

Relationship between the Whole Brain Creativity Model and Kolb's Experiential Learning Model

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abstract

The aim of this article is to illustrate the relation between the cognitive styles in Kolb's experiential learning model and dominance in brain functioning. A descriptive analytical study of the literature on creativity and the development of creative thinking, explored various theories and definitions of creativity, and the nature of creative learning. Congruences between cognitive styles and the four quadrants of the Whole Brain Model were detected. This article focuses specifically on Kolb's cognitive styles in relation to the Whole Brain Model and the implications thereof for nursing education.

opsomming

Die doel van hierdie artikel is om die verband tussen die kognitiewe style in Kolb se ervaringsleermodel en dominansie in breinfunksionering te illustreer. In 'n beskrywende analitiese literatuurstudie oor kreatiwiteit en die ontwikkeling van kreatiewe denke, is verskeie teorieë en definisies van kreatiwiteit asook die aard van kreatiewe leer, verken. Ooreenkomste tussen kognitiewe style en die vier quadrante van die Heel Brein Model is aangedui. Die fokus van hierdie artikel is spesifiek gerig op die verband tussen Kolb se kognitiewe style en die Heel Brein Model en die implikasies daarvan vir verpleegonderwys.

introduction

Cognitive styles (learning styles) refer to consistent individual differences in the manner in which information is organised and processed (Witkin & Goodenough 1981:1). Kogan in Garity (1985:12) defines cognitive styles as the individual variations in modes of perceiving, remembering and thinking, or as distinctive ways of apprehending, storing, transforming and utilising information. According to Herrmann who developed the Whole Brain Model which focuses on the development of creativity, cognitive styles are determined by dominance in brain functioning. He states that a person's preferred modes of knowing (cognitive styles) correlates strongly with what he/she prefers to learn and how he/she prefers to learn (Herrmann 1989:17).

Kolb (1976) identifies four learning styles in his Experiential Learning Model. He views these as acquired, consistent patterns of learner-environment interaction (Laschinger & Boss 1984:375). He considers his model of learning as a theoretical one which integrates perception, cognition, behaviour and experience (Holbert & Thomas 1988:31). The 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. Kolb's model has considerable potential for guiding the design of whole brain learning and creativity in nursing.

research design

An exploratory descriptive design comprising an analytical literature study was utilised. The study was based on the assumption that there might be a relationship between Kolb's Experiential Learning Model and Herrmann's Whole Brain Model. The aim was to explore the relation between Kolb's learning styles and Herrmann's preferred modes of knowing as indicated by dominance in brain functioning. Kolb's model is particularly suitable to guide teaching in a practice oriented profession such as nursing. Furthermore the development of whole brain learning enhances creativity amongst students. This article will demonstrate that there is a relationship between these models and that teaching which is organised to accommodate different cognitive styles, simultaneously stimulates whole brain learning. Students can thus be strongly supported to reach their full potential, intellectually



the whole brain creativity model

The Whole Brain Model which was developed by Herrmann (1989), originated from the split brain theory that divides the functions of the human brain into left and right hemispheric processes. Herrmann made a finer distinction (based on his research) by separating the functions of the two hemispheres each in an upper and lower quadrant. He refers to the Whole Brain Model as a metaphoric model with an A-, B-, C- and D-quadrant (Herrmann 1989:63-65). He attributes the upper left (A) quadrant with logical, analytical, quantitative and rational (factual based) thinking, and the lower left (B) quadrant, with the abilities of planning, organising, focussing on detail and linear thinking (sequentiality). The upper right (D) quadrant is regarded as responsible for holistic, intuitive, integrative and synthesising processes, while the lower right (C) quadrant appears to be the origin of emotions, feelings, interpersonal skills and kinaesthetic

awarenesses (see figure 1). According to Herrmann creativity necessitates utilisation of thinking processes from all four quadrants (Herrmann 1989:197, 411).

kolb's experiential learning model

Each one of Kolb's learning styles is a combination of two of the four learning modes of the learning process as described by him (Potgieter 1996:94).

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.

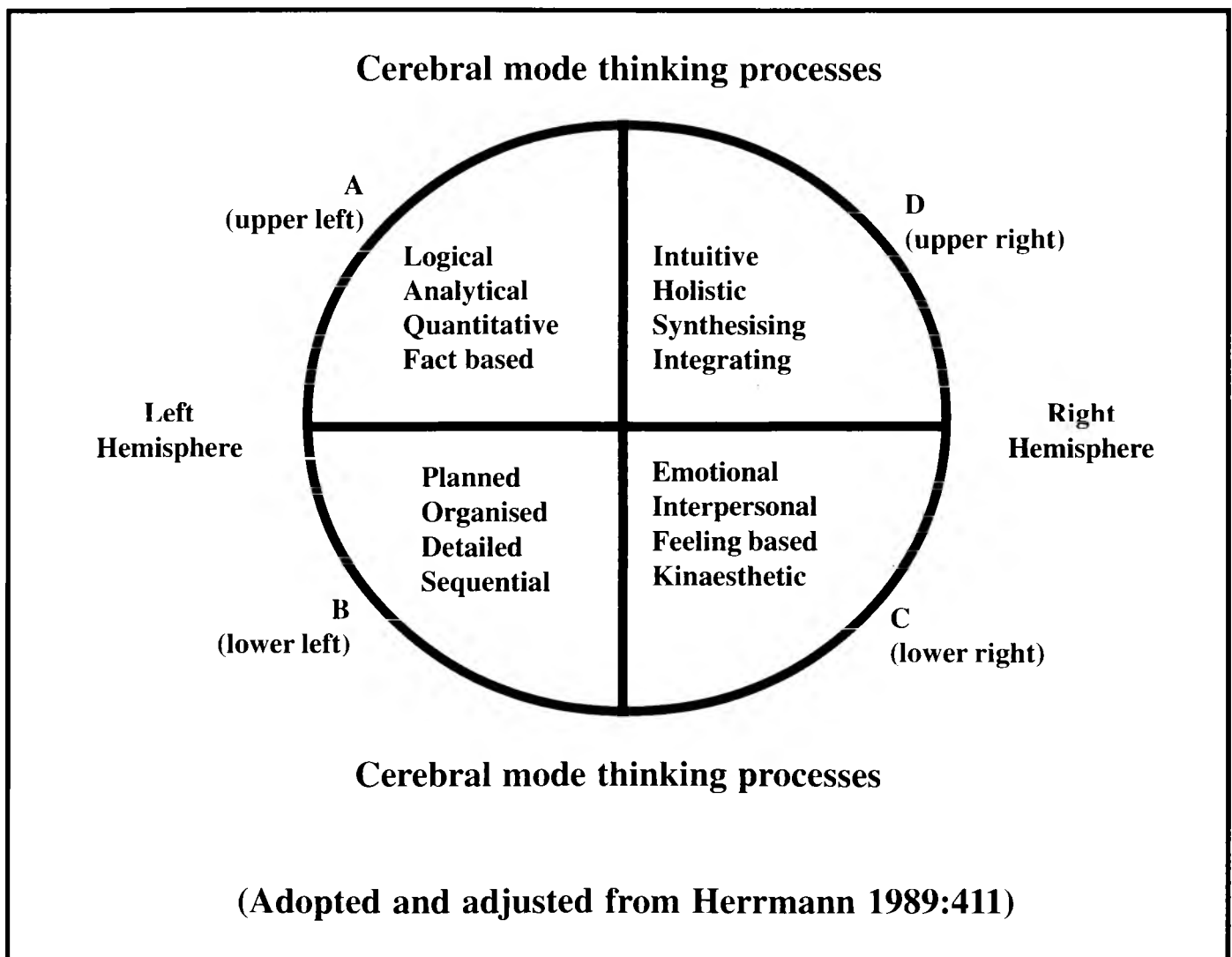
Problem-solving is approached in an intuitive *artistic* way. individuals with a concrete experience orientation enjoy and

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 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

Figure 1 : The whole brain model



thoughts and feelings to form opinions, and value patience, impartiality and thoughtful judgement (Kolb 1984:68).

The 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 kinesthetically 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, manipulations 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. 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 1988:341).

Kolb's four learning styles

(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 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 1983:274).

(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 focussed 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 assimilative 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 other for information than on their own analytic ability. Accommodators are at ease with people but are sometimes perceived as impatient (Kolb 1984:78).

Kolb's experiential learning model in relation to the whole brain creativity model

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 was, however, not feasible. Kolb's learning styles do not appear to be merely left or right brain oriented, but seem to comprise a combination of left and right brain processes. After examination of his four learning modes it appeared that they could be related to the four quadrants, and, on comparison, the following pattern emerged:

concrete experience - C-quadrant
reflective observation - D-quadrant
abstract conceptualisation - A-quadrant
active experimentation - B-quadrant
(Potgieter 1996:105)

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
convergers - preference for A- + B-quadrant thinking
assimilators - preference for A- + D-quadrant thinking
accommodators - preference for B- + C- + D-quadrant thinking
(Potgieter 1996:105). (See figure 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.

implications for nursing education

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 to enhance learning. It is, however, essential to stimulate the student to use his less preferred modes of learning in order to achieve whole brain functioning. According to Kolb students should be taught to develop skills in their less preferred learning modes, so that they can become more flexible holistic learners (Holbert & Thomas 1988:32). Messick (1984:69)

states that 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.

The relationship between Kolb's model and the Whole Brain Model implies that nurse educators who base their teaching on the experiential model not only accommodate different learning styles but at the same time stimulate whole brain creativity in their students. The following discussion can serve as a guideline for organising the teaching-learning environment:

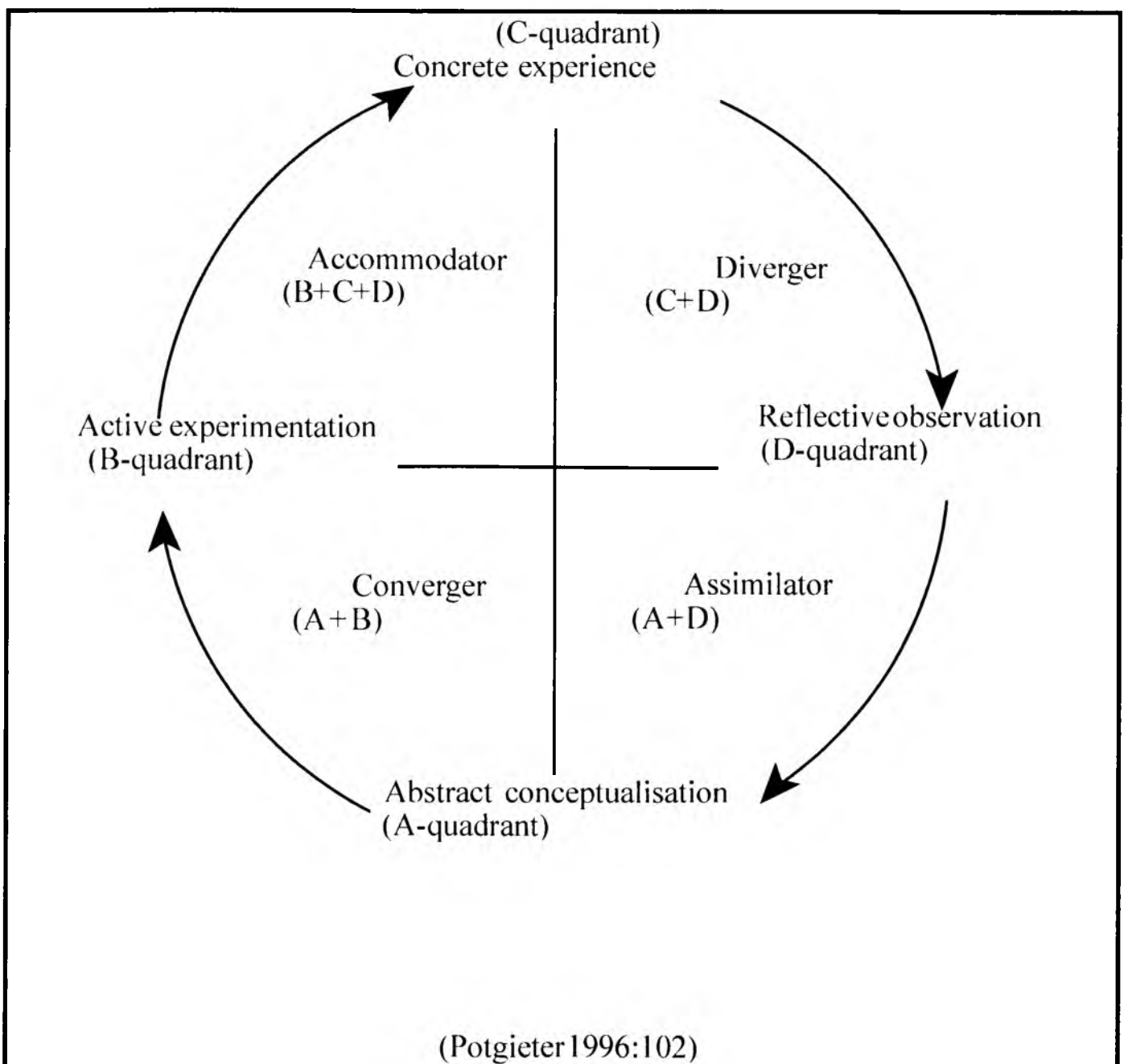
(1) Concrete experience: C-quad-

rant thinking (divergers and accommodators)

Concrete experience refers to immediate personal involvement in human situations with emphasis on the affective domain. Teaching strategies which would enhance this mode of learning include role play, simulation, patient case histories, values clarification, socio-drama, group discussions, ward rounds, and assigned patient interviews in the clinical field. Students are hereby provided with opportunities to learn about human emotions, as engagement in interpersonal relationships with peers and patients is facilitated.

Patient case histories, ward rounds and patient interviews offer students concrete

Figure 2 : Kolb's learning cycle and learning styles in relation to the four quadrants of the whole brain model



experiences in real-life situations wherein they can discover first hand information themselves. Values clarification, role play, simulation, group discussions and socio-drama enable students to become aware of a diversity of feelings, attitudes, values and viewpoints and they learn how to express their own views (Potgieter 1996:101).

The abovementioned teaching strategies facilitate experiential learning and involve to a greater extent the processes of the C-quadrant in the Whole Brain Model.

(2) Reflective observation: D-quadrant thinking (divergers and assimilators)

This learning mode focuses on observation and reflecting (understanding and intuiting the meaning of ideas and situations). Holbert and Thomas (1988:32) suggest teaching strategies which include observational experiences followed by structured group discussions. Clinical assignments to observe specific procedures (for example, a particular surgical procedure in the operating 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 to report on clinical incidents in order to express their views and impressions on how such situations were handled and how they think these could have been managed more effectively. Visual displays including films, videos and pictures can be presented to students where they have to analyse and evaluate the scenarios – this stimulates creative thinking. Individual projects on issues which require personal opinions and understanding, such as ethical issues and context specific problems which require intuitive thinking, could be given to students. Diaries and journal-keeping fall into this category. 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 teaching strategies such as metaphorical thinking, guided fantasy and expressive writing, also provide opportunities for reflective thinking, and intuiting the meaning of ideas and situations (Potgieter 1996:103). These teaching strategies are experiential in nature and focus mainly on the D-quadrant processes in the Whole Brain Model.

(3) Abstract conceptualisation: A-quadrant thinking (convergers and

assimilators)

Abstract conceptualisation emphasises thinking as opposed to feeling. According to Hodges (1988:344), formal lectures and textbook reading offer symbolically complex situations which expand one's capacity for abstract conceptualisation. To this list can be added written assignments, case studies, learning packages and programmed learning, as they all provide for analysis and abstract conceptualisation.

The teaching-learning environment must be structured since factual detail, systematic planning, analysis and abstract thought are emphasised. This mode of learning corresponds with the A-quadrant and Herrmann (1989:56) states that individuals who prefer this mode need structure and detail in order to be comfortable with a new learning experience. Additional teaching strategies whereby these individuals will benefit include clinical conferences, seminars, individual projects and case studies. Problem-solving should involve crucial problems in nursing which necessitate a direct scientific approach and not a divergent approach. As these individuals may appose most creative thinking techniques (because they are unstructured), brainstorming might provide a challenge to them and can enhance their ability to present more creative end products (Potgieter 1996:104).

(4) Active experimentation: B-quadrant thinking (accommodators and convergers)

Active experimentation focuses on changing situations and actively influencing people. The emphasis is on active doing and practical applications. 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 field should be encouraged. Students could 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, nursing care plans and clinical learning experiences should be emphasised as they offer opportunities for practical application of student knowledge. Creative teaching strategies including synectics and creative problem-solving, may appeal to this group of students because these can assist them to find practical solutions to problems (Potgieter 1996:104).

These teaching strategies provide some sort of structure and appeal strongly to the B-quadrant processes of the Whole Brain Model.

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 to Herrmann's statement that multiple dominance can be detected in occupations requiring the ability to rely on more than one mode (Herrmann 1989:100-101).

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).

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 have been indicated.

Herrmann (1989:100-103) has found triple dominants occurring in nursing and social work, and reports that in the typical nursing profile the greatest preference is in the B- and C-quadrants and to a lesser extent the D-quadrant which shows nurses as accommodators and divergers.

Similarities between Herrmann's and Kolb's findings are also illustrated with reference to engineers (A- or A- + B-quadrant, convergers), bookkeepers (B- or A- + B-quadrant, convergers), social workers (C- or C- + D-quadrant, divergers) and educators (C- or C- + D-quadrant, divergers) (Potgieter 1996:107-109).

summary

It appears that there are definite links between individuals' cognitive styles and dominance in brain functioning. The general view of researchers is that although the teaching-learning environment should be organised to accommodate individual students' cognitive styles, stimulation of the less preferred modes of thinking should also be provided. This

will assist students to develop their full potential by utilising whole brain functioning. Kolb's experiential model not only accommodates a variety of learning styles but also facilitates whole brain learning. It seems to be a particular appropriate model for nursing education if the aim is to produce competent, effective and creative nurse practitioners.

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