide calm, sensitive, individualised care. Patients differ in their attitudes towards death and symptom control is important to the self-esteem of the patient. For example, pain, mental dysfunction, nausea, respiratory problems, infections, bedsores, are distressing. Most of these can be controlled by well-known measures and the remainder through aggressive therapies. Specific nursing techniques, such as positioning, suctioning, skin care, providing an aesthetic environment free from noxious smells, administering analgesics timeously and assisting

the patient with personal hygiene, are all relieving measures during a patient's last days. Social and religious needs should be met. If a dying patient decides a visit from relatives or friends is more important than a dressing change or stoma care, this priority should be respected.

The central principle is that the nurse acts as advocate for the dying patient and seeks to protect the basic human values of dignity, respect and autonomy (Bandman & Bandman 1990:260; 262-263).

The following example illustrates the ethical dilemmas nurses can encounter when caring for the dying patient:

Example 11

A nurse who came on duty in the oncology unit after a week's holiday, could hear the moans of a young man suffering the effects of metastatic bone cancer. He had been hospitalised a few months previously for a course of chemotherapy and then discharged. He was re-admitted with no prognosis. The metastatic growths in his spine were causing him excruciating pain while brain stem metastases were hastening his death. The goal of his nursing care was to keep him as comfortable as possible. The nurse was astonished to find that the patient had received 780 mg of morphine by continuous infusion during the last eight hours as well as 20 mg boosters every four hours. This type of dosage was enough to cause respiratory repression even in a patient weighing 85 kg. The head nurse explained that the patient's tolerance was very high probably because of the fact that he had been addicted to heroin as a teenager. The nurse felt that she should give him another 20 mg booster to relieve his pain but was a little apprehensive as he might arrest afterwards. She was concerned because she knew she might kill him in the process. She also knew that patients develop tolerances to morphine which require increased dosage rates to produce the desired analgesic effect. The nurse was in conflict because she wanted to benefit her patient by giving the

injection but there is an independent moral principle that prohibits killing. To cut a lengthy discussion on ethical principles short, the answer is provided by the American Nurses Association's (ANA) Code for Nurses which states:

> *Nursing care is directed toward the prevention and relief of suffering commonly associated with the dying process. The nurse may provide interventions to relieve symptoms in the dying client even when the interventions entail substantial risks of hastening death.*

The ANA does apparently not condone direct active killing but recognises that it is appropriate to take the risk to kill a patient if one's intention is to relieve suffering (Veatch & Fry 1987:167-169).

The examples given and their discussions were chosen with the aim of reflecting on the interpretation and realisation of the broad concepts of the scope of practice in professional nursing practice.

6.5 THE SCIENCE-ART OF NURSING PRACTICE

Nursing is a scientific as well as a humanistic discipline.The human science of nursing is founded upon an epistemology that includes metaphysics, aesthetics, humanities, art and empirics. As a human science is about, for and of humans, it has a humanistic base rooted in art. It respects intuition, compels logic and reason, exacts discipline, necessitates critical thinking, requires creativity, views the individual holistically and has caring as its ethical imperative. The uniqueness of nursing as a discipline is characterised by its humanistic and holistic viewpoint based on a fundamental ethic of caring (Bevis & Watson 1989:220, 221; Chaska 1990:101, 227; Watson 1985:29).

Carper (1978) identified four fundamental patterns of knowing in nursing. These are empirics (the science of nursing), ethics (the moral component), personal knowledge and

aesthetics (the art of nursing). Each pattern of knowing is necessary for mastery of the discipline, yet they cannot stand alone but are interrelated and interdependent. This indicates the complexity and diversity of nursing knowledge. Carper explains it as follows:

> *Nursing thus depends on the scientific knowledge of human behaviour in health and illness, the aesthetic perception of significant human experience, a personal understanding of the unique individuality of the self and the capacity to make choices within concrete situations involving particular moral judgements.*
>
> (Perry & Jolley 1991:24; Silva, Sorrell & Sorrell 1995:3; White 1995:75)

Empirics, the science of nursing, represents knowledge gained from sensory experiences. It involves principles, laws and theories for the purpose of describing, explaining and predicting phenomena of concern to nursing. For example, empirical knowledge related to pain control might be expressed as theories, interpretive descriptions of the etiology of pain, facts reflecting the pathology, and clinical opinions about how to manage pain. This is the linear and factual component of nursing (Carper 1978:13-14; Jacobs-Kramer & Chinn 1988:130, 132).

Ethics, the moral component of nursing, focuses on matters of obligation or what ought to be done. It encompasses knowledge of ethical theories and codes and involves valuing, clarifying, advocating and ethical decision-making. The ethical pattern of knowing requires an understanding of different philosophical positions and an authentic interpersonal involvement and develops to its fullest through exploration of nursing practice (Carper 1978:20-21; Jacobs-Kramer & Chinn 1988:134; White 1995:78).

Personal knowledge, as a fundamental pattern of knowing in nursing, refers to an interpersonal process involving interactions, relationships and transactions between the nurse and the patient. It is concerned with the knowing, encountering and actualising

of the individual self. The nurse approaches the patient not as an object, but strives to actualise an authentic personal relationship, which results in the therapeutic use of the self. Personal knowledge, to know the self, develops through personal encounter with another. It is an important aspect for the actualisation of real caring as it includes intuitive knowing (Carper 1978:18-19; White 1995:79-80).

Aesthetics, the art of nursing, is expressed through action taken to provide for the patient's needs. This pattern of knowing can be conceptualised as a separate knowledge form or as a synthesis of all knowledge forms. As a separate form it constitutes knowledge about artful nursing practice while as a synthesis of knowledge patterns, it encompasses the total knowledge spectrum integrated in nursing practice. Benner's reference to the expert nurse illustrates this synthesis. The aesthetic pattern involves perception of balance, rhythm, proportion and unity of the whole situation. Experience is essential to aesthetic practice. Context-specific experience allows for engaging, interpreting and envisioning. Aesthetics thus requires involvement in a situation and an all-at-once interpretation of a situation (Carper 1978:17-18; Jacobs-Kramer & Chinn 1988:136; White 1995:82).

Carper's four patterns of knowing encompass the cognitive, affective and psychomotor domains of nursing. Empirics refer to the cognitive; ethics and personal knowledge to the affective; and aesthetics to both affective and psychomotor domains. The interrelatedness of the patterns of knowing and the domains, is illustrated in Isabel Stewart's (a great nurse leader of her time) words:

> *...the real essence of nursing,*
> *as of any fine art,*
> *lies not in the mechanical details of execution,*
> *nor yet in the dexterity of the performer*
> *but in the creative imagination,*
> *the sensitive spirit,*

and the intelligent understanding lying back
of these techniques and skills ...

(Appleton 1993:899)

Aydelotte in Benner (1984:v) refers to the mystery of expert nursing practice and calls for respect for this mystery rather than to dispel or standardise practice by submitting it to rules and procedures. Schein (1972) refers to the important component of a professional programme as *training for uncertainty*. It implies a willingness to take responsibility for key-decisions that may be based only on partial information and the willingness to make decisions under conditions of high risk (Reilly & Oermann 1992:7-8).

Both Aydelotte and Schein have divergent thinking skills in mind when they speak about having to deal with ambiguities and risk-taking. Professional nursing practice encompasses convergent aspects (when one action is possible and the rationale is supported by theory) as well as divergent aspects (when multiple actions are possible because no one theory can provide support for the response).

According to Benner (1983), *nursing practice is always more complex (than to put theory learned in the classroom into practice) and presents many more realities than can be captured by theory alone* (Reilly & Oermann 1992:5).

Benner's view is expressed from a different perspective by Stewart: *Technique, mind, soul and imagination are all essential in the foundation of a true artist. The nurse as a true artist is essential to the progression of nursing into something other than a highly skilled trade* (Donahue 1985:467).

Nursing practice is a synthesis of the science and art of nursing.

6.5.1 Psychomotor skills

Psychomotor skills are an extremely important aspect of the practice of nursing as nursing is largely a practical endeavour. These skills are used during both the assessment and implementation phases of the nursing process and constitute a significant portion of nursing interventions. Motor skills relevant to nursing fall in the third category of Oxendine's classification namely: (1) maturation-dependent skills eg walking, speaking; (2) educational-related skills eg writing, reading; and (3) intrinsic-value skills eg recreational and vocational skills (Quinn 1995:56-57; Reilly & Oermann 1992:247-248).

Psychomotor skills in nursing are those dimensions of practice which involve the ability to act efficiently in a situation that requires neuro-muscular coordination. They are purposeful, complex actions based on principles. Their application in practice is an integrated phenomenon that involves the cognitive, psychomotor and affective domains. The teaching of these skills is a significant component of the education of nurses (Reilly & Oermann 1992:248, 261).

Unlike other forms of learning, motor skills require practice in order to be learned. Practice encompasses repetition of a procedure under specific conditions. Physical practice is always followed by mental practice (visualising the task through imagery). Apart from feedback from the teacher which is extremely important, students receive kinaesthetic feedback from their own bodies. They become aware of the muscles and joints they are using which informs them of the position of limbs and the action of movements (Quinn 1995:58).

Kinaesthetic feedback makes the students aware of the fine nuances in the performance of motor skills which in the end perfects the skill to such a level that the patient suffers minimum pain or discomfort. For example, a student who has practiced giving intramuscular injections many times in the clinical laboratory on oranges and models,

and a few times on patients, learns exactly how to control muscle coordination related to the angle, speed and power of insertion of the needle, in order to give a painless injection.

Research studies have shown that psychomotor skill learning requires moderate motivation and immediate feedback, and that the learner feels comfortable with herself in the performance, before the skill can be applied on a more sophisticated level in nursing practice. Bruton (1976) found that perceptual awareness of bodily kinaesthetic cues and appropriate response to the cues contribute towards mastery of the skill (Reilly & Oermann 1992:256-257, 266, 285).

Skilled performance encompasses the following characteristics: accuracy, speed, efficiency, timing, consistency, anticipation, adaptability and perception. Whereas the student nurse and novice practitioner can achieve the first five requirements, mastering of the last three only comes with expertise in practice (Quinn 1995:56).

Psychomotor skills relevant to nursing practice can be categorised as follows:

(1) gross motor skills which involve large muscles or the whole body, eg patient positioning, cardiac massage or ambulation

(2) manual skills which refer to manipulative tasks that are repetitive and usually involve eye-arm action, eg physical assessment, body hygiene, suctioning, chest drainage

(3) fine motor skills which involve muscular coordination of fingers and wrists aimed at precision-oriented tasks, eg administering injections, insertion of IV catheters, and surgical dressings requiring instrumentation (Reilly & Oermann 1992:250)

Psychomotor skills can only be learned in the clinical laboratory or in the clinical field because they need to be rehearsed and practiced. Motor skills need to be performed within a coordinated behaviour pattern characterised by a realistic time, motion and speed context. The teacher needs to consider the level at which the student must learn the skill. When considering the characteristics of skill performance as mentioned, it is evident that students cannot achieve the highest level for every skill they learn. Even experienced nurses will vary in the relative degree of skill amongst the nursing procedures they practice (Quinn 1995:59; Reilly & Oermann 1992:284). The most appropriate educational models for the learning of psychomotor skills are experiential and mastery learning (see 5.3.4 and 5.4.4).

As has already been mentioned, psychomotor skill performance does not occur in isolation and the cognitive domain forms a very important part of these skills. Newly qualified nurses find that performing skills they have been taught in the clinical laboratory, require more varied and complex skills in real practice (Benner 1984:121). The following example illustrates the integration of the cognitive and psychomotor domains and the complexity of skill performance in the contextual situation that characterises nursing practice. The starting and maintenance of intravenous therapy has been selected as an example since most patients receive IV therapy or blood products when hospitalised and because the applied technology of IV therapy has grown tremendously.

Example 12: Starting intravenous therapy

A professional nurse is quoted:

> *A lot of questions need to be asked. How do you choose between a butterfly or an IV intracath? You have to consider why you want the line in. And just learning the insertion alone is difficult. You take into consideration the length of time you will be leaving the line in and the*

kinds of medications that will be given, or whether it's a short-term, keep-open IV. With limited medications, then the butterfly IV is more comfortable and presents less of a threat of phlebitis. Doctors vary in their preferences as well, and you have to take that into consideration. And, of course, the condition of the patient and his veins makes a great deal of difference. For example, with older patients special skill is required. They look as if they are going to be easy to get in because the veins look large, but they are so fragile. If you do not use a very, very slight tourniquet, the thin membrane of the older patient's vein will just pop open.

(Benner 1984:124-125)

Example 12 illustrates the inquiring attitude of the professional nurse and how she has to integrate scientific knowledge from various fields such as pharmacology, anatomy, physiology and pathology as well as personal knowledge gained from nursing experience, when she has to perform a psychomotor skill. The example also reveals the contextual quality of each practice situation as no two patients who require the same procedure present with identical circumstances.

Example 10 (in which the nurse had to change the patient's dressings) provides an excellent example of how the experienced nurse integrates the psychomotor, cognitive and affective domains.

Skilled psychomotor performance is an art, as there are no ideal, perfect situations in the illness continuum where motor skills can be directly and involuntarily applied Nurses must know how to adjust procedures in unique situations. This refers to aesthetics (as identified by Carper) as a synthesis of the four knowledge patterns.

6.5.2 Affective skills

Affective competencies include value based behaviour and moral reasoning that are essential elements in expert nursing practice. They deal with the realm of feelings, attitudes, beliefs, and ethics which constitute the caring functions. They transcend all aspects of practice and characterise nursing as an art and as a humanistic discipline (Quinn 1995:278; Reilly & Oermann 1992:291).

The affective domain is included in Carper's ethics pattern of knowing in nursing. The goals of affective learning are to develop skill in moral reasoning in order to manage ethical and moral dilemmas and to develop a value system which incorporates the values espoused by the nursing profession. These values are embedded in ethical codes for nurses, in the rules and regulations of the controlling bodies of the profession and in the philosophy underlying nursing. The affective component of practice is personal and value based and can only be taught through experiential learning. The development of self-awareness and a non-judgemental attitude is essential to nursing practice. This implies that the nurse must become aware of her own emotional needs, biases, blindspots and impact on others, and that she should realise that whereas feelings cannot be controlled, behaviour can. Effective nurses control their behaviour to prevent their own prejudices, beliefs and needs from intruding into nurse-patient relationships. Therapeutic use of the self begins with the ability to convey acceptance to the patient. It has been demonstrated that it is not essential to *like* a patient in order to be therapeutically effective. When tempered with moderation, disclosure of a nurse's negative feelings toward a patient can be put to optimal therapeutic advantage because some patients cannot tolerate attitudes of *unconditional positive regard* (Holden 1990:70-71; Kay 1993:342-344). Patients can sense whether a nurse is knowledgeable and competent. It is through this *knowing* that they feel secured in crisis situations.

The therapeutic use of the self is a central concept of the affective domain of practice and forms an integral part of transpersonal caring. It is also an integral part of the

personal knowledge pattern identified by Carper.

Caring has emerged as the dominant paradigm of nursing practice, and is viewed by Watson (1985) as the moral ideal of nursing. It encompasses the whole spectrum of affective skills. Among the 27 different caring constructs which Leininger (1981) identified, are empathy, concern, compassion, nurturance, presence, support, trust, sensitivity and love. Norris (1989) views caring as the fusion of thinking, feeling and acting, and adds that it requires a vast amount of knowledge, experience, wisdom and expertise in a professional practice. Caring as a process and an art, involves knowledge and commitment; it energises action, increases intimacy and self-actualisation and empowers both participants in the nurse-patient relationship (Caffrey & Caffrey 1994:12-13; Kurtz & Wang 1991:5; Reilly & Oermann 1992:298; Watson 1995:29).

The constructs of caring which have been mentioned in the above paragraph, are elucidated in the nurse-patient relationship in Example 1, where the nurse played advocate for the 17-year-old quadriplegic.

Caring transactions and transpersonal human care are viewed as those scientific, professional, ethical, aesthetic, creative and personalised giving - receiving behaviours and responses between two individuals. In transpersonal caring the nurse enters into the lived experience of another person and that person enters into the nurse's experience. Caring is contextual, relational and subjective. It is the nurse's perception of actions, not the action itself. If nurses focus only on the obvious, for example, immobilisation, anger, obstinacy, and hostility, the intersubjective field possibilities are ignored. The idea behind transpersonal caring is to look beyond the person suffering from a physical ailment in order to discover the spirit within (Parker 1990:281-282; Reilly & Oermann 1992:298).

The difficulty to capture the comprehensiveness and complex nature of caring, is somewhat explained in Krysl's words: *Caring for others takes place, so to speak, in the*

metaphysical realm. We cannot see this realm, but we experience it (Parker 1990:279).

The following poem by Krysl reflects the complex yet basic human intersubjective energy present in a transpersonal caring moment:

Example 13

Sunshine Acres Living Center

The first thing you see up ahead is Mr
Polanski, wedged in the
arched doorway, like he means absolute
to stay there, he who shouldn't
be here in the first place, put in here
by mistake, courtesy of that grandson
who thinks he's a hotshot, and too busy raking in
the dough to take time for an old
man, If he had anyplace to go, you know he'd be out
instantly, if he had any
money. So he intends

to stay in that doorway, not missing
a thing, and waiting
for trouble. Which of course
will come. And could be you – you're handy, you look
likely, you have

the authority. And you're
new here, another young
whippersnapper, doesn't know

ankle from elbow, but has been given
the keys. Well he's
ready, Polanski. So you go right
to him. Mr. Polanski, good
morning – you say it in Polish,
which you learned a little of
when you were little, and your grandmother taught you
a little song about lambs, frisking
in a pen, and you
danced a silly little dance with your grandmother
while the two of you
sang. So you sing it

for him, here in the dim, institutional
light of the hallway, light which even you find
insupportable, because at that moment
it reminds you of the light in the hallway
in the resthome where, when your grandmother
died, you weren't
there. So that you're also singing
to console yourself. And at the moment you pay her
this silly little tribute, Mr. Polanski
steps out of the doorway. He
who had set himself to
resist you, he who had made himself
a first, Mr. Polanski,
    contentious
    often combative
    and always inconsolable

hears that you know
the song. And he steps out
from the fortress of the
doorway, begins

to shuffle
and sing along.

(Parker 1990:279-281)

Mr Polanski could also have been an abandoned, vulnerable person suffering from major depression, schizophrenia, cancer or AIDS. The nurse was presented with an opportunity to decide how to be in that caring moment. She looked beyond the obvious, sensing Mr Polanski's innermost needs and from connections from her own past experiences, and sudden illumination, she formed a new synthesis which resulted in a special caring moment that brought peace of mind to Mr Polanski.

The special sensitivity exhibited by the nurse in Krysl's poem, is viewed by Holden (1990:72) as a sensitivity which is accompanied by a perceptual mode capable of understanding the mind of the patient from within, and perceptively intuiting the hidden intentions and conflicts underlying the observed behaviour. It is an excellent example of personal knowing as identified by Carper.

The two persons in a human caring situation are both in a process of being and becoming. Each brings with him a unique life history and phenomenological field and both are influenced by the nature of the transactions. Moustakas describes a transactional human caring relationship as follows:

> *The opportunity to engage in genuine caring is a process of intuitive awareness, sensing and knowing, a recognition of the mystery, the awe, the capriciousness, the unpredictability of life, the possibility of the power*

of silence and of real dialogue with others in the deep moments of life ... and indeed spiritual qualities of our energy interchange via the caring relationship.

(Parker 1990:282)

The role of the affective competencies in nursing practice will become more and more important as the contemporary and future world indicate an increasingly complex society where moral decisions, value conflicts and ethical issues will be increasingly intricate.

6.5.3 Cognitive skills

Cognitive skill development is a significant aspect of nursing practice. It is separate from the affective and psychomotor domains in the sense that each has special characteristics of performance, but the three domains are inextricably interrelated. Cognitive skills essential for nursing practice encompass concept learning, problem-solving, decision-making, critical thinking and clinical judgement (Reilly & Oermann 1992:207, 240). I would like to add creative thinking, as the expert nurse practitioner has to be an innovative thinker.

6.5.3.1 Concept learning

A concept is a mental image, an idea in one's mind formed by a generalisation from specific concrete experiences linked to empirical knowledge. It provides knowledge of the essence of things. Conception means to know something beyond the level of sensation (King 1988:22). The acquisition of facts and information is important in the health fields but the vast mass of details can only be accomplished through the learning of concepts. Concept learning provides a means for students to group together facts and categorise new information. A concept is a general phenomenon which reflects a group of events or objects that share common traits. These are the identifying features of a

concept. Conceptualisation serves to reduce the complexity of the environment through placing events or objects into categories. Concepts assists nurses in categorising events and objects they deal with in practice (Reilly & Oermann 1992:209-211).

The nursing diagnosis is an example of a concept attainment task which requires from the nurse to group characteristics or cues into a diagnostic category. Characteristics such as decreased muscle strength, impaired coordination and stiffness of joints may be grouped together as a nursing diagnosis of impaired physical mobility (Reilly & Oermann 1992:210). Other concepts relevant to nursing practice include pain, empathy, caring, immobilisation, ethical dilemmas, and asepsis. These concepts manifest in many different situations in practice. For example, the principles of asepsis must be applied during wound care, catheterisation, removal of stitches, shortening of drains, and when assisting in the operating theatre.

Concept learning is enhanced through experiential learning. The concept empathy can be learned through role play and psychodrama, whereas the concept immobilisation can be learned through clinical practice experiences with post-operative patients, comatose patients, and patients suffering from a cerebral vascular incident or bone fractures.

Concept learning is similar to what Bruner refers to as understanding the structure of a subject. Both require comprehension and insight (see 4.4.1.4).

6.5.3.2 Problem-solving

Problem-solving and the nursing process are essentially the same processes as they have in common data gathering; identification of the problem (in the nursing process this is the nursing diagnosis); planning which implicates consideration of alternative solutions; implementation of the solution or plan; and evaluation of the outcome. A belief in the nursing process, however, as the prototype of reasoning in professional nursing practice, ignores intuition as a recognised component of the perceived view of science and a

legitimate way of knowing in nursing (Miller & Rew 1989:84; Zerwekh & Claborn 1994:113).

Nurses are confronted daily by unique and complex patient- or setting-oriented problems which require the ability to use concepts and theories in order to find solutions. Not all problems lend themselves to resolution through application of theory and a technical approach. Analytical reasoning is useful in structured settings but nursing practice invariably involves highly complex interacting elements which require analytical and non-linear thinking processes. Recent studies question the merits of exclusive attention to a logical, analytical and linear process of reasoning in practice related problems (Miller & Rew 1989:84-85; Reilly & Oermann 1992:211).

In nursing practice many problems do not present themselves as well-defined to which previous learned rules can be applied. When a unique, complex problem presents, reflection-in-action occurs according to Schon. By reflecting on the unexpected aspects of a problem, the nurse frames new questions, strategies and objectives. This inquiry may reframe the situation or suggest an experiment based on the professional's repertoire of theoretical principles, technical knowledge and experience. The nurse searches her mental data bank of knowledge and experience for the most likely explanation or strategy for this unique clinical problem. The experienced nurse has a greater repertoire to draw from and often allows vague hunches to guide her in finding a solution (Reilly & Oermann 1992:213; Saylor 1990:9).

Benner affirms the role of intuition in solving clinical problems and making nursing judgements. According to Benner, *experts dare not stop with vague hunches, but neither do they care to ignore those hunches that could lead to early identification of problems and the search for confirming evidence* (Benner 1984:xix).

Example 9 illustrates the analytic and linear processes of problem-solving used by the nurse in charge of the emergency unit in order to accommodate each patient's needs.

6.5.3.3 Intuition

Intuition is a non-linear thinking process which is based on a perception of cues that are linked together with basic knowledge and past experiences. Bruner (1963) describes intuition as *the intellectual technique of arriving at plausible but tentative formulations without going through the analytic steps by which such formulations would be found to be valid or invalid conclusions*. Intuition is a sense of knowing without a preceding rational analysis. It is synthesis, rather than analysis (Miller & Rew 1989:85; Reilly & Oermann 1992:214).

Intuition is an essential component of the art of nursing and of the nursing process. Expert nursing care, ethical dilemmas and the ability to predict behaviour based on inadequate and ambiguous data necessitate the use of intuition. The emphasis placed on the nursing process and on the breaking down of assessments into separate problems, thus dismissing intuitive data, has been criticised in the nursing literature as it results in missing the overall picture. For it is the combination of intuition and objective verifiable approaches that enable nurse practitioners to deliver holistic care. According to Benner (1984), intuitive nurses are the more experienced practitioners and are holistic versus the fractionated or procedural (Correnti 1992:91-92).

In Example 8, the nurse relied on her intuition as she had a feeling all along that something serious was wrong with the patient who had undergone an esophageal dilatation procedure. She kept on searching for cues and persisted in seeking medical help, until in the end she was proved right.

Intuitive thinking processes can be encouraged through experiential learning experiences which include open group discussions where reflective thinking is emphasised, group brainstorming, group visualisation, and mental imagery. Students should be prompted to share ideas, use their intuitive sense and offer creative alternative solutions (Miller & Rew 1989:86; Reilly & Oermann 1992:214-215).

6.5.3.4 Decision-making

Decision-making has been identified as a critical component of nursing practice. The ever-changing health care environment requires from nurses to be effective in both problem-solving and decision-making. By definition, problem-solving and decision-making are almost the same processes because both are initiated by a problem. In decision-making, however, the objective may not be to solve a problem, but to deal with the results of a problem. Whereas problem-solving is a more scientific process, decision-making is value based (Pardue 1987:355; Zerwekh & Claborn 1994:14-115).

Quality of patient care depends on the ability of the nurse to effectively combine problem-solving and decision-making. The latter involves data gathering, generation of alternatives and selection of one of the alternatives. Effective decision-making requires critical thinking. Decision-making is influenced by the nurse's knowledge base, values, biases and cultural norms. Nurses must be attuned to their own value systems and understand the effect it has on their thoughts and perception. The values associated with a particular situation will limit the alternatives generated and the final choice of decision. Whenever possible, decisions must be made with patients and/or other health personnel, not for them, in order to gain their full cooperation (Faulkner 1985:125; Reilly & Oermann 1992:215, 216; Zerwekh & Claborn 1994:115).

There is a distinction between a good decision and a good outcome, as a good decision may or may not result in a good outcome. While it is desirable to attain both, the good decision-maker is willing to take risks even if the outcome is not positive. The following example illustrates this point:

Example 14

An evening charge nurse who had 24 patients in her unit, had to make the following decision. One of the patients who was terminally ill seemed to be having a particular

difficult evening but needed only basic comfort measures and not complex care. The charge nurse had a choice of either assigning the patient to a professional nurse or to a nurse aide. If her choice fell on the former, the workload for the other staff would be heavier and she, herself would have to administer medications. In the end she did decide on the professional nurse who, because of her experience, could offer the patient more emotional and physical support than the aid would have been able to. This nurse spent time sitting with the patient during the shift and, close to the end of it, the patient died. The question is whether it was a good decision with a bad outcome or a good decision with a good outcome (Zerwekh & Claborn 1994:115).

It is my opinion that it was a good decision because the nurse in charge took the risk of overloading herself and the other staff to give the dying patient the best care possible. The patient had available a professional nurse who had, apart from the emotional support she could offer, also the necessary scientific and technical skills, if needed. The outcome was bad because the patient died, but due to a good decision, he was able to die peacefully and comfortably.

6.5.3.5 Critical thinking

Critical thinking is one of the higher order thinking skills (involving comprehension, application, analysis, synthesis, evaluation) required in the complex health care system. It assists nurse practitioners in the development of alternative solutions to patient problems and in the management of complex nursing systems, and enables them to be safe, competent and skilful practitioners. In many aspects of practice there is *no right way* and alternate modes of care must be examined as a result. Critical thinking involves distinguishing relevant from irrelevant information, drawing clinical inferences from the information, recognising unstated assumptions, weighing findings and examining the basis for generalisations. It encompasses the evaluation of ideas when assessing information, evaluating procedures or making judgements. It requires from the nurse that she sets aside her own visions of the truth and reflects on alternatives

(Pond, Bradshaw & Turner 1991:18; Reilly & Oermann 1992: 218, 232; Sullivan 1987:12).

Critical thinking is a rational process directed toward specific goals. The critical thinker seeks reasons on which to base assessment, evaluation or judgement, the latter being made objectively, impartially and nonarbitrarily. Considering the influence of expanding knowledge and technology on health care, critical thinking is vital to effective nursing care. It underlies problem-solving, decision-making and competent clinical judgement (Reilly & Oermann 1992:217-218).

Critical thinking is exhibited in Examples 5 and 12. In Example 5 the nurse had to evaluate the patient's vital signs in relation to medication and fluids administered and to assess the patient's reaction against what normally holds for patients who have similar surgery. Findings were examined and possible reasons for the patient's lack of progress were sought. Through objective viewing of different alternatives, the correct judgement was eventually made. Example 12 illustrates how the nurse had to weigh and evaluate various alternatives, possible results, reactions and probabilities before she could start the procedure of intravenous infusion.

Experiential learning experiences including case studies, group discussions, clinical conferences, writing assignments and mental imagery are suggested for the development of critical thinking skills. These experiences provide opportunities for reflective thought, inquiry, discovery, struggling with dilemmas, and clarifying different perspectives (Pond, Bradshaw & Turner 1991:18-19; Reilly & Oermann 1992:231-232).

6.5.3.6 Clinical judgement

Expertise in clinical judgement is central to the practice of safe and effective nursing care. It encompasses a series of decisions made by the nurse in interaction with the patient. These are based on observations, evaluation of data observed, diagnosis and

nursing actions to be executed on behalf of the patient. Problem-solving, decision-making, critical thinking and creative thinking are all involved during the process of clinical judgement (Reilly & Oermann 1992:222; Tanner 1987(a):154; Wurzbach 1991:27).

Two different theoretical perspectives have guided the descriptive research on clinical judgement, namely the rationalist perspective which includes information processing theory and decision theory, and the phenomenological perspective. Although much more research is needed, the phenomenological perspective is gaining more impetus as there is evidence that with increasing expertise, the emphasis shifts from the use of abstract principles and rational approaches, to the use of practical knowledge in holistic or intuitive judgements (Reilly & Oermann 1992:222-225; Tanner 1987(b):23-24).

The phenomenological studies have shown that the analytical processes of clinical judgement are not the primary mode during this process, because they are used only when the nurse detaches herself from the task. Benner provided evidence that expert clinical judgement derives from a grasp of the whole situation. It encompasses a perceptual assessment based on a combination of the senses of touch, smell and sight, as well as an interpretation of a patient's physical, verbal and behavioural expression. According to Benner, perceptual awareness is central to good clinical judgement and starts with vague hunches and global assessments that initially bypass critical analysis. A study conducted by Pyles and Stern (1983) identified the formation of a gestalt or achievement of insight about a patient situation congruent to Benner's description (Benner 1984:xviii; Benner & Wrubel 1982:12; Tanner 1987(b):25).

Intensive care nurses generally acknowledge that they rely on intuition to make sound clinical judgements. They regard the following observations as critical to the analysis of a patient's condition: saturation (blood gas levels), ECG and blood pressure; the patient's alertness and general orientation in relation to the kind and strength of sedation received and his cooperation with the ventilator; arterial and venous pressures;

electrolyte balance; and urine output. However, their intuitive awarenesses, based on their expanded knowledge base and wealth of experience, complete the picture. An experienced intensive care night nurse's appreciation and acknowledgement of the role of intuition during clinical judgement, is expressed in the following quotation:

> *Thanks to nurses' intuition and physicians' willingness to trust and abide by it, a patient was falling off to sleep when he might otherwise have been going into pulmonary edema.*
>
> (Correnti 1992:94)

Examples 1, 5, 8, 9, 10 and 12 illustrate how experienced nurses approach clinical situations from a holistic viewpoint and through using analytical, reflective and critical thinking, while at the same time relying on their intuition, and making decisions which often include risk-taking.

6.5.4 The expert nurse practitioner

According to Benner (1984:v), nurses change their intellectual orientation, integrate their knowledge and refocus their decision-making on a different basis from the process oriented way that they were taught.

The Dreyfus Model (1981) describes five levels through which student nurses pass before they become expert clinical practitioners - novice; advanced beginner; competent; proficient and expert (Benner 1984:xvii).

The expert nurse gets a gestalt on a situation and has an intuitive grasp of the situation. She zeroes in on the accurate region of the problem without consideration of unfruitful alternative diagnoses and solutions because of her background of experience. By using concrete situations as paradigms, evaluating alternatives on the basis of comparison of salient elements, and perceiving the situation as a whole, the expert nurse arrives at a

holistic decision.

The transformation of a skill comes with mastery. When rules are followed, performance is halting, rigid and mediocre. Expert performance, however, is marked by fluency, flexibility, proficiency and vision. Expert nurses spend time thinking about the future course of a patient, anticipating problems that might arise and contemplating on how they would handle it (Benner 1984:xvii, 3, 31, 32, 34, 102).

From the above discussion it becomes obvious that the expert nurse functions on the highest level of Treffinger's creative learning model (see figure 4.5).

A study conducted by Davies to determine whether observation of clinical role models could lead to knowledge and discovery, revealed the following. Students reported that they recognised creativity and flexibility in nurse practitioners and related these attributes to the ability to provide individualised, context-specific care. They labelled the more experienced nurses as calm, pleasant, spontaneous, helpful, flexible, very interested, excellent, organised, well informed, brilliant, capable and outgoing (Davies 1993:631, 635).

When asked to cast their role models in the care provider role the students in Davies's study recognised the following abilities and skills. The efforts of the nurse practitioners to constantly adjust and adapt to changes in the profession, modifying approaches to suit the context and dealing with conflicting needs. Practical competence in divergent situations - where problems were contextually specific and not well defined and which resulted in conflicting values - were also noted. Bevis and Clayton (1988), Smyth (1988) and Speedy (1989) regard context specificity as the hallmark of creative and individualised nursing practice (Davies 1993:634).

The attributes of the expert nurse which include flexibility, intuition, vision, sensitivity, perceptiveness, independency, ego-strength, openness to experience, persistence,

knowledgeableness and inquisitiveness, concur with the characteristics of the creative person (see 2.5.2.1). Many of these attributes became apparent in Examples 1, 5, 8, 9, 10 and 12.

It is my conclusion that the expert nurse practitioner is a creative and innovative nurse.

6.5.5 Creativity and the science-art of nursing practice

Carper's four patterns of knowing in nursing appear to include the four quadrants of Herrmann's whole brain creativity model (see figure 3.2 and 3.3). Empirics, which encompasses the cognitive skills, can be placed in the A-quadrant. The cognitive skills which were discussed in this chapter are higher order skills which include abstract, analytical, linear, rational, reflective, evaluative and productive thinking. These skills are classified in Bloom's higher cognitive domain and De Corte's productive operations (see 4.3.1 and 4.3.2). They are also inherent to metacognition and formal operational thought (see 4.4.1.2 and 4.4.1.3).

Ethics, the moral component of nursing, appears to belong mainly within the B-quadrant. Moral reasoning and ethical decision-making require knowledge of the fine detail of every ethical dilemma in which the nurse is involved, as well as of ethical models and codes. The process of values clarification is procedural in nature involving sequential steps.

Personal knowledge falls within the C-quadrant, has emotions and feelings are intrinsically involved in the development of knowledge of the self. The affective domain is entirely C-quadrant oriented.

Aesthetics, the art of nursing, as a strong D-quadrant orientation because of the intuitive processes involved, the ability to view a situation holistically, and the ability to synthesise. These qualities have been identified in the expert nurse. The psychomotor

domain of aesthetics, however, relates to the B-quadrant as motor skills involve detail, sequential and procedural processes.

The practice of nursing in all its dimensions, involves all the processes in the whole brain creativity model. Although research has shown that nurse practitioners are mainly B- and C-quadrant dominant (see 4.2.3), it is my opinion that the expert nurse needs to be well-balanced in the A-, B- and C-quadrant, but slightly more dominant in the D-quadrant.

6.6 CONCLUSION

The mystery, diversity, complexity and challenge inherent in the practice of nursing have been illuminated in this chapter. The nursing model has moved from a medical model - objective, logico-deductive, and treatment oriented, to a nursing care model - humanistic-existentialistic, holistic, phenomenological and human experience oriented. Where nursing practice was entrenched in a training modality in the past, it is now based on an educational modality.

The nursing profession today seeks a nurse who can function in a highly scientific and technological milieu. A nurse who can accept the ambiguities of a modern and dynamic medical and health care world - a complex world in which there are no certainties or any clear and easy solutions. A world where everyday judgements are fraught with ethical and moral dilemmas that require re-evaluation of our most basic ideas about human life.

The nurse practitioner of today and tomorrow has to be more knowledgeable, insightful of ethical issues and capable of critical thinking, more caring, compassionate and human, more creative and open to new ideas and willing to accept change and challenges.

The following quote from Bevis and Watson (1989:64) summarises the new paradigm

for nursing:

> *We must find a balance, a truce, a truly liberated climate of teaching, of inquiry, so that we fuse the scientific with the metaphysical, and infuse a new respect for those things uniquely human: morality, judgement, intuition, reflection, imagination, creativity, values, meaning and spiritual sensitivity.*

CHAPTER 7

Innovative teaching strategies

7.1 INTRODUCTION

In our rapidly changing world it is widely recognised that competence alone is no longer sufficient, but that creative and innovative leadership is required to find successful solutions to problems. Research findings have revealed that the level of creative productivity increases after creativity courses have been undertaken (Parnes 1992:14).

As nursing programmes become more complex, innovative approaches to teaching require to be explored. The need for the development of problem-solving skills to be used in nursing practice, is increasingly being recognised. Creative problem-solving skills, however, do not necessarily emerge suddenly or even spontaneously - their development and advancement must be encouraged and shaped through practice (Carroll & Howieson 1991:68; Parfitt 1989:666).

Creativity experts criticise the traditional education system for stifling creativity because

of its directive approach. They feel therefore that it is imperative that educators should revise their teaching attitudes and strategies with the aim of stimulating creativity in their students. This, in turn, will enhance the development of problem-solving skills.

Innovative teaching strategies incorporate methods, many of which will be new, or even unique, to many teachers and students alike, but which will motivate students, create a pleasant learning environment, and maximise learning. Creativity in teaching implies that the teacher implement strategies which arouse attention and interest, increase concentration and make learning more fun. Nurse educators could, and should, employ teaching strategies which stimulate both hemispheres of the brain and accommodate different cognitive styles. When linear and visual materials are used together, students are compelled to think in the non-preferred mode (Handfield-Jones, Nasmith, Steinert & Lawn 1993:4).

The literature on nursing research repeatedly pinpoints the following teaching strategies as being innovative or creative: role play, simulation, games, case study, guided fantasy, group investigation and brainstorming (De Meneses 1980:443; Ferguson 1992:17, 18; Freitas, Lantz & Reed 1991:5; Gaze 1991:54, 55).

The teaching strategies discussed in this chapter have been selected on the basis that not only are they viewed by experts in the field as creativity inducing, but also that they are of particular applicability to nursing. Each is described briefly and its application to nursing education and relation to creativity, elaborated.

7.2 BRAINSTORMING

7.2.1 Description

Brainstorming refers to the spontaneous generation of ideas with the aim of generating the greatest variety of possible solutions to a problem through free association. It was

originally developed by Alex Osborn (1957) as a technique to help business groups produce high-quality ideas. He believed that individuals could think more creatively when exposed to the ideas of others. However, he later admitted that, despite the many virtues of group brainstorming, individual ideation could be just as productive (Dacey 1989:123; Davis 1986:92; De Young 1990:112-113).

Brainstorming is part of a total process, creative problem-solving is the whole. It is an essential part of the idea-finding stage of creative problem-solving. According to Gehlbach (1986:38), brainstorming is the starting point for much real-world creative problem-solving.

A central concept of brainstorming is that the generation of ideas should be kept separate from the evaluation of their worth - deferred judgement is therefore applied. Based on the assumption that quantity can lead to quality, brainstorming is subjected to four basic rules:

(1) Criticism is ruled out - deferred judgement is applied.
(2) Free-wheeling is encouraged - wild or funny ideas are accepted.
(3) Quantity is desired.
(4) Combination and improvement are sought (Dacey 1989:123; Sisk 1987:110).

The rationale behind these rules is that deferred judgement acts as reinforcement for innovative and far-fetched ideas and that it is more likely to find a creative idea by being *wild* first and then *taming down.* Quantity offers better chances of finding good ideas, whereas combination and improvement become possible when one idea inspires the next (Davis 1986:90).

Brainstorming encompasses two stages, namely:

- idea-generation (fact-finding and idea-finding, the free-wheeling stage)

- idea-evaluation (ideas are evaluated against selected criteria, eg cost, safety, effect on other patients) (De Young 1990:114; Kim 1990:43)

During brainstorming sessions students are encouraged to build on the contributions of others, produce a large quantity of ideas, offer wild and funny ideas, withhold editing own ideas, and avoid criticising others' ideas. The lecturer or group leader must write down all the ideas. The ideal group size is 10 to 12, and brainstorming is always more productive with a heterogeneous group (Davis 1986:90).

The variations of brainstorming include the following:

- **Stop-and-go method**. Short sessions of idea generation (10 minutes free-wheeling) are alternated with brief idea evaluation sessions. This helps students to stay on the right track.

- **Philips 66 method**. This technique is used with large groups. The problem is presented and the group is divided into smaller units each containing about six students who brainstorm for six minutes. The leader of each unit has to write down all the ideas or possible solutions. Each unit then has to report all, or only their best, ideas to the large group.

- **Reverse brainstorming**. The basic problem is turned around in order to find new perceptions and viewpoints. For example, *How can medico-legal hazards be increased in a surgical ward?* or *How can student attrition be increased?* This technique promotes suggestions that illuminate the real problem as the students list what is actually happening. Group brainstorming is often superior to individual efforts - those in a group can pool their knowledge to produce higher quality thoughts (Dacey 1989:124; Davis 1989:93).

To increase the flow of ideas during brainstorming, Osborn's (1963) list of idea-spurring

questions - incorporated by Eberle (1971) for ease of rememberance in the acronym, SCAMPER - can be used. This is:

S = substitute
C = combine
A = adapt
M = modify, magnify, minify
P = put to other uses
E = eliminate
R = reverse, rearrange (eg opposite or upside down) (Du Rand 1993:52; Sisk 1987:111)

7.2.2 Advantages and limitations

Brainstorming enhances the students' belief in being able to hatch ideas. It provides a springboard for thinking in new and different directions and builds the students' confidence (Kawenski 1991:264).

Students participate actively while drawing on previous knowledge and experience. Brainstorming is fun and therapeutic as it offers students the opportunity to be flexible in creating and constructing solutions. As judgement is deferred, it produces the essential creative atmosphere (creative attitudes, psychological safety) - the single most essential ingredient of innovative thinking (Burnard 1989:24; Davis 1986:88-89).

However, brainstorming cannot always guarantee a perfect solution. Deferred judgement may not aid the production of creative ideas and individuals can often be more creative when alone. Davis (1986:94) emphasises that forced creative thinking techniques should supplement, not replace, original individual thinking.

7.2.3 Application to nursing education

Brainstorming is a useful technique to identify the reactions of groups of students to various situations, such as coping with bereavement or working with the mentally handicapped. This could help the lecturer detect problem areas in clinical practicals or difficulties experienced by an individual student in coping with these issues, which would enable her to offer asistance where necessary (Burnard 1989:27).

As part of problem-solving and as a route to creative thinking, it can be used either in the lecture room or during clinical conferences. Students can be asked to brainstorm solutions to professional problems such as the image of nursing or burnout among nurses (De Young 1990:112).

Brainstorming as a technique, can be used to determine the content of a course. It can also be used at the beginning of a workshop (to draw on prior knowledge and experience) or at the end (to identify the associations related to what the students have learned). It can be implemented to explore the affective domain (feelings, emotions, value systems, attitudes) as a means to develop the student's self-awareness. For example, when the lecturer discusses the topic *depression*, the students can be asked to brainstorm how they feel when they are depressed. A topic such as *caring for the dying person* can elicit personal difficulties concerning their feelings or attitudes about the issue - this may lead to a more productive discussion (Burnard 1989:25-26).

7.2.4 Relation to creativity

Brainstorming is essentially a problem-solving approach that stimulates divergent thinking. Ideational fluency and flexibility are developed during idea generation and synthesis and elaboration take place when students build on the ideas of others. These are the key-abilities of creativity as identified by Torrance (see 2.5.1.1).

Brainstorming is experiential in nature, draws on one's previous knowledge, and facilitates active participation and cooperative learning in a relaxed and playful atmosphere. This atmosphere can be attributed to a feeling of psychological safety which is the result of an open atmosphere characterised by acceptance and freedom of thought, and the withholding of judgement. These aspects are congruent with the requirements for the fostering of creativity (see 5.6.2).

In relation to the whole brain creativity model, brainstorming stimulates D-quadrant processes as visual thinking, imagination and intuition are used to generate ideas while C-quadrant processes are engaged when feelings, emotions and values are explored. A- and B-quadrant processes are utilised at the end of a session when ideas are evaluated in order to find the best idea or solution. Logical, analytical, detailed and sequential thinking is essential during the evaluation phase (see figures 3.2 and 3.3).

7.3 CREATIVE PROBLEM-SOLVING

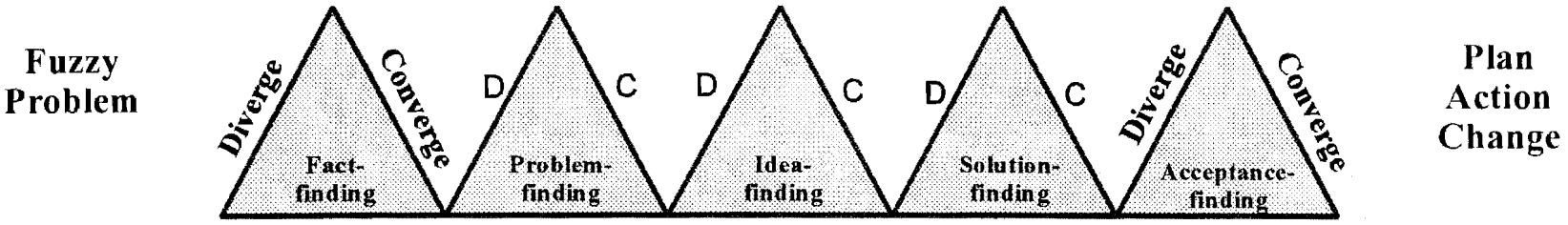
7.3.1 Description

Creative problem-solving requires finding the greatest number of interconnections and interrelationships and connecting them in both obvious and not so obvious ways. This requires responsible creative action (Parnes 1981:59).

The creative problem-solving (CPS) model was originally formulated by Alex Osborn (1963) and further developed by Sydney Parnes (whose model is the most widely used) to stimulate creativity. The CPS model encompasses five stages: fact-finding, problem-finding, idea-finding, solution-finding and acceptance-finding. A unique feature is that each of the stages first involves a divergent thinking phase during which many ideas (facts, problem definitions, ideas, evaluation criteria, implementation strategies) are generated, and is followed by a convergent phase during which the most promising ideas are selected for further exploration - see figure 7.1 (Davis 1986:64, 66). According to

Figure 7.1

Creative problem-solving process



CPS

Divergent thinking

= think of many ideas and defer judgement

Convergent thinking

= when focussing on one answer/response

(Sisk 1987:110)

Glover (1980:95), creative problem-solving is the broad definition, but fluency, flexibility, elaboration and originality are the specific behaviours.

Creative problem-solving develops productive, complex, abstract and higher level thinking skills. It encourages students to focus on open-ended tasks, and to develop products that challenge existing ideas and produce new ones (Sisk 1987:113). Fuller in Torrance (1979:103) states that any genuinely creative idea requires the ability to put things into context and this ability comes into play during brainstorming and problem-solving. Ochse cites that the most crucial aspect of CPS is finding the problem. She agrees with Torrance (see 2.5.1.1) that a sensitivity to problems is a notable characteristic of creative people. Both Arlin (1975) and Getzels (1975) describe problem-finding as a creative process in itself because the ability to view old problems from a new angle, requires imagination and results in new advances in science (Ochse 1990:187).

Carroll and Howieson (1991:71) emphasise that CPS skills do not emerge suddenly but need to be encouraged and carefully shaped through practice. This is affirmed by Bruner (1960) as quoted by Parnes (1972:23): ... *it is only through the exercise of problem-solving and the effort of discovery that one learns the working heuristic of discovery* ...

The creative problem-solving process includes:

(1) **Fact-finding**. At this stage the problem is ill-defined. All the known facts about the problem must be listed and all information, impressions, observations, feelings and questions should be explored. Parnes (1981:133, 137) suggests re-examining the situation for more facts and emphasises a right brain focus through visualisation of the situation. This might provide more information or clues. The who, what, when, why, how and where questions should be asked during this stage (Davis 1986:68; Du Rand 1993:33; Sisk 1987:109).

Dacey (1989:127) believes that no successful creative problem-solving is possible without the presence of some combination of synectic methods (discussed under 7.5). These methods are intended as psychological tools to consciously tap the unconscious. During the fact-finding stage an analogy can be used to make the strange familiar (see 7.5.1.1). The fact-finding stage parallels the preparation phase of the creative process as described by Wallas (see 2.5.1.2).

(2) **Problem-finding**. The formulation of the problem is more important than finding a solution. If the real problem is not addressed, the correct solution will not be found. Redefinition of the problem is essential during this stage as the problem is probably not the same as was first thought. Alternative problem definitions should be listed. What is the real problem? What needs to be accomplished? The problem can be stated in a well-defined procedure by using the following kind of question: *In what ways might I ...* (Du Rand 1993:43; Parnes 1981:137; Sisk 1989:109). For example, the problem encountered when a patient does not give his cooperation to the nursing staff, can be addressed as follows: *In what ways might his cooperation be gained?* or *In what ways might his attitude be changed, or How can he be convinced?*

The individual could fantasise or daydream a scenario of how he would alter the situation to be like he wants it to be. A fantasy analogy can be created to visualise the ideal outcome (see 7.5.1.2). The creative individual's capacity for intuitive perception (the recognition of associations and similarities among objects and concepts) is crucial during this stage (Kim 1990:38; Parnes 1981:133).

(3) **Idea-finding**. This is the brainstorming stage. Ideas should be freely listed without criticism or evaluation for each of the problem definitions accepted in stage 2. The main focus is to generate as many ideas as possible by giving free reign to the imagination. When functional fixedness hinders the search for ideas,

Osborn's idea-spurring questions (or Eberle's SCAMPER) as explained in 7.2.1, can be used to increase or improve ideas. Parnes stresses quantity and freedom of expression in the absence of evaluation, as being the abilities allowing free reign to the imagination (Davis 1986:70; Parnes 1981:85; Sisk 1989:109).

At the end of this stage, six to eight ideas which seem to be the most likely to assist in finding a solution to the problem, should be selected.

(4) **Solution-finding**. Individuals should become aware of the multiple consequences associated with the ideas being considered, and should picture the changes from as many viewpoints as possible. The *worst case analysis* can be used when formulating a potential solution to a problem. This refers to imagining the worst possible result occurring which can lead to the asking of questions about the solution that would not generally have occurred to the individual (Dacey 1989:121-122; Parnes 1981:133, 137).

Criteria for evaluating the selected six to eight ideas, should be established. Each criterion must be applied to each idea objectively and rated to present a matrix listing (see figure 7.2). If the solution with the highest score is not as acceptable as one of the others, it can be bypassed. Du Rand (1993:58, 62) proposes that, if two ideas/solutions end up with the same score, brainstorming can be used once again to choose the one that suits the needs best.

(5) **Acceptance-finding**. The best idea should be developed as fully as possible, before implementation. A plan of action should be developed while keeping in mind who would accept or reject the plan. Brainstorming can again be used during preparation for implementation. Individuals to ask themselves the following two questions: *What difficulties may arise?* and *What is the worst possible that can happen?* (Davis 1986:71; Parnes 1981:137; Sisk 1987:110).

Figure 7.2

Evaluation model

Ideas	Effectiveness	Acceptability to patients	Acceptability to nursing personnel	Cost	Total
1	2	4	5	3	14
2					
3					
4	4	5	4	3	16*
5					
6					

Rating Scale

5 = Excellent

4 = Very good

3 = Good

2 = Fair

1 = Poor

(Sisk 1987:112)

Creative problem-solving is versatile and can be adjusted according to circumstances - the five stages need not be followed sequentially. If the problem is obvious and already well-defined, the starting point can be the generation of ideas and if a few good ideas already exists, the starting point can be the establishment of criteria (Du Rand 1993:71).

Davis (1986:85) suggests turning the problem around, which can stimulate personal creative thinking techniques, for example:

- To start with the goal and work backwards and deduce what is required to reach the goal.

- To begin with the ideal/perfect solution (the problem-solving itself) and work backwards to design a creative solution.

7.3.2 Advantages and limitations

Creative problem-solving enhances problem-solving abilities to solve complex problems. If several approaches are developed towards a problem, it is more likely to find more satisfactory solutions (Glover 1980:14).

When the brain is fuelled with facts, observations, problems, etc, it produces ideas and associations which become the basis of new insights and perspectives. In this way more of the positives inherent in any situation are discovered and the *impossible* is no longer absolute (Parnes 1981:51).

Creative problem-solving, obviously, cannot answer all problems encountered in nursing practice as some situations (such as resuscitation of a patient) demand immediate convergent thinking and behaviour.

La Belle (1974:59) states that the application of creative problem-solving's deliberate, disciplined methods increases the chances, but does not guarantee that truly original creative solutions will be produced. If not used, however, anything more than marginal improvement would rarely result. For example, a nurse familiar with creative problem-solving would be more resourceful in rendering emergency care at the scene of an accident where the necessary equipment is not available - she would, in many situations, be able to improvise substitutes in order to render meaningful treatment. Practice in creative problem-solving improves divergent thinking which is essential in the effective handling of such situations.

7.3.3 Application to nursing education

Problem-solving has been identified as an important curriculum element in the education of nurses. The knowledge which is needed in different patient care situations is varied and dependent on aspects such as the patient's condition and his unique response to that condition. According to Reilly and Oermann (1985:149), student nurses are continuously confronted with problems which are client-setting oriented. The development of problem-solving ability is thus a critical requirement of a nursing education programme.

Clinical judgement, the ability to make wise choices of nursing action in sometimes ambiguous and stressful situations, can be improved through practice in creative problem-solving. According to La Belle (1974:59), teaching students to approach patient care situations through problem-solving is a means of teaching for reflective thinking.

It is not only patient care problems which can be approached through creative problem-solving, but also such issues as administrative difficulties, interpersonal relations and medico-legal hazards. The following are examples of issues that can be addressed by creative problem-solving:

- How to manage a surgical/medical ward with a shortage of nursing personnel.

- How to interact with an aggressive and arrogant physician in order to maintain open communication canals.

- How to reduce medico-legal hazards in a paediatric unit.

7.3.4 Relation to creativity

Creative problem-solving stimulates both convergent thinking (analytical, logical, evaluative) and divergent thinking (fluent, flexible, reflective) (see 4.4.1.1). It facilitates active participation and experiential learning, and combines left and right brain processes. Creative problem-solving differs from ordinary problem-solving in that it makes use of synectic methods, imagination and fantasy, as well as of divergent thinking. Its most valuable function is that it stimulates productive learning (see 4.3.2.2 - De Corte's classification).

The relation of creative problem-solving to the creative process, the abilities of creativity as identified by Torrance (see 2.5.1.1), and whole brain creativity is illustrated in table 7.1.

7.4 TEACHING BY METAPHOR

> *The greatest thing by far is to be a master of metaphor.*
> *It is the one thing that cannot be learned from others.*
> *It is the mark of genius.*
>
> Aristotle
>
> (Williams 1983:80)

Table 7.1

Relation of creative problem-solving to the creative process, key-abilities of creativity and whole brain creativity

CREATIVE PROBLEM-SOLVING (Parnes)	CREATIVE PROCESS (Wallas)	KEY-ABILITIES OF CREATIVITY (Torrance)	WHOLE BRAIN CREATIVITY (Herrmann)
(1) Fact-finding	] Preparation	Psychological openness Internal visualisation	Thinking processes: A-quadrant: • factual • logical • quantitative • analytical D-quadrant: • visualisation
(2) Problem-finding	]	Sensitivity to problems Penetration Re-definition	B-quadrant: • detail • sequential
(3) Idea-finding	Incubation	Fluency Flexibility	D-quadrant: • holistic • intuitive • integrating
(4) Solution-finding	Illumination	Synthesis Originality	A-quadrant: • logical • analytical D-quadrant: • intuition • holistic
(5) Acceptance-finding	Verification	Elaboration	B-quadrant: • detailed • organised • sequential C-quadrant: • emotional • interpersonal • feeling-based

7.4.1 Description

The ability to use and understand metaphors is a relatively new concept that is receiving considerable attention in creative education. Various experts in the field suggest a relationship between efficient metaphor use and creativity. Kogan (1983) views its use as the distinction between ordinary divergent thinking and high quality divergent thinking. A creative person must not only be able to think of many different things from different categories, but must be able to compare these in unique, qualitatively different ways (Dacey 1989:101-102).

Metaphorical thinking is the ability to make connections between two unlike objects through recognising that they share common traits in the same way or exemplify a common principle. This type of thinking does not proceed linearly but leaps across categories and classifications to discover new relationships. A metaphor (analogy) is, however, never exactly like the object to which it is being compared. There are always differences and discrepancies present (Williams 1983:33, 56, 67).

Davis (1986:51) explains metaphorical thinking as the ability to borrow ideas from one context and to use them in another, or to borrow a problem solution from a related problem. This explanation is exemplified in the way the telephone was invented. Bell perceived the inner bones of a human ear as being massive when compared to the delicate thin membrane that operated them. The thought occurred to him that, if such a delicate membrane could move bones relatively so massive, then perhaps a somewhat thicker membrane could move his piece of steel. This is how he conceived the telephone (Barron 1969:134).

Metaphors can be used to introduce a unity, clarify a concept, evaluate comprehension and stimulate divergent and productive thinking. The use of metaphors makes learning easier and more effective (Joyce, Weil & Showers 1992:220; Williams 1983:57).

Williams (1983:70-71) regards questions based on metaphor, as an excellent way to evaluate comprehension, as they force students beyond memorisation to evaluate their comprehension. The following two examples of questions illustrate this statement:

(1) Use the main events which lead to the French Revolution and explain their importance.

(2) How was the period leading up to the French Revolution, like the building up of a thunder storm? (Williams 1983:71)

Whereas the first question only stimulates the student's memory, the second question prompts visual images because of the comparison between the two events. The student will search his mind for similarities and ways to describe the likenesses between the two events and to use analytical and evaluative thinking, verbal and non-verbal thinking, visualisation and synthesis. These thinking processes include both left and right brain processes which will lead to a much more creative and detailed answer.

Davis (1986:131) suggests that the following questions can serve to elicit deliberate metaphorical thinking:

- What else is like this?, for example: How is *caring* in nursing like a polar bear?

- What could be copied?, for example: What else could be used to temporarily immobilise a fractured femur if a splint is not available?

- What have others done?

- What would professionals do?

A distinction is made between sensory metaphors, which encompass visual associations

(how they look and feel like) and functional metaphors (Williams 1983:78-79). The following are examples of metaphorical thinking:

- Music composition: Comments such as *inspired by* or *is based upon* directly indicate that ideas for a specific creation were metaphorically borrowed from an earlier source by the particular composer.

- Cartoons which make fun of political events.

- A recipe for baking cookies, written in the language of a hospital operating theatre.

- A comparison being made between a metal spring and hope.

- The invention of the knapsack - the Australians conceived the concept from the kangaroo mother carrying her baby (Davis 1986:117-118, 123; Kawenski 1991:264).

The abovementioned metaphors are all functional metaphors except for the cartoons which are visual metaphors. Metaphorical thinking is a skill which should be taught to students. Offering students a connection through metaphor is only the beginning of teaching through metaphor; it provides a model of metaphorical thinking, but does not teach the skill. Students should be asked to generate and discuss metaphors themselves, and the lecturer should help them clarify their thoughts. Metaphorical thinking plays a vital role in synectics (see 7.5) (Dacey 1989:125; Williams 1983:58).

7.4.2 Advantages and limitations

Davis (1986:114, 205) regards metaphorical thinking as central to creativity, creative problem-solving, creative ability and creativity techniques. Metaphorical thinking

involves taking ideas from one context and using them in another, thus producing a new idea combination. This refers to synthesis, a key-element of creativity.

New ideas which come from mental operations (other than induction), lead to an increase in semantic information. Metaphorical thinking is one such source. The metaphorical mode of thinking is holistic and focuses on recognising and understanding patterns and general principles (Williams 1983:59).

Metaphors introduce conceptual distance between students and objects and prompt original thoughts. They often bring forth a permanent change in one's perception of something. The use of metaphorical thinking may therefore aid in breaking functional fixedness, which enables one to look at something from a different viewpoint (Boden 1992:213; Joyce, Weil & Showers 1992:220).

Metaphorical thinking is basic to problem-solving and creativity because it involves the ability to play with ideas and concepts. Apart from being effective, metaphorical thinking is also fun; as it allows play to be part of the learning process (Williams 1983:80).

7.4.3 Application to nursing education

Metaphors draw on experiential learning, and as this is crucial to a practice discipline such as nursing, nursing education may benefit tremendously by the use of metaphor.

Fontes (1994:20) describes how metaphor can be used to explain difficult concepts. Nursing theory is an abstract concept which student nurses find hard to understand. Fontes uses a geographical map, as a metaphor to a nursing theory. A map represents the relationship of ideas about a certain geographical territory whereas a scientific theory represents an abstract set of ideas about certain human phenomena. As a map is not the actual territory it represents, a nursing theory about human phenomena is not

equivalent to the human phenomena that it attempts to describe. A difference between the two concepts is that a map is more visual and a theory more verbal. As maps are well-known to all students and as they are visual, students find it easier to make connections between a map and a theory.

The following example of metaphor can be used in nursing education. When introducing a new unit, metaphor can be used in the following way. A balloon can serve as a metaphor to introduce students to the anatomy and physiology of the lung. Both are inflated by air inlet and deflated by air outlet and both have the characteristic of elasticity and react to changes in air pressure. The balloon, however, does not have alveoli and bronchi.

Metaphor not only offers a verbal explanation but adds a visual image - this combination enhances learning and understanding as both hemispheres of the brain are engaged.

7.4.4 Relation to creativity

The most outstanding functions of metaphorical thinking include the changed perceptions, holistic view and visual images it evokes, and the facilitation of synthesis and elaboration. These functions as well as other abilities of creativity, such as psychological openness, flexibility and penetration (see 2.5.1.1), are essential in the search for similarities between two totally different and unlike objects which do have in common some major characteristics or functions.

Metaphorical thinking aids productive learning (see 4.3.2.2) as students utilise existing knowledge in the exploration of new concepts which lead to new insights, and a better understanding of subject content. Experiential and discovery learning (see 4.4.1.4) is encouraged.

7.5 SYNECTICS

7.5.1 Description

Synectics refers to the joining together of different and apparently irrelevant elements. Synectic methods are conscious, metaphor-based techniques for bringing these elements together. It is designed to lead the individual into a slightly illogical world in order to provide opportunities to invent new ways of seeing things, of expression and of approaches to problems. Synectics provides deliberate avoidance of logical thought because the latter leads to an inadequate conception of the problem and thus an absurd solution (Davis 1986:131; Joyce, Weil & Showers 1992:216).

Synectics should be part of creative problem-solving as it provides individuals with a repeatable procedure that increases the probability of success and hastens the arrival of an innovative solution (Prince 1971:33).

According to Kawenski (1991:264), synectics does not strive for quantity during problem-solving as does brainstorming; it has a sterner goal, namely, to produce a single new viewpoint. Davis (1986:132) views the purpose of synectics as making the problem-solving process more effective by using analogies. Part of the skill in using synectics, however, is to avoid analogies that are too exact, too obvious or not *strange* enough (Alexander 1971:10).

Originally described by William Gordon in 1961, synectics has since become a classic in the field of training for creative thinking. Synectics theory proposes an operational theory for the conscious use of the preconscious psychological mechanisms present in an individual's creative activity. Gordon based his theory on the assumptions that all individuals can improve their creative abilities if they understand the underlying psychological processes, and that the emotional, irrational components of the creative process are most important (Dacey 1989:125; Gordon 1971:14, 15).

Synectic mechanisms aim to induce appropriate psychological states that promote creative activity. These psychological states, which include empathy, involvement, play, detachment and the use of irrelevance, are basic to the creative process, but are not operational. According to Gordon, individuals cannot be persuaded to be intuitive, empathise, become involved, play, tolerate irrelevance or be detached. Synectic mechanisms, however, draw them into these required psychological states (Gordon 1971:21).

Synectics theory applies to the integration of diverse individuals into a problem-solving group, while the ability to tolerate and use the irrelevant is regarded as being of fundamental importance for seeking a solution (Gordon 1971:15, 20).

The synectics process depends on two mechanisms, with metaphor playing a vital role:

- making the strange familiar (search for similarity)
- making the familiar strange (shed preconceptions and perceptual habits)

7.5.1.1 Making the strange familiar

As it is a basic human tendency to be threatened by any strange object or concept, the individual tends to force any strangeness encountered into an acceptable pattern. The mind compares the strangeness with existing knowledge and attempts to convert the strangeness into familiarity. Three basic procedures: analysis, generalisation and model-seeking or analogy are involved (Prince 1971:33).

In any problem-solving situation, the individual's first priority is to understand the problem. This is essentially an analytical and convergent stage. By using a familiar metaphor, students are lead to analyse the problem - metaphor is used for analysing in this case, and not for creating conceptual distance. The purpose is to increase the student's understanding of the problem (Dacey 1989:126; Gordon 1971:14).

An example of making the strange familiar is in the use of a coffee filter as an analogy for explaining kidney function. Both serve the function of filtering by sorting molecules - certain molecules pass through, while others are retained. Similarities should be sought and differences pointed out.

Making the strange familiar, usually leads to a variety of superficial solutions. Basic novelty, however, demands a fresh viewpoint and this is facilitated by the next mechanism (Prince 1971:33).

7.5.1.2 Making the familiar strange

This is a conscious attempt to look at an old problem in a new way. Making the familiar strange, is to distort, invert or transpose the everyday ways of looking and responding. For example, the layman sees a tree as a collection of solids in an otherwise empty space, but the sculptor consciously inverts his world and sees the familiar tree as a series of voids or holes carved within a solid block of air (Dacey 1989:126; Gordon 1971:22; Prince 1971:34).

Making the familiar strange, involves true creativity and uses four mechanisms, each metaphorical in character: personal analogy, direct analogy, symbolic analogy and fantasy analogy. In this case metaphor is used to create conceptual distance (Dacey 1989:126; Joyce *et al* 1992:230).

(1) **Personal analogy**. This refers to personal identification with the elements of a problem. It releases the individual from viewing the problem in terms of previously analysed elements. By imagining yourself as the object through personification, new insights into the functions or character of the object are gained (Gordon 1971:23; Kim 1990:44).

Joyce *et al* (1992:221) describe personal analogy as emphatic involvement with

an object which requires loss of oneself as one transports oneself into another object. Dacey (1989:126) views personal identification with an object as a process similar to empathy as one can identify with people's feelings or with inanimate problems, such as movement of subatomic particles.

Gordon views role playing as a kind of personal analogy used to assist individuals in solving problems that are people-oriented. Torrance (1979:122) affirms that personal analogy frequently involves role playing. The following example illustrates how it can be used in nursing education. A student can be asked to personify a patient dying from AIDS. This death scene can lead the student towards greater understanding, empathy and insight into how to handle this type of situation more effectively. This example illustrates the viewpoint of Gordon (1971:21) that the individual cannot be persuaded to emphasise or become involved, but that synectic methods draw the individual into these required psychological states.

According to Prince (1971:38), both science and art abandon detached observations and analysis in favour of personal analogy. He quotes Keats' personal analogy during the writing of Endymion: *I leaped headlong into the sea, and thereby have become better acquainted with the sounds, the quicksands, and the rocks, than if I had stayed upon the green shore and piped a silly pipe, and took tea and comfortable advice.*

(2) **Direct analogy**. This involves the direct comparison of parallel facts, knowledge or technology. During this comparison knowledge and techniques from one domain are used in another one. The function of direct analogy is to transpose the conditions of the real topic or problem situation to another situation in order to present a new view of the problem. In other words, when confronted with a problem, the individual uses direct analogy when thinking of ways in which related problems have been solved (Dacey 1989:126; Joyce *et al* 1992:222; Kim

1990:45).

Direct analogies may include persons, animals, plants or non-living things, for example:

- When explaining the concept *motivation*, a cheetah can be used as a direct analogy. The students should be asked: *How is motivation like a cheetah?* Answers may include the following similarities: goal-directed action, movement in one direction (when prey is hunted), speed, power, energy.

- When explaining the concept *therapeutical use of the self* to student nurses, they can be asked: How is the *therapeutical use of the self* like a forest rain? (This example is explained in detail in 7.5.1.3.)

(3) **Symbolic analogy (compressed conflict)**. This type of analogy is characterised by its immediate appearance. It is a compressed description of the function or elements of the problem as a specific individual views it. Symbolic analogy is usually a visual image, immediate and poetic, disembarrassed of words. For example, Maxwell made mental images to represent the elements of every problem - he used symbols without words. Gordon (1961:48) quotes Sir Francis Galton: ... *I fail to arrive at the full conviction that a problem is fairly taken on by me, unless I have continued somehow to disembarrass it of words.* It can be an objective and impersonal image which is aesthetically satisfying and captures the essence of a relationship between a problem and a poetic response, but which may not be realistic or technologically possible. Symbolic analogy, a complex visual resolution fitting a number of requirements, is viewed as the inventor's product (Barron 1969:134; Dacey 1989:126; Gordon 1971:25).

According to Kim (1990:45), symbolic analogy means to view the problem

through objective, impartial images, which may be pictorial representations, mathematical formulas or other media.

Prince (1971:36, 37) explains symbolic analogy as involving the procedure to select the key-word and decide on the essence of its meaning. To feel for the important connotations of the word and then to put these feelings into one or two words, for example:

forest fire	=	progressive ingestion
target	=	focused desire
mixture	=	balanced confusion

These examples are referred to in the literature as book titles or compressed conflicts. Compressed conflict is a symbolic analogy in which a two-word description of an object is given while the words seem to be opposites or contradictory. This enables the individual to incorporate two frames of reference with respect to a single object. The greater the distance between the frames, the greater the mental flexibility. Gordon gives the examples of *life-saving destroyer* and *nourishing flame*, and Pasteur uses the expression, *safe-attack* (Joyce *et al* 1992:221). These examples will be explained further in 7.5.3.

Compressed conflicts can aid in approaching a problem from a different viewpoint. Joyce *et al* (1992:216) give the example of the absenteeism problem usually being addressed by some form of punishment, such as suspension. They suggest that a sense of *belongingness* can be created by using analogies describing the situation from a different perspective. Thoughts of the absentee as an *unhappy lark* on a *destructive vacation* ending as an *empty feast*, can generate empathy which will lead to an investigation into the cause of the absenteeism as it is very often a result of the real problem. The use of compressed conflicts can assist individuals to find more effective solutions to issues because they facilitate a variety of perspectives on a situation.

(4) **Fantasy analogy**. When using fantasy analogy, the problem-solver identifies the characteristics of the ideal situation and then seeks ways to realise the wish. It can be viewed as working backwards from an ideal goal. The problem solver thinks of fantastic, far-fetched ideal solutions which very often can lead to creative yet practical ideas (Davis 1986:136; Kim 1990:45).

Fantasy is used in synectics as a way of freeing the imagination from the bounds of the real world. According to Barron (1969:134), specific laws are imagined as if they did not hold and the question is then asked: *What would be the consequences?* For example, what would be the consequences if the law of gravity did not hold?

Dacey (1989:126) indicates that fantasy analogy starts when the problem-solving group asks the following question: *In our wildest fantasies, how do we want the solution to work?*

An example of fantasy analogy is given in 7.5.3.

7.5.1.3 Synectics procedure

When synectics is applied to problem-solving, three types of analogies, direct, personal and symbolic, form the basis of the process. The lecturer must seek analogical responses by asking evocative questions (those requiring an analogical/metaphorical answer) as these form the bridge between analysis and analogy. The lecturer determines which type of analogy he/she wants, ie, direct, personal or symbolic (Joyce *et al* 1992:221; Prince 1971:34).

To illustrate the synectics procedure, one of the examples of direct analogy mentioned in 7.5.1.2, is used.

When the lecturer wants to convey the meaning of *the therapeutical use of the self* to student nurses, he/she may proceed as follows:

- Students can be asked to present a direct analogy for the mentioned concept which may elicit the following responses:

  - blanket
  - forest rain
  - lioness
  - washing machine

- If *forest rain* is selected as the direct analogy, students must seek similarities between *the therapeutical use of the self* and *forest rain.* This may evoke responses such as: patients are dependent upon the nurse's psychological support, just as the plants are dependent on the rain for healthy growth; the approach of the nurse towards the patient is characterised by compassion and sensitivity, which can be compared to the gentle falling of the raindrops on the plants' leaves to prevent damage, and so on.

After the above discussion, a personal analogy can be requested from each of the students in which they have to identify themselves with falling raindrops. They now have the opportunity to get kinaesthetically and emotionally involved and this may produce a diversity of viewpoints and more detailed information. This can be followed by the lecturer asking for a symbolic analogy inferred from *forest rain*, which may be a two-word description presenting a paradox. Responses may, for example, be:

- enforced togetherness
- soothing coolness
- colourful dialogue

From the diversity of responses given by the students, these symbolic analogies may add to, extend and enhance the students' knowledge of the concept, *the therapeutic use of the self*, as they explain them in relation to the concept.

Prince (1971:37) emphasises that analogies must be *force-fitted* to the problem in order to be effective. It is through the strain of the new fit that the problem is stretched, pulled and refocussed which allow it to be viewed in a new way with increased insight.

7.5.2 Advantages and limitations

The use of synectics brings the creative process to consciousness. Gordon regards the emotional irrational component as more important than the rational. It induces open-ended thoughts - a mental state in which new ideas are possible. He regards an irrational state as best for exploring and expanding ideas and stresses that it is not a decision-making stage. He views the understanding of the emotional and irrational as a prerequisite for creativity (Gordon 1971:17-18).

Analogies are important sources of creative ideas as knowledge acquired in one domain can be applied to another domain. Novel ideas required for the development of a new theory can be provided by analogies (Gordon 1971:80, 446).

Analogies evoke images, kinaesthetic experience, cognitive and affective involvement. They facilitate psychological openness, penetration, flexibility, fluency, synthesis and originality.

Synectics does, however, need a lot of practice and can be time-consuming. Uncovering the comparison of a direct analogy's ramifications requires substantial time, and so does the process of personification in personal analogies (Gordon 1971:25).

7.5.3 Application to nursing education

Synectics can be used in nursing education to explain difficult concepts, to aid students' memory of factual information, to increase understanding of complex problems, and to increase empathy with patients.

Lantz and Meyers (1986:64-65) give an excellent example of a personal analogy to aid the teaching of medication administration, an essential part of patient care, but which is a challenging and complex study unit of the nursing curriculum. In this example, each student in the class is asked to become a different drug and to include in their personal analogies the following:

- family characteristics, personal characteristics, behaviour, interaction problems and adverse reactions

One student, who became valium gave the following description:

> *... My name is Val, I come from India ... I'll show you peace, love, inner harmony and tranquility. ... I am known to many as Diazepam, of the house of Benzodiazepines ... perhaps you know my brothers, Librium, Xanax. ...Are you tense anxious, tired or agitated? ... If life is too tough, come to me, come into my embrace of tranquility. I'll relax your large skeleton muscles and have a direct effect on your brain. ... I am the light, the peace, the calm, my lessons can be heavysome. ... Don't drive or operate machinery when you are on the enlightened plane with me. For some, the message of inner peace is too great and they become confused, depressed, disoriented, have headaches, slurred speach. ...I come in white, yellow or blue tablets, or take me directly into your veins or flesh - 40 mg a day for the adult is my maximum strength ...*

The use of personal analogy provides a creative way to gain knowledge on medication administration. The student in this example has analysed, interpreted, elaborated and synthesised information.

An example of a direct analogy is illustrated by Fontes' (1994:20) comparison between a geographical map and a nursing theory (described in 7.4.3). This direct analogy aids comprehension, analytical thinking, synthesis and reflective thinking.

Symbolic analogies can be used in nursing education to indicate both the positive and negative aspects of concepts, medications or patient situations. Gordon's *life-saving destroyer* can be used to explain the functions of chemotherapy. It kills cancer cells thereby saving the patient from immediate loss of life, but it also destroys normal tissue.

Gordon's example of *safe-attack* can be used to describe cardio-pulmonary resuscitation. While carrying out this emergency procedure the purpose is to save the patient's life but the procedure of cardiac massage necessitates physical strength and when viewed from a distance, might look like an attack. This analogy emphasises the importance of doing cardiac massage properly.

Fantasy analogy can be used by imagining how a hospital ward for caring of the terminally ill should be organised - equipment, decor, atmosphere, nursing support -in order to make it an ideal place in which such patients can spend the last moments of their lives. This exercise will stretch the imagination and stimulate thought beyond the ordinary, past the constraints layed down by the burocracy of hospitals, to produce a new and refreshing perspective.

The use of synectics in nursing education makes the learning material much more interesting, aids comprehension and stimulates productive thinking as students have to integrate, analyse, synthesise and evaluate information.

7.5.4 Relation to creativity

The most outstanding feature of synectics is that it leads the individual into an illogical world in order to gain new perspectives. It allows the preconscious psychological mechanisms to come forward which is regarded as one of the major reasons why synectics can lead to the production of original ideas. The neo-psychoanalysts propose that true creativity is only possible when the ego can draw ideas from the preconscious - the preconscious is more free to form new associations (discussed in 2.5.4). Both Freud and Jung refer to the unconscious/subconscious as encompassing a wealth of experiences and memories. According to Freud it involves everything the individual has experienced since conception, whereas Jung states that is concludes memories that go back to the individual's forefathers (Prince 1971:31) (discussed in 2.3.4).

Synectics is an experiential learning activity which draws heavily on previous knowledge and enhances whole brain learning. It stimulates the visual, intuitive and holistic processes of the D-quadrant together with the emotional and kinaesthetic processes of the C-quadrant. After utilisation of the right brain processes, synectics returns to left brain processes when analysis and logical thought (A-quadrant processes) and detailed and sequential thought (C-quadrant processes) are used to finally clarify the concepts for which analogies were sought (see figure 3.2).

7.6 VISUALISATION: IMAGERY AND FANTASY

7.6.1 Description

Visualisation or visual imagery, refers to the ability to recall and construct visual images within the mind. It can be defined as seeing with the mind's eye. Visualisation includes imagination, memory images, dreams, visions and fantasies. It involves the use of all the sensory modalities: seeing, hearing, smelling and feeling.

Many of our ideas are transformed into images. Imagination may contain elements of past perceptions, arranged in a different way than perceived, or may be made up of newly created material. Fantasy, is the ability to generate and manipulate mental imagery. Williams (1983:116) describes fantasy as *the door to our inner world, that magical realm where the imagination creates its own realities unfettered by the limitations we encounter in the outer world.*

Imagery plays an extremely important role in creative thinking. Torrance (1979:126) regards the ability to visualise objects, concepts, systems and processes as an essential component of successful creative work in musical composition, writing, scientific discovery and mechanical invention. Khatena (1984) affirms Torrance's view when referring to creative imagination as the source material of musicians, writers, poets, scientists and mathematicians (Sisk 1987:296).

Kim (1990:33) views images as central to creative ideation as inspirations occur mostly in pictorial form, and cites the example of Poincarè's *sensual imagery* which lead him to sense a mathematical proof in its entirety *at a glance.*

It has been reported in the literature that Mozart could hear a whole new symphony all at once, and that words did not seem to play a part in Einstein's thinking, but that visualisation and imagery took over. Samuels and Samuels (1977:250) quote from a letter Mozart wrote in 1789:

> *When I am, as it were, completely myself, ... - say, travelling in a carriage, or walking after a good meal, or during the night when I cannot sleep; ... my ideas flow best and most abundantly ... My subject (music) enlarges itself, ... and the whole, though it be long, stands almost complete and finished in my mind, so that I can survey it, like a fine picture or a beautiful statue, at a glance. Nor do I hear in my imagination the parts successively, but I hear them, as it were, all at once.*

Visualisation is regarded as a very effective strategy for problem-solving. To move from a verbal statement of an idea to a visual representation requires thinking about the idea in a new way to discover new possibilities. According to Parnes in Torrance (1979:130), many individuals experience a blockage in thinking about creative solutions because they are not able to visualise an object as having more than one function. Imagery is thus seen as a superior mode of mentation as it allows the individual to consider more ideas and the opportunity to progress more.

Kim (1990:34-35) regards imagery as a critical component of thinking as pictures assist in the initial exploration of ideas and in the communication of ideas to others.

Torrance (1979:138) states that disciplined approaches to creative problem-solving make deliberate use of fantasy because it provides an inexhaustible supply of analogies which are useful in stating and solving problems.

7.6.1.1 Visualisation techniques

Amongst the several visualisation techniques described in the literature, guided imagery/fantasy and identification fantasy seem to be the most valuable for educational purposes. The others are used during meditation.

Williams (1983:116-118) has documented that disciplines like engineering and medicine use fantasy in their planning of space colonisation, organ transplants and unconventional healing methods such as laser therapy. Fantasy is also used to think through the logistic problems of organ rejection and other catastrophic events. The deliberate use of fantasy proves to be an effective approach to creative problem-solving. Fantasy is a valuable teaching and thinking tool. It stimulates involvement in the teaching-learning situation, increases motivation, offers new ways of remembering and facilitates a *gut-level* of understanding that goes beyond the verbal presentation of a lecture.

7.6.1.1.1 Relaxation exercise

The first step in learning how to improve the ability to visualise, is to achieve a state of relaxation. A comfortable and quiet place must be selected and extraneous stimuli kept to a minimum. According to Williams (1983:121), the verbalisation of the left hemisphere must be shut off in order for the right hemisphere to be heard. When the outside world recedes, the inner world surges forth, presenting itself in the form of visualisations (Samuels & Samuels 1977:143).

Guided relaxation fantasy aims to encourage relaxation and gives the right hemisphere the opportunity to take over.

Example: Guided relaxation exercise

> *First get your body in a comfortable position, one in which you can relax easily. ... Now close your eyes. ... Become aware of your breathing. ... Don't do anything about it, just be aware of how the air moves in and out. ... Allow the air to move deep into your abdomen but don't force it. ... Become aware of your feet. ... Allow them to relax and feel warm and heavy. ... Let that relaxed, warm heaviness spread up your legs ... through your knees ... your thighs ... and into your body. ... Imagine the relaxation spreading through your body ... filling your stomach ... chest ... back ... shoulders. ... Let your arms relax ... your hands. ... Now feel your neck relaxing, becoming soft and warm. ... Finally, let your face relax. ... Let your jaw become loose and easy. ... Feel your lips relax ... your cheeks ... your eyes ... your forehead ... and your scalp. ... Continue to be aware of your breathing and take a moment or two to enjoy the way your body feels before we begin our fantasy journey.*
>
> (Williams 1983:121)

7.6.1.1.2 Observer fantasy

An observer fantasy generates inner sensory imagery. It may be used to introduce new material, to visualise the ideal solution to a problem, to visualise settings for community studies or to provide stimulus material for creative writing. An example of an observer fantasy which lead to a great invention in science, is Einstein's fantasy about himself riding a ray of light - he discovered the theory of relativity through this observer fantasy (Williams 1983:117).

Example: Guided observer fantasy

This is a guided observer fantasy. Its aim is to

- introduce new material
- stimulate awareness of all the senses to aid retention
- increase the student's understanding of the patho-physiology of diabetes mellitus

Guide students through a relaxation exercise and then start the fantasy with the following:

> *Imagine that you are shrinking ... allow yourself to become so tiny that you can fit into the pancreas of the human body. You are now the size of a body cell and are travelling through the acinar cells of the pancreas. Look at the purple-pinkish colour of the inside of the pancreas, and feel the moist softness of the cells around you. Slowly you drift to areas of the pancreas where the islets of Langerhans lie motionless like spotted islands amidst the dark purple blue sea of pancreatic acini - the dark purple blue is caused by the more prominent nuclei of the acinar cells. You drift silently closer to one of the islets and gradually become aware of the slow movement of the darker alpha cells and listen to the soft murmur of the lighter coloured beta cells as they secrete insulin in order to increase the*

rate of glucose transfer through the cellular membranes of the cells of the body organs. Suddenly a far off rumbling is heard and you become aware of an odour of sweet apples surrounding you. As you look around you with the rumbling sound getting louder and louder until you feel as though your eardrums are going to explode any moment, you see an over-whelming tide of glucose rolling towards you, and within an instant ... it floods the whole islet of Langerhans where you are struggling for breath as you try to raise your head above the tide ... (the researcher's example)

This guided observer fantasy stimulates kinaesthetic awareness and imagery. It provides aesthetic elements and takes the learner to a make-believe world where the irrational is combined with the rational - the latter being represented by the factual information given.

7.6.1.1.3 Identification fantasy (personal analogy)

Identification fantasy produces kinaesthetic experience and emotional response. It generates inner sensory imagery and can be used to develop an understanding of difficult concepts and course material (Williams 1983:118).

Example: Guided identification fantasy

This guided identification fantasy aims to

- assist the student in developing empathy with a patient
- assist the student to render holistic patient care
- enhance the student's understanding of the anxiety patients experience when connected to a respirator

The students should be guided through a relaxation exercise before proceeding with the fantasy (the researcher's example):

I am drifting, as if on a cloud ... I hear that sound again ... ssslh ... puff, ssslh ... puff ... and in between ... bleep ... bleep ... What is that? Sometimes I hear voices, softly muttering, but I cannot understand what they say ... and in between is that mixture of sounds always present. It is so dark, I wonder where I am? What is that smell? ... the odour reminds me of disinfectants ... it is not totally familiar, though. As the sound increases in volume, I become aware of my own body ... I try to move my fingers ... I can move them! ... but I cannot lift my arm ... it is too heavy. I try to move my toes, yes, they can move! My chest feels as if a huge rock is resting on it and I feel a numb pain in my throat. I try to move my eyes, to open them ... the light is very bright ... I strain my eyes against the light ... it takes some time, and then I recognise the white ceiling above me, the white walls, I see the end of a bed ... my bed? ...I am lying on that bed! There's a huge machine standing next to my bed ... this is where that sound comes from. I look at the translucent corrugated pipes, two of them coming from the machine, reaching up to my throat ... Suddenly it dawns on me ... I am connected to that machine! I am in a hospital! An ice cold iron hand grips my chest, crushing my heart as though it wants to wring all life from me ... I feel my heart protesting, beating faster and faster, and I hear that beep ... beep ... sound accelerating. I feel the cold dampness of perspiration, running from my forehead, even my hands and my feet feel damp. I am scared ... I am petrified! Why is this machine connected to me? Why do I have that crushing heaviness on my chest? What if that machine suddenly stops? Am I going to die? I try to call for help ... but there's no sound coming from my lips ... I cannot even call for help!

The abovementioned example focuses on the affective experiences of a critically ill patient who is connected to an electro cardiogram (ECG) monitor and a respirator via a tracheostomy. A patient in this state needs a lot of psychological support and technically skilled care which should be provided by a nurse having a sound scientific

knowledge base. Patients can sense if a nurse is unsure of herself and this adds to their anxiety. This learning activity aims at leading the student towards emphatic understanding by providing her/him with the opportunity of becoming the patient through personalisation.

7.6.2 Advantages and limitations

Visualisation is a basic way of obtaining, processing and representing information. It improves reading comprehension, aids memory, increases understanding, and stimulates creativity. Visual thinking is a powerful tool which enables students to become more efficient learners. As most information is unobservable, visualisation through mental images is essential to bring complex phenomena into the students' grasp. Fantasy can be used to translate verbally presented material into images, making the information more accessible and comprehensible to students (Bradley-Springer 1993:7; Williams 1983:32, 92).

Imagination plays a part in the thinking of all subjects. It enables students to combine previously unrelated ideas and to produce something new. Students can use visualisation in social relations to help them understand themselves and others, to overcome stress, and to focus their attention. If lecturers use and explore visual imagery they can assist their students to develop a growing consciousness and to refine the skill of visualisation in order to access total brain power (Sisk 1987:300).

The use of visualisation techniques in education needs a lot of practice from the part of the teacher as well as from the students, and can be time-consuming.

7.6.3 Application to nursing education

The nursing curriculum offers a wide variety of subjects and problem situations in which the application of visualisation techniques can be used with success.

Greer and Levine (1991:252-253) report on a study in which the conjunctive use of fantasy and intrinsic motivation enhanced creative writing performance - in this case, Haiku-style poetry. Fantasy was induced through guided imagery - students were asked to close their eyes, relax, and experience a fantasy about *snow* (the fantasy was designed to elicit visual and kinaesthetic responses). Afterwards, they were asked to write a Haiku poem on *snow*. This poem was compared to a Haiku poem they had previously written without the aid of guided fantasy on *laughter*. Intrinsic motivation was induced by asking the students to select from a list, the reasons why they enjoyed writing. This seemed to increase subjective motivation. The authors found that the Haiku poem on *snow* was the better one and it was written in a more creative style through the use of evocative language.

The above example shows how fantasy can aid creative thinking as it provides direct contact with an object or situation and enables awareness of all the senses. By experiencing a situation (although only in the mind), much more detail can be gathered. This leads to different views and increased knowledge and insight. The student obtains much more information in her/his mind which can enable her/him to deliver a better product.

A study conducted by Speck (1990:346) showed reduced anxiety levels in first year students learning to perform injections after they had been exposed to guided imagery. The experimental group in this research study received guided imagery instruction by using an audio cassette tape. This included relaxation, focusing on the topic, and imaging the procedure. The students were guided to use their senses, eg smelling the alcohol swab, feeling the patient's skin when checking for landmarks, and visualising successful completion of the procedure. The control group who did not receive the guided imagery, but was subjected to the same amount of practising in the clinical laboratory as the experimental group, revealed, on testing, a much higher level of anxiety when they had to perform their first injection on a real patient.

Speck's example reinforces the belief that guided imagery provides relaxation and

reduces anxiety directly. Guided imagery can be used in this way to prepare students for many highly stressful situations in nursing practice. For example, students can be taken on a guided imagery about how they will handle the situation in their ward when a patient suffers a heart arrest or develops pulmonary embolism. Going through the whole procedure, such as the clinical manifestations and emergency treatment, in their minds will prepare them to have more confidence and knowledge of how to handle the situation effectively when it occurs in reality.

According to Bradley-Springer (1993:7), guided imagery stimulates personalisation, which serves two creative purposes, namely encouraging student relaxation, and allowing students to visualise and focus on the selected problem. The author used it as an innovative teaching strategy to teach student nurses about Alzheimer's disease. Her objectives were to increase student understanding of the disease, empathy and retention. She took the role of an old lady suffering from Alzheimer's disease, and *wrote letters to her son* during the course of her illness. *Letters to Henry* describe the symptomatology, physical and psychological deterioration, the way that the patient personally experiences the disease, and the deterioration of social and family relations as the disease progresses. These letters were read to her students. The results of this example of guided imagery showed the development of increased insight, empathy, retention, and critical thinking skills through personalised reflections.

Through the above teaching strategy Bradley-Springer managed to provide her students with a very valuable learning experience. The aesthetic and emotional quality, elaboration and synthesis of detail, and holistic picture that were portrayed in the letters, will ensure that her students never forget the extent of this disease.

Leytham (1990:179) used a guided fantasy exercise to enable her students to recognise another person's dilemma and have empathy with, and a better understanding of the other's situation. *In this exercise, the students and a fictitious (imagined) person, against whom the students bore a grudge, were shipwrecked on an island. All managed to swim*

safely to the shore where the person found himself in a situation in which he was completely at the mercy of the students. They had total control over him by means of a magic power spell. Leytham prompted the students to subject the person to any kind of hardship and deprivation they wanted to and for as long as they wished. When he had reached a state of total helplessness, however, Leytham asked the students to cast off the spell, to change their feelings towards the person to those of tenderness and acceptance of the good and the bad in his character, and to treat him as a fellow human-being.

After the exercise the students' feelings were explored. They all admitted that they now felt sorry for the person against whom they had previously borne a grudge.

Examples such as this guided fantasy exercise, will assist student nurses to improve interpersonal relationships with peers, seniors, patients and other members of the health team. This will contribute towards a more positive psychological climate in a hospital which will also be of benefit to the patients.

7.6.4 Relation to creativity

Visualisation in the form of imagery and fantasy is essentially a right brain process. According to Wenger in Parnes (1992:254), the main language of the right cerebral hemisphere is one of sensory images and impressions.

Visualisation provides a new perspective on a problem through involvement of all the senses. Flexibility, redefinition of a problem, synthesis and elaboration are some of the abilities of creativity which are developed during imagery and fantasy. Individuals do not see incomplete pictures in their minds; imagery and fantasy are always rich in detail and colour. The departure from the rational and logical, presents openness and a total freedom, which is not possible in the real world.

Visualisation stimulates the D-quadrant processes of imagination and synthesis as well as the emotional and kinaesthetic processes of the C-quadrant. It provides the student with a much richer experiential learning activity and, although right brain processes are emphasised, students use analysis, detail and organisation (which are left brain processes) to serve as the basis for their imagery and fantasies (see figure 3.2). Visualisation is an excellent teaching strategy for teaching the affective domain.

7.7 HUMOUR AS A TEACHING STRATEGY

7.7.1 Description

Much has been written about the use of humour in education. Humour is reported to relax individuals and reduce stress and anxiety, which leaves individuals more open to learning. As humour and laughter have specific physiological effects on the human body such as muscle relaxation, stimulation of the circulatory system and an increased production of endorphins, the result is a direct reduction of stress and anxiety and an improvement in cognitive retention and task performance. Svebak (1982) in Parrott (1994:36) states that laughter stimulates both hemispheres of the brain simultaneously, coordinating all the senses. This produces a unique level of consciousness and a high level of functioning (Robbins 1994:39).

The essence of humour can be identified as the juxtaposition of incongruous elements. Humour is a quality which appeals to a sense of the absurdly incongruous. Wit, as a manifestation of humour, can be described as swift perception especially of the incongruous (Kim 1990:93). Parnes (1981:33) views creativity and humour as closely related because both rely on appropriate absurdity and contain some *opposing* elements. He describes humour as the mating of playfulness and seriousness; fantasy and reality; nonsense and purpose; the irrational and the rational. Humour depends largely on being able to see something in more than the obvious, expected way. One of the abilities of creativity is to see something in a different way, away from the obvious (discussed in

2.5.1.1). The characteristic of opposing elements found in humour is a phenomenon which has also been described in creative people - the dichotomy of personality traits (see 2.5.2.1).

Kim (1990:101) views the factors of creativity as permeating all forms of humour and summarises these factors as follows:

- The purpose of a humorous situation is to elicit an emotional response.
- The diversity factor in humour involves the fusion of two or more objects not normally associated with each other.
- Fusion involves identification of relationships which tie the objects through a unifying theme.
- Humour evokes striking images.
- A comic situation must be externalised.

Kim's explanation elicits the emotional involvement, divergent thinking, synthesis, visual images and externalisation aspects of creativity. It also implies the presence of psychological openness and penetration which is essential to recognise a humorous situation.

Parrott (1994:36) views a humorous outlook as characterised by flexibility, spontaneity, unconventionality, shrewdness, playfulness and humility. It is viewed as a necessary tool in order to maintain some semblance of sanity in an often sobering and bizarre setting. Nursing practice frequently demands having to deal with seriously ill patients under stressful circumstances brought about by inadequate staffing and ill-equipped facilities because of curtailment in health finances.

Humour can be a planned teaching strategy, a spontaneous event that helps to explain a concept or principle, or it can be part of a planned teaching strategy.

Humour can be introduced into the teaching-learning situation by way of role play, simulation, stories, comic strips, cartoons or problem-solving.

7.7.2 Advantages and limitations

Zellman and Bryant (1983) in Robbins (1994:39) propose that relevant and well-integrated humour leads to superior retention of information, enhances student-lecturer rapport and makes learning an enjoyable experience.

Humour has a positive influence on cognitive as well as affective learning. Parrott (1994:37) reports that the advantages of humour include increased attention, interest, comprehension, retention and motivation. Humour enhances the generation of ideas, divergent thinking, creativity and productivity because of the playful and enjoyable learning environment it creates. The affective advantages of humour as a teaching strategy include the improvement of relationships, the establishment of a feeling of connectedness which leads to mutual trust, a sense of freedom, decreased anxiety, positive attitudes, and a positive self-image. Humour opens communication lines, crosses social and cultural barriers, assists in dealing with awkward problems and may help to solve problems by way of the different perspectives it offers. It also helps to reduce boredom and class-monotony (Leidy 1992:206; Parrott 1994:36-37; Robbins 1994:39).

Watson (1988:89) explains that when humour is part of the teaching strategy, communication between the lecturer and students is characterised by freedom and psychological openness which sets a tone that allows human error and encourages freedom to explore alternatives. The authoritarian position of the teacher is reduced and fear and anxiety become less of a threat. Students become more relaxed and more open

to learning as well as more flexible in their attitudes.

When humour is used as a teaching strategy, however, the humour must be relevant to the subject and care should be taken against the pitfalls of humour namely, sarcasm, ridicule, and racist or ethnic jokes (Robbins 1994:39).

7.7.3 Application to nursing education

Nursing is an extremely challenging, highly stressful, but rewarding profession. Nurse practitioners have to deal with people at their very best and worst. Student nurses must deal with many emotional situations - humour will help them to handle it better. Both Parrott (1994:36) and Robbins (1994:40) regard humour as a coping and management tool in stressful situations.

An example of using cartoons as an additional strategy to include humour in teaching, is given by Robbins (1994:39). The author commented on the usefulness of placing cartoons pertaining to health care, next to appropriate subject content. The aim was to attract students' interest and create a playful and pleasant atmosphere in order to aid learning and retention. Students reported that they enjoyed the learning experience more and had a better student-teacher rapport, and that it improved their understanding of some of the content.

Schuster (1987:18) reports on the use of the well-known Garfield comic strips to counteract waning student interest in learning thyroid disfunction. Garfield seems to typify both hyper- and hypothyroidism. The lecture room was filled with stuffed animals, balloons, pencils and posters representing Garfield. Garfield aided in retention of content, understanding and motivation.

Parrott (1994:3) refers to the example of pinning comic strips which depict life but poke fun at it, on bulletin boards. Examples of these are the *love is* ... series, Dennis the

Menace, Garfield, and the Pink Panther. The aim is to emphasise particular issues and reduce anxiety over certain topics, for example, aging, dieting, adapting to change or death. The bulletin board must be changed with the introduction of each new content theme. Students who were subjected to this learning experience reported that they found the bulletin boards humorous and interesting and that it was a key teaching instrument for retention of specific content.

These examples illustrate the pleasant, playful and relaxed influence that humour has on the teaching-learning environment, and the resulting increase in student interest and motivation. As cartoons and comic strips also convey a visual message, they contribute towards retention, understanding and insight through the added perspectives given by visualisation.

Parrott (1994:37-38) describes the use of humour in a role play with the aim of aiding retention, motivation, increasing understanding and inducing a relaxed and pleasant atmosphere. The teacher, another faculty member or a student visits the medical nursing class as the character, *Granny Grits*, to help present content on aging. *Granny Grits* offers her 86 years of wisdom, experience, philosophy and wit in a realistic, humorous manner without being demeaning to the elderly. Tugging at her dress to make herself more decent, sniffing, chewing tobacco, coughing, rocking and pill rolling, she listens, interjects comments and tells stories. Included in the presentation of the content is assessment, history taking, treatment and a description of medicare benefits. Parrott reports that she has used this example with several classes and that students always enjoy and remember it as a special learning experience.

Robbins (1994:40) gives a few examples on the use of humour to enhance learning in the clinical laboratory. Her aim is to motivate students to aid retention and comprehension, and to provide a pleasant and fun-atmosphere in the clinical laboratory. She regards exaggeration as an excellent form of humour, as illustrated in the following two examples:

- A 50 ml syringe with a six inch spinal needle is used to introduce students to parenteral administration.

- A demonstration is given whereby a size 24 Foley catheter is used to catherise a female mannequin.

The absurdity and inappropriateness of the equipment reinforces the students' understanding of why selecting the correct size is important. Through visualisation, not only the funny side of mistakes, but also the danger it might hold for the patient, is permanently imprinted on their minds. This is one example of the opposing elements (eg absurdity versus reality) present in a humorous situation as explained by Parnes (1981) (see 7.7.1).

7.7.4 Relation to creativity

The use of humour as a teaching strategy develops flexibility, psychological openness, penetration and synthesis (see 2.5.1.1). New connections are formed as students have to look deeper for understanding and learn to view problems from different perspectives.

Humour provides a pleasant, playful and relaxed atmosphere - the type of atmosphere conducive to the fostering of creativity as it is also characterised by openness, mutual acceptance and spontaneity (see 2.5.2.2.2).

The use of humour in teaching, facilitates experential and cooperative learning and focuses on reflective thinking. These aspects have all been related to creative learning (see 5.6).

Humour is a combination of cognitive and affective skills as it requires the sterner processes of the left brain (facts, detail, organisation) as well as the visual and emotional processes of the right brain (see figure 3.2).

7.8 WRITING AS AN INNOVATIVE TEACHING STRATEGY

7.8.1 Description

Recent research studies indicate writing as a powerful tool for students to master the intellectual content of their courses. Students gain information and conceptual insights through writing as it is an active mode of learning which facilitates active inquiry and forces students to take responsibility for their own learning. *To understand something is to express it in one's own words!* (Lantz & Meyers 1996:64).

Various authors suggest the use of free writing as a means of encouraging creative analysis, synthesis and problem-solving. Writing assists students in discovering new relationships through exploration of content. It increases understanding; enhances thinking and personal growth; and develops higher-order conceptual skills, such as problem-solving and reflective thinking (Bradley-Springer 1993:9; Klaassens 1988:17).

Rosenthal and Sauer (1985:384-385) distinguish three different styles of writing:

(1) **Expressive writing** is a relaxed and personal style of writing which enables the writer to examine his/her thoughts and feelings. Examples in nursing education include diaries and logs about clinical experiences. Nurse educators read these in order to detect problems which students experience during clinical practice.

(2) **Transactional writing** is written for a specific audience. It conveys factual information with the aim of explaining and reporting. Examples include ward reports and patient reports.

(3) **Poetic writing** is a form of art which uses both cognitive and creative processes. It challenges students to combine theories and facts with feelings and rhythm. Examples of poetic writing include poetry, songs, metaphors and parables.

Poetic writing involves evocative language. The vocabulary is connotative and associative, highly sensual, less precise (because it involves the rich, associative imagery of poetry) and ambiguous in nature. For example, the poet Robert Burns, uses evocative language when he writes: *My love is like a red, red, rose ...* Burns is not concerned with the exact colour of this rose, and he uses the word *red* repeatedly to evoke an image and a set of associations. The meaning of these words will be slightly different for each listener, as this type of language cultivates ambiguity, suggesting (not stating) and working on the listener's subjective experience (Williams 1983: 32, 33).

Expressive and transactional writing depend mostly on left brain processes as specific and detailed information, ordered in a logical form, is written down. The right brain processes which include feelings, holistic and visual thinking, are used to a lesser extent. Transactional writing requires precise and denotative language and prizes clarity - this refers to left brain processes. Poetic writing depends on both left and right brain processes because it combines factual information with feelings. The right brain processes are, however, more important as imagery and evocative language are essential ingredients.

Student nurses need to acquire writing skills to enable them to accomplish a variety of required nursing tasks. These include documentation, referrals, reports, communications, research and publications (Bradley-Springer 1993:9). The writing styles required for these tasks, however, are expressive and transactional writing. If poetic writing is encouraged in nursing education, it will lead to the development of productive learning and creative thinking. Poetic writing increases memorisation and understanding of subject content, and stimulates the development of affective skills such as empathy, compassion and caring.

Lantz and Meyers (1986:64) state that the act of writing promotes the kinds of creative and critical thinking skills required of professional nurses. They quote Slaninka (1981) to illustrate their viewpoint: *Within the nursing profession, underdeveloped writing skills*

are of particular concern because of the extensive demands placed on the professional nurse.

7.8.2 Advantages and limitations

When writing is applied as an innovative teaching strategy, students develop both cognitive and affective skills. Writing aids explorative and discovery learning, memorisation, insight and understanding. It develops reflective, critical, analytical and problem-solving skills (Bradley-Springer 1993:9; Klaassens 1988:17).

Writing involves students emotionally, enhances aesthetic knowledge and assists personal and professional growth.

The only limitation of writing as a teaching strategy is that it is time consuming.

7.8.3 Application to nursing education

According to Bradley-Springer (1992:5), the nursing revolution has called for commitment to methods that incorporate holistic and phenomenologic principles into the planning and implementation of learning experiences for student nurses. Phenomenology uses reflection and introspection to discover meanings in human experience. The writing of diaries and clinical logs, as well as the writing of poems related to patient conditions, presents a holistic view of a situation and develops reflective, critical, analytic and creative thinking, which leads to the discovery of new insights.

An example of using writing as a learning experience to discover the true meaning in human experience and thereby enhancing aesthetic knowledge, is given by Smith (1992:54). Students were asked to record in writing the details of a caring experience which they had undergone during their clinical nursing practice. After Smith had read each students' story, they were asked to elaborate in writing on particular issues. On

reading these Smith identified several universal themes and elements describing a caring presence, and gave a list of them to each student. A group discussion was held which, through sharing each other's experiences, views, feelings and perceptions enhanced the students' understanding of a caring presence. After the interpretive discussion, Smith read several of the stories to the group as a means of assisting the students to expand their views on the meaning of a caring presence. By reflecting on nursing practice, the students became emotionally involved by recalling their experiences - warmth, love, joy and fulfilment were mentioned and they became aware of the explicit and tacit meanings associated with a caring presence; it enhanced their aesthetic knowledge.

This is an example of an expressive writing exercise which went through the processes of analysis, synthesis and elaboration. Students were presented with an opportunity for active and cooperative learning, reflective thinking and emotional involvement. At the end of the teaching session they had an extended knowledge and understanding of a caring presence as compared to when they first wrote about their individual experiences.

Bradley-Springer (1992:5, 8-9) gives another example of using expressive writing to improve writing skills and to enhance empathy and caring among student nurses. Students were required to select any health care problem listed in their course syllabus and to bring information about the symptomatology and treatment of the problem to class. In order to establish evaluation criteria, an evaluation form, based on a creative product semantic scale by Besemer, was presented to each of the students before they started their writing assignment on the selected problem (see figure 7.3). The next step was for them to personalise their health care problem. Guided imagery was used to stimulate personalisation. They were subjected to a guided relaxation exercise followed by an identification fantasy: *Relax, take deep breaths, ... close your eyes ... be calm ... center on some point inside of yourself ... now think of the health care problem you've selected ... think of people who have this problem. How are they similar? How are they different? ... What if you were living with the problem? How would you feel?*

Figure 7.3

Abbreviated formative evaluation form for expressive writing

If you have to write a paper on a specific health care problem, how would you like the end product to be evaluated on the following scale:

The paper is:

5	4	3	2	1

exciting	**dull**
novel	**predictable**
original	**done before**
valuable	**worthless**
accurate	**inaccurate**
useful	**useless**
organised	**disorganised**
harmonious	**jarring**
clear	**ambiguous**
interesting	**boring**

(Abbreviated from Bradley-Springer 1992:8)

What would you do? (Bradley-Springer 1992:7, 8). As a last step before commencing their writing assignment, an example of a creative paper on HIV infection was read to them in order to give them a good idea of what was expected from them. The students' writing assignments were subjected to self-evaluation and peer evaluation according to the mentioned evaluation form, after which they had a two-week period in which to complete their final papers. The result was that the students gained insight, empathy and critical thinking skills through personalised reflections.

The combination of expressive writing and guided imagery which was used in the latter example, enhanced active and cooperative learning, affective learning and reflective thinking. It provided the students with the opportunity for personal development through the freedom of expressing themselves in writing, and for professional development because of the experiential and cooperative nature of the learning experience.

An illustration of poetic writing is elicited in an example described by Schuster (1994:95). Haiku was used as a creative way for students to express their perceptions and feelings about aging while covering the gerontology content of the nursing curriculum. According to Higginson (1985), author of the Haiku Handbook, the central act of Haiku is to let an object or event touch us and then to share the event with another (Schuster 1994:96).

Haiku generally comprises three lines containing five, seven and five syllables respectively. The following are examples of students' Haiku:

Let me drift away
Let my soul float to heaven
Let me die in peace

Reliving the past
The older man thrived on it

It kept him going

(Schuster 1994:95)

The Haiku was the result of students' reflection on their own and others' feelings and perceptions about aging. It enhanced their understanding and empathy and stimulated productive thinking, as new knowledge and insights were gained. Haiku is a way of developing students' creative potential as it draws on right brain processes: feelings, emotions, holism, synthesis, and aesthetics. Affective learning, reflective thinking and cooperative learning were facilitated when students read and discussed their Haiku poems in class. They became aware of others' perspectives and emotions and had the opportunity to share self-discovered knowledge.

Ishida *et al* (1994:164) suggest that students write down significant learning experiences which affect nursing practice, by way of weekly journal entries. Categories can be established such as: things did not go as planned/was particularly demanding/captures what nursing is all about, etc. This will increase students' understanding of events as they write about their thoughts and feelings, the demands of the situation, satisfactory experiences and a changed outlook for the future.

In order to increase poetic writing skills, students can be asked to write a parable illustrating the emotional experience of a patient suffering from AIDS/terminal cancer/cerebral vascular incident. A prerequisite for this assignment could be that they find a metaphor connected to the selected condition and analyse similarities and differences before they start writing. Metaphor can assist students to produce a more creative end product through the use of evocative language elicited by the comparison of two objects from totally different frames of reference. For example, the struggle of the AIDS or cancer patient can be compared to the fight between two kudu bulls - an encounter which often results in death when their horns become entangled.

In the same way, students can increase their expressive writing skills when asked to

write a story on subjects such as congestive cardiac disease/diabetes mellitus/chronic renal failure (illustrating clinical manifestations, emotional experience and social implications) by using imagery or identification fantasy to increase divergent and productive thinking.

7.8.4 Relation to creativity

When writing is used as a teaching strategy, it enhances analysis, evaluation, synthesis, and elaboration. These abilities are directly linked to creativity as they represent the higher cognitive skills in Bloom's taxonomy (see 4.3.1.1) and have been identified as abilities of creativity by Torrance (see 2.5.1.1).

Writing stimulates reflective thinking which aids problem-solving and leads towards productive learning. It combines the visual, imaginative and affective processes of the right brain with the analytical, logical and sequential processes of the left brain, thus engaging the student in whole brain creative learning (see figure 3.3).

7.9 ROLE PLAY

7.9.1 Description

Role play involves the spontaneous acting out of a problem situation by two or more participants. Learning occurs through active participation, reflection and immediate feedback. Role play is specifically directed at the affective domain and assists students to gain new perspectives about human relationships. This strategy forces the participant to think about the person whose role is assumed. A role play should be built upon carefully structured problems which are based on real-life situations (De Tornay & Thompson 1987:34; Mellish & Brink 1990:148).

Schoenly (1994:210) emphasises the need to set the right climate for role play as

responding to exercises regarding beliefs and values requires a level of risk-taking by the participants. An open, accepting attitude by the teacher and mutual respect, support and freedom are necessary to facilitate learning in the affective domain.

The stages of a role play involve selecting a problem situation or critical incident; writing a scenario; asking for volunteers to play the roles; briefing each participant on his/her role; acting out the scenario in a 5 to 15 minutes drama; participants providing feedback on their feelings; and observers evaluating the scenario. Debriefing is sometimes necessary in cases where students become too emotionally involved (Burnard 1989:22; Gustafson 1988:119).

Discussion of the role play focuses on interactions, feelings, emotions and attitudes observed and experienced. It is sometimes necessary to have two or more presentations of the same scenario to illustrate different points of view. Reversal of roles is also recommended to give students the opportunity to gain insight into another person's behaviour, and to gain a better understanding of how people interact (Gustafson 1988:119; Mellish & Brink 1990:148). According to Freitas, Lantz and Reed (1991:7), student nurses should particularly be involved in playing the role of the patient or family members in order to gain a better understanding of the patient's position and that of the family members.

7.9.2 Advantages and limitations

Role play is a very appropriate technique to teach the affective domain. It assists students in exploring feelings, attitudes and values. Students learn to express their own feelings and to accept those of other people. They gain insight into the values and behaviour of others which enhances their understanding of interpersonal relationships. Role play assists students in problem-solving and in resolving personal dilemmas and increases empathy as they get the opportunity to be in the other person's shoes. Lower-level (receiving and responding) and mid-level (valuing and organisation) affective

objectives are obtained through role play (see 4.3.1.2) (Burnard 1989:20; Gustafson 1988:118; Handfield-Jones *et al* 1993:5; Schoenly 1994:211).

Role play requires skilful preparation by the teacher and is time-consuming. There is a tendency to use it without paying cautious attention to the basic rules and, as it may embarrasses shy students, teachers should take extra care to debrief them after participation (Gustafson 1988:118).

7.9.3 Application to nursing education

Role play has always been a valuable teaching strategy in nursing education. However, since the evolving concept of nursing has been explored in the context of caring, the feelings, values and attitudes of nurses have become the focus of renewed attention. Watson (1988) encourages nurse educators to *attend to the education of the whole person and recognise that learning is subjective, contextual, dialogic, and values driven* (Schoenly 1994:209).

Chapman (1983:269, 270) proposes that most definitions of nursing emphasise that it is an interpersonal activity that focuses on understanding the patient as an individual. Such descriptions highlight not only the caring aspect but also the health maintenance aspect. The nurse-patient relationship is regarded as a vital factor in patient recovery. Role play is a very appropriate strategy to teach interpersonal skills, such as communicating, counselling and interviewing.

Example:

The following is an example of a role play focused on the affective domain, illustrating ability for and lack of interpersonal skills:

Scenario: Mrs Walker, a middle-aged lady is readmitted to the medical

ward with delirium tremens. She is well-known by the ward staff. She lives in a nearby hotel and spends most of her monthly allowance on alcohol. Her husband died of cancer and her only son was killed in an automobile accident at the age of twenty. Mrs Walker claims that she has nothing to live for and complains bitterly about nurse Smith, who treats her very disrespectfully. She confides in nurse Thompson who has always been very sympathetic towards her. It is a well-known fact amongst the nursing staff that nurse Smith's father died of pancreatitis, a direct result of his long-time abuse of alcohol. After having witnessed a conflict situation between Mrs Walker and nurse Smith, nurse Thompson decides to confront nurse Smith on the issue (Schoenly 1994:212).

This role play can be acted out two or three times, each time with different students acting out the three roles. The following objectives could be obtained:

- exploration of other people's feelings
- identification of other people's values
- development of empathy through increased understanding of the possible reasons for other people's behaviour
- realising the extent of a nurse's behaviour on a patient
- gaining different perspectives on a problem
- discovering the importance of maintaining good interpersonal relationships with patients

7.9.4 Relation to creativity

Role play is essentially an affective and problem-solving strategy. It provides students with self-discovered knowledge about the feelings, emotions and reasons behind the behaviour of others. Students need to display psychological openness, flexibility, fluency, and divergent thinking in order to play the roles of others. Penetration of the

problem, analysis and synthesis take place and students' perceptions change, when they view the problem from the other person's perspective.

Role play combines visual, imaginative and intuitive thinking (D-quadrant) with emotions and feelings (C-quadrant) and although it necessitates analytical (A-quadrant) and sequential (B-quadrant) thinking, it relies heavily on the irrational (referring to C-quadrant processes). The emphasis is therefore on right brain processes. Role play stimulates the development of the affective domain (discussed in 4.3.1.2) which plays an important role in creativity as cited by various researchers. The thinking and feeling processes which can be developed by role play are on the second level of Treffinger's creative learning model (see figure 4.5).

Role play provides active participation, cooperative learning, and reflective thinking and is experiential in nature. These aspects contribute towards creative learning (see 5.6).

7.10 SOCIODRAMA (PSYCHODRAMA)

7.10.1 Description

The terms psychodrama and sociodrama have been interchangeably used in the literature. Sociodrama is a variant of role play, originally developed by Moreno (1946), and since adapted by Torrance and others. According to Torrance (1975), role play provides one with the opportunity to shed the inhibitions which stifle the production of alternative solutions. It gives a person a license to think, say and do things he/she would not otherwise do (Dacey 1989: 127-128).

Sociodrama is a group problem-solving process. It involves the re-enactment of a real life situation lived by one or more of the group members, or acting out an imagery situation with the aim of solving a group or social problem. Sociodrama has an imaginative side to it, and can be used to solve future as well as present-day problems

and conflicts (Burnard 1969:23; Dacey 1989:127).

As an experiential teaching strategy, sociodrama assists in the development of affective skills. It develops emotional competence, intuition and sensory awareness. It provides a deeper understanding of the dynamics of human interaction and probes into the reasons behind individual behaviour patterns.

The stages of sociodrama are similar to those of standard role play and other group problem-solving methods. The teacher or leader of the group has to guide the sociodrama in an objective way and may provide music, decorations, or other mood-setting techniques to create the correct atmosphere. Sociodrama includes the following stages:

(1) *Defining the problem.* The teacher or leader of the group guides the discussion towards defining the problem that will be the topic of the sociodrama. All responses are accepted and no judgements are allowed.

(2) *Establishing a conflict situation.* The group must agree on a clear statement of the problem or conflict situation, based on the various initial responses. Judgement should be deferred and no direction for resolution should be given.

(3) *Casting of characters.* This is a sensitive stage. Participation should be voluntary but the teacher should encourage experimentation. Different students should take turns to play the same role in order to evoke different viewpoints.

(4) *Briefing the characters.* The actors must discuss their roles and the setting, and ask observers to consider possible directions for the play. The observers can be asked to identify with different points of view.

(5) *Acting out the drama.* The skill and experience of the teacher is important as

he/she must employ a variety of production techniques to elicit constructive dialogue and possible solutions. Care must be taken not to direct the play towards a specific outcome and sensitivity to areas of conflict among the group must be shown.

(6) *Cutting the action.* The teacher has to stop the play when a successful resolution appears or when the actors become blocked or distressed. A new setting may be restructured to act on the same problem.

(7) *Discussing and analysing the results.* The group has to redefine the problem and state clearly the possible solutions which have arisen from the sociodrama.

(8) *Further testing and/or implementation of ideas for new behaviour.* Proposed solutions generated in the initial sociodrama session may be tested in new sessions or could be generalised to situations outside. Solutions are evaluated during this stage (Dacey 1989:128-129).

The following variations can be implemented during sociodrama in order to serve different purposes:

- **Soliloquy technique**. The aim of the soliloquy technique is to *open up* a problem in order to expose the hidden possibilities. It can be used directly after a conflict confrontation to bring the conflict out into the open and highlight it. According to Torrance (1976:169), problem and conflict situations usually encompass a great deal of hidden feelings and factual information which are often glossed over. Bringing out the hidden aspects of a problem into the open, frequently produces an immediate solution.

  During the soliloquy technique some of the actors are asked, especially after a heated exchange, to soliloquize their feelings and emotions about what just

happened in the play. This may bring out an original idea not mentioned during the dialogue of the play, or provide an opportunity for incubation which may elicit the forthcoming of new ideas when the play resumes (Dacey 1989:129).

- **Double technique**. During this technique an actor in a conflict situation is joined by another actor who takes on the role of his/her *other self*. The *other self* should try to spur the actor towards deeper levels of expanded consciousness (Dacey 1989:130).

- **Multiple double technique**. This involves more than two actors taking the same role while each plays a different mood or perspective. For example, one actor can play the *good* and another the *bad* side of a character in a conflict situation (Dacey 1989:130).

7.10.2 Advantages and limitations

Burnard (1969:23) regards sociodrama as useful to encourage the development of assertiveness and counselling skills, and to explore students' personal life problems. Gaze (1991:54) states that sociodrama can be integrated into all levels of nursing education in order to produce more perceptive and intuitive nurse practitioners. Student nurses gain greater individual awareness through the techniques of sociodrama and begin to see patients less as *objects*. Sociodrama provides student nurses with the opportunity to develop their intuitive sense, explore their emotional reactions to incidents in practice and, most importantly, to develop their ability to empathise with patients and relatives.

Muckle in Gaze (1991:54-55) views sociodrama as a teaching strategy that unlocks the creativity in nursing as it enables nurses to be more perceptive and open in the nurse-patient relationship, and leads to a deeper understanding of human behaviour.

Torrance believes that sociodrama can promote a holistic consciousness which arises from the right hemisphere of the brain. According to him, certain production techniques employed by the leader of the group can induce states of heightened awareness, rapture, regression, meditation, and reverie (Dacey 1989:129).

As sociodrama is a strategy which was originally developed for use in psychology, the teacher must be well-trained to use it and must take special care to derole students after emotionally traumatic sociodrama sessions. Although sociodrama can be time-consuming, the many advantages it holds for educating student nurses, outweighs its limitations.

7.10.3 Application to nursing education

According to Burnard (1969:23), sociodrama can be used to help in deciding when to refer patients to other health professionals and to provide opportunity for reflective thinking on working with dying patients and bereaved relatives.

Gaze (1991:54-55) reports on a few hospital schools and colleges in the United Kingdom that have integrated sociodrama and theatre workshops into all levels of nursing education. The topics which have been covered include re-enacting incidents from clinical practice, caring for elderly people, caring for HIV infected patients, coping with loss, managing challenging behaviours, looking at the emotional consequences of trauma and stress (as it affects both nurses and patients), and re-enacting true case studies. There are also a few private companies which use a range of dramatic techniques to act out incidents in clinical practice - they are contracted by the nursing schools to present drama sessions to the student nurses. Some of these companies allow student nurses to come up on stage to express feelings or needs which they feel the actors have not expressed.

As is evident in the literature, sociodrama can be used widely in nursing education. The

soliloquy technique can be used, for example, with ethical issues such as euthanasia. Nurse practitioners often find themselves in the situation where an unconscious patient is kept alive by a respirator. In cases of brain death the question is who is going to switch off the machine? Many different perspectives and emotions have to be considered - those of the family members, the nurse and the physician. Sociodrama can help students to view the issue from many perspectives and to explore the hidden emotions and influencing elements involved in this kind of situation.

The double technique is an excellent way for students to learn about the complicated psychological defects in psychiatric nursing. A student can, for example, have an interview with a *schizophrenic patient* with a third student playing the *other self* of the *schizophrenic patient*. This might help students to gain a better understanding of the schizophrenic's dilemma when he has to listen to the nurse while at the same time experiencing auditory hallucinations.

The multiple double technique can be used to teach students how to relate to difficult patients or health team members. Through exposure to the good and bad in other individuals and a variety of perspectives, students are lead towards a deeper understanding of human behaviour, empathy is developed and they become more skilful in effectively handling difficult patients or team members.

7.10.4 Relation to creativity

Sociodrama is a group problem-solving strategy, focused on experiential learning. It is strongly right brain oriented and develops particularly the affective skills. Sociodrama encourages the use of imagination and intuition (D-quadrant processes) to a greater extent than role play, by probing deeper into a problem/conflict situation to expose hidden feelings and facts. This often leads to an immediate and original solution. Penetration, openness and originality are abilities of creativity (see 2.5.1.1).

By using the double and multiple double techniques, sociodrama probes deeper into the complexity of human nature and thereby increases insight, understanding and empathy. Emotions and feelings (C-quadrant processes) are explored.

The levels of receiving, responding and organisation in Bloom's affective taxonomy (see 4.3.1.2) are developed by sociodrama.

The affective skills of awareness, openness to complex feelings and conflict, and imagery, which are developed by sociodrama, are on the second level of Treffinger's creative learning model (see figure 4.5).

The cognitive skills developed during sociodrama include analysis (of feelings and other's behaviour), reflective thinking, synthesis and evaluation. These refer to the complex thinking processes on the second level of Treffinger's creative learning model (figure 4.5). Analysis and evaluation are A-quadrant processes whereas synthesis is a D-quadrant process (see figure 3.2).

7.11 SIMULATION

7.11.1 Description

The word *simulation* derives from the Latin, *simulare*, *similis*, which means *like*. To simulate means to feign, resemble, or mimic. Simulation as a teaching strategy involves the realistic presentation of the structure of a real situation or object. Persons, environments or objects are used to represent original reality in a modified fashion. The student participates actively by interacting with persons or objects in a particular situation in order to deal with a problem, and receives feedback about responses without having to be concerned about real-life consequences (De Tornay & Thompson 1987:26; Gustafson 1988:123; Mellish & Brink 1990:146).

Simulation is actually a problem-solving teaching strategy. It induces affective involvement while at the same time stimulating cognitive development. As it has a close resemblance to play, the activity must focus on a clear teaching purpose (Sisk 1987:114).

Simulation is particularly useful when the composition of a task is complex and difficult to analyse. Rather than a one answer approach to a problem, it provides the opportunity for students to become aware that there are often several ways of dealing with it, and creative behaviour and divergent thinking are encouraged (De Tornay & Thompson 1987:41).

The different types of simulation used in the health professions include written and computer simulations, mediated and role played simulations, physical simulators, live simulated patients and simulation games.

Written and **computer simulations** offer practice in problem-solving, decision-making and clinical judgement. An actual problem or patient case is presented and students have to select from among relevant, irrelevant, beneficial and harmful options, each leading to different end results. They are provided with feedback on each decision about the effects of that action. Available nursing literature supports written and computer simulations as valuable teaching/learning and evaluation tools for clinical problem-solving and decision-making (De Tornay & Thompson 1987:32-33, 39).

Mediated simulation and **physical simulators** are very useful in nursing education because of nursing's practice component. Mediated simulations include video tapes illustrating interpersonal skills and interviewing techniques, and audio reproductions of human cardiac or respiratory sounds. These are used for teaching interpersonal skills, or for diagnostic or evaluation purposes. Physical simulators are three-dimensional life-like models of the human body which are used for practising clinical procedures, such as cardio-pulmonary resuscitation, catheterisation, colostomy care, venopunctures and

administration of IV fluids, until skill and mastery are obtained (De Tornay & Thompson 1987:35-37).

Role played simulation involves problem situations or critical incidents depicting conflict. It may be partly structured or completely spontaneous. The student does not play a role, but responds as herself/himself. This technique involves statement of the problem and objectives, designing a scenario including resources and character identification, playing out the scene, and evaluating and providing feedback. Problem-solving, decision-making skills and interpersonal skills are developed (De Tornay & Thompson 1987:33-34; Sisk 1987:114-115).

The **live-simulated patient technique** is useful for both teaching and evaluation. Individuals are trained to act the role of a patient and have to exhibit specific clinical behaviours, provide a specific history and respond in certain ways. According to De Tornay & Thompson (1987:38), this is an ideal technique for evaluation as objectivity is increased, performances are measured to identical criteria, and feedback is provided immediately, all of which enable students to strengthen their clinical skills.

Simulation games have the characteristics of both simulation and games. They provide interactive problem settings, operate according to set rules, and involve an element of competition. Games can deal with theoretical content, attitude changes, clinical processes, evaluation or remedial work. They provide a high degree of enjoyment and relaxation and stimulate recall and reinforcement of learning. A simulation game is a powerful medium for facilitating learning because of the element of friendly competition. It allows learners to become involved, experience feelings and examine attitudes (De Tornay & Thompson 1987:39, 49; Handfield-Jones *et al* 1993:6).

7.11.2 Advantages and limitations

Simulation increases student motivation and interest because it builds on their curiosity

and gives them the opportunity to inquire and explore. Cognitive learning is improved as students learn to develop decision-making and problem-solving skills and internalise factual information, concepts and principles. Affective learning is enhanced through simulation as it offers students the opportunity to gain insight into others' values and attitudes. Empathy and self-awareness are enhanced and this leads to an increased insight into interpersonal relationships (De Tornay & Thompson 1987:28-29; Sisk 1987:115).

When simulation is used by a lecturer as part of her teaching repertoire, learning tasks are made less complex than they actually are in the real world, in order to give students the opportunity to master those tasks which are extremely difficult in the real life situation. Simulation provides the elements of a real life experience, without the risk to the patient. The quality of learning can thus be improved before the student nurse has to care for the patient. An additional advantage is that students learn from self-generated feedback through their own senses (and not only from verbal descriptions) and develop reflective thinking (De Tornay & Thompson 1987:41; Joyce *et al* 1987:361).

A limitation of simulation is oversimplification of reality which can lead students into improper learning resulting in erroneous transfer to real situations. Role play simulation, written simulations and simulation games can be time-consuming to design. Mediated simulation and computer simulations are both time-consuming and expensive, while physical simulators are very expensive.

Simplification may result in distorting, obscuring or confusing real-life circumstances. Activities performed exclusively either alone or in a group may result in not all students' needs being met (De Tornay & Thompson 1987:41; Gustafson 1988:123).

7.11.3 Application to nursing education

Nurse educators frequently use the different types of simulation as they are very appropriate for teaching a practice discipline. The literature on nursing gives a variety of examples.

An example of a role play simulation is given by Howland-Regan (1982:18-20). She describes how she teaches the handling of a crisis situation creatively by giving students the opportunity to experience a crisis. At the beginning of one of her lectures a messenger brings a letter to the class which she reads out to the students. The letter contains devastating news which may either involve the resignation of the entire teaching staff of the faculty, loss of clinical affiliation, or loss of accreditation. The class turns into total confusion as students give expression to their feelings and emotions. The lecturer gives them about ten minutes of spontaneous interacting and then starts resolving the crisis. Students are asked to report on their own physical and psychological reactions and those observed by their peers to help them draw meaning from the crisis. Students report that they find this learning experience highly motivating and exciting and that it gives them valuable information about what people in a crisis really endure.

The abovementioned example illustrates the risk-taking and surprise elements of creative teaching. It includes experiential learning, total affective and cognitive involvement, active participation, divergent thinking (when trying to find possible solutions) and reflective thinking during the evaluation of the session.

Bradley-Springer (1993:7) describes another example of a role played simulation in which a student simulates her own death. The observers are asked to describe their own feelings and the *dead* student has to describe her experience. The objective of this simulation is to help students to empathise with patients and their families as they face death.

This learning experience is experiential, student-centred, emotionally and kinaesthetically oriented.

An excellent example of a live-simulated patient is given by Parrott (1994:37-38) in her description of the use of *Granny Grits* to present content on aging, as discussed in 7.7.3. This simulation technique can be used to teach the content of many disease conditions, for example, major depression, paranoid schizophrenia, Parkinsonism, tuberculosis and AIDS. It gives students the opportunity to use more of their senses in learning and presents a holistic picture. Students hear, listen, visualise, become aware of the affective domain and socially related aspects, and pick up non-verbal cues. They organise information immediately because they receive it from different sources simultaneously. This aids whole brain creative learning as processes from all four quadrants are engaged.

Games are often used in nursing education as they are valuable strategies in a variety of teaching-learning and evaluation settings. Stern (1989:96) suggests the use of board games such as Monopoly, Trivial Pursuit and Scruples to motivate students during courses lasting six weeks or longer, for example, those on orientation, management, or intensive care unit reviews. Apart from board games, Stern suggests the use of *The People's Court* for problem-solving nursing ethical dilemmas on such topics as confidentiality or accepting more patients to your unit when you have a shortage of staff. This game illustrates the diversity of such problem situations and adds an element of challenge, risk and fun to the learning experience.

Stern (1989:96) also mentions the *Oxygen Relay Race*, a game which was created to induce curiosity and to make learning a fun-experience. A box containing pieces of paper on which different methods of oxygen administration are written, is passed around the class. Each student selects one of the pieces of paper and has one minute to get the correspondingly correct equipment in a huge box comprising all the different masks and cannulas. Students have fun while looking for their equipment and are afterwards

shown a 15 minutes videotape presentation on oxygen administration.

Another self-created game is reported by Ishida *et al* (1994:164). The *germ game* is used to teach students the principles of asepsis. Apart from being a fun activity, it provides visual stimuli and opportunity for critical thinking. During this game, one student performs a procedure involving asepsis in the clinical laboratory. Any one of the other students tosses a germ (made of coloured paper) into the field of operation when a break in technique is identified. The first student then attempts to cite the principle violated, suggests a remedy and implements it.

In the above-mentioned examples learning is enhanced in a stimulating and pleasant environment. Students participate actively and are challenged cognitively - they are offered the opportunity for critical and reflective thinking.

7.11.4 Relation to creativity

Simulation stimulates imagination and provides a holistic view of a problem. It is essentially problem-centred and experiential in nature and creates an enjoyable and relaxed learning climate. Students feel free to inquire, explore and take risks in a safe environment where failure is allowed until mastery is eventually obtained. A creativity inducing environment is thus established (see 5.7).

Whole brain creative learning is facilitated by simulation as both left and right brain processes are stimulated. D-quadrant processes are represented by visualisation, imagination, and the holistic view offered. C-quadrant processes are stimulated through kinaesthetic and emotional experiences especially with physical simulators, games and role play simulations. A-quadrant processes including logical and rational thinking, are stimulated by all types of simulation and so are the B-quadrant processes including organisation and sequential thinking (see figure 3.3).

7.12 THE CASE STUDY

7.12.1 Description

The case study can be defined as a teaching strategy that stimulates thinking through complex problem analysis of actual or hypothetical situations. Traditionally, it has been associated with business and law courses as it was first instituted by the Harvard Law School during the late nineteenth century. It is an excellent strategy for exploring the dynamics of social, organisational and ethical relationships, and for teaching the clinical aspects of health care. The case study provides a safe environment for the development of problem-solving and decision-making skills. Case studies are often complex patient situations which are presented for practice in decision-making and clinical judgement (Johnson & Purvis 1987:118; King 1984:85).

Case studies usually include background information on an organisational-, communication-, or patient-based problem in a specific institutional setting. They can be presented as written scenarios, as reviews of cases encountered in clinical practice, or as videos on interpersonal conflicts or ethical issues. However, not all the necessary information is given, as in reality decision-makers never have all the information to hand (Davis 1986:97; Mellish & Brink 1989:193; Thompson 1991:21).

According to Lawrence (1953) in Johnson and Purvis (1987:118), a good case study serves as a vehicle by which a chunk of reality is brought into the classroom to be pulled apart and put together again before the situation can be fully understood.

In the implementation of the case study the lecturer presents the case and acts as group leader. The students have to generate options and argue the merits of various solutions. Different types of questions are asked in order to stimulate critical and creative thought. During the discussion students work through all the stages of the problem-solving process. There are a few variations of the stages involved in this process. After having

studied those given by King (1983), Orlich (1990) and Parnes (1981), the following are suggested in order to stimulate creative thinking.

(1) *Fact-finding.* A sensitivity to problems must be developed, as well as the ability to sense needs and deficiencies, and to see the unusual. Relevant and irrelevant information should be distinguished, and the who, what, where, how, when and why questions may be asked. All the known facts about the problem should be listed without making inferences. Impressions, observations and feelings must be explored. Parnes (1981:133) suggests visualisation of the problem situation in order to get a holistic view of the problem, which, at this stage, is still ill-defined. Questions 4, 8 and 12 given in table 7.2 can be asked.

(2) *Problem-finding.* The problem should be viewed from all angles. Penetration is necessary in order to get underneath the problem, away from the obvious. Psychological openness can be applied in an attempt to restructure the problem away from mental set (functional fixedness). Questions to be asked include: What is the real problem? and What must be accomplished? The actual problem should be re-defined and subproblems defined. Parnes (1981:133) suggests fantasising a scenario on how to alter the problem situation the way the individual would like it to be. Kim (1990:38) proposes that the use of intuitive perception is crucial during this stage. The questions 3 to 9 in table 7.2 can be asked.

(3) *Generation of ideas/alternative solutions.* Students should be encouraged to think of as many ideas possible as well as a variety of different ideas or possible solutions in order to increase fluency and flexibility. Brainstorming is a very effective technique to use during this stage especially if a creative solution is desired. Criticism and judgement must be withheld. Six to eight of the best ideas which seem to be the most likely solutions, should be selected. The questions 1 to 4, 6 and 7 in table 7.2 can be asked.

(4) *Evaluation of the alternatives.* Each of the selected ideas or possible solutions must be evaluated. The positive and negative consequences of each must be considered, while examining both short-term and long-term goals. Intuition should be allowed to play a role during the evaluation of alternatives. Internal visualisation (the ability to visualise beyond the exteriors) can be applied in order to get a view of the internal dynamics and to recognise logical inconsistencies. Questions 3, 4, 5, 6, 7 and 9 given in table 7.2 can be asked.

(5) *Decision-making.* The solution which seems to have the most favourable consequences for the present situation, should be selected (this does not necessarily mean the greatest number of positive consequences). During decision-making, synthesis of ideas and thoughts takes place - new associations of thoughts, facts and ideas are formed. The questions 10 to 14 in table 7.2 can be asked.

(6) *Evaluation of the decision.* The final decision or solution should be discussed and its advantages, disadvantages and effectiveness in the particular situation evaluated. Questions 6 to 9 and 11 to 14 in table 7.2 can be asked (King 1983:42; Klaassens 1988:16; Parnes 1981:133, 137; Torrance 1979:64, 73, 116, 168).

7.12.2 Advantages and limitations

The case study provides a safe environment for the development of problem-solving and decision-making skills. Through discussing relevant issues and verifying facts in order to make judgements skill in reflective thinking is developed, and the ability to transfer problem-solving processes from familiar to unfamiliar situations is learnt (Lowenstein & Sowell 1992:15-16; O'Connell & Bates 1976:224-245).

Table 7.2

Questions for stimulating creative thinking

- **Quantity question** (encourages fluency)
  - (1) What are all the possible solutions to _____?
  - (2) List as many ways as you can think of _____?
- **Viewpoint question** (encourages flexibility, new perspectives, shift of viewpoints)
  - (3) What would _____ mean from the viewpoint of a _____?
  - (4) Describe _____ from the viewpoint of _____.
- **Personal involvement question - identification fantasy/personal analogy** (provides subjective experience and releases the individual from rigid, preconceived perceptions)
  - (5) Become _____ and describe your feelings.
- **Conscious self-deceit question - fantasy analogy** (stimulates the ability to remove mental blocks, creates ideal situations and modifies these situations in order to make them applicable to realistic situations)
  - (6) You have been given the power to _____, how will you use it?
  - (7) Suppose you could have _____ in working on this problem, how would you use it to _____?
- **Analysis**
  - (8) What factors are causing the patient/family/physician/nurse to act _____?
  - (9) What assumptions are underlying your conclusion?
- **Synthesis**
  - (10) What might happen if you combined _____ with _____?
  - (11) What conclusions do you draw from _____?
- **Evaluation**
  - (12) Do you agree that ____?
  - (13) How effective can _____ be?
- **Play devil's advocate**
  - (14) Ask students to defend their reasoning against different viewpoints.

(Demetrulias & Shaw 1985:15-16; Wink 1993:14)

Case studies provoke critical thinking by providing students with opportunities to examine and scrutinise patient problems and ethical dilemmas. They learn to consider alternatives, distinguish relevant from irrelevant information, examine their own and others' viewpoints, rethink old ideas, make decisions and evaluate outcomes. Clinical judgement is enhanced through the opportunity to apply theoretical knowledge in situations which mimic real clinical practice (Pond, Bradshaw & Turner 1991:18-19; Thompson 1991:20).

During case analysis, group interaction is enhanced through the discussion of personal values, beliefs, and viewpoints which contribute towards professional socialisation of the student nurse. Ethical case analysis aids emotional and moral development as students become aware of their own values and attitudes (King 1984:39; Thompson 1991:21).

The case study increases student motivation because of the active involvement and immediate feedback that they receive from their lecturers (Tarcinale 1987:341).

O'Connell and Bates (1976:245) regard the lack of ready-made material for case studies in the nursing situation as a major limitation of this strategy. I do not agree on this point as there is a wealth of critical incidents and ethical dilemmas which occur almost daily in nursing practice, from which the nurse educator can select examples. A real limitation of the case study is the necessity of keeping class size reasonably small in order to give each student ample opportunity to work through all the stages. The case study is also limited by the skill and preparation of the lecturer as a discussion leader and as an expert on case material (Thompson 1991:21).

7.12.3 Application to nursing education

The case study is frequently used in nursing education for the development of problem-solving and critical thinking skills as well as for the integration of theoretical knowledge

and professional practice. Clinical case studies can be used to present leadership and management content. This facilitates analysis and synthesis of new material with previous learning and the promotion of application of theory to particular nursing situations (Lowenstein & Sowell 1992:15).

Schoenly (1994:211) cites the case study as a popular strategy for teaching ethics in the nursing curriculum. Thompson (1991:20, 23) supports this view by indicating the value of ethical case analysis for teaching ethics and integrating ethics content into professional practice. The case study bridges the gap between theory and practice and creates a safe, supportive environment for student learning in what is regarded as a difficult area of nursing practice.

Tarcinale (1987:340) views the case study as the most common example of vicarious learning in health professional teaching. He states that vicarious learning (learning through imagined participation) is attained through the student's involvement in the problem-solving activities built into the case study.

If the case study is viewed as vicarious learning, then creative problem-solving, role play, sociodrama and simulation also fall within this category as students are encouraged to use their imagination while participating in these learning activities.

Case studies provide a means for applying theoretical principles to nursing practice and teach student nurses that problem analysis is not limited to single solutions. As successful development of problem-solving skills improves logical reasoning, the case study assists students in developing clinical decision-making skills (Dailey 1992:8).

Example of a case study:

A nurse is about to administer the last of a series of IV solutions that has	*Surgical Unit General Hospital*

been ordered for a man who had surgery two days previously. The nurse's observations result in her questioning whether he should have additional fluids. It is 3 a.m. and she knows the surgeon will be very angry if called during the night. She struggles in deciding whether she should be the patient's advocate by calling the surgeon, determining what would be best, and possibly not administering the solution, or alternatively whether not to make the call, thereby protecting the surgeon's sleep and herself from his anger, and to blindly administer the fluid which is probably not in the patient's interest.

(King 1984:123)

It is evident that not all the necessary information is given here. The incomplete information in this case includes the type of IV solution, type of surgery (major abdominal, or minor surgical procedure), age of the patient, bowel sounds present, urine output, whether he may eat or may not eat yet, his general demeanour and condition including blood pressure, pulse and respiration rates and temperature. This information is crucial for the making of a sound decision.

The nurse's dilemma in this case is whether she should obey the doctor's orders - disobedience might lead to legal action if the patient's health is placed in jeopardy. Whether the nurse administers the last IV solution or not, she is liable for her own actions. If either of these should adversely affect the patient, she will be guilty of

misconduct as she must be able to make independent decisions based on her evaluation of the patient's condition at that time.

This case study may generate many alternative solutions based on possibilities depending on relevant information that has not been given. It provides students with the opportunity of exploring all possibilities and of probing deeper into the problem. Critical thinking, analysis, synthesis, imagination and evaluation are stimulated.

7.12.4 Relation to creativity

The case study is a group problem-solving strategy which facilitates cooperative and experiential learning and divergent thinking. It stimulates students' curiosity and provides an opportunity for explorative and discovery learning. These aspects concur with the essential elements present in creative learning (see 5.6).

The required skills of analysis, synthesis and evaluation are among the productive operations as cited by De Corte's classification of objectives (see 4.3.2.2) and are linked to creative learning. Sensitivity, openness, flexibility, penetration, redefinition and elaboration which are essential during case study analysis, are all abilities of creativity as cited by Torrance (see 2.5.1.1).

The case study focuses more on left brain processes as logical, analytical and rational thinking (A-quadrant processes) and organised, sequential and detailed thinking (B-quadrant processes) are essential to effective problem-solving. The right brain processes, visual and holistic thinking (D-quadrant) and emotions and feelings (C-quadrant) are used to a lesser extent during case analysis (see figure 3.2).

The strongest support for the case study as an innovative strategy that fosters creativity, lies in the fact that it is problem-centred and facilitates productive learning.

7.13 VALUES CLARIFICATION

7.13.1 Description

Values clarification involves the identification and sharing of personal values. It is a means of opening up the student's skill in recognising her/his own values, and it offers a way of learning the process of valuing. Values underlie all ethical decision-making and are the standards which influence the nurse's behaviour (Schoenly 1994:212; Steele 1986:247).

The aim of values clarification is to make students consciously aware of their own values and underlying motivations which guide their actions, and to offer them the opportunity of clarifying and defending their values by using the valuing process (Mellish & Brink 1990:190; Ewan & White 1991:134). As ethical problems are often wrapped in emotions, individuals tend to resolve ethical dilemmas on the spur of the moment, when they are least able rationally to do so. Values clarification is a rational process in which each piece of information is given equal worth. Students learn ways of valuing, but not a set of values, and discover their own viewpoints on issues (Mellish & Brink 1990:191; Steele 1986:247).

The values clarification process is based on Rath's theory of valuing and involves three states: choosing, prizing and acting.

(1) *Choosing*: to *choose* freely from *alternatives* after *thoughtful consideration* of the consequences of each alternative.

(2) *Prizing*: to *cherish*, and be happy with the choice; and to be *willing* to *affirm the choice* in public.

(3) *Acting*: to *do something* with the choice; and to *act repeatedly* in the same

way.

(Ewan & White 1991:137)

It is important to establish the correct teaching-learning climate for values clarification as values cannot be strengthened in an atmosphere of fear and mistrust. Risk-taking is involved when students have to respond to questions and exercises regarding beliefs and values. As the willingness to take risks is influenced by the perception of acceptance from the lecturer and peers, the lecturer needs to display an open, accepting attitude. A relaxed atmosphere, characterised by openness, freedom of expression, and the absence of negative feedback, should be created. Each student's values must be respected and mutual trust and support should be established (Mellish & Brink 1990:191). The learning climate for values clarification concurs with the creativity inducing environment as discussed in 2.5.2.2.2.

According to Mellish and Brink (1990:191), a values clarification session should include the following steps:

- explaining to students that they do not need to discuss their viewpoints if they do not wish to
- discussing the concepts of values and valuing
- introducing the theoretical framework (Rath's theory)
- providing values clarification exercises wherein the stages of the valuing process are used
- clarifying with the students any congruences which they can identify between their personal values and the values of the nursing profession

7.13.2 Advantages and limitations

Values development leads the student towards self-actualisation as principled decision-making requires higher levels of moral reasoning. Ethical/moral decision-making requires responsible principled choices and these are based on critical and reflective thinking. Schoenly (1994:209) reports that movement to the higher levels of moral reasoning indicates inner growth and the development of a guiding value system wherein the intellect and emotion are blended.

Values clarification results in increased awareness, empathy and insight. It promotes self-discovery and enhances personal growth through increased self-awareness (King 1984:15; Schoenly 1994:212).

Values clarification is an excellent strategy of teaching ethics and ethical decision-making. It leads nurses towards a more humanistic orientation, and assists in personal and professional growth as nurses learn to act consistently and logically in ethical decision-making in a principled way. Values which are consistent are established, and it fosters the art of professional practice (Mellish & Brink 1990:191, 192).

According to Steele (1986:248), the valuing process involves changing your value system as new evidence comes in. This refers to an open and flexible attitude which directly opposes functional fixedness and therefore may facilitate creativity.

7.13.3 Application to nursing education

Nursing practice requires of nurses to make ethical and moral decisions almost on a daily basis. Nurse educators have the responsibility of preparing students for the moral dilemmas, ethical issues, and varied viewpoints and conflicts encountered in nursing practice. Contemporary ethical issues include in vitro fertilisation, sperm banks, abortions, active and passive euthanasia, surrogate motherhood, and donation of organs

for organ transplants. Nurses have to take care of these patients, give advice, converse with relatives and sometimes have to act on behalf of the patient, always keeping in mind the patient's best interest. Ethics in nursing involves the critical examination of the moral dimensions of practice.

The rapid increase in the development and utilisation of technology, advances in medical science, and the diversity of ethnic groups who are consumers of health services, have added to the ethical issues and value conflicts which practising nurses have to cope with daily (Gaul 1987:113; Schoenly 1994:212).

Gaul (1987:113) regards ethical practice as essential to the development of autonomy of the nursing profession.

The following are examples of values clarification exercises:

(1) Student nurses are asked to list four values which guide their daily interactions and to rank these according to priority. They are then divided into groups of four to discuss their values, give reasons why these values guide their actions, and compare these to the values of the profession as laid down in ethical codes.

(2) Students are given alternatives such as those mentioned below, to rank and are asked to mention the value which emerges in response to their first choice. The students should be asked what would be the most difficult for them:

- to care for a woman who had an illegal abortion
- to counsel parents with a Downs' syndrome child
- to switch off the respirator connected to a patient who has been in a coma for three years, on request of the family

By working through these exercises students learn to recognise their own values and reasons behind their actions. They learn to think rationally about ethical dilemmas and to act consistently in similar cases.

7.13.4 Relation to creativity

Values clarification facilitates experiential learning and reflective thinking and combines the affective and cognitive dimensions in a problem-solving approach which stimulates cooperative learning. These aspects concur with the aspects which have been identified as beneficial to creative learning (see 5.6).

The higher levels (valuing, organisation and characterisation) of Bloom's affective domain of objectives, can be realised through values clarification. These abilities have been indicated as essential to creativity (see 4.3.1.2). The internalisation of values which takes place during values clarification is on the third level of Treffinger's creative learning model (figure 4.5).

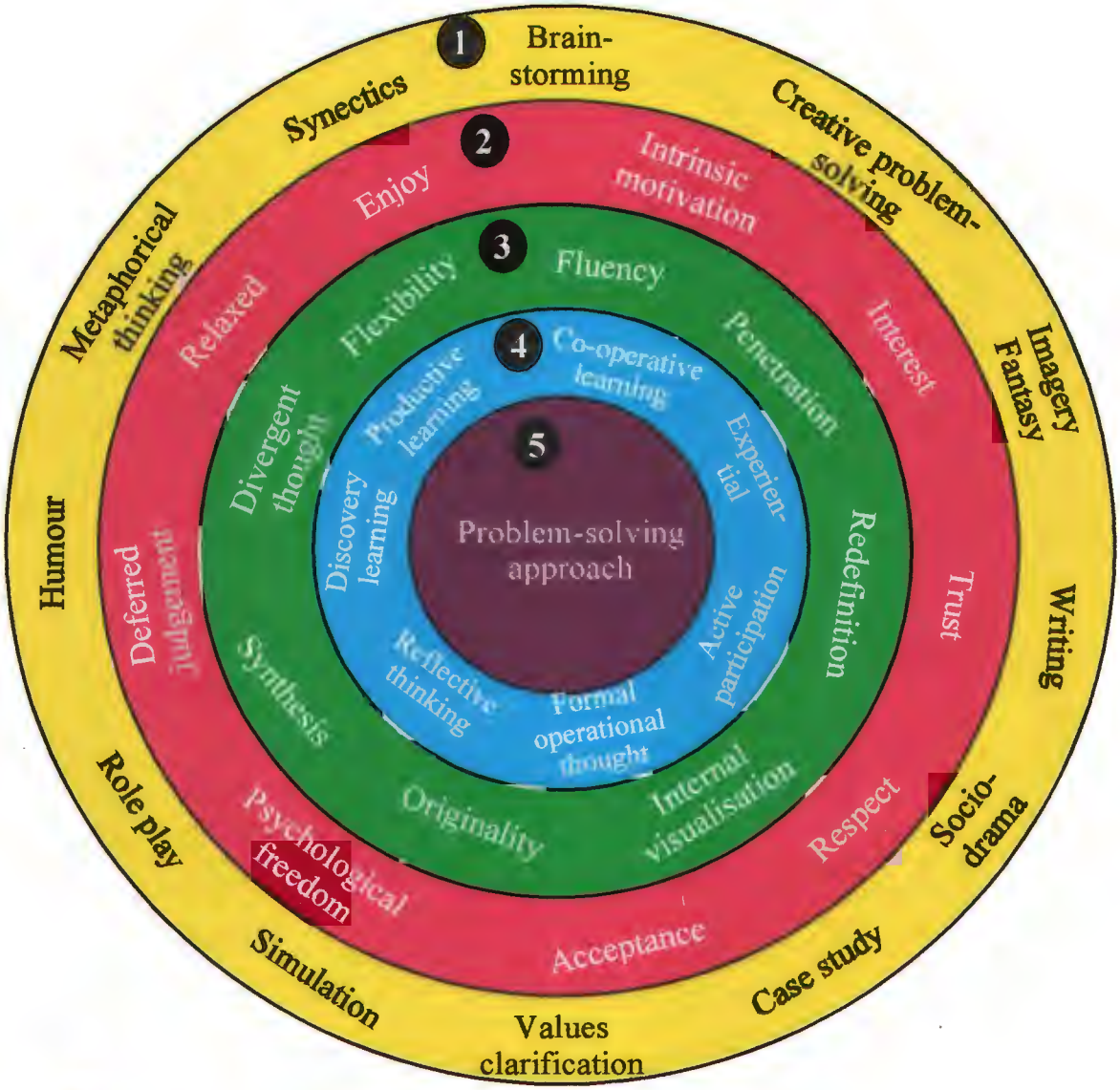
Values clarification draws heavily on C-quadrant processes (emotions, feelings) but combines these with A-quadrant (logical and analytical thinking) and B-quadrant (organised, sequential thinking) processes (see figure 3.2). Values clarification also stimulates D-quadrant processes as a holistic view should be obtained of the situation in order to make the correct decisions in a particular situation. It therefore facilitates whole brain learning.

7.14 SYNTHESIS

(1) The teaching strategies discussed in this chapter arouse student attention and interest through different and unconventional stimuli, provide a relaxed atmosphere for problem-centred learning and foster creativity. Figure 7.4 illustrates the characteristics inherent in these strategies.

Figure 7.4

The relation between innovative teaching strategies and creativity



1 Innovative teaching strategies

2 Creativity inducing environment

3 Key-abilities of creativity

4 Nature of creative learning

5 Problem-solving approach

(2) The required learning environment for the implementation of innovative teaching strategies concur with the creativity inducing learning environment as discussed in 2.5.2.2.2. This environment is characterised by mutual trust, respect and acceptance; deferred judgement; and psychological freedom. The relaxed and enjoyable atmosphere which prevails tends to increase student interest and intrinsic motivation.

(3) The processes which have been identified by Torrance as the key-abilities of creativity (see 2.5.1.1) are stimulated. Students learn to be flexible and fluent in their thinking; to penetrate and redefine problems by looking at them from different viewpoints; and to use internal visualisation, synthesis and originality in their thinking.

(4) Experiential, cooperative and discovery learning are facilitated through the active participation in the learning experiences which are promoted by these strategies. They are essentially student-centred in nature and stimulate productive learning which encompasses reflective thinking, formal operational thought (Piaget), metacognition, productive operations (De Corte) and the higher levels of Bloom's cognitive taxonomy, namely analysis, synthesis and evaluation. All of these processes have been linked to creative learning (see 5.6.1, 4.3.1.1, 4.3.2.2, 4.4.1.2, 4.4.1.3, 4.4.1.4 and 4.4.2.2).

(5) The focus of innovative teaching strategies is that of a problem-solving approach. This bears many common features to creativity. Torrance's definition of creativity is one concerned with problem-solving (see 2.5.1.1). Wallas' description of the four stages of the creative process, namely preparation, incubation, illumination and verification (see 2.5.1.2), refers to problem-solving. Problem-solving thus lies at the very heart of creative endeavour.

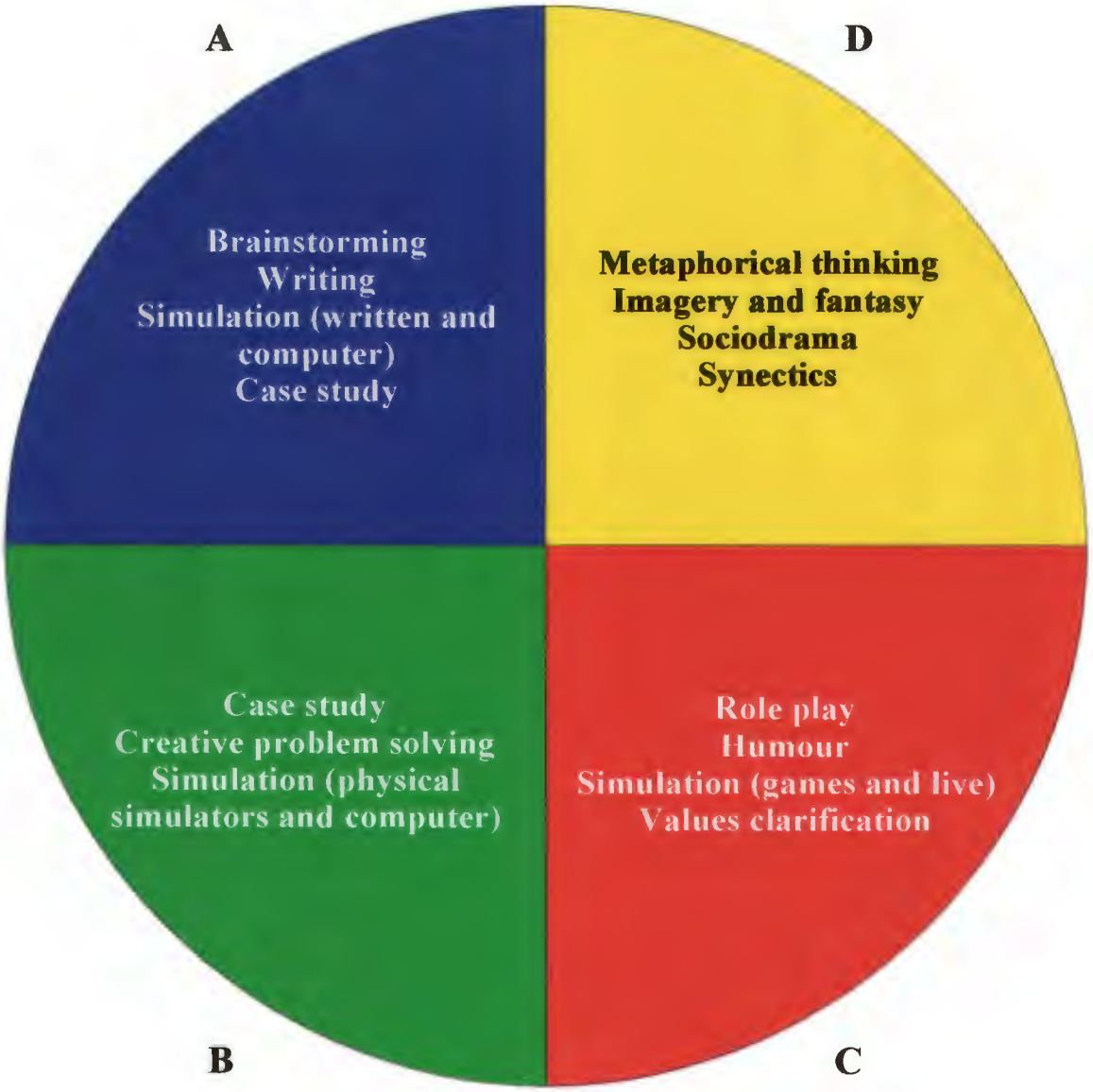
Innovative teaching strategies stimulate both hemispheres of the brain (as are discussed

in this chapter at the end of each relevant section) and accommodate different cognitive styles as they emphasise linear as well as visual thinking (see 4.2.1 and figure 4.2). Although the analysis of the relation of these teaching strategies to creativity reveals whole brain stimulation, it also indicates variations in primary focus. This finer distinction is illustrated in figure 7.5.

Based on both the cognitive and humanistic theories of learning (see 4.4.1 and 4.4.2), the teaching strategies elaborated on in this treatise have the potential of fostering creative learning and of developing the necessary skills in student nurses which will enable them to combine art and science into not only their present, but also, as qualified practitioners, their future nursing practice.

Figure 7.5

Grouping of innovative teaching strategies within the whole brain model, according to primary focus



CHAPTER 8

A nursing education model for the fostering of creativity

8.1 INTRODUCTION

The overall aim of this research study is realised in this chapter, namely the conceptualisation of a nursing education model encompassing innovative teaching strategies. A detailed description of the model is given in order to clarify its significance to nursing education.

The research that was done to enable development of the model, comprised an analytical study of the literature on the determinants of the educational setting and of creativity. The model is based on assumptions derived from an analysis of the literature. An inductive approach was followed during the first stage of the development of the model with the aim of determining relevant concepts. A deductive approach was used during the final stage to ascertain a complete and holistic presentation.

In order to describe the model explicitly some of the information mentioned in foregoing chapters is reiterated in this chapter. No guidelines for the implementation of the model are given as nurse educators are familiar with the didactics of education. However, it is suggested that nurse educators who wish to implement the model, read this thesis in its entirety to enable them to attain a deeper understanding of what teaching for creativity encompasses.

8.2 BACKGROUND OF THE MODEL

8.2.1 Aim

The aim of the model is the fostering of creativity in student nurses which will enable them to become innovative and creative nurse practitioners.

8.2.2 Rationale of the model

The fostering of creativity in nursing education has been the subject of vigorous discussions in recent years. In considering the complex problems confronting nurse practitioners in current health care systems, nurse leaders have expressed increasing concern regarding the lack of stimulation for the development of creativity in nursing. Creativity has become a valued attribute as an answer to questions such as: *How can students be encouraged to think beyond traditional boundaries and learned limitations*? and *How can students develop the ability to find new and better solutions to complex, individual patient problems?* (Holbert & Thomas 1988:34; Margolius & Duffy 1989:32; Thomas 1979:115).

The need for creative nurse practitioners has been emphasised by the American Association of Colleges of Nursing in a report published in 1986 which recommended that the education of the professional nurse should ensure the ability to *appreciate the role of the fine and performing arts in stimulating individual creativity, expressing*

personal feelings and emotions, and building a sense of commonality of human experience (Margolius & Duffy 1989:35).

A creative nurse practitioner is viewed as one who has had *extensive knowledge and experience with conventional methods of patient care as well as the judgement to know when the conventional is not sufficient and the drive and resourcefulness to find other choices and options* (Margolius & Duffy 1989:32). The truth of this statement is illustrated in the examples given in chapter 6 and in the discussion of the expert nurse practitioner in 6.5.4.

Creativity is valued by nurse educators and practitioners as a means of coping with individual patient problems in an environment marked by constant change due to scientific and technological advances. Considering the anticipated role of nurses in the future, students who are able to think divergently and creatively, will be better prepared to enter the nursing profession (Ferguson 1992:16).

Nursing education literature indicates that some nursing curricula inhibit and that others promote creativity. The process curriculum which is designed on the philosophy of promoting individuality and a problem-solving approach to nursing care, should logically promote creativity, and the need for creative problem-solvers in nursing practice has clearly been established (Thomas 1979:116, 119). This research study has revealed that problem-solving is the core of creativity. The four educational models included in this nursing education model all focus on problem-solving, as do the innovative teaching strategies described in this thesis.

Holbert and Thomas (1988:34) emphasise the need for a holistic approach in nursing education programmes and the development of flexible, life-long learners and problem-solvers. They suggest that a whole brain education approach be followed wherein students' individual cognitive styles are considered. This model provides for whole brain learning and emphasises a problem-solving approach as discussed in 7.14.

8.2.3 A prescriptive instructional model

Instructional models provide structural frameworks for guiding and developing particular educational activities and environments. They offer a blueprint that indicates the different ways in which various aspects can be organised in order to achieve outcomes under anticipated conditions. The major components of theories and models of instruction include conditions, methods and outcomes (Maker 1982:1; Reigeluth 1983:15, 21).

Models can be used in many different ways and can be either highly theoretical and abstract, or more practical. The *nursing education model for the fostering of creativity*, is more practical as the major aim is that nurse educators should be able to implement it in nursing education. Instructional models are also classified as prescriptive or descriptive. This model meets the criteria for a prescriptive model. A prescriptive model is goal directed, uses sets of conditions and desired outcomes as constants, and prescribes the best methods as the variables of interest (Reigeluth 1983:22).

The goal of this model is to foster creativity in student nurses. The sets of conditions include the setting of objectives on the higher cognitive and affective levels, considering the philosophy of nursing by following humanistic and cognitive approaches to education, and suggesting particular existent educational models that are compatible to the education of nursing as a practice discipline. The desired outcomes include productive learning, divergent and reflective thinking, flexibility, synthesis, originality and whole brain learning. A variety of innovative teaching strategies is prescribed as variables of interest because they should be diversified in order to suit a student's individual cognitive style.

8.3 ASSUMPTIONS WHEREUPON THE MODEL IS BASED

The *nursing education model for the fostering of creativity* is based upon the whole brain

model, the theories of creativity and the nature of nursing practice. From a synthesis of these theoretical viewpoints and the nature of practice, the following assumptions are accepted:

- Development of whole brain learning leads to creativity.

- Stimulation of whole brain learning in student nurses produces innovative and creative nurse practitioners.

- Nursing practice in a rapidly changing world necessitates effective, innovative and creative nurses to render holistic, contextually-based care.

- The key-abilities of creativity can be developed in student nurses.

- The determinants that play a role in the development of creative thinking skills, include theories of learning, objectives, educational models, cognitive styles, teaching strategies and the learning environment.

- A philosophy of nursing guides the practice of nursing and forms the foundation of nursing education.

- The four patterns of knowing in nursing practice indicate the need to include cognitive and humanistic theories of learning in nursing education.

- The different domains of objectives give an indication as to which educational models are more appropriate to ensure attainment of objectives.

- Theories of learning are directly related to the different domains of objectives and are linked to particular educational models.

- Teaching strategies should be compatible to the different cognitive styles of students in order to enhance learning.

- Students' non-preferred brain quadrants should also be stimulated in order to develop whole brain learning.

- Innovative teaching strategies stimulate and develop creative learning.

- The creativity inducing learning environment necessitates a specific psychological atmosphere.

8.4 DESCRIPTION OF THE MODEL

The model is described in its entirety which encompasses its contextuality, visual presentation and concepts, and interrelationships.

8.4.1 The context of the model

The context of this model is nursing education. It can thus be implemented in any nursing education situation whether it be in the lecture room or clinical field, in basic nursing education, in post-basic nursing courses, or as part of staff development in the health service situation.

8.4.2 The structure of the model

The structure refers to the concepts which include conditions, methods and outcomes, as well as the interrelationships among the major and related concepts. The visual presentation of the model contributes to an immediate and deeper understanding of the interrelationships and continuous flow of actions involved.

8.4.2.1 Visual presentation

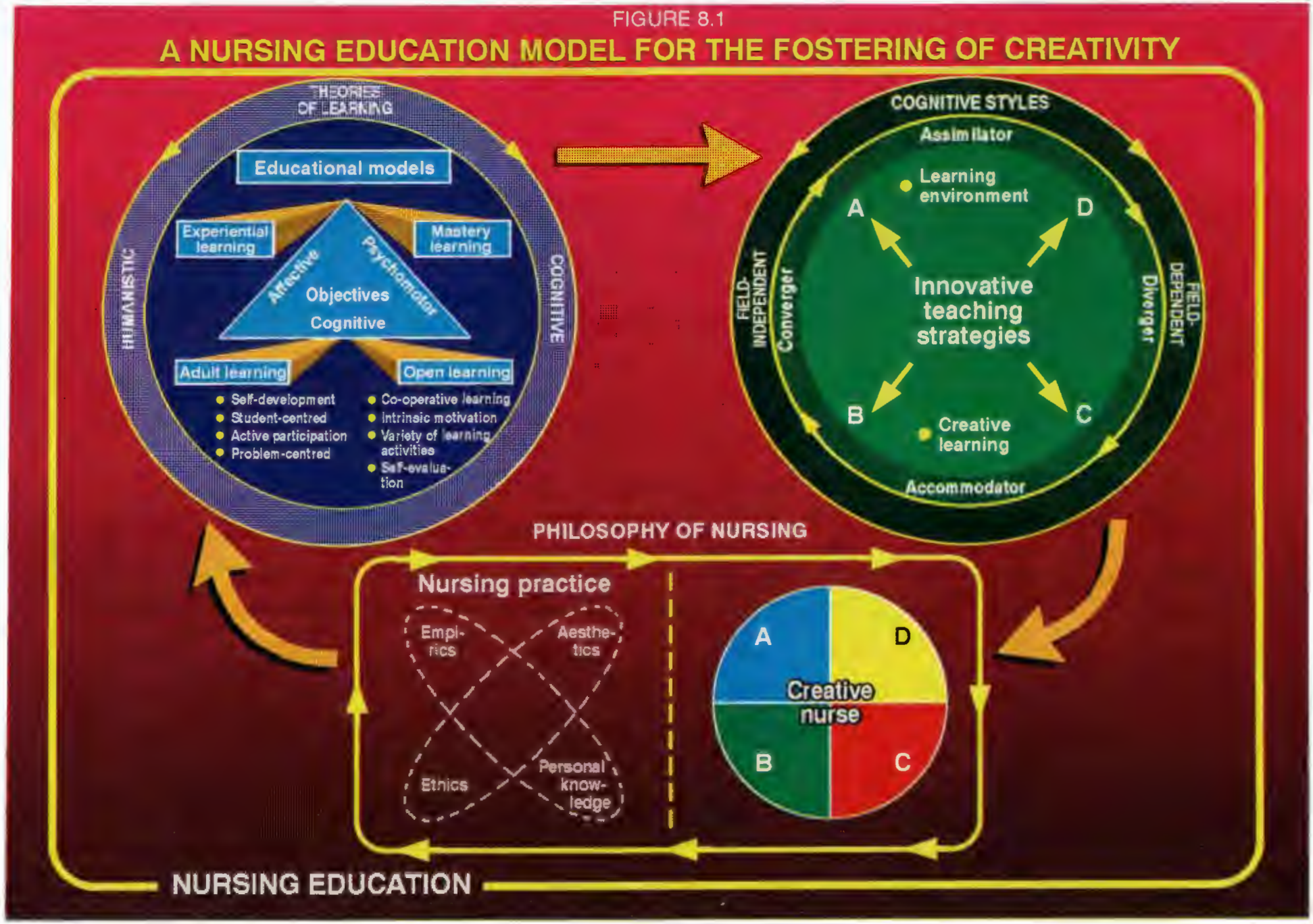
The visual presentation offers an overview of the conceptual relationships within the model (see figure 8.1). Different structures including circles, triangles, rectangles and eclipses are used to indicate meanings, positions and interrelationships between concepts. Circles have been selected because of the association with the whole brain model which is the primary focus of this thesis, as well as for their unlimited use for the inclusion of many variables which show a coherence. The triangle has been chosen because of its appropriateness to present the three domains of objectives on the three different lines. The rectangles distinguish between educational models and objectives, which are enclosed in the same circle. Eclipses have been chosen to indicate continuing movement which implies never ending growth as nursing knowledge continuously expands. Interrupted lines depict overlapping of concepts and fields, whereas arrows show direction and continuous movement and flow.

The primary colours used in the visual presentation of the model correspond with the colours of the whole brain model. These colours determined by Herrmann (1989), are used worldwide during creativity courses which focus on the whole brain model. Although Herrmann chose yellow to represent the more creative D-quadrant, I prefer to use green to symbolise creativity because green indicates growth and new life in nature.

Edward de Bono (a well-known creativity expert) chose green for the creative hat in his famous publication, *Six Thinking Hats*. The purpose of the more subtle colours is to add to the visual attractiveness of the model. Visualisation and visual presentations are very important aspects of creativity.

FIGURE 8.1

A NURSING EDUCATION MODEL FOR THE FOSTERING OF CREATIVITY



8.4.2.2 Description of the concepts and interrelationships

The seven major and several related concepts and their interrelationships are described.

(1) **Philosophy of nursing**

A philosophy of nursing forms the foundation of nursing practice and the basis on which a nursing curriculum is built. Although each school of nursing formulates its own philosophy, the philosophy underlying worldwide nursing today is rooted in humanism, holism, existentialism and phenomenology.

Humanism emphasises the unconditional worth of each individual and the development of human potential. The nurse educator has to respect the students, acknowledge their worth as unique individuals, and guide each towards self-actualisation while allowing and accepting individual differences. A holistic approach is characterised by a relationship where attention is given to the physical, spiritual, psychological and social dimensions of every student. The student has to be socialised into the profession and when needed, counselling should be available. A relationship of mutual trust should prevail.

Existentialism involves viewing each student as a unique human being, allowing freedom of choice, understanding the relationship between choice and responsibility, authenticity in tutor-student relationships, and guiding students along the process of becoming. Phenomenology includes accepting students' individual perceptions of reality and the giving of contextual guidance because each student experiences a situation differently.

These philosophical views should also be realised in the nurse-patient relationship during the practice of nursing. A more detailed explanation is given in 6.3.

There is an interrelationship between the nursing philosophy and the theories of learning which is relevant to nursing education. The humanistic, existentialistic and phenomenological influences in the philosophy indicate a need for humanistic theories of learning because of the emphasis on human relationships and the focus on the affect. Holism indicates a need for humanistic as well as cognitive theories of learning - nursing practice requires cognitive, affective and psychomotor skills as patients have a right to holistic care.

The visual presentation of the model shows that nursing practice is enclosed by a philosophy of nursing. The big yellow arrow indicates that both the nursing philosophy and the nature of nursing practice determine which theories of learning are relevant to nursing education.

(2) **Nursing practice**

Nursing practice is represented by the four patterns of knowing which nurses value and use, as identified by Carper (1978) and which are discussed in greater detail in 6.5.

- **Empirics** refers to the science of nursing and thus represents scientific knowledge, derived by the senses. It includes theory, principles, and concepts and refers to the cognitive skills essential to nursing practice. It implies knowledge of the basic, biological and medical sciences, and nursing theories. Cognitive skills, including concept learning, critical thinking, problem-solving, decision-making, intuiting and clinical judgement, are all part of this pattern of knowing and indicate the need for the inclusion of cognitive learning theories in a nursing education model.

- **Ethics**, the moral component of nursing practice, encompasses knowledge of ethical codes of nursing, ethical theory, principles and guidelines. It involves explicating different philosophical positions about what is good or right, and

whose interest is being served. Valuing, clarifying and judgement are involved when the nurse practitioner is confronted with ethical dilemmas (Chinn & Kramer 1991:8-9). Nurses cannot, however, make ethical judgements without empirical knowledge about ethical principles and codes, different philosophical viewpoints and the process of valuing - this indicates the interrelationship between empirics and ethics. The development of affective skills is essential to this pattern of knowing although it also requires cognitive skills.

- **Personal knowledge** represents the inner experiences of the individual. It is only through knowing the self, that one is able to know another human-being. Knowing the self facilitates meaningful, shared human experience. This pattern of knowing is closely related to the *therapeutic use of the self* as explained in 6.5.2. Student nurses need to accumulate personal knowing before they can engage in a real *caring* moment or relationship. Intuitive knowing plays an important role. Personal knowledge is affect-oriented and requires the inclusion of humanistic theories of learning in nursing education. Personal knowledge is enhanced by empirics as scientific knowledge leads to a better understanding of self, others and particular situations.

- **Aesthetics** refers to the art of nursing. It is made visible through the actions, conduct, attitudes, and interactions of the nurse in response to others. When aesthetic knowing develops, the nurse's actions become artistic. Unique, meaningful, and deeply moving interactions with patients become elucidated during the performance of psychomotor skills. Aesthetics only occurs contextually, in the moment, and is unique to the particular aesthetic experience (Chinn & Kramer 1991:10-11). Aesthetics as expressed in the art/act of nursing practice, involves empirics (scientific knowledge about illness and relevant treatment), personal knowledge (understanding the patient's total situation) and knowledge of ethics (making the correct decision in the patient's interest). Aesthetics combines cognitive, affective and psychomotor skills and thus

indicates the need for the inclusion of both cognitive and humanistic theories of learning in a nursing education model.

None of the four patterns of knowing can stand by themselves, they are all interrelated, and together form the whole of nursing knowledge. Each pattern describes something about nursing knowledge and each is equally vital because it uniquely contributes towards the whole of knowing (Chinn & Kramer 1991:5).

The interrelatedness amongst the four patterns of knowing is visually presented in the figure by the surrounding overlapping and intermittent eclipses. The arrow which points from the nursing practice paradigm to the theories of learning illustrated on the periphery of the first circle (the one on the left hand side), indicates that the nature of nursing practice influences the selection of theories of learning appropriate to nursing education.

(3) Theories of learning

Theories of learning attempt to explain the different ways in which students learn. The cognitive and humanistic theories of learning are of particular concern to nursing education as student nurses need to master the cognitive and affective skills essential to effective nursing practice. The psychomotor skills required for practice are included under the cognitive theories as psychomotor performance cannot be separated from cognitive involvement. The four patterns of nursing knowledge encompass the cognitive, affective and psychomotor domains (see 6.5). In order to produce a creative nurse practitioner, the cognitive and humanistic theories of learning are significant as creativity involves both cognitive and affective processes (see 4.4).

- **Cognitive theories** are concerned with how individuals attend, perceive, memorise, comprehend, learn concepts, solve problems, and think about their

own thinking processes (discussed in 4.4.1). The following cognitive skills have been selected as being significant to nursing education.

Problem-solving lies at the very heart of creativity and nursing practice. The contextuality of nursing requires the solving of problems in continuously changing and diverse situations and it is therefore part of the creative process (discussed in 2.5.1.2, 4.4.1.1, 6.5.3.2 and 6.5.3.4).

Metacognition has been directly linked to creative thinking techniques because both assist individuals to regulate their own thinking and behaviour. The development of nursing theory has been described as a creative process requiring metacognitive flexibility which facilitates analysis, penetration, synthesis and reproduction (discussed in 4.4.1.2). Metacognition is an important part of ethical decision-making as it enables one to make unbiased and just choices.

Formal operational thought plays a significant role in empirics as a pattern of knowing in nursing because it refers to the ability of dealing with potential or hypothetical situations and involves scientific reasoning. It is an essential process for effective problem-solving and includes some of the key-abilities of creativity such as ideational fluency, flexibility, penetration, synthesis, redefinition and originality (discussed in 4.4.1.3). Student nurses need to attain the level of formal operational thought in order to arrive at sound decisions, develop critical thinking abilities and be effective at clinical judgement when practising nursing (discussed in 6.5.3.4, 6.5.3.5 and 6.5.3.6).

Discovery learning stimulates productive learning and combines rational analytical thought with intuition. The relevance of a combination of intuitive and critical, analytical thinking for nursing practice, has been illustrated in the examples given in chapter 6, and has been discussed in 6.5.3.3, 6.5.3.4, 6.5.3.5 and 6.5.3.6). Discovery learning is experientially based, explorative and

spontaneous in nature, and therefore stimulates creativity (discussed in 4.4.1.4). It is essential to the development of the aesthetic and personal knowledge patterns of nursing.

- **Humanistic theories** are concerned with the development of the affect and focus on feelings, attitudes, beliefs and values. Affective skills are very important in the development of the ethics, personal knowing, and aesthetic patterns of nursing practice. Student nurses need to develop skill in moral reasoning, therapeutic use of the self and caring (discussed in 6.5.2). The role of the affect in creativity has been acknowledged in definitions of creativity as well as by Torrance (1993) in his study of the beyonders and by Herrmann (1989) in his whole brain creativity model. Affective traits, such as openness to experience, sensitivity, passion, spontaneity, enthusiasm and dedication, have been mentioned (discussed in 4.4.2.1).

Rogers' and Maslow's theories are of particular significance to nursing as a humanistic discipline.

Student-centred learning (as proposed by Rogers), emphasises self-directed learning and self-evaluation. This fosters independence, self-reliance and creativity on condition that the relationship between the educator and student is characterised by respect, trust, authenticity, acceptance and emphatic understanding. External threats in the learning environment should be eliminated (discussed in 4.4.2.2). The principles of student-centred learning are of specific relevance during psychomotor skill learning. A safe learning environment in the absence of threat (such as the possibility of unintentional harm caused to patients when the student has not yet mastered the skill) is provided in the clinical laboratory (discussed in 4.4.2.2 and 6.5.1).

Self-actualisation (as proposed by Maslow), is an inherent part of the

development of student nurses. They need to be socialised into the profession and have to proceed through a maturation process in order to become independent, responsible and accountable professionals. The professional nurse needs to acquire the traits of a self-actualised individual in order to fully understand the uniqueness of human beings in their socio-cultural context and the health-illness continuum. The self-actualised person posesses characteristics such as self-sufficiency, autonomy, independence, spontaneity, sensitivity, openness, a sense of humour and the ability to handle stress. These are the characteristics described by Maslow as belonging to the self-actualised person, and these were also found in expert nurses as reported by various researchers (discussed in 4.4.2.3 and 6.5.4).

The visual presentation of the model shows theories of learning around the circumference of the first circle containing the educational models and the objectives. This illustrates the interrelationship between the different concepts. Theories of learning guide the educator in the selection of suitable educational models. The humanistic theories are more applicable when the models of experiential and adult learning are implemented, because of the emphasis on affective learning. Although the cognitive theories are suited to all four educational models, they are slightly more applicable when mastery and open learning are offered as these focus mainly on cognitive learning.

The triangle containing the different domains of objectives depicts the interrelationships with the educational models.

(4) Objectives

Objectives describe the required end behaviour of students after particular learning experiences. The preparation of students for nursing practice demands the setting of objectives in the cognitive, affective and psychomotor domains.

The use of behavioural objectives has been criticised in recent nursing literature for resulting in restrictive guidelines for evaluation, ignoring students' interest and stifling creativity (Bevis & Watson 1989:30). Objectives are, however, valuable for guiding instruction and learning. Creativity experts propagate that the setting of objectives on the higher levels of the cognitive domain stimulate the development of creative thinking skills (Neethling 1993).

- **Cognitive objectives** should be set on the higher levels of Bloom's taxonomy which include analysis, synthesis and evaluation, in order to stimulate creative thought. The lower levels, knowledge, comprehension and application, can, however, not be omitted as they are necessary for the development of a sound knowledge base which forms the basis of creative endeavour (discussed in 4.3.1.1).

  When De Corte's classification is used for the setting of objectives, it is essential to set these on the productive operation level which includes interpretive production, convergent production, evaluative production and divergent production of information. These are the activities which stimulate creative thought. The setting of objectives on the receptive-reproductive operations level materialises in reproduction of information which encompasses memorisation and comprehension. These lower levels are again necessary to gain background knowledge (discussed in 4.3.2.2 and 4.3.2.1).

  Development of the cognitive domain is congruent to the empirics pattern of knowledge in nursing practice (discussed in 6.5).

- **Affective objectives** include the levels of receiving, responding, valuing, organisation and characterisation. The setting of objectives on all these levels will stimulate creative thought as the affect plays a very important part during creative endeavour. These activities result in the development of sensitivity,

expressiveness, commitment, perseverance and holistic perception, which have been reported as part of creativity (discussed in 4.3.1.2). Development of the affective domain plays an important role in acquiring knowledge in the aesthetic, personal knowledge and ethics patterns of nursing practice (discussed in 6.5).

- **Psychomotor objectives** guide the teaching of psychomotor skills which are a significant aspect of nursing because it is largely a practical endeavour. These skills require practice and repetition in order to be learned. The characteristics of a skilled performance include accuracy, speed, efficiency, timing, consistency, anticipation, adaptability and perception (Quinn 1989:93-95). The characteristics including anticipation, adaptability and perception only materialise with experience which means having performed the skill in real nursing care situations. These are the characteristics of skills as performed by expert nurses and can be linked to creativity because the skills are adjusted in the presence of a special sensitivity together with a kinaesthetic awareness, to suit a particular situation. The development of the psychomotor domain involves both the empirics and aesthetic patterns of knowing of nursing practice. As was mentioned in 6.5.1, kinaesthetic awareness and cognitive ability are essential in order to perfect a motor skill.

The visual presentation of the model shows the objectives in a triangle in the middle of the circle surrounding the educational models. Each domain has been placed on a particular side of the triangle for a specific purpose. The affective side is joined to the experiential learning model because of its suitability to the teaching of affective skills. In the same way, the mastery learning model is connected to the psychomotor side which indicates its special appropriateness to the teaching of psychomotor skills. The cognitive side is combined with both the adult learning and open learning models which depicts their appropriateness for teaching cognitive skills. However, all four models are compatible to the teaching of cognitive, affective and psychomotor skills.

The interrelatedness amongst the cognitive, affective and psychomotor domains is illustrated by enclosing them within a triangle. These interrelationships have been discussed in 6.5.

(5) **Educational models**

The four educational models have been selected on the basis of their particular suitability to nursing education and their student-centred approach. **Adult learning** is specifically applicable to nursing education because a significant percentage of student nurses are adults whereas the remainder are at the stage between adolescence and adulthood. **Mastery learning** is very appropriate for teaching the psychomotor skills which are an important part of a practice discipline. **Experiential learning** provides a perfect match for the teaching of a humanistic practice discipline as it provides holistic and active participation in learning experiences. **Open learning** offers ideal opportunities to nurse practitioners for continuing education in a profession which constantly demands the updating of its members' knowledge.

An analysis of the four educational models has revealed a common aim and assumptions that are congruent to creativity and essential to nursing education when the aim is to produce a creative nurse practitioner (discussed in 5.6.1).

Self-development which involves growth, maturation, unique human experiences, and self-actualisation appears to be the common aim. The abilities which are developed during these processes include self-confidence, competency, empowerment and sensitivity as well as the traits that characterise self-actualised individuals (discussed in 5.6.1 and 4.4.2.3). The professional nurse needs to be a self-actualised person in order to cope with human suffering in a world which tends almost to be overwhelmed by technology.

Student-centredness refers to self-directedness and independency. Students take responsibility for their own learning and their needs have first priority. This fosters self-reliability, self-discipline and independence and increases ego-strength. The student nurse is therefore offered the opportunity to become an independent and effective practitioner (discussed in 5.6.1).

Active participation in the learning experiences is advocated by all four models. It facilitates discovery learning, productive learning, reflective thinking and metacognition by way of doing, experiencing and reflecting. Active participation is essential to the learning of psychomotor and affective skills. Individuals can only develop their creativity through direct experience (discussed in 5.6.1).

Problem-centred refers to inquiry, experimentation and discovery. It involves formulating hypotheses, considering alternatives, fluency, flexibility, convergent and divergent thinking, analysis and synthesis. It provides opportunities for the development of formal operational thought and productive learning. Creative learning is problem-centred (discussed in 2.5.1.2).

Cooperative learning involves learning from others' experiences, ideas, values, attitudes, feelings and perceptions. This provides an expanded framework from which the student can enhance her own knowledge base. Reflective thought, metacognition and both social and personal development, are facilitated. Cooperative learning offers security and psychological safety to the young student nurse through peer-support. This leads to self-confidence, flexibility, openness and sensitivity which are pre-requisites for creative growth (discussed in 5.6.1).

Intrinsic motivation is the driving force behind creative endeavour. It is derived from interest, curiosity, challenge, enjoyment and passion and other factors arising from the internal self of the individual. The student nurse needs to be intrinsically motivated in order to become an effective nurse practitioner as nursing is a very demanding

profession (discussed in 2.5.2.2.4).

A variety of learning activities ensures that students with different learning styles are accommodated and that opportunities are provided for cognitive, affective and cognitive learning. It facilitates whole brain learning, and thus creative learning, as stimulation is provided to all four quadrants of the brain (discussed in 5.6.1).

Self-evaluation is an important aspect of nursing education as nurse practitioners need to continually evaluate themselves to establish whether they are effective in practice and updated in their knowledge. It promotes persistence and increases responsibility, self-esteem and self-honesty. Self-evaluation is conducive to the development of creativity (discussed in 2.5.2.2.2, 2.5.2.2.3 and 5.6.1).

The visual presentation of the *nursing education model for the fostering of creativity* depicts the common aim and assumptions of the four educational models encircled in the first circle. The arrow which departs from the first circle containing the educational models and objectives, points directly to the second circle which depicts the cognitive styles on its periphery and the innovative teaching strategies internally. This indicates the relationship between educational models, cognitive styles and teaching strategies. Within the selected educational models, the educator has to organise teaching in such a way that different cognitive styles are accommodated. This can be realised in the choice of teaching strategies and the guidance given to students during learning activities.

(6) Cognitive styles

Cognitive or learning styles refer to the different ways in which individuals perceive and organise information. It is essential for the nurse educator to be familiar with the cognitive styles of her students so that she can organise her teaching to accommodate different styles with the aim of enhancing all her students' learning.

Field-dependent students tend to be right brain (D- and C-quadrant) dominated as they prefer to learn through visualisation, perceive holistically, find it easy to learn social material and show a sensitivity to others' feelings. They will thus benefit from innovative teaching strategies which include imagery and fantasy, metaphorical thinking, synectics, humour, role play, sociodrama and simulation. However, their left brain (A- and B-quadrant) also needs stimulation as they find it difficult to analyse, solve problems and structure information (discussed in 4.2.1.2). Teaching strategies grouped within the A- and B-quadrant might be helpful (see figure 7.5).

Field-independent students prefer left brain processes and are good with problem-solving, analysis and structure and reorganisation of information. They tend to be autonomous and work independently. These students would prefer innovative teaching strategies including brainstorming, creative problem-solving, writing, case study, written and computer stimulations. This group of students should, however, also be stimulated to use their right brain processes and need special assistance with the learning of social subjects and the development of interpersonal skills such as communication and empathy (discussed in 4.2.1.2). Teaching strategies grouped within the D- and C-quadrant might be helpful (see figure 7.5).

The **assimilator**, **diverger**, **accommodator** and **converger** are the four cognitive styles identified by Kolb (1976) and have been discussed in detail in 4.2.2.1, 4.2.2.2 and 4.2.2.3.

Assimilators learn through abstract conceptualisation and reflective observation which indicate brain dominance in the A- and D-quadrant. These students prefer abstract thinking and approach problems in a scientific way. They observe and describe ideas and concepts in order to understand them. Practical applicability is not regarded as important. They tend to use intuition when searching for the meaning of situations and prefer to rely on their own thoughts. They are not feeling-oriented but value precision, and the aesthetic quality of a structured conceptual system.

Divergers show a preference to learn through concrete experience and reflective observation. This depicts brain dominance in the C- and D-quadrant. These students use their imagination to view concrete situations from many perspectives. They prefer action, enjoy relating to others and are feeling-oriented. They have an open-minded approach, are good intuitive decision-makers and function well in unstructured situations.

Accommodators use concrete experience and active experimentation which indicate a preference for the C- and B-quadrant. These students prefer doing to thinking and solve problems by trial-and-error. They are good at getting things done, adapt easily to changing situations, seek opportunities and take risks. They rely on others for information and are at ease with people. They use D-quadrant processes to a lesser extent.

Convergers learn through active experimentation and abstract conceptualisation which indicate a preference for B- and A-quadrant processes. These students are good at problem-solving, decision-making and the practical application of ideas. They tend to be unemotional and prefer to focus on problems requiring convergent thinking. They prefer technical problems to interpersonal issues.

In the visual presentation of the model, Kolb's four learning styles have been placed on the periphery of the circle indicating the whole brain model. They are situated in a way that illustrates which quadrants of the brain they show a preference for. Figure 7.5 gives and indication of the innovative teaching strategies from which students with different cognitive styles would benefit.

The visual presentation of the model shows innovative teaching strategies in the centre of the second circle with arrows pointing to all four quadrants to indicate that they stimulate whole brain learning.

(7) **Innovative teaching strategies** facilitate a creativity inducing learning environment and foster creative learning. They focus on problem-solving, accommodate the different cognitive styles, stimulate all four quadrants of the brain, and thus enhance whole brain learning. The strategies discussed in this thesis have additionally been selected on the basis of their particular applicability to nursing education. They include brainstorming, creative problem-solving, teaching by metaphor, synectics, humour, writing, role play, sociodrama, values clarification, visualisation (imagery and fantasy), case study and simulation, as discussed in chapter 7.

- The **learning environment** is an important determinant in the facilitation of creative learning. The implementation of innovative teaching strategies requires the creation of an open psychologically free environment. This implies the absence of external evaluation and criticism, in a climate in which the student feels free to explore, experiment and take risks. An atmosphere of authenticity is established wherein the student is accepted as unconditionally worthy and where mutual respect and trust prevail. A non-judgemental atmosphere is created in which self-evaluation is encouraged and judgement deferred. This allows students to become self-directed in their learning and to enjoy individual as well as collaborative learning in a relaxed environment. They become more sensitive to the moods and feelings of others and to external stimuli, and optimum learning can thus take place. Intrinsic motivation is increased because learning is enjoyed and external threats such as evaluation and competition are absent, and the learning environment is student controlled. (The creativity inducing learning environment is discussed in detail in 2.5.2.2.3 and 5.6.2, and is illustrated in table 5.2 and figure 7.4.)

- **Creative learning** is essentially problem-solving in nature and is facilitated through experiential learning which implies active participation. It is developed through discovery learning (allowing inquiry, exploration and experimentation)

and through cooperative learning (providing exposure to others' ideas and knowledge which enhances one's own frameworks of reference and knowledge). Experiential and discovery learning provide ideal opportunities for the facilitation of productive learning. Students explore and become sensitive to problems, deficiencies and gaps in knowledge, they search for solutions, formulate hypotheses and test them, modify solutions and gain new knowledge in the process. Productive learning involves reflective thinking, metacognition and formal operational thought. These cognitive operations are characterised by the abilities of analysis, synthesis, evaluation, intuiting, perception, internal visualisation, penetration, fluency, flexibility, redefinition and originality. All these processes are linked to creative learning (discussed in 2.5.1.1, 4.3.1, 4.3.2 and 4.4.1). Creative learning necessitates whole brain learning as thinking processes from all four quadrants are essential (see figure 3.2). The visual presentation of the model illustrates with an arrow that innovative teaching strategies result in the production of a creative nurse.

(8) The concept **creative nurse**, is enclosed in a circle presenting the whole brain model. This implies that the creative nurse uses thinking processes from all four quadrants of the brain. The traits of an innovative and creative nurse are congruent to those exhibited by the expert nurse practitioner. The expert nurse is capable of critical and analytical thinking, and combines logical and rational thought with intuition during clinical judgement. Expert nurses exhibit flexibility, sensitivity, perceptiveness, vision, and proficiency. They approach patient situations holistically and contextually and can anticipate potential patient problems. They can synthesise opposite traits, for example, exhibiting outer calmness while experiencing inner anxiety during emergencies, being spontaneous in one situation and reserved in another, and being caring or being detached, depending on what the situation requires. Maslow refers to this phenomenon as a *resolution of dichotomies* found in the self-actualised individual (see 2.5.3). The expert nurse is organised, well-informed,

independent, compassionate and feeling-oriented, but also factual and procedural (see examples in chapter 6, discussion in 6.5.4 and illustration in figure 3.2).

8.5 EVALUATION OF THE MODEL

The model is evaluated according to the criteria set by Maker (1982:10-11) which include the criteria identified by Reigeluth (1983:26) for the evaluation of instructional models.

(1) Appropriateness to the situation

This refers to the purposes of the model, whether it corresponds with the needs of the students and the philosophy of the educational institution, and to what extent the assumptions of the model fit reality.

The need for innovative and creative nurse practitioners in the contemporary and future health care delivery system, is presented and discussed in chapter 6. The model has been designed to educate students for nursing practice and is based on the general prevailing philosophy of nursing. The underlying assumptions which state for example that whole brain learning results in more effective nursing practice and that creativity can be developed in students, are on par with reality. This was illustrated in the analysis of the nature of nursing practice and the characteristics and abilities of the expert nurse (see chapter 6).

(2) Comprehensiveness

This involves the total variation that can be accounted for which includes content-, process-, product- and learning-environment modifications.

The content which is accounted for in this model includes the four patterns of knowing

The content which is accounted for in this model includes the four patterns of knowing in nursing and can be modified according to students' needs. Depending on whether students need more development regarding empirics or personal knowledge, objectives can be focussed on either the cognitive or the affective domains.

Process modification refers to the teaching methods used and the thinking processes required from the students. This model includes a variety of teaching strategies which stimulates the different thinking processes of all four quadrants of the brain. Teaching strategies can also be varied to suit different cognitive styles.

Product modification is concerned with the end result of education, in this case the newly qualified nurse practitioner. The modification provided by this model is that it not only produces an educated nurse, but an innovative and creative nurse who can function dominantly in any one of the four quadrants, depending on what the situation requires. For example, a caring moment relies heavily on C-quadrant processes whereas an emergency situation relies mainly on A-quadrant processes.

This model suggests various modifications to the psychological learning environment in order to create an environment conducive to the fostering of creativity.

The model contains overall comprehensiveness because it includes a variety of educational models, theories of learning, cognitive styles, objectives and teaching strategies.

(3) **Flexibility or adaptability**

This refers to the ease with which the model can be adapted to all content areas and to the administrative structure of the educational institution, whether it can be combined with other models to provide a comprehensive programme and how adaptable it is to individual differences in students.

The model offers flexibility regarding the choice of educational models, objectives and teaching strategies which can be selected to comply with the nature of the content. It can be adapted to the administrative structure of any nursing education institution as implementation depends on the skill and knowledge of the individual nurse educator. It can be combined with other educational models (as mentioned in 5.1) as long as the basic principles of teaching for creativity are considered. The model is very adaptable to individual differences as it offers a variety of theories of learning, educational models, and teaching strategies, and considers different cognitive styles.

(4) **Practicality**

This concerns the availability of materials to implement the model, the cost of materials, special training needed and the ease with which the model can be implemented in the present situation.

The model can be implemented without any additional materials or costs because teaching strategies can be varied and adapted according to circumstances (whether in the presence or absence of media centres) (discussed in chapter 5). No special training is needed except that nurse educators should be encouraged to read widely about creative learning or to read this thesis in its entirety in order to arrive at a better understanding of the concept of creativity in education. This model can be implemented immediately in the present situation by nurse educators as an individual endeavour.

(5) **Validity**

The questions asked here are whether the model was developed by using appropriate methods, and if it is defensible as a qualitatively different programme for student nurses. Is the model internally valid or structurally sound, and how much research has been done to show its effectiveness as an educational approach?

The method used to develop this model was an analytical study of the literature concerning all the concepts included in the model. The model is based on assumptions derived from this analysis of research findings. It is defensible as a qualitatively different approach to the education of student nurses as the teaching strategies and required learning environment have been proved through repeated testing in creativity courses. As this model has yet to be tested in practice, no research is available to show its effectiveness in nursing education. However, according to Field and Morse (1990:139), validity in qualitative research refers to the extent to which the research findings represent reality. On the basis of the homogeneity found on analysis of various research studies in the literature which lead to the design of this model, the model can be regarded as having internal validity.

8.6 CONCLUSION

The description of the *nursing education model for the fostering of creativity* marks the consummation of this research study. The model presents a challenging, new approach to nurse educators. It is hoped that they will disclose the vision, openmindedness, flexibility and compassion, to instill in their students a free and inquiring mind, a passion for nursing, and the courage to cope with change and challenges.

CHAPTER 9

Summary, conclusions and recommendations

9.1 SUMMARY

This study originated against the background of much debate on the need for the development and expression of creativity in nursing. The focus of the concern is the nurturing of creativity in student nurses. Students need to be prepared to solve the complex problems in the health care environment resulting from ever-expanding knowledge, advanced technology and changing human values. The complexity of contemporary nursing requires that practitioners respond and adapt to unique patient-situations. The ability to solve problems effectively and make high level decisions based on a firm knowledge base, is expected of the professional nurse (Jones 1983:405; Klaassens 1992:28) (see 1.1).

Nursing is a growing and changing profession and requires from practitioners innovative, unconventional and independent thinking in order to cope with, and adapt to change. Creativity is viewed as a means to help nurses cope with rapid changes in the health care

environment, while at the same time providing for more holistic and individualised care. Individualistic and imaginative patterns of patient care have become essential to professional practice (Ferguson 1992:18-19; Lantz & Myers 1986:65).

As found throughout this study, much of the literature on nursing research repeatedly indicates that there is an urgent need for nurse educators to stimulate creative thinking skills and assist students to problem solve effectively, and to explore innovative teaching strategies applicable to nursing education. The study was undertaken against this background ie to determine the nature of creativity and the processes involved in creative thinking and learning, and with these in mind to develop a nursing education model which incorporates innovative teaching strategies.

More specifically, the aim of the study was to

- explore the concept creativity, by analysis of its various definitions and theories
- analyse the whole brain theory of creativity
- establish the relationship between cognitive styles and teaching for creativity
- indicate the role of learning objectives in the development of creative thinking skills
- determine the relation between theories of learning and creativity
- identify educational models of specific relevance to nursing education which facilitate creative learning
- analyse the practice of nursing in order to indicate whether creativity is needed

- identify and describe innovative teaching strategies applicable to nursing education

- develop a nursing education model which would foster creativity in student nurses

As a point of departure, the various theories of creativity and the whole brain theory serve as the conceptual framework on which this study is based. The first chapter gives the background and outline of the study. Chapters 2 to 7 involve an analytical study of the literature, and chapter 8 encompasses a description of the designed model. This chapter contains the conclusions reached from the study and recommendations for further research.

9.2 CONCLUSIONS

The conclusions are discussed using the same headings as are given in the previous chapters. They are derived from the analysis of the relevant literature.

9.2.1 Modern conceptions of creativity

There are basically two opposing views about creativity. The traditional view explains it as a special talent which is inherited and belongs only to a few superior individuals. The more recent view refers to it as an authentic human ability which can be further developed by education and a suitable environment. Some researchers theorise that although creativity may be biologically determined, it can still be enhanced through environmental conditioning (see 2.2 and 2.3.4). This leads to the conclusion that creativity can indeed be developed.

9.2.2 Definitions of creativity

Although the various definitions of creativity either refer to the person, product or process, certain common aspects are identifiable (see 2.4). It can be deduced from the given definitions that creativity involves the ability to free oneself from one's own conceptual frameworks of reference in order to see something from a different perspective, to become intensively involved, in a given situation, or to synthesise and to produce a novel idea or product.

9.2.3 Theories of creativity

9.2.3.1 Cognitive, rational and semantic theories

9.2.3.1.1 Cognitive abilities

These theories view creativity as being largely set in the cognitive domain. They focus on the creative process and product. In Guilford's structure-of-intellect model, the operations involving divergent production and the products involving transformations are linked to creativity. The abilities inherent to divergent thinking, are congruent to the key-creative abilities as identified by Torrance: ideational fluency, flexibility, elaboration, originality and semantic redefinition. Guilford's transformations concur with Torrance's concepts of synergy, synthesis and redefinition (see 2.5.1.1).

It can be deduced from Torrance's process and artistic definitions of creativity that it involves both the cognitive and affective domains. Apart from the cognitive processes mentioned above, the uneasiness resulting from tension mentioned in the process definition, and the references to listening and singing in the artistic definition, refer to involvement of the affect. From Torrance's survival definition of creativity, it can be concluded from his use of the words ... *taught* ... *self-discovered* ... *self-disciplined* ..., that creativity necessitates practice, learning, intense involvement, effort and persistence

(see 2.5.1.1).

9.2.3.1.2 Creative problem-solving

Research and theories on the creative problem-solving approach reveal that the creative process involves four basic processes, namely, preparation, incubation, illumination and verification. These prevail irrespective of whether theorists describe creative problem-solving as encompassing five or seven stages. From the descriptions of various creative geniuses, such as Helmholtz and Poincarè, the following can be concluded: Creativity requires a sound knowledge base, hard work and dedication (especially during the preparation and verification phases). It takes some contemplation of a problem which should be considered from many different perspectives and then, after leaving it aside for a while, a creative idea often comes to mind - this is known as the incubation phase. A creative idea appears when the mind is at rest, such as just before awakening from sleep or when a person is in a relaxed state. This is referred to as the illumination phase (see 2.5.1.2).

9.2.3.1.3 Associative theories

These theories refer to creativity as encompassing the connection of previously unrelated ideas or levels of experience. Analysis of this cognitive operation leads to the conclusion that it involves certain key-abilities of creativity, namely, fluency, flexibility, penetration, synthesis and elaboration (see 2.5.1.3).

- **Gestalt theories**

Creativity is believed to involve the reconstructioning of a pattern, gestalt or problem, and reference is made to the negative influence that rigidity or fixed mental sets have on this process (see 2.5.1.4). It can be deduced that psychological openness, sensitivity, penetration and flexibility (key-abilities of creativity, discussed in 2.5.1.1) are necessary

to break away from such fixed mental sets. The ability to view something from a different perspective is repeatedly mentioned in the various definitions of creativity (see 2.4).

Wertheimer specifically refers to the relationship between creative thinking and productive thinking, as both involve grouping, organisation and structuralisation (see 2.5.1.4). It can be concluded that creative thinking is synonymous with productive thinking, as they use the same cognitive processes, namely analysis, synthesis and evaluation.

9.2.3.2 Personality and environmental theories

- **Personality theories**

The personality theorists believe that the creative person exhibits certain personality traits, attitudes and behaviour. The creative individual is characterised by ego-strength, independence, flexibility, sensitivity, perceptiveness, intellectual effectiveness, an openness to experience, vision, and a positive attitude towards life (see 2.5.2.1). The openness, flexibility and sensitivity have also been emphasised by the cognitive theorists (see 2.5.1.1 and 2.5.1.4). Some theorists regard creative people's behaviour as non-conforming.

A unity of opposites has been described in highly creative people. This implies that they are at the same time more independent and more dependent, more non-conforming and more conforming, more open and more self-acting (see 2.5.2.1). They can apparently maintain an equilibrium between these opposing characteristics because of their flexibility, perceptiveness and ego-strength.

- **Environmental theories**

No comprehensive theories exist on the role that the environment might play in the development of creativity, but specific issues are addressed.

Regarding **social** and **cultural influences**, it is evident that the exaggerated emphasis placed on conformity, competition and success in the Western society has a negative influence on creativity (see 2.5.2.2.1). The emotional blocks caused by a fear of rejection, failure or being different, apparently *freeze* creativity.

The literature on the required **learning environment** for the enhancement of creativity, repeatedly reveals the need for psychological freedom and security, the absence of external evaluation (because it produces defensiveness), deferred judgement and extended effort (see 2.5.2.2.2). It is deduced that an environment that adheres to these criteria is conducive to the generation of creativity.

Teacher attitudes appear to play a very important role in the creativity inducing learning environment. Reference is made to the negative influence that rigid and authoritarian teachers have on their students' creativity. They do not allow individual exploration and experimentation, overemphasise success and external evaluation and therefore inhibit self-directed and self-responsible learning (see 2.5.2.2.3). Such teachers stifle creativy. The open teacher who creates a learning environment conducive to creativity encourages students to use their imagination and allows self-activity, experimentation, hypothesising, spontaneous expression, and self-evaluation, while accepting every student as being unconditionally worthy (see 2.5.2.2.3).

Research studies on **rewards** and **motivation** indicates that rewards and extrinsic motivation do not stimulate creativity but that intrinsic motivation plays an important role during creative performance (see 2.5.2.2.4). It is deduced that intrinsic motivation which results from curiosity, interest, challenges and passion is essential to creativity.

These same qualities have been found in the *beyonders* as reported by Torrance (see 2.5.2.1).

9.2.3.3 Humanistic theories

To the humanists, creativity is realised by a passion and commitment to live a full and productive life. They emphasise the need for an intensive encounter of the person with the real world, devoid of stereotyped views (see 2.5.3). This implies openness, freedom from fixed perceptions, and cognitive and emotional involvement. These qualities have also been mentioned by the cognitive theorists (see 2.5.1.4 and 2.5.1.1) as being part of creativity.

The distinction made between special talent and self-actualising creativeness (see 2.5.3) concurs with the two different approaches to creativity as mentioned in 2.2. It is interesting to note that Maslow's description of self-actualising creative individuals is congruent to the creative personality as reported by the personality theorists. The corresponding traits include openness, independence, ego-strength, perceptiveness, courage and expressiveness. Maslow affirms the personality theorists' view regarding a unity of opposites in creative people, which he calls a *resolution of dichotomies* (see 2.5.3 and 2.5.2.1).

Rogers elaborates on the concept of psychological freedom which is such an important factor in a learning environment conducive to creativity. Accepting the student as unconditionally worthy, understanding emphatically and providing a climate where external evaluation is absent, are essential elements in providing psychological safety. From these assertions and Rogers' reference to the relationship between internal locus of evaluation and creativity (see 2.5.3), it can be concluded that self-evaluation should be encouraged during the fostering of creativity.

9.2.3.4 Psychoanalytic theories

These theories view creativity as deriving from the unconscious and preconscious. Their descriptions of the role of the unconscious, preconscious and primary process thinking during the creative process (see 2.5.4) lead to a better understanding of the concept creativity. Primary process thinking (whether as a preconscious or unconscious process) occurs on the verges of sleep and involves remote associations and metaphorical thinking, and is said to release creative ideas. It is deduced that it plays a role during incubation and illumination because it concurs with Helmholtz and Poincare's descriptions when they received their *sudden inspirations*. It can also be concluded that creativity necessitates both unconscious and conscious processes as both preparation and verification involve conscious processes.

9.2.4 The whole brain theory of creativity

9.2.4.1 Left and right hemispheric specialisation

The differences between the functions of the left and right hemispheres, revealed by the split brain studies during the 1960s, lead to the assumption that creativity resides in the right hemisphere. The reason for this being that the right hemisphere was attributed with holistic, intuitive and creative imaginative processes and the left hemisphere with verbal, analytical, and logic processes. Recent research, however, shows that creativity necessitates cooperation between the hemispheres (see 3.1, 3.2 and 3.3). It can be concluded that creative performance necessitates functions from both hemispheres as the key-abilities of creativity such as analysis and redefinition, refer to left hemispheric, and synthesis, sensitivity and synergy to right hemispheric functions (see 2.5.1.2 and table 3.1).

The situational and iterative functioning of the brain explains how an individual moves through the phases of the creative process by using left or right brain processes (see

3.4.2). During the preparation and verification phases, left brain processes, such as analysis and abstract thinking are used. This refers to situational functioning as the left brain is activated (see table 3.1). When the individual moves from the preparation to the incubation and illumination phases, iteration occurs between the left and right hemispheres as intuition and visualisation are the processes required (see 2.5.1.2 and table 3.1).

It can be deduced from the research findings on brain specialisation that individuals who tend to approach problems analytically and factually are left brain dominated while those who approach problems intuitively and visually are right brain dominated (see 3.5.1 and table 3.1). This dominance in brain functioning is believed to determine a person's cognitive style (preferred mode of knowing).

9.2.4.2 The four quadrant model

The four quadrant model which was developed by Herrmann (1989) gives a finer distinction of the left and right hemispheric functions. On the basis of the type of questions he asked in his questionnaires and the four distinct clusters which appeared on analysis of more than 500 000 questionnaires (see 3.5.1), it can be concluded that the four quadrant model is valid and reliable.

The four quadrant metaphorical model (encompassing the A-, B-, C- and D-quadrant) can be regarded as a whole brain model because it distinguishes between the left and right cerebral hemispheres and the left and right halves of the limbic system and therefore represents both conscious and unconscious thinking processes. The limbic system is the centre for instinct and feeling and thus represents the id and the unconscious as described by Freud (see 2.5.4 and 3.4.1). The left and right cerebral hemispheres are referred to as the neocortex which is responsible for the higher thought processes (see 3.4.1).

Herrmann's findings on the distribution of brain dominance reveal that most individuals (60%) are double dominant which indicates that they show a preference for using two particular brain quadrants. A smaller number of individuals are triple dominant (30%) meaning that they tend to use three specific brain quadrants most of the time. A small percentage is single dominant (7%) using only one brain quadrant and only a very few (3%) are quadruple dominant (see 3.5.1). The latter group is believed to be highly creative because they use all four quadrants (see 3.5.2).

9.2.4.3 The whole brain model in relation to creativity

The creative process as described by Wallas (see 2.5.1.2) relies on all four quadrants of the whole brain model. From the thinking processes identified as characteristic of each quadrant (see figures 3.2 and 3.3), it can be deduced that the creative process necessitates whole brain thinking (see 3.5.2 for specific detail).

Various researchers view creative geniuses, for example, Da Vinci, Einstein and Kekulé, as being skilled in using both left and right brain processes and attribute their extraordinary talent to their use of their non-dominant quadrants. It is postulated that strengthening of the non-dominant brain quadrants, enhances the functioning of the dominant quadrant (see 3.5.2). If this is the case, the conclusion can be drawn that individuals can enhance their creative performance by exercising their non-dominant quadrants.

The experiences of Einstein and Kekulé who both encountered their periods of illumination (when great discoveries were made) through dreams (see 3.5.2), concur with those of Helmholtz and Poincaré (see 2.5.1.2). It affirms the role of unconscious processes during the creative process. The role of the C- and D-quadrant processes indicated by the emotional involvement in dreams and the holistic and synergistic visual images, are clearly illustrated. As no scientific problem can be solved without vigorous rational, analytical, detailed and sequential thinking, it can be concluded that the A- and

B-quadrant processes were also used during the processes which lead to their great discoveries. It is therefore deduced that whole brain thinking is essential to creativity.

Herrmann views creative people as having a primary preference for the D-quadrant with strong secondary preferences in the other quadrants (see 3.5.2). As almost all definitions of creativity make reference of synthesis (see 2.4), it can be concluded that Herrmann might be correct as synthesis is a D-quadrant process.

9.2.4.4 The whole brain teaching and learning model

It can be inferred from Herrmann's whole brain teaching and learning model (see figure 3.4) that a combination of structured and experiential learning activities are required to facilitate whole brain learning. Students should be supported in their preferred mode first, and then in their non-preferred modes in their efforts to develop whole brain functioning.

The structured teaching-learning environment required for students showing a preference for the A- or B-quadrant indicates that they are verbally oriented, rational and disciplined, and have inquiring minds. The differences between the two are that while the A-quadrant dominated students are analytical, fact-based, intellectually inclined and achievement driven, the B-quadrant dominated students are procedural, controlled, kinaesthetically inclined and task driven. The latter individuals are thus the more practical (see 3.5.3 and figure 3.4). The similarities and differences are accounted for by the teaching strategies illustrated in figure 3.5.

The experiential teaching-learning environment appropriate for students with a preference for the D- or C-quadrant discloses that they are non-verbally oriented, spontaneous, explorative and inquisitive. D-quadrant dominated students are, however, visual, intuitive, open-minded and independence driven, whereas the C-quadrant dominated students are emotional, expressive, and feelings driven (see 3.5.3 and figure

3.4). The teaching strategies in figure 3.5 illustrate an emphasis on visualisation for the D-quadrant and on interpersonal activities for the C-quadrant.

It is concluded that the whole brain teaching and learning model can assist educators to implement a more holistic approach towards teaching.

9.2.5 Cognitive styles

Cognitive styles refer to consistent individual differences in the manner in which information is organised and processed. Modes of perceiving, remembering and thinking are involved. As Herrmann refers to an individual's preferred mode of knowing as his preference for a specific brain quadrant, it can be deduced that cognitive style and brain quadrant preference are related (see 4.2).

9.2.5.1 The field-dependent/independent cognitive styles in relation to whole brain learning

9.2.5.1.1 Field-dependency

Analysis of the literature on cognitive styles reveals that field-dependent individuals tend to perceive patterns holistically, favour visual learning, are sensitive to others' feelings, work well in groups, are dependent on frequent feedback and find it easy to learn social material (see 4.2.1). These preferences indicate utilisation of the D-quadrant (visual, holistic) and C-quadrant (interpersonal, feelings, emotions) processes (see 4.2.1.1 and figure 3.2). It indicates double dominance in the D- and C-quadrant.

9.2.5.1.2 Field-independency

Field-independent individuals' preference for analysis, abstract thinking and fact-based theory, and their impersonal, independent approach refer to utilisation of A-quadrant

processes. Their ability to organise, structure and generate principles and rules from material and reorganise situations, depicts utilisation of B-quadrant processes (see 4.2.1, 4.2.1.1 and figure 3.2). These preferences indicate double dominance in the A- and B-quadrant. It can thus be concluded that field-dependent individuals are right brain oriented and field-independent individuals, left brain oriented.

9.2.5.1.3 Educational implications for whole brain learning

The field-dependent student's preference for D- and C-quadrant processes should be supported by selecting teaching strategies which facilitate visual and cooperative learning. For example, fantasy, simulation, clinical assignments, role play, field trips and values clarification can be used. They should be given clear objectives and frequent feedback. Their non-preferred A- and B-quadrant can be stimulated by offering formal lectures with visual media, case studies, group projects, learning packages, and programmed learning (see 4.2.1.2 and figure 3.5).

Field-independent students must be presented with teaching strategies which enhance independent problem-solving and analytical and sequential thought because of their preference for the A- and B-quadrant. Teaching strategies including reading assignments, individual projects, programmed learning and learning packages would be suitable. These students will need additional assistance with the social sciences. Their non-preferred D- and C-quadrant can be stimulated by simulation, clinical assignments, values clarification, role play and clinical post conferences (see 4.2.1.2 and figure 3.5).

It suggested that nurse educators should familiarise themselves with their students' cognitive styles. Field-dependent and field-independent students should first be supported in their dominant quadrants and then in their less preferred quadrants to stimulate whole brain learning and enhance creativity. The fact that psychiatric nurses tend to be field-dependent and surgical nurses field-independent (see 4.2.1.2) strengthens the case for the development of whole brain learning in student nurses as

their basic education requires competency in the various fields of nursing.

9.2.5.2 Kolb's experiential learning model

Kolb identified four modes of the learning process and each of the four cognitive styles described by him encompasses a combination of two of the four learning modes. His explanation of how individuals perceive reality through varying degrees of apprehension or comprehension relates to the whole brain model. Comprehension appears congruent to left brain processes (abstract, analytical, verbal, linear, sequential) and apprehension concurs with right brain processes (holistic, concrete, spatial, analogic, intuitive). Each of his learning modes appears to correspond with a different quadrant of the whole brain model (see 4.2.2, figure 4.1 and figure 4.2).

9.2.5.2.1 Modes of the learning process in relation to the whole brain model

- **Concrete experience** appears to be mainly C-quadrant oriented as individuals with a preference for this mode focus on experience and feelings, and value interpersonal relationships. An indication of a lesser utilisation of D-quadrant processes is illustrated in their reliance on intuition during problem-solving and their open-minded approach (see 4.2.2.1 and figure 3.2).

- **Reflective observation** tends to be linked to the D-quadrant. These individuals prefer intuiting the meaning of situations, have vision and approach problems from different perspectives. A lesser preference of the C-quadrant is elucidated in their reliance on their own feelings to form opinions (see 4.2.2.1 and figure 3.2).

- **Abstract conceptualisation** is strongly linked to the A-quadrant as these individuals approach problems in a scientific and abstract way and value logic and analysis. A lesser preference for the B-quadrant is indicated by their valuing

of precision and systematic planning (see 4.2.2.1 and figure 3.2).

- **Active experimentation** is mainly B-quadrant oriented as individuals who show a preference for this mode are goal directed, focus on practical application, and are good at getting things done. A slight preference for the D-quadrant is indicated by their willingness to take risks to attain their goals (see 4.2.2.1 and figure 3.2).

9.2.5.2.2 Kolb's four cognitive styles in relation to the whole brain model and the educational implications for whole brain creativity

Kolb's four learning styles cannot be directly categorised within the four brain quadrants of the whole brain model. Each learning style appears to be double dominant and not necessarily left or right brain oriented as some individuals present with a combination of left and right brain processes (see 4.2.2.3 and figure 4.2).

- The **convergent learning style** relies primarily on abstract conceptualisation and active experimentation which reveal double dominance in the A- and B-quadrant. Convergers are unemotional and are good at problem-solving, decision-making and practical application of ideas (see 4.2.2.2 and figure 4.2). It is suggested that they be offered teaching strategies appropriate to the A- and B-quadrant which include case studies, individual projects, learning packages, programmed learning and clinical learning experiences (see 4.2.2.3 and figure 3.5).

- The **divergent learning style** relies on concrete experience and reflective observation which depict a double dominance in the C- and D-quadrant. Divergers are feeling-oriented and enjoy relating to other people. They are imaginative and observant, view concrete situations from many perspectives, and can organise different relationships into a gestalt (see 4.2.2.2 and figure 4.2). The most appropriate teaching strategies for divergers appear to be those

classified for the C- and D-quadrant and include role play, simulation, values clarification, clinical post-conference, imagery and fantasy (see 4.2.2.3 and figure 3.5).

- The **assimilative learning style** utilises abstract conceptualisation and reflective observation which indicate double dominance in the A- and D-quadrant. Assimilators use inductive reasoning and abstract concepts, and synthesise dissimilar observations into integrated explanations. They are less interested in people (see 4.2.2.2 and figure 4.2). It is suggested that assimilators be offered teaching strategies appropriate for A- and D-quadrant oriented students which include reading assignments, individual projects, case studies, metaphorical thinking, imagery and fantasy, and clinical assignments (see 4.2.2.3 and figure 3.5).

- The **accommodative learning style** utilises concrete experience and active experimentation. Accommodators appear to be triple dominant in the C-, D- and B-quadrant (see figure 4.2). They adapt through opportunity seeking, risk-taking and action. They solve problems in an intuitive trial-and-error manner, and are at ease with people. They find it easy to adapt to rapidly changing situations. (action refers to the B-, easiness with people to the C-, and risk-taking to the D-quadrant) (see 4.2.2.2). It is deduced that the following teaching strategies from the B-, C- and D-quadrant may appeal to accommodators: programmed learning, learning packages, clinical learning experiences, simulations, field trips, clinical assignments and patient case studies (see 4.2.2.3 and figure 3.5).

Although students must be supported in their preferred modes of learning, they should also be taught to develop the processes of their less preferred modes (brain quadrants) to enable them to become flexible and whole brain learners.

9.2.5.2.3 The relation between cognitive style, brain dominance and professional occupation

There appears to be a close relationship between brain dominance and occupation. It is believed that individuals either choose occupations consistent with their cognitive style or are shaped by the fields they enter. The literature supports the view that individuals can strengthen their less preferred modes. Researchers have consistently found a congruence between Kolb's four cognitive styles and particular occupations (see 4.2.3 and figure 4.3). Significant similarities are detected between Herrmann's distribution of occupational patterns according to brain dominance and Kolb's classification of professional groups according to cognitive style (see figures 4.3 and 4.4). Both Kolb and Herrmann found nurses to be accommodators and divergers. (Herrmann reported triple or double dominance in the B-, C- and D-quadrant.) Other occupational groups included, reveal engineers and bookkeepers as convergers (A- and B-quadrant), and educators and social workers as divergers (C- and D-quadrant). Although double dominance is indicated according to Kolb's classification, Herrmann's classification gives a finer distinction by depicting the slightly stronger quadrant for each occupational group (see figures 4.3 and 4.4).

9.2.6 Instructional objectives

Teaching for creativity demands that objectives be set to stimulate creative thinking skills. As creative behaviour involves the production of something new and original, objectives which bring forth mere reproduction are not adequate. Analysis of Bloom's cognitive and affective taxonomies and De Corte's classification has revealed the following.

9.2.6.1 Bloom's taxonomy

Educators are being criticised by creativity experts for emphasising mainly the lower

levels of Bloom's cognitive taxonomy which lead to reproduction of information. It is the higher levels which stimulate creative production (see 4.3.1).

- **Cognitive domain**

The lower levels including knowledge, comprehension and application, are not regarded as creative skills. They are, however, necessary to form the foundation of knowledge in any field on which creativity is based (see 4.3.1.1 and 2.5.1.2). Analysis is not a creative skill but is a prerequisite to synthesis and evaluation; it involves identifying the elements presenting a whole. Synthesis and evaluation are regarded as creative skills. Apart from being a key-ability of creativity, synthesis is included in all the definitions of creativity. Evaluation involves the cognitive and the affect, and plays a role during the preparation, incubation and verification phases of the creative process (see 4.3.1.1, 2.5.1.1 and 2.5.1.2).

- **Affective domain**

It is concluded that the entire affective domain plays an essential role during creative endeavour. The lower levels including receiving and responding are on the first, valuing and organisation on the second, and characterisation on the third level of Treffinger's creative learning model (figure 4.5). Empathy, a central concept in caring, involves the two lower levels whereas the three higher levels require emotional commitment and rational cognitive processes. Attainment of these levels is essential to enable nurse practitioners to act effectively and consistently with regard to ethical issues (see 4.3.1.2).

9.2.6.2 De Corte's classification

De Corte and his co-authors' classification of more general aims of education includes two major categories, one of which the productive operations, is associated with creative

learning (see 4.3.2).

- **Receptive-reproductive operations** include apperception, recognition and reproduction of information which appear to concur with the first three levels of Bloom's cognitive taxonomy (see 4.3.2.1). These operations cannot produce creativity but are prerequisites for creative thought because they establish a sound knowledge base.

- **Productive operations** are directly linked to creative thinking abilities and are essential for effective problem-solving (see 4.3.2.2). Interpretive production of information requires internal visualisation, penetration and sensitivity (key-abilities of creativity - see 2.5.1.1). Convergent production requires rational, analytical and logical thought which are essential during the preparation and verification phases of the creative process (see 2.5.1.2). Evaluative production involves making a value judgement. It involves cognitive and affective processes, and plays a role during all the phases of the creative process (see 4.3.2.2). Divergent production occurs when there is more than one solution to a problem, and it encourages flexibility and fluency as well as the other key-abilities of creativity, because it is directly linked to creative thought.

  There appears to be a direct relationship between the operations in Guilford's structure-of-intellect model and De Corte's classification of objectives. Guilford's convergent production, evaluation and divergent production concur with De Corte's productive operations and indicate creative skills (see 4.3.2.2 and figure 4.6).

9.2.7 Theories of learning

Apart from being of particular significance to nursing as a humanistic science, the cognitive and humanistic theories appear to have a lot in common with creativity as they

encompass the affective and higher cognitive processes (see 4.4).

9.2.7.1 Cognitive theories

The cognitive theorists seek to explain unobservable aspects such as thought, memory, perception, concept learning, problem-solving and metacognition. They emphasise intrinsic motivation, the need to stimulate students' curiosity, and the provision of enjoyable learning experiences, which seem to be crucial to the development of creativity as reported by the environmental theorists (see 4.4.1 and 2.5.2.2).

- **Problem-solving and creative thinking**

Ordinary problem-solving does not necessarily require creative thinking, but many problems can be solved more effectively if creative thinking is involved. By providing practice opportunities with feedback together with time allowance for incubation in a relaxed and playful learning environment where judgement is suspended, a climate for creative problem-solving can be set. This facilitates psychological freedom and perceptual openness and stimulates fluency, flexibility and penetration as the environment concurs with the requirements for the development of creativity (see 4.4.1.1 and 2.5.2.2.2).

- **Metacognition and creative thinking**

Metacognition refers to a person's ability to think about his own thinking and exercising control over it. It involves forming associations and images, organising new information, predicting outcomes, evaluating effectiveness of attempts and changing to other strategies, if necessary. These processes require openness to experience, visualisation, flexibility, fluency and redefinition which are all key-abilities of creativity (see 4.4.1.2 and 2.5.1.1). Metacognitive thought thus involves creative thinking skills. The point of view that the development of nursing theory is a creative process requiring

metacognition, and that nurses who engage in metacognition can manipulate creative thought which enables them to practice more effectively are expressed in the literature (see 4.4.1.2). This affirms the relationship between higher cognitive skills and creative thought.

- **Piaget: formal operational thought**

Formal operational thought is a higher cognitive ability which encompasses abstract thinking, testing hypotheses, imagining ideal worlds, thinking beyond information presented, and forming concepts independent of physical reality. It concurs with Torrance's definition of creativity (formulating and testing various hypotheses) and requires flexibility, fluency, penetration, and redefinition (key-abilities of creativity) (see 4.4.1.3 and 2.5.1.1). Formal operational thought is viewed as a necessary but not adequate condition for creative problem-solving as it facilitates analytical, logical and divergent thinking but lacks the affective processes essential to creative performance. It is, however, important for nursing practice since it represents analytical, critical-evaluative and creative thought, and is a requirement stipulated by the South African Nursing Council (see 4.4.1.3).

- **Bruner: discovery learning**

Discovery learning, based on problem-solving, is one of the most influential cognitive models. It emphasises inquiry, discovery, curiosity and intrinsic motivation, which are congruent to the creativity-inducing learning environment (see 2.5.2.2.2 and 2.5.2.2.3). Bruner's concept of coding systems (see 4.4.1.4) appears to play a significant role during creative behaviour. It enables individuals to go beyond given information to form many associations and to build in new codes which lead to a deeper understanding of a problem. The creative behaviour materialises in psychological openness, visualisation, penetration, fluency, synthesis and redefinition (see 4.4.1.4).

9.2.7.2 Humanistic theories

Humanistic education focuses on the affective outcomes of learning: feelings, attitudes, values and beliefs, and is concerned with creativity and human potential. Self-directed and student-centred learning, intrinsic motivation and self-actualisation are emphasised and problem-solving, spontaneity and psychological freedom in the learning environment are encouraged. This concurs with the creativity inducing environment as created by the open teacher (see 4.4.2.1 and 2.5.2.2.3).

- **Rogers: student-centred learning**

This approach emphasises self-initiated learning which involves the cognitive and affective domains, active participation, self-evaluation and an educator-student relationship characterised by authenticity, trust, acceptance and emphatic understanding. Rogers' principles of learning comply with the requirements set by the environmental theories of creativity. Psychological freedom is granted by the nature of the educator-student relationship and by self-evaluation with the result that external threats are minimised. Experimentation and risk-taking are allowed which stimulate openness to experience, sensitivity and penetration. Apart from stimulating creativity, Rogers' theory is very applicable to nursing education as his principles of learning reveal the essential aspects of a caring relationship and environment (see 4.4.2.2 and 2.5.2.2.3).

- **Maslow: self-actualisation**

To Maslow, the ultimate goal of education is to assist the student towards self-actualisation. He proposes that the self-actualised person is a creative individual. The traits which he confers to the self-actualised individual have also been identified by the personality theorists (see 2.5.2.1). These include independence, autonomy, a strong ethical and moral outlook, self-sufficiency, spontaneity, flexibility, a sense of humour, and perceptiveness. These are the qualities which should be developed in student nurses

to enable them to become effective nurse practitioners as set out in the programme objectives by the South African Nursing Council (see 4.4.2.3).

9.2.8 Educational models and creativity

Educational models provide structural frameworks which guide educational planning and organisation of learning experiences. The four selected models are of particular relevance to nursing as a professional, humanistic, and practice discipline. They appear to have a lot in common with teaching for creativity, as they are essentially student-centred (see 5.1). Conclusions on the required learning environments for the four models are discussed at the end of this section.

9.2.8.1 Adult learning

Adult learning is a purposeful effort towards self-development and leads to a growing self-awareness and a readiness to make existential choices. It relates to Maslow's concept of self-actualising creativeness which involves openness to experience, independence, self-sufficiency, commitment and a problem-centred orientation (see 5.2.1).

9.2.8.1.1 Assumptions of adult learning

Adults display a **need to know** because they want to use their knowledge in real-life situations. This implies an eagerness to discover gaps in their knowledge (see 5.2.2.1) which is also found in creative individuals (see 2.5.1.2).

The independent **self-concept** displayed by adults enables them to be self-directed, a trait belonging to the self-actualised individual. Self-directed learners are capable of identifying their own cognitive styles (involves metacognition), use their intuition, and acquire knowledge through inquiry and problem-solving which lead to productive and

creative learning (see 5.2.2.2 and 4.3.2).

The **experience** which adults bring to the educational setting form a basis for transformations which encompass moving figure and ground and arriving at a better gestalt (see 2.5.1.4). This, together with the possibility that experience can be used as a basis for metaphor (see 5.2.2.3), indicates creative behaviour.

Adults become **ready to learn** when their existing knowledge proves to be deficient to cope effectively. As coping involves having to deal with change, it points to innovation and creativity is viewed as the vehicle for innovation. Readiness to learn is influenced by curiosity, mastery and challenge which stimulate creativity (see 5.2.2.4 and 2.5.2.2.3).

Adults' **orientation to learning** which is life- and problem-centred concurs with that of the creative individual. Problem-solving is viewed as complicated behaviour leading towards the formation of new principles of a higher order (see 5.2.2.5).

The phenomenon that adults are **motivated** by factors such as recognition, self-esteem, job-satisfaction, curiosity, interest and challenges, depicts intrinsic motivation which is also the motivating force behind creative endeavour (see 5.2.2.6 and 2.5.2.2.4).

9.2.8.1.2 Significance of adult learning to nursing education

Adult learning is particularly applicable to nursing education because it is problem-centred and student-centred, and encourages active participation and cooperative learning. Nursing practice requires skill in problem-solving and continuous interaction between the nurse, patient and other health team members.

The teaching strategies proposed by adult learning represent all four quadrants of the whole brain model. It is thus concluded that whole brain and creative learning can be

developed (see 5.2.4 and figure 5.1).

9.2.8.2 Mastery learning

The aim of mastery learning, to enable every student to attain the desired objectives and to develop to his/her fullest capacity, concur with the view on the development of creativity - freedom to develop one's own potential (see 5.3.1).

9.2.8.2.1 Assumptions of mastery learning

Student **aptitude**, **perseverance** and **ability** to understand instruction as well as the **quality of instruction** and **variety of learning activities**, influence learning. The breaking down of learning material into smaller units with specific objectives and the setting of several tests to facilitate frequent feedback are advocated (see 5.3.2).

As student aptitude refers to the amount of time required to master a learning task and perseverance to intrinsic motivation, a psychological free environment should be created wherein the student is accepted as unconditionally worthy and where exploration and practice are encouraged. The learner's ability to understand instruction, the variety of learning activities and the quality of instruction which influence learning, lead to the conclusion that whole brain teaching is required to provide stimulation for each quadrant.

It can be deduced that the breaking down of learning material into smaller units and the several tests set for each unit, followed by corrective instruction (see 5.3.2), support and encourage students to strive towards mastery, and do not impose the usual threat of external evaluation which is so detrimental to creative learning.

9.2.8.2.2 Significance of mastery learning to nursing education

Mastery learning is of particular significance to nursing because a certain level of mastery must be obtained in practical procedures in order to render safe patient care. A specific level of mastery is also required in subjects including anatomy, pathology, biochemistry and physiology to ensure safe practice (see 5.3.4).

Figure 5.2 illustrates how the teaching strategies proposed by mastery learning can be presented to facilitate whole brain learning and creativity. These strategies comply with the requirements of mastery learning as they facilitate self-pacing, cooperative learning, reflective observation, small steps and feedback, and make provision for aptitude and perseverance.

9.2.8.3 Experiential learning

Experiential learning is pragmatic, phenomenological and humanistic in nature and aims to merge abstract thinking and concrete experience. It is regarded as the key-stone of humanistic education because it provides a holistic, integrative perspective on learning by linking experience, perception, cognition and behaviour.

9.2.8.3.1 Assumptions of experiential learning

Learning as a process implies that it takes place through invention and reinvention with the result that ideas and concepts are modified and reformed by experience. This indicates the necessity to provide students with learning activities which stimulate inquiry and exploration as is done by the open teacher to foster creative learning (see 5.4.2.1 and 2.5.2.2.3). **Learning as a continuous process** leads to increased knowledge and a better understanding of the world (see 5.4.2.2). This phenomenon is evident in the lives of creative geniuses such as Poincaré and Heimholtz (see 2.5.1.2). **Learning requires the resolution of conflicts between dialectically opposed modes**

of adaptation to the world. The dialectically opposed modes of adaptation refer to the resolution of conflict between abstract concepts and concrete experience which results in learning (see 5.4.2.3). This phenomenon can be explained by the iterative function of the brain which may occur between the two cerebral hemispheres (A- and D-quadrant), or the limbic halves (B- and C-quadrant). It is known that the left brain is the seat of abstract thinking and the right brain that of concrete processes (see 3.4.2 and figure 3.1). **Learning is a holistic process of adaptation to the world**. This implies that the individual is involved in the learning process in totality which includes thinking, feeling, perceiving and behaviour. As the major process of adaptation, learning encompasses creativity, problem-solving and decision-making which include both divergent and convergent adaptive aspects. Herrmann's whole brain creativity model illustrates learning as a holistic process (see 5.4.2.4 and figure 3.2). **Learning involves transactions between the person and the environment**. Experiential learning involves transaction which results in changed relationships. This involves productive learning because it necessitates the skills of analysis, synthesis and evaluation. It is a different process from interaction which appears to involve rote learning (see 5.4.2.5). **Learning is the process of creative knowledge**. Knowledge is created from a resolution of conflict between the concrete/abstract dialectic through apprehension or comprehension (see 5.4.2.6). Apprehension involves C-quadrant processes and comprehension A-quadrant processes (see figure 5.3). The other way in which knowledge is created occurs through the active/reflective dialectic by way of extension or intention. Extension involves B-quadrant processes and intention D-quadrant processes. This leads to the conclusion that Kolb's explanation of how knowledge is created involves whole brain learning (see 5.4.2.6 and figure 5.3).

9.2.8.3.2 The experiential taxonomy

The experiential taxonomy indicates that whole brain learning is involved during experiential learning. **Exposure** and **participation** involve mainly C- and D-quadrant processes as physical experience and visualisation are important during these stages.

Identification links left and right brain processes because of intellectual and emotional involvement. **Internalisation** and **dissemination** use mainly A- and B-quadrant processes because rational and logical thinking as well as organisation are essential during these stages. The right brain processes are, however, also utilised because of the involvement of the affect (see 5.4.2.7 and figure 3.2).

9.2.8.3.3 Significance of experiential learning to nursing education

Experiential learning is of major significance to nursing as a humanistic practice discipline. It provides for teaching the affective domain which pertains to the ethical, moral and value issues of the profession, and offers ideal opportunities for the development of problem-solving and practical skills (see 5.4.4).

The teaching strategies propagated by experiential learning represent the four quadrants of the whole brain model and Kolb's experiential learning model (see figure 5.4). Experiential learning thus appears to be very suitable for the development of creative learning.

9.2.8.4 Open learning

The aim of open learning is the enhancement of human potential. It is a flexible and student-centred approach which is more readily accessible than conventional courses and removes the barriers of time, place and space (see 5.5.1).

9.2.8.4.1 Assumptions of open learning

The open learning model provides **accessibility**, a high degree of **student control**, **student support**, **multi-media**, a **variety of learning activities**, and **learning programmes which are adaptable** to individual student needs. It is essentially **student-centred** and considers **personal growth** as a significant outcome of learning.

A **team approach** (which includes student representation) is followed in the preparation of programmes. These concepts concur with the requirements for creative learning as every student is accepted as worthy and psychological openness and flexibility are facilitated. Personal growth, student support and the consideration of individual students' needs which are highly valued, lead to the conclusion that every student is granted the freedom of unconditional development. It appears as though open learning directly opposes traditional education by providing the opportunity for development of individual creativeness while at the same time removing the barriers which stifle creativity (see 5.5.2).

9.2.8.4.2 Significance of open learning to nursing education

Open learning offers the ideal opportunity for practising professional nurses to develop themselves, further their education and update themselves with the latest scientific and technological advances. It is a means of equipping nurses with the ability to adapt to the rapidly changing health care environment and deliver innovative care.

The teaching strategies offered by open learning represent all four quadrants of the whole brain model (see 5.5.4 and figure 5.5). Open learning thus creates a creativity inducing learning environment and stimulates whole brain and creative learning.

9.2.8.5 The relation between the four educational models and creativity

Analysis of the nature of adult, mastery, experiential and open learning reveals the following prominent common concepts which contribute towards the development of creativity (see 5.6.1, table 5.1 and figure 5.6).

- A common aim towards the development of **self-actualisation** is evident which concurs with Maslow's self-actualising creativeness and portrays the abilities required from the professional nurse.

- **Student-centredness** facilitates the development of a positive self-concept and self-discipline which are desired attributes of a creative person (see 2.5.2.1).

- Active participation facilitates cognitive, affective and psychomotor learning. Creativity is developed through direct experience, exploration and discovery (see 2.5.1.2).

- Problem-centred learning develops metacognition, reflective, formal operational, convergent and divergent thought and thus leads towards productive learning and creativity. The development of problem-solving skills is fundamental to effective, contextual nursing practice (see 5.6.1).

- Cooperative learning promotes the higher levels of cognitive and moral reasoning (including metacognition, reflective and divergent thought, sensitivity and perceptiveness) as students learn from one another's ideas and experiences (see 5.6.1).

- Intrinsic motivation is stimulated by interest, inquiry, challenges, enjoyment of learning in a psychological open environment and frequent feedback on success. It is essential to creative performance and effective nursing practice as both require total involvement and dedication and a willingness to accept challenges and take risks (see 2.5.2.2.4 and 5.6.1).

- The variety of learning activities provides for the different cognitive styles of students and stimulates whole brain learning by offering activities which appeal to the preferences of each of the four brain quadrants (see 5.6.1).

- Self-evaluation and criterion-referenced evaluation promote extended effort and persistence, and are essential to maintain competence in nursing. These are the only types of evaluation which is tolerated by creative persons as they do not

present a threat (see 5.6.1).

The major movements in current education which provide support for creative learning include individualised and learner-centred instruction, experiential curricula and humanistic education (see 5.6.1). The four selected models appear to meet these requirements.

9.2.8.6 Relation between the learning environments of the four educational models and creativity

The nature of the learning environments advocated in the four models concur with the creativity inducing environment (see 5.6.2, table 5.2, 2.5.2.2.2 and 2.5.2.2.3). **Psychological openness** which facilitates safety, absence of threat and emphatic understanding and **authenticity** which involves mutual trust and respect and unconditional acceptance, prevail. **Collaborativeness** facilitates mutual discovery and develops flexibility. The **non-judgemental** atmosphere offers a relaxed atmosphere. **Enjoyment** and **pleasure** is experienced because of total involvement and the prospects of success in the end as individual differences are considered. **Student support** is established by providing acceptance, encouragement and frequent feedback. The student-controlled environment facilitates self-directed learning, expanded consciousness, persistence and risk-taking (see 5.6.2).

9.2.9 The practice of nursing

The challenge and art of nursing has always been the merging of the professional (practice) and disciplinary (theory) dimensions, in such a way that both enrich and complement each other. The nurse's greatest dilemma today is to adjust to the rapid changes in the health care setting and to cope with the opposing demands of increasing advances in technology and science, and basic human needs which require caring (see 6.1).

9.2.9.1 Definitions of nursing

Although the definitions differ to some extent, they all indicate a humanistic foundation which emphasise a service to mankind. A holistic approach is detected in their references to caring for the physical, psychological, spiritual and social dimensions of man. However, of the definitions given in this thesis, it is only the definition by the South African Nursing Council which refers to nursing's scientific body of knowledge. This indicates how nursing has developed as a science since the 1970s and how important it has become in the contemporary era of scientific and technological advances (see 6.2).

9.2.9.2 Philosophical foundations of nursing

Contemporary nursing follows a holistic, humanistic-existentialistic and phenomenological approach (see 6.3). Humanistic-existentialism is concerned with individual worth and self-actualisation. This concurs with the humanistic view of creativity (see 2.5.3), especially Maslow's concept of self-actualising creativity. As phenomenology views reality to be in the individual's unique perception of an event and not the event itself, it affirms the contextuality of every nurse-patient relationship. This refers to pattern identification as described by the gestalt theorists (see 2.5.1.4).

9.2.9.3 Professional practice

9.2.9.3.1 Professionalism

Nursing is acknowledged as a profession on the basis of its scientific body of knowledge, a code of ethics in which the profession's beliefs are declared, its control over conduct of members by a legalised body which ascertains that high standards are maintained, the requirements for mastery of specialised skills, and a central focus of service to mankind (see 6.4.1).

9.2.9.3.2 Code for nurses

The Code for nurses expresses the profession's value and beliefs and guides nursing practice. The key-concepts which derive from the Code include the following:

Advocacy, **accountability**, **responsibility**, **autonomy**, **authority** and **competence**, require from the nurse a sound theoretical knowledge base, clinical competence, knowledge of the nursing act and regulations and a value system which adheres to the profession's ethical codes as well as a passion for fellow man. Apart from being knowledgeable, the nurse has to be independent, perceptive, sensitive, flexible, experienced, self-confident, and caring. This is illustrated in examples 1 and 2 in 6.4.2. These traits have been identified by the personality theorists as belonging to creative people (see 2.5.2.1). **Respect for patients' rights** and maintaining **confidentiality** demand mutual respect and trust. A patient's right to know the truth and his right to have his wishes honoured must be adhered to (see examples 3 and 4 in 6.4.2). It requires from the nurse a special perception and sensitivity which equal the creative abilities mentioned in 2.5.1.1. **Collaboration** refers to the interdependent functions of the nurse as a member of the health care team (see 6.4.2). Psychological openness, flexibility, and sensitivity are valuable assets in order to maintain good interpersonal relationships (see 2.5.1.1).

9.2.9.3.3 Scope of practice

Nursing's scope of practice encompasses broad concepts based on definitions and theories of nursing which provide an outline and authorisation of the nurse practitioner's role and functions (see 6.4.3).

The *nursing regimen (a)* mentioned in the scope of practice, refers to the *nursing process*, a fundamental concept in practice. It appears that some of the key-abilities of creativity (see 2.5.1.1), such as openness, sensitivity, penetration, are essential during

the *assessment* phase which requires inference, problem-solving, perceptions, intuition, critical thinking, observation and awareness of hidden cues (see 6.4.3). The *planning* and *implementation* phases require openness, flexibility, fluency and sensitivity from the nurse as she has to plan with the patient and adjust according to the needs and responses of the patient. The *evaluation* phase necessitates penetration, sensitivity, flexibility, synergy and redefinition in order to make the necessary changes according to the patient's responses.

The concepts in the scope of practice including *execution of prescribed treatment (b), administration of medicine and monitoring vital signs (c), maintenance of fluid and elimination (i) and (m)* are illustrated in **example 5** (open heart surgery) (see 6.4.3). It indicates the need for the nurse to utilise whole brain thinking. She must have the factual knowledge to enable her to think analytically (A-quadrant), consider all relevant detail (B-quadrant) view the situation holistically and use her intuition (D-quadrant), and have compassion for the patient and go to any lengths to have the patient's condition improved (C-quadrant) (see figure 3.2).

The *maintenance of bodily regulatory mechanisms (k)*, and *provision of effective patient advocacy (s)* are realised in **example 8** (see 6.4.3). The significance of the nurse's intellectual efficiency and the use of her intuition which derives from her wealth of experience and knowledge, are illustrated. The abilities of analysis, planning, persistence, sensitivity, penetration, synergy and holistic observation are demonstrated when she acts on behalf of the woman who underwent an oesophageal dilatation procedure. It depicts whole brain functioning as well as some of the key-abilities of creativity (see figure 3.2 and 2.5.1.1).

The concepts including *facilitation and healing of wounds (j)*, and *establishment of an environment in which physical and mental health are promoted (p)*, require the merging of the instrumental and expressive roles of the nurse. This is illustrated in **example 10** (see 6.4.3) wherein the nurse dressed the patient's wounds. She displayed empathy,

sensitivity, fluency, flexibility, analysis and synthesis which refer to the key-abilities of creativity (see 2.5.1.1).

The concept which refers to caring for the dying patient (t) necessitates true caring. The abilities required from the nurse include sensitivity, flexibility, penetration, psychological openness, synergy, a holistic perspective, intellectual efficiency, compassion and a certain level of risk-taking. **Example 11** (see 6.4.3) illustrates how the nurse took the risk of administering more morphine despite the possibility of respiratory repression. All these aspects indicate the need for creative behaviour from the nurse.

It is concluded from the variety of examples citing nursing practice incidents, that the abilities and skills expected from the effective nurse concur with those possessed by the creative individual. The cognitive (see 2.5.1.1 and 2.5.1.2), personality (see 2.5.2.1), humanistic (see 2.5.3), gestalt (see 2.5.1.4) and whole brain (see 3.5) theories are all involved.

9.2.9.4 The science-art of nursing practice

Carper's four fundamental patterns of knowing in nursing give a very true picture of the nature of nursing (see 6.5). **Empirics**, the science of nursing, involves the cognitive skills, **ethics** includes cognitive and affective skills, **personal knowledge** which emphasises interpersonal skills represents the affective domain, and **aesthetics**, the art of nursing, involves affective, psychomotor and cognitive skills. Each pattern is essential for mastery of the discipline but they are interrelated and interdependent which indicate the complexity and diversity of nursing knowledge.

The science-art of nursing is often referred to as a mystery, as nursing practice cannot be standardised or submitted to rules and procedures. The essence of nursing education seems to be *training for uncertainty* as effective practice implies a willingness to take

responsibility for key-decisions, based on partial information, and made under conditions of high risk. The merging of science and art requires a mastery of the necessary technique, and a special involvement of mind, soul and imagination (see 5.6). A quest for creativity is inferred in this.

9.2.9.4.1 Psychomotor skills

Psychomotor skills form an extremely important part of the practice of nursing as it is largely a practical endeavour. Both the assessment and implementation phases of the nursing process require these skills (see 6.5.1) and when teaching them visualisation, modelling, practice and kinaesthetic feedback are important. The mastery and experiential educational models are thus appropriate.

Whole brain functioning is essential for acquiring skilled performance. The criteria including accuracy, efficiency, consistency, and speed, refer to A-, B-, and C-quadrant processes as they involve factual knowledge, analysis, detail, sequence and kinaesthetic awareness (muscular coordination is essential). The remaining criteria, anticipation, adaptability and perception refer to D-quadrant processes (see figure 3.2). The key-abilities of creativity which are developed involve sensitivity, flexibility, and synergy as each practice situation is unique.

Example 12 (6.5.1) illustrates the integration of psychomotor and cognitive skills when the nurse institutes the administration of intravenous therapy, and **example 10** (6.4.3) (dressing of wounds) demonstrates the integration of psychomotor, cognitive and affective skills. Aesthetics, as a synthesis of the four patterns of knowing, is also evident in this example.

9.2.9.4.2 Affective skills

The affective competencies involve feelings, attitudes and ethics, and therefore

represent the caring functions of the nurse. The aesthetics, ethics and personal knowledge patterns of knowing are represented (see 6.5.2).

Two important concepts within the affective domain include *therapeutic use of the self* and *caring*. Therapeutic use of the self is the art of conveying acceptance to the patient. It is a central concept of the affective domain and forms an integral part of transpersonal caring (6.5.2).

Caring, as the dominant paradigm of nursing, encompasses empathy, concern, compassion, support, sensitivity, presence, love, trust, knowledge, experience and expertise. Caring is an art, and is very well elucidated in **example 1** (6.3) in which the nurse acted as advocate for the young quadriplegic patient, and in **example 13** (6.5.2), in the poem about Mr Polanski. The poem reveals the nurse's ability to look beyond the obvious, and to connect previously unrelated ideas and levels of experience. This is a creative endeavour which concurs with the associative theories of creativity (see 2.5.1.3). Creativity is also evident in the nurse's use of intuition, her sensitivity and perceptiveness of Mr Polanski's needs and the sudden appearance of illumination after a synthesis and synergy of past experiences and knowledge. This is an excellent example of personal knowing and aesthetics portraying the art of nursing.

The experiential educational model is appropriate for teaching the affective domain. Attainment of the higher levels of Bloom's affective taxonomy is essential for student nurses in order to be competent in the ethics, personal knowledge and aesthetic patterns of knowing.

9.2.9.4.3 Cognitive skills

The cognitive skills required for effective nursing practice represents nursing as a science and refer to the empirics pattern of nursing knowledge (see 6.5.3). These include:

- **Concept learning** enables students to master the vast mass of information concerning the health-illness continuum by grouping together facts and categorising new information (see 6.5.3.1). Concept learning necessitates understanding something beyond the level of sensation and thus results in meaningful and productive learning. The true understanding of concepts such as pain, empathy, caring and ethical issues, involves the key-abilities of creativity (see 2.5.1.1) and whole brain learning (see figure 3.2). For example, understanding pain involves factual knowledge of the different kinds and causes (A-quadrant process), planning for intervention and administration of pain relief methods (B-quadrant process), showing empathy (C-quadrant process) and obtaining a holistic picture and reacting on intuition (D-quadrant processes).

- **Problem-solving** and the nursing process are basically the same processes. Nurses are confronted daily with unique complex problems (see 6.5.3.2). Analytical and sequential thinking (A- and B-quadrant) are essential but because of the need to solve problems within the contextuality in which they occur, both linear and non-linear processes are required. **Examples 1** (6.4.2), **5** and **8** (6.4.3) illustrate how experienced nurses combine linear processes with intuition and holistic thinking (D-quadrant) in the presence of compassion (C-quadrant) in order to solve complicated problems.

- **Intuition** is a sense of knowing without a preceding rational analysis. It is a synthesis of perceptual cues arrived at through the linking of basic knowledge and past experiences. The literature reveals that expert nurses are intuitive and holistic (see 6.5.3.3). It is deduced that they link knowledge, detail, intuition and holistic perception with emphatic knowing which encompasses whole brain thinking (see figure 3.2).

- **Decision-making** is a critical component of nursing practice. Both problem-solving and decision-making are initiated by a problem, but decision-making has

to deal with the results and is value based. The quality of patient care depends mainly on the nurse's ability to effectively link problem-solving and decision-making. Nurses should thus be aware of their value systems as they influence decision-making and may limit the generation of alternatives (see 6.5.3.4). It is concluded that the key-abilities of creativity including sensitivity, ideational fluency, penetration and elaboration (2.5.1.1) might lead to better decision-making.

- **Critical thinking** incorporates analysis, synthesis, evaluation, reflective thought, inquiry, discovery and clarification of opposing perspectives (see 6.5.3.5). As a higher order cognitive skill it is vital to effective nursing practice, as illustrated by **examples 5** (open-heart surgery) and **12** (intravenous therapy) (see 6.4.3). Critical thinking requires analytical, sequential and detailed thought (A- and B-quadrant) as well as holistic thinking and visualisation through reflective thinking (D-quadrant). The C-quadrant is excluded.

- **Clinical judgement** is one of the central functions of the nurse practitioner. The phenomenological perspective acknowledges the utilisation of both linear and non-linear thinking processes during clinical judgement. The latter necessitates perceptual assessment (touch, smell, sight) and an interpretation of the patient's physical, verbal and behavioural expressions. It apparently begins with intuition through vague hunches and holistic assessment, and only after detachment from the situation is the nurse capable of analysis and critical thinking. The reference to nurses working in intensive care units who acknowledge the important role of intuition during clinical judgement, affirms this view (see 6.5.3.6). It seems that whole brain thinking engaging the D- and C-quadrant and then the A- and B-quadrant is essential. **Examples 1, 5, 8, 9, 10 and 12** (see 6.4.2 and 6.4.3) illustrate how expert nurses engage in risk-taking, holistic viewing, analytical, reflective, critical and intuitive thinking. These link clinical judgement to creative thought.

9.2.9.5 The expert nurse practitioner

The description of the expert nurse in the literature refers to her ability to zero in on the real problem, perceive intuitively, observe holistically, get a gestalt of the situation and anticipate future problems (see 6.5.4). This implies utilisation of the key-abilities of creativity (2.5.1.1) as well as the ability to identify patterns as proposed by the gestalt theorists (2.5.1.4).

The traits that students have identified in their clinical role models include spontaneity, flexibility, independence, intellectual efficiency, competence in divergent situations and the ability to provide individualised context-specific care and adapt to changing situations (see 6.5.4). These concur with the characteristics attributed to creative individuals (see 2.5.2.1).

9.2.9.6 Creativity and the science-art of nursing

It appears that Carper's four patterns of knowing represent the four quadrants of the whole brain model (see 6.5.5 and figure 3.2). **Empirics** relates to the A-quadrant which involves the higher cognitive processes in Bloom's taxonomy and the productive operations in De Corte's classification (see 4.3.1 and 4.3.2). **Ethics** appears to relate mainly to the B-quadrant as ethical decision-making requires detail and sequential steps. The C-quadrant is, however, also indicated because of involvement of the affective domain. **Aesthetics** indicates a strong relation to the D-quadrant as holistic viewing and intuition are essential to the art of nursing practice. The psychomotor skills involved in aesthetics relate to B-quadrant processes as detail, sequentiality and procedural processes are involved (see 6.5.5 and figure 3.2).

It is concluded that the professional nurse of the future will have to be more knowledgeable, capable of critical thinking, insightful regarding ethical issues, more caring, compassionate and human, more imaginative, creative and open to new ideas,

willing to take risks and accept challenges.

9.2.10 Innovative teaching strategies

Innovative teaching strategies encompass new and unique methods which increase student motivation and maximise learning by encouraging active participation and creating a pleasant and open learning environment (see 7.1).

Each of the teaching strategies discussed in this thesis is particularly applicable to nursing education and stimulates creativity.

9.2.10.1 Brainstorming

The most outstanding feature of brainstorming is that a quantity of ideas is encouraged in a relaxed and playful atmosphere in which judgement is deferred. Creative thinking skills including ideational fluency, flexibility, elaboration and synthesis are developed (see 7.2.1 and 7.2.4). Whole brain thinking is stimulated through visualisation, imagination and emotional involvement during the idea generation phase, and analysis and sequential thinking during the evaluation phase (see 7.2.4 and figure 3.2).

Brainstorming is particularly valuable to nursing education not only in situations when professional problems are addressed, but also to generate ideas during group discussions and creative problem-solving and to explore students' reactions and feelings after experiences with bereavement and emergency situations (see 7.2.4).

9.2.10.2 Creative problem-solving

The value of creative problem-solving appears to be the great variety of cognitive skills which are developed. These include analysis, logical, factual, quantitative, sequential, detailed, visual, holistic, intuitive, convergent and divergent thought (see 7.3.1 and

figure 7.1). There appears to be a interrelationship between the phases of creative problem-solving, the creative process, key-abilities of creativity and the whole brain model (see table 7.1).

Creative problem-solving differs from ordinary problem-solving as it makes use of synectics, imagination and fantasy particularly during the fact- and idea-finding phases, as well as divergent thinking (see 7.3.4).

Problem-solving is a critical requirement of effective nursing practice as each patient problem presents a unique situation. Clinical judgement, ie the ability to make wise choices of nursing action in ambiguous and stressful settings, can be improved through practice in creative problem-solving. It can also be applied to solve administrative problems and medico-legal hazards (see 7.3.3).

9.2.10.3 Teaching by metaphor

Metaphorical thinking is viewed as central to creative ability as it produces new idea combinations, synthesis and originality (7.4.2). It makes learning more effective and stimulates divergent and productive thought by prompting visual images and analytical, evaluative, and holistic thinking. Evaluation questions which are based on metaphor force students beyond memorisation to comprehension (see 7.4.1).

As metaphors offer a visual image and a verbal explanation they combine right and left brain processes and thus enhance whole brain learning. Metaphors can be used in nursing education to make learning more fun, to enhance student understanding of difficult concepts, and to introduce new subject matter. An example is given in 7.4.3.

9.2.10.4 Synectics

The most outstanding feature of synectics is that it can induce particular psychological

states (including empathy, involvement, play, detachment and the use of irrelevance) which promote creative activity. Apparently people cannot be persuaded to be intuitive or to empathise but need to be drawn into these required psychological states (see 7.5.1).

The analogies used in synectics evoke images, holistic thinking, kinaesthetic experience, emotional awareness, and analytical, detailed and sequential thought. It therefore stimulates whole brain thinking and learning (see figure 3.2). Synectics facilitates psychological openness, penetration, flexibility, fluency, synergy, synthesis, elaboration and originality - key-abilities of creativity (see 7.5.2 and 7.5.4).

Synectics can be widely applied in nursing education to teach the affective domain by using personal analogy (see 7.5.3), to explain difficult concepts through using direct analogy (see 7.5.1.2, 7.5.3 and 7.4.3) and to clarify the positive and negative aspects of certain concepts such as chemotherapy by using symbolic analogy (see 7.5.1.2 and 7.5.3). Fantasy analogy can produce new and refreshing perspectives - see example in 7.5.1.2.

The use of synectics enhances student interest, provides a spontaneous and relaxed learning atmosphere and stimulates productive learning.

9.2.10.5 Visualisation: imagery and fantasy

Visualisation plays a central role in creative thinking as it provides the source material of much original thought which may lead to the creation of new concepts. The work of the geniuses Einstein and Mozart are extreme examples of it (see 7.6.1). Visualisation is regarded as an effective strategy for problem-solving, because it requires thinking about a problem in a new way.

Imagery and fantasy are essentially right brain processes as they involve visualisation, holistic viewing, intuition (D-quadrant) and emotions, and feelings and kinaesthetic

awareness (C-quadrant) (see figure 3.2). New perspectives on problems are provided through involvement of all the senses. It is concluded that imagery and fantasy develop whole brain learning as left brain processes including analysis (A-quadrant) and detail and organisation (B-quadrant), serve as the basis for imagery and fantasy (see 7.6.4).

Fantasy can be used in nursing education to reduce anxiety levels in students who have to perform risky psychomotor procedures for the first time. As it facilitates personalisation, it can be used to aid memory and comprehension, and to teach affective skills. It can enhance intrinsic motivation and provides a relaxed and enjoyable learning atmosphere (see 7.6.3).

9.2.10.6 Humour as a teaching strategy

Humour appears to be closely linked to creativity as both combine playfulness and seriousness, fantasy and reality, the irrational and the rational, and both depend on the ability to see something in more than the obvious way. Other similarities include a common purpose to involve the affect, the fusion of objects not normally associated with each other and the evoking images. These activities lead to divergent thinking, psychological openness, penetration, flexibility, imagery and synthesis (see 7.7.1).

Humour has a strong influence on the learning environment. It is believed to reduce stress and anxiety and therefore contributes towards a relaxed atmosphere. Humour improves relationships and establishes a feeling of connectedness which results in mutual trust and thus psychological openness. It also increases attention, interest and motivation. This concurs with a creativity inducing learning environment (see 2.5.2.2.2, 2.5.2.2.3 and 7.7.2). Humour combines cognitive and affective processes. It requires the sterner left brain processes (including facts, detail, organisation) and the visual and emotional processes of the right brain and thus stimulates whole brain learning (see 7.7.4).

As nursing practice presents many stressful situations, humour can be used as a coping tool to reduce stress. Student motivation and interest can be stimulated by the use of cartoons or comic strips portraying well-known characters that relate to subject content. It can also be used in role play or in the clinical laboratory in which case absurdity and exaggeration can increase student learning (see 7.7.3).

9.2.10.7 Writing as an innovative teaching strategy

Writing is viewed as a powerful tool for students to discover new relationships through exploration and inquiry and to gain information and conceptual insight (see 7.8.1). From the three different writing styles described in the literature, expressive and poetic writing are valuable to nursing education in order to stimulate creativity. The example of a writing assignment on a caring experience (described in 7.8.3) illustrates that expressive writing stimulates analysis, reflective thinking, synthesis, elaboration and emotional involvement. This experience facilitates productive learning which is linked to creative learning. The combination of expressive writing and guided imagery described in the example in 7.8.3 appears to enhance affective learning and critical thinking skills.

Poetic writing involves evocative language and depends more on right brain processes including visualisation, emotions and feelings. This type of language apparently cultivates ambiguity (see 7.8.1). The example of poetic writing discussed in 7.8.3 about the students who wrote Haiku poems during a gerontology course shows that students gained new knowledge and insights. It enhanced their understanding and empathy and stimulated productive thinking.

Writing stimulates whole brain learning as it combines the visual, imaginative and affective processes of the right brain, with the analytical, logical and sequential processes of the left brain (see 7.8.4).

9.2.10.8 Role play

Role play is an excellent method for teaching the affective domain as it assists students to gain insight into the behaviour of others, and develops empathy and interpersonal skills (see 7.9.2). The levels of the affective domain which can be obtained include receiving, responding, valuing and organisation (see 4.3.1.2). These are on the second level of Treffinger's creative learning model (see figure 4.5).

Role play focuses mainly on right brain processes as it combines visual, imaginative and intuitive thinking (D-quadrant) with emotions and feelings (C-quadrant). Left brain processes including analytical and organised thinking (A- and B-quadrant) are used to a lesser extent when behaviour is interpreted (see 7.9.4).

As nursing is an interpersonal activity and a caring profession it requires development of the affect. Role play can aid students' sensitivity, divergent thinking and flexibility (see 7.9.4).

9.2.10.9 Sociodrama

Both sociodrama and role play focus on affective skills but whereas role play emphasises comprehending others' feelings and behaviour, sociodrama has a sterner goal, namely, to redefine a problem and to identify the possible solutions which arise from the sociodrama. Sociodrama probes deeper into problem/conflict situations to expose hidden feelings and facts. It stimulates sensitivity, penetration, openness and originality which are all key-abilities of creativity.

Sociodrama develops the levels of receiving, responding and organisation of the affective domain (see 4.3.1.2) and the cognitive skills of analysis, synthesis and evaluation through reflective thinking. The affective skills including awareness, openness to complex, feelings and conflict and imagery are on the second level of

Treffinger's creative learning model as are the cognitive skills (see 7.10.4 and figure 4.5). It can therefore be concluded that sociodrama stimulates and develops creativity.

Sociodrama can be widely applied in nursing education to develop the principle of caring, a central concept in nursing. Examples encompass re-enacting incidents from clinical practice including caring for HIV infected patients; coping with loss and emotional consequences of trauma and stress; interviewing a schizophrenic patient; and ethical issues such as euthanasia (see 7.10.3).

9.2.10.10 Simulation

By facilitating active participation and providing a safe psychological learning environment simulation increases student interest and motivation as they get the opportunity to explore and build on their curiosity and to take risks (see 7.11.2). This concurs with a creativity inducing learning environment (see 5.7).

Application of simulation techniques is very appropriate for teaching nursing (see 7.11.3). Mediated role play and life patient simulations particularly stimulate D-quadrant processes including visualisation, imagination, intuition and holistic viewing, as well as C-quadrant processes such as emotions and feelings (see 7.11.3 and figure 3.4). Written and computer simulations and physical simulators focus mainly on analysis and facts (A-quadrant) and on detail and organisation (B-quadrant). Simulation games stimulate analytical, factual, detailed and sequential thought (left brain) as well as feelings and visualisation (right brain). Simulation techniques therefore contribute towards whole brain learning.

9.2.10.11 The case study

The case study stimulates higher cognitive skills through complex problem analysis of actual or hypothetical situations. The different phases of the problem-solving process

stimulate different key-abilities of creativity. **Fact-finding** stimulates a sensitivity to problems, and **problem-finding** develops the abilities of penetration, visualisation and redefinition. **Generation of ideas or solutions** develops fluency, flexibility and openness, whereas **evaluation of the alternatives** stimulates analytical, logical, visual and intuitive thinking. **Decision-making** stimulates synthesis and originality. **Evaluation of the decision** stimulates evaluation and elaboration (see 7.12.1). It can thus be concluded that the case study develops productive learning and creative learning as these abilities include De Corte's productive operations and the higher levels of Bloom's cognitive taxonomy (see 4.3.2.1 and 4.3.2.2) and are on the second level of Treffinger's creative learning model (see figure 4.5).

Case studies can be widely used in nursing education as a means of applying theoretical principles to practice, integrating ethics content into professional practice through ethical case analysis, and to develop problem-solving and clinical judgement skills (see 7.12.3).

9.2.10.12 Values clarification

Values clarification enables students to make rational decisions when confronted by ethical issues (see 7.13.1). It leads to the development of principled decision-making which involves the higher levels of moral reasoning and it contributes to the development of inner growth and self-actualisation (see 7.13.2), as students become aware of their own value systems and the underlying motivations which guide their actions.

Values clarification develops the higher levels of Bloom's affective taxonomy which are significant to creativity (see 4.3.1.2). The internalisation of values which takes place is on the third level of Treffinger's creative learning model (see figure 4.5). It develops whole brain learning as it combines the processes of the left and right brain. It involves emotions and feelings (C-quadrant) and combines these with logical and analytical

thinking (A-quadrant) and organised, sequential thinking (B-quadrant). It also involves obtaining a holistic view (D-quadrant) of the situation before a decision can be made (see 7.13.4).

9.2.10.13 Relation between innovative teaching strategies and creativity

As is illustrated in figure 7.4, the central focus of the innovative teaching strategies discussed, is **problem-solving**. These strategies stimulate creative learning as they facilitate **active participation**, **discovery** and **cooperative** and **experiential learning**, and develop **reflective**, **formal operational** and **productive thought**. The key-abilities of creativity which are developed by them include **flexibility**, **fluency**, **divergent thinking**, **penetration**, **internal visualisation**, **redefinition**, **synthesis** and **originality**.

A very crucial aspect to be considered when implementing innovative teaching strategies is the learning environment as it plays a major role in the fostering of creativity. The strategies require a learning environment which allows **psychological freedom**, encourages mutual **acceptance**, **trust** and **respect**, offers **deferred judgement**, **enjoyment** and a **relaxed atmosphere**, and stimulates **interest** and **intrinsic motivation** (see 7.14, 2.5.2.2.2, 2.5.2.2.3 and figure 7.4).

9.2.11 General conclusions

The most significant conclusions pertaining to the aims of this study are:

- From the definitions and theories of creativity it is concluded that creativity necessitates specific cognitive and affective abilities and that it can be stimulated and developed in every individual.

- Knowledge of the whole brain theory of creativity and understanding of the whole brain teaching and learning model can assist educators to implement a

holistic approach to teaching.

- Analysis of the field-dependent/independent and Kolb's four cognitive styles has revealed a definitive link to the whole brain model. Each cognitive style indicates double dominance in specific quadrants.

- The setting of cognitive objectives on the higher levels of Bloom's taxonomy and the productive operations level of De Corte's classification seem to be of utmost importance for the development of creative thinking skills.

- The cognitive theories of learning are particularly significant to the development of creativity as they focus on the higher cognitive skills which are involved in creative thinking. The humanistic theories of learning contribute towards development of the affect which is an essential part of creative behaviour.

- Adult, mastery, experiential and open learning have many aspects in common with creative learning and they comply with the requirements of the creativity inducing learning environment. Each of these models is of specific relevance to nursing education to facilitate competency in the cognitive, affective and psychomotor domains.

- Analysis of the practice of nursing has revealed that the effective or expert nurse has to be a creative nurse. She should possess the traits of the creative individual, the key-abilities of creativity and the versatility to use whole brain thinking skills.

- The teaching strategies which are discussed in this thesis are regarded as innovative because they stimulate creative learning and require a creativity inducing learning environment. They are particularly applicable to nursing education because of their experiential and problem-centred focus.

- It is considered that the *nursing education model for the fostering of creativity* (discussed in chapter 8, figure 8.1) has the potential to develop creativity in student nurses as it is based on the principles derived from the various theories of creativity, the whole brain creativity model, theories of learning, educational models which appear to promote creativity and the nature of nursing as a science art.

9.3 IMPLICATIONS FOR NURSE EDUCATORS

The general conclusions of this study have specific implications for nurse educators, the most significant of which are:

(1) Nurse educators are advised to read widely about the nature and theories of creativity in order to come to a better understanding of the concept. The South African Nursing Council refers to the development of creative thinking in its policy statement on the aims of professional nursing education. It is thus imperative that nurse educators understand the true meaning of the concept before they can organise their teaching to stimulate creativity. The planning of a creativity inducing learning environment is crucial to the fostering of creativity, and nurse educators should devote a lot of attention to this aspect. This will involve evaluating themselves to determine whether they are closed or open teachers and then, if necessary, striving towards becoming more open teachers.

(2) Nurse educators should consider attending creativity courses offered by organisations such as Sartori, the Creativity Foundation of South Africa, to expand their knowledge on the whole brain theory of creativity in general and methods which stimulate creative thinking. This will contribute towards a more holistic approach to teaching and to skill in using innovative teaching strategies.

(3) If nurse educators familiarise themselves with their students' cognitive styles, it

will enable them to adjust their teaching approaches and to select teaching strategies and media according to individual preferences. For the students this will contribute to enhancement of their learning abilities and the development of creative thinking, and will make their learning experience more enjoyable.

(4) Nurse educators should focus on setting objectives and evaluation on the higher cognitive levels to facilitate productive and meaningful learning and the development of creative thinking skills.

(5) The exploration and integration of various cognitive and humanistic theories of learning into educational planning, can enrich the quality of education offered by nurse educators. This will produce students who are more goal-directed for their role as professional practitioners and will enhance their cognitive and affective skills, which are so essential to effective practice.

(6) Nurse educators should give serious consideration to the implementation of the adult, mastery, experiential and open learning models in nursing education. If this is done, it will assist their students in obtaining the objectives of the three different domains and facilitate self-directed, cooperative, discovery, experiential and productive learning, all of which contribute towards the development of creative learning. A creativity inducing learning environment will also be established in the process. It is, however, suggested that nurse educators also explore other educational models, which may enhance creative learning.

(7) Nurse educators should strive to be enviable role models to their students, displaying the traits of the self-actualising creative individual. In order to achieve this they will have to engage in life-long continuing education to maintain a sound knowledge base. In addition, they will regularly have to spend time in clinical practice to keep themselves up to date in the practical requirements of health care. They, themselves, must be creative in order to set

an example to their students in this respect. An open and positive attitude towards life, acceptance of others as unique and unconditionally worthy, courage to accept change and challenges, and most important of all, to exhibit **caring** towards students and patients, are essential attributes of the creative nurse educator.

(8) The implementation of the different teaching strategies in nursing education discussed in this thesis, could in students, facilitate meaningful and productive learning and develop their creative thinking skills. Learning will be made more interesting and enjoyable, which should lead to increased student motivation.

(9) If the nursing education model for the fostering of creativity were to be implemented in nursing education, nurse educators would become more creative in their teaching and, at the same time, the creativity of their students would be stimulated. Much of the necessary background information is contained in this thesis.

9.4 RECOMMENDATIONS

It is recommended that the following issues be considered for further research:

9.4.1 Methods that stimulate creative thinking skills

The pursuit of this research study has revealed that there are a great variety of methods which develop creative thinking skills. These are described in the literature and many are presented in creativity courses. It is recommended that an entire research study be devoted to methods stimulating creative thinking skills with specific relevance to nursing education.

9.4.2 Theories of learning

An investigation into all the relevant theories of learning which are of significance to nursing education is suggested. A comprehensive and explicit discussion of how they can be applied to nursing education, may facilitate the advanced planning of nursing education, and would be of assistance to students by enhancing meaningful learning.

9.4.3 General educational models

A study on a variety of educational models not discussed in this thesis which may be relevant to nursing and which may contribute towards the development of creative learning, might expand the possibilities of teaching for creativity in nursing education.

9.4.4 The nursing education model for the fostering of creativity

It is of relevance that a study to test the validity of the nursing education model for the fostering of creativity be conducted in practice. This could be done at a particular nursing college, simultaneously at several colleges, or by individual nurse practitioners. During its implementation, it is suggested that both experimental and control groups be set up in order to exclude extraneous variables as far as possible.

9.5 LIMITATIONS OF THE STUDY

Due to the extent of this research study it was not feasible to include all the theories of learning and all educational models which are relevant to nursing education and have significance for the development of student creativity. It was also not possible to discuss in greater detail each theory and model selected for this study as each, it is felt, could almost have been a research study on its own.

The existence of such a vast number of methods which stimulate creative thinking skills,

made it extremely difficult to choose only a few. The ones that were chosen are of particular relevance to nursing education, but there are others which can be used to great advantage.

9.6 POST SCRIPT

This study supports the modern conception of creativity as being an authentic human ability that can be developed by education in a suitable environment. It has indicated that the educator who displays an open approach towards teaching and acknowledges each student's unique human potential, contributes towards the development of creative behaviour. The most significant aspects in teaching for creativity appear to be the creation of a psychological open learning environment with a student-centred, problem-solving focus, and the successful utilisation of both left and right brain thinking processes.

It is trusted that this study will help to motivate nurse educators to become open teachers who will assist and guide their students to become self-actualised professional practitioners. It is hoped that serious consideration of the implications of this study might lead to implementation of the suggestions. If this were done, it could possibly inspire innovation in nursing education with the ultimate aim of producing more effective, competent and caring nurses.

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