THE RELATIONSHIPS BETWEEN LEARNING STYLES, CRITICAL THINKING AND TEACHER INSTRUCTION IN NURSING EDUCATION

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The Relationships between Learning Styles, Critical Thinking and Teacher Instruction in Nursing Education

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Introduction

The characteristics of students entering post secondary institutions have changed dramatically as we enter the new millennium. This is evident in the changing enrollment pattern of students entering post secondary studies. The enrollment trend has changed from the traditional 18 year old high school graduate to a more non traditional population. The student body is now comprised of students with an average age of 25 years and older, who have many life experiences and a variety of academic backgrounds ranging from high school to university. In 1993-94 adults age 25 years and older composed 60% to 65% of all college students enrolled in either full-time or part-time studies (Statistics Canada, 1997). Gray and Herr (1998) state that "the majority of those involved in workforce education beyond the high school level are adult learners age 22 or older" (p. 165). According to Knowles, Holton and Swanson (1998), information technology and human longevity are factors contributing to this direction in adult education.

Merriam and Caffarella (1991) emphasized the impact social and cultural influence such as demographics, economics, and technology has on adult learning. The changing demographics reflect an aging population, the number of adults are greater than the number of youths, and a population that is better educated. These factors have created the need for society to provide learning opportunities for older adults. Closely linked with demographics are technology and industry which provide strong indicators in shaping educational programs for post secondary institutions and industry. These programs range from formal education programs to continuing education programs for upgrading of knowledge and skills.

The individual goals, needs, objectives and age of adult learners vary considerably, making them a dynamic and heterogeneous group. Each of these individuals will bring with him

or her a unique way of learning or learning style. Socioeconomic status, previous job experience, marriage, children, divorce and community involvement are some of the characteristics which influence and motivate these adult learners to succeed in their studies. According to Eyres, Loustau and Ersek (1992) "those 23 and older generally have had a variety of life experiences including raising a family and pursuing other occupations" (p. 176). This trend in student population coupled with limited time frames for teaching, financial constraints of the learning institution, the overwhelming rate of information available as a result of the technological revolution and the high class numbers, present an enormous challenge to educators. The question involving these variables is how to facilitate learning among these learners. In a 1992 study comparing older students to younger students Eyres et al state that:

> While these older students are novices in some of the theoretical and scientific content of nursing, they are simultaneously more capable of dealing with complex situations, compared to younger students. The implication is that they require the same structural supports and clarity of expectations for their class work, but that older students could benefit from opportunities for different discourse challenges in the program (p. 180).

The diversity of these students demands that the educator employ a variety of teaching methods. A variety of teaching methods provides students with opportunities to use different ways of learning. Case (1994) emphasizes that effective teaching require considerations of learner differences. "When we use a variety of teaching strategies we give each learner the opportunity to experience at least a portion of the learning experience in his or her preferred style" (p. 106).

Educators also need to be aware of their own preferred teaching style. Very often educators use teaching strategies with which they are comfortable, without considering how applicable that style is to the lecture content or the individual student's learning style.

To accommodate individual students' learning styles, educators should encourage students to be active learners. Facilitating an active learning environment provides students with the opportunity to use higher order thinking skills through a variety of learning activities. "To be effective, instruction must accommodate all styles in every class" (Griggs, Griggs, Dunn & Ingham, 1994, p. 42). To meet the social, economic, environmental and the complexity of knowledge development in today's society, the development of critical thinking skills is necessary in all educational disciplines.

The Paper Folio Background

The topic for this paper folio is the relationship between learning styles, critical thinking and teacher instruction in post secondary education, especially in nursing education. The author will explore three topics: (a) learning styles, (b) critical thinking, and (c) the development of critical thinking and learning styles in nursing education. Although addressed as three different topics, they are all relevant to adult education in that a student's ability to think critically is related to his or her preference for learning. As pointed out by Davis (1993), an individual's preference for learning also enables the student to experience other learning strategies.

The purpose of this folio is to highlight critical thinking in nursing education. A thorough literature review demonstrated the importance of developing critical thinking skills in nursing students who must perform proficiently and demonstrate application of knowledge in a complex working environment. As members of a profession in which situations change quickly, nurses cannot depend upon routinized behavior, procedure manuals or traditions. They must

develop the ability to make guided decisions drawn from a sound basis in order to respond appropriately under stress in fast paced clinical environments. Teaching to accommodate the individual student's learning style is an important aspect in facilitating the development of critical thinking abilities of students.

National and international nursing associations recognize critical thinking as an essential component of nursing practice. Likewise, nursing schools include critical thinking as an outcome objective of its curriculum. The challenge for nurse educators is to demonstrate how they teach and measure critical thinking (Catalano, 2000).

The focus of the first paper addresses learning styles as an assessment tool in nursing students' preferences. It examines learning styles as a major aspect of adult learning and its significance for adult learners and adult educators. The characteristics of students entering post secondary institutions have changed significantly due to such factors such demographics, economics and technology. The question is how to facilitate learning among these learners. The author will present a literature review of specific learning style inventories and the important contribution they make in facilitating and enhancing teaching effectiveness.

The relationship between learning styles and critical thinking is evident in the literature. Critical thinking is seen by educational disciplines as an objective, and the reasons for teaching critical thinking is well documented. According to Quam (1998), critical thinking is a process in which students become active learners. "To be active learners, students are engaged physically and mentally. They are doing things, and also thinking about what they are doing" (p. 79).

A characteristic of the learner is his or her learning style. Sims and Sims (1995) describe learning styles as "characteristic cognitive, affective, and physiological behaviors that serve as stable indicators of how learners perceive, interact with, and respond to the learning

environment" (p. xii). Learning style is the way an individual prefers to learn. According to Davis (1993), understanding learning styles can assist the educator in designing instruction to build on the different strengths adult learners bring to the classroom. By using different teaching strategies, educators provide students with the ability to expand their critical thinking skills and therefore their learning efficiency and capacity.

Critical thinking is well documented in the nursing literature as being essential in the nursing profession. The complexity of health care and the information explosion presents an enormous challenge to decisions nurses make on a continuous basis. Nursing education therefore must prepare students to develop critical thinking skills and independent judgements to make appropriate and safe decisions in the provision of nursing care.

The second paper will examine critical thinking in post secondary education. Specifically, the author will review research on several critical thinking models in nursing. These models provide a foundation for future research and educational strategies in the development of critical thinking skills for students enrolled in nursing programs.

The third paper will examine how learning styles have been applied to promote critical thinking in the design and development of nursing programs. According to Inouye and Flannelly (1998), presenting knowledge in a curriculum is not enough, educators must develop teaching strategies that appeal to all students' learning styles. Case (1994) points out that using a variety of teaching strategies will provide each student with an opportunity to experience some of the learning experience in his or her preferred style. This provides an active learning environment and appeals to a diverse student population thereby enhancing critical thinking skills.

The components of program development provides a framework on which instruction is accomplished. The literature stresses the influence the learner characteristics has in deciding

which methods, teaching strategies and resources are needed. Through this framework educators can utilize creative teaching methods to accommodate the learning styles and past experiences of students in the promotion of critical-thinking within the curriculum. By facilitating individual learning styles in the development of students critical thinking skills educators can prepare students to meet the challenges of the 21st century.

Paper I

Learning Styles

Learning styles describe both the way an individual prefers to learn and the influences on his or her preference for learning. The literature on learning styles reviewed in this folio is in the context of the adult learner. Therefore to gain an appreciation of individual learning styles, educators are encouraged to be knowledgeable of the concept of adult learning. According to Sims and Sims (1995) "educators must have knowledge and understanding of the learning process, particularly how individuals learn" (p. 1).

There exists a number of learning theories which provide a focus for the adult learner/educator. These theories answer questions related to who the students are, the objectives to be accomplished, the teaching strategies to use and the evaluation process. The implications for this aspect of adult teaching include adopting the theory of learning styles as a framework in providing direction in how to facilitate learning among these learners. "The adult learner is the most common client of programs that address the missions of providing career opportunities for individuals" (Gray & Herr, 1998, p. 165).

Working with adult learners can be challenging as well as rewarding. The role of the educator encompasses a variety of functions. An effective educator is a person who can meet these challenges, adapt to the needs of the learner with the tools, information and support that are essential to enhance learning. According to Ismeurt, Ismeurt and Miller (1992) "an awareness that different learner characteristics influence the exchange of information will assist in maximizing teaching and learning experiences" (p. 41). To be effective, educators must consider and accommodate all learner characteristics and styles in every class.

Characteristics of Adult Learners

Adults participate in different types of learning, organized learning activities, self-directed learning and courses for academic credit. Age, experience, background, and educational achievement are just some of the characteristics of this heterogeneous group. According to Knowles (1985), in any group of adults there will be a wide range of individual differences in terms of background, learning style, motivation, needs, interests and goals. Therefore given this diversity adult education becomes a challenge for educators who must place emphasis on individual teaching and learning strategies.

Andragogy is a concept of adult learning and according to Tight (1996) can be viewed as a philosophical orientation to adult education. "The use of the word andragogy has been traced back as far as 1833, but Malcolm Knowles is generally credited with the popularization of the term" (Cross, 1981, p. 222).

Abruzzeese (1992) contends that:

> At its best, an adult learning experience should be a process of self-directed inquiry, with the resources of the teacher, fellow-students, and materials being available to the learners, but not imposed on them. Knowles' name is linked with andragogic concepts of learning. Andragogy is "the art and science of helping adults learn", as contrasted to pedagogy, which is "the art and science of teaching" (p. 30).

Knowles (1980) developed four assumptions for andragogy as follows:

- As a person matures, his/her self moves from one of dependent personality toward one of self-directing human being.
- An adult accumulates a growing reservoir of experience, a rich source of learning. For an adult, personal experiences establish self-identity and so are highly valued.

- The readiness of an adult to learn is closely related to the development tasks of his or her social role, and
- There is a change in time perspective as individuals mature, from one of future applications of knowledge to immediacy of application; thus an adult is more problem-centered in learning (p. 44).

These andragogic concepts places the learner at the centre, with the educator as a facilitator of learning. The assumptions of self-direction, maturity, valuing experiences, readiness to learn, and motivation provide educators with a guide to teaching the wide spectrum of adult learners. Thus the process assists the adult learner to become self-directed and to engage in critical thinking.

Knowles' concept of andragogy and his set of assumptions provide educators with a guide to teaching the wide spectrum of adult learners. These include:

Need to Know: Adults need to understand why they should learn something before they are willing to learn it. The educator should structure learning experiences so that the reasons to learn and the value of the learning are experienced. A possible strategy might be for the educator to uncover the individual learning motivation.

Self Concept: Most adult learners see themselves as responsible for their own learning. They see themselves being self-directed. They make their own decisions and assume responsibility for their own lives. The implications for educators is to establish a learning environment of respect, mutuality and collaboration. This means paying more attention to the physical and psychological environment. Knowles emphasizes that the learning environment most conducive to learning is one that attends to the physical environment and psychological atmosphere.

Learner's Experiences: Adult learners have gained many experiences. It is important for educators to draw on this valuable knowledge. Educators should facilitate learners experience through such methods as role playing and group discussions. "When teaching adults, educators must acknowledge their experiences and provide experiential learning exercises that capture the knowledge and skills of the learners" (Abruzzeese, 1992, p. 32).

Readiness to Learn: Adults become ready to learn the things they need to know that will help them cope more effectively with their life situations. This principle is related to their developmental tasks and role changes.

Orientation to Learning: Adult orientation to a learning experience is based upon the perception that it will assist them to perform tasks on problem solving in their life situations. According to Knowles (1980) an adult learner's orientation toward learning shifts from one that is subject centered to one of performance centered. Adult educators must possess an understanding of the learners' experience and be cognizant of the concerns of the learners.

Motivation: Adults are motivated both externally and internally. "Motivation is a term used to describe forces acting on or within an organism to initiate, direct and maintain behaviour and to explain differences in the intensity and direction of behavior"(Redman, 1988, p. 21). Adult may be motivated externally to learn, for example for a work promotion or higher pay. However, adults may also be motivated by internal forces such as responsibility, achievement, and wanting to do a better job.

The principles of andragogy provide direction for adult educators in facilitating learning. By providing a variety of teaching methods and a climate of respect and collaboration, these principles help educators implement relevant learning experiences for adult learners. According

to Mezirow (1981) "andragogy is an organized and sustained effort to assist adults to learn in a way that enhances their capacity to function as self-directed learners" (p. 21).

Learning Theories

Learning theories provide educators with an understanding into how people learn. Quam (1998) points out that the development of learning theories can be considered a process whereby ideas stimulate thinking to find answers to increase our understanding of practice-based issues. According to Sims and Sims (1995).

> Researchers have struggled for years to define what constitutes learning and to better understand how people learn. Because there has and will continue to be studies aimed at improving learning in higher education, instructors and their institutions have a responsibility to be open-minded to concepts or ideas that may indeed improve our understanding of how people learn and what makes some teaching more successful than other teaching (p. 21).

Theory-based teaching provides insight into the impact the various teaching techniques has on the learner. It also assists the educator to organize his or her thinking and to plan strategies to convey an understanding of the knowledge to all students. Babcock and Miller (1994) describe three main theories which are applicable to the adult learner, the behaviorist theory of learning, the cognitive theory of learning and the humanistic theory of learning.

Behaviorist Theory of Learning

This theory was pioneered by Edward Thorndike and expanded upon by Watson, Pavlov, and Skinner. It centers around external motivation and the idea of providing rewards for desired results. B. F. Skinner is one of the most famous behaviorist theorists in the field of learning especially related to the concept of reinforcement. He formulated the learning theory, operant

conditioning, which is based on operant learning. According to Schunk (1996), aspects of the environment such as situations, events or stimuli serve as signals to elicit a response from the learner. When the response is reinforced, it is strengthened and the behavior is most likely to be repeated. The response can be either positive reinforcement or negative reinforcement. An example of reinforcement and punishment processes can be seen in the table below.

Table 1
Reinforcement and punishment processes.

	Discriminative Stimulus	**Response**	**Reinforcing (Punishing) Stimulus**
Positive reinforcement (Present positive reinforcer)	T gives independent study time	L studies	T praises L for good work
Negative reinforcement (Remove negative reinforcer)	T gives independent study time	L studies	T says L does not have to do homework
Punishment (Present negative reinforcer)	T gives independent study time	L wastes time	T gives homework
Punishment (Remove positive reinforcer)	T gives independent study time	L wastes time	T says L will miss free time

T refers to teacher and L to learner

(Schunk, 1996, p. 68).

Operant conditioning focuses on the antecedent (beforehand) event, the response to that event, and the consequences or the response that follows. A behavior that is followed by a negative response (punishment) will be decreased and a behavior that is followed by positive response (reinforcement) will be increased. Babcock and Miller (1994) state that an undesirable behavior or a desirable behavior can be changed by altering the antecedent event. Changing an

antecedent event to produce a desirable behavior for a person learning to lose weight for example would be to "shop on a full stomach and use a shopping list".

Mackeracher (1996) states that behaviorists "assume that learning can be controlled from outside the learner by the application of the correct stimulus for the desired response and by the appropriate reinforcement of that response to encourage its continued use" (p. 223). The behaviorist orientation centers around external motivation and the idea of providing rewards for desired results. According to Merriam and Caffarella (1991), reinforcement is central to the explanation of the learning process in this orientation. This particular process is teacher oriented and commonly used in program instruction.

Behavioral principles are applied to many aspects of adult learning especially psychomotor or task analysis which lends itself to behavioral objectives. This type of learning is very popular in a variety of settings such as programmed instruction and computer assisted instruction. Behaviorism theory according to Cross (1981) lends itself to adult learning and is applicable to well-motivated and self-disciplined adults who study off campus.

Cognitive Theory of Learning

Cognitivism focuses on the whole learning process and views learning as a complex cognitive activity. Its emphasis is on the internal processes within the learner's control such as memory, perception and problem solving. The cognitive theorist considers each person as a unique individual with different experiences and different perceptions or views of learning. For example two people experiencing the same event at the same time tend to have different perceptions of that event (Babcock & Miller, 1994). This orientation to learning is based on the Gestalt view which looks at the whole process of learning rather than its parts. A main goal of

this learning approach is to promote understanding and insight in designing instruction to address individual learner differences.

According to Gray and Herr (1998)

> Cognitive science research had led to a different view or learning namely, that there are different ways to learn and that individuals have different preferences or styles. In the cognitive learning approach the emphasis is not on the stimulus but on the learner. It is recognized, for example, that humans are often stimulated to learn by curiosity, not by some external stimulus (p. 158).

Quam (1998) refers to cognitive learning in the context of the adult learner as gaining new insights or knowledge. This type of learning enables learners to store information in a way that the information is accessible when needed. Key to the cognitive theory of learning is organizing information systematically before it is entered into the learner's brain. Individual learning styles are rooted in this theory. It is a problem solving approach which places emphasis on a critical thinking process. This approach to learning is learner focused. The learner thinks about a problem from a number of perspectives and gains insight into the solution.

Humanistic Theory of Learning

Humanistic theory is equated with the human potential movement in the 1970s and has its root in the works of psychologists such as Carl Rogers, and Abraham Maslow. Humanists believe that the study of human nature should include human choices, creativity and self-actualization. An example of humanistic psychology is Maslow's hierarchy of needs. Merriam and Caffarella (1991) point out that Maslow, considered to be the father of humanistic psychology believed that all humans are born with instinctive needs. "It is a theory of human

motivation based on a hierarchy of need" (p. 132). Self actualization is the goal of this theory and is only possible when basic biological and sociological needs are fulfilled.

Babcock and Miller (1994) maintain that it is essential for humanistic educators to be aware of three characteristic beliefs of this theory. First, learners should be directly involved in directing their own learning, making the learner self-directed and self-motivated. Second, affective learning is stressed emphasizing the caring aspect of the learner. Third it is the belief that learners should be taught to value learning for its own sake. The table below outline the basic tenets of humanistic psychology.

Table 2
Basic tenets of humanistic psychology

1. Conscious experience is an important and primary source of data for the psychologist.
2. The essential nature and integrity of the human being as a whole must be addressed.
3. The essential freedom and integrity of the human being is valued but individual limitations must be taken into account.
4. Human nature cannot be fully defined.
   Human nature is more than what people do; it includes what people are.

(Babcock & Miller, 1994, p. 42).

These three beliefs are in keeping with many of the adult learning principles such as motivation, self-concept, student-centered learning and self direction. The humanistic approach to education encourages "individuality, independence, creativity, a spirit of inquiry, a commitment to caring and lifelong learning" (Centre for Nursing Studies, student handbook, p. 10). The humanistic theory of learning consider learners as being responsible for their own learning. According to Merriam and Caffarella (1991), "humanist theories consider learning from the perspective of human potential for growth" (p. 132). This philosophy to learning is

orientated toward the natural tendency for people to learn in a caring environment. It stresses self direction and the value of experience from the learner perspective.

Growth and Development Theories

Individuals goals, needs, objectives and the age of adult learners vary considerably, making them a dynamic heterogeneous group. Learners come from all socio-economic backgrounds. According to Merriam and Caffarella (1991), socioeconomic status is a factor which influences adult participation. The age of learners has a correlation to various events in their lives, for example starting a career, divorce, career advancement, retirement.

> Age is an especially interesting characteristic because it reveals so clearly certain socialized perceptions about the role of education at various life stages. Younger people tend to be pursing credentials...Ages 25-45 concentrating on occupational and professional training for career advancement...50 and older are preparing for use of leisure time (Cross, 1981, p. 57).

The phase of adult development also relate to age for example job, marriage, children, divorce and community involvement.

The learning efforts of adults are generally distributed among several areas. A younger adult's learning centers around studies, family and self. The learning activities of middle age, and older age adults are focused around work and leisure. The latter two age groups approach learning activities related to work differently from other related projects, for example learning activities for work carry more stress than self-directed learning projects for leisure.

Motivation is another factor inherent with adult learners. "Motivation can be defined as an individual's desire to do something based on a need" (Abruzzeese, 1992, p. 147). Motivation generally results from life changing events, a love of learning, self esteem or pleasure.

It is evident from the literature review on adult learners that learners pursue learning for many reasons. Therefore educators should create a climate of respect and collaboration bearing in mind that adults are individuals with different ways of learning and like to be recognized as such. They bring their life's experience to the learning process and their skills and knowledge can be shared with others.

Overview of Growth and Development Theories

Inherent in the learning experiences of the adult learner are the theories of growth and development in the three stages of adulthood (young adult, middle adult and older adult). These theories are widely acknowledged in the literature, which basically states that at different stages in life, people have different needs. According to Craven and Hirnle (2000), these theories can be described under five categories: psychodynamic, cognitive, developmental task, human needs and moral development.

Psychodynamic theories: These theories focus on human behavior throughout the lifespan. Two famous theorists, Sigmund Freud and Erik Erikson, are acknowledged for their work on these theories. Freud's theory emphasized the psychosocial development across the lifespan while Erikson stresses the social and cultural changes an individual must successfully pass through before entering the next stage.

Cognitive development theory: This theory highlights the intellectual processes of human thinking through various stages of development. Jean Piaget based this theory on four developmental cognitive stages (sensorimotor, pre-operational, concrete operations and formal operations) ranging from birth to adolescence. Knowles, Holton, and Swanson (1998) state that cognitive development theory contributes to adult learning in two ways. "First, they help to explain some differences in the way adults learn at different stages in their life. Second, they

help explain why the core learning principles are exhibited in different ways at different stages of life" (p. 171).

Development task theory: Robert Havighurst founded this theory, which examines specific tasks at various stages throughout life from infancy to older adulthood. Each stage throughout life progresses to a higher order task.

Human needs theory/humanistic theories: Humanistic theories, described earlier under learning theories, proposes that each person has the ability to grow to their fullest potential. Abraham Maslow, a well known humanistic theorist, developed a hierarchial framework of human needs.

Moral development theory: Lawrence Kohlberg developed this theory on moral reasoning based on the work of Piaget. His levels of moral development are aligned with Piaget's stages of human development.

Knowles, Holton, and Swanson (1998) state that adulthood is a developmental process which does not end when adulthood is reached. "Adult development theories have a profound influence on thinking about adult learning because adults' learning behavior varies considerably due to developmental influences" (p. 170).

Life stages and transactions are evident in the three stages of adulthood. Roles and responsibilities are specific to various age groups synonymous with growth and development theories. In general, young adults demonstrate tasks of cognitive and psychosocial development. The need to be independent, formal educational studies for the establishment of a career, and the need to launch out on their own (establishing their own home and forming personal relationships with a mate) are tasks associated with this stage of adulthood.

Interest in learning is also maintained in middle age and older adults. In middle age, adults usually enter post secondary education to up grade working skills, further career advancement, or make a career change. The older age adults interest in learning is usually for enjoyment and personal interest as they make the transition from work to retirement.

Life events are seen as a concept which has an influence on learning. These events do not necessarily coincide with age specific periods. An individual life event such as divorce may be likened to a transition. In some cases this event may provide motivation to return to school in order to become self sufficient. The concept of transition in people's lives can be linked to adult learning and is related to transitions which involve family and career (Merriam and Caffarella, 1991).

Developmental theories provide educators with a framework to understanding the implications for adult learning. According to Knowles, Holton and Swanson, (1998),

- Adult learning is inextricably intertwined with adult development.
- Adult learning will vary primarily with stages of cognitive development.
- Motivation and readiness to learn will vary primarily according to stage of life-span development.
- Adult learning facilitators must be attentive to learners' stage of development, and tailor learning experiences to fit that development stage (p. 178).

Adult Learning Styles

There is no uniform agreement in the literature on a definition of learning style or a common theory upon which the work or learning style is based. Smith (1982), as quoted in Merriam and Caffarella (1991), defines learning style as "the individual's characteristic ways of processing information, feeling, and behaving in learning situations" (p. 24). Davis (1993) states

that "some students prefer to work independently, while others do better in groups. Some students prefer to absorb information by reading, others by active manipulation" (p. 185).

According to learning style theory, every person within a group will have his/her own learning style "for processing information and for learning and his own individual level and type of ability" (Brundage & Mackeracher 1980, p. 45). Therefore, educators need to increase their awareness in this theory. According to Case (1994), there is a need to stimulate nursing students into becoming more active learners by asking rather than telling. "To do this we need to be constantly aware that learning occurs most effectively when the learner in involved...We will never find time for interactive learning if we insist on telling the learner everything" (p. 106).

There are many models of learning style put forth in the literature. Claxton and Murrell (1987), as quoted in Davis (1993) place the models into four categories.

> *Personality models* refer to basic personality characteristics (for example, extrovert versus introvert). *Information-processing models* reflect how people take in and process information (for example, holistic manner-seeking overall understanding-versus serial manner-adopting a step-by-step approach). *Social-interaction models* focus on how students interact and behave in the classroom (for example, learning versus grade oriented). *Instructional preference models* focus on the medium in which learning occur (for example, listening, reading, direct experience) (p. 185).

Personality Learning Style Model

A learning style model which predicts preference based on personality is one based on the work of Herman Witkin and uses a field dependence and field independence approach to learning (Mackeracher, 1996). This is one of the best known and researched orientation to learning. It is a model using embedded figures to distinguish between field dependent and field

independent approaches to learning. According to Brundage and Mackeracher (1980), the field dependent approaches learning in global terms. This individual would have a tendency to see the whole rather than the parts of any situation. The field independent individual on the other hand is more analytical in problem solving. Witkin as stated in Garity (1985) emphasizes that:

> The field-dependent individual experiences his surroundings in a relatively "global" fashion, passively conforming to the influence of the prevailing field or context. Such an individual tends to see the whole rather than the parts of a situation. The field-independent individual, on the other hand, experiences his surroundings, "analytically" with objects separate from their backgrounds (p. 12).

The field-dependent person tends to be more interactive in his/her approach to learning placing emphasis on interpersonal relationships. They enjoy working with others and learn from an environment in which emotions and experiences are shared as part of the learning process.

Field independent learners are more impersonal than field dependent learners and like a formal learning environment. There is less emphasis on the social aspect of learning. "Field independent learners prefer task focused, flexible activities which allow them to be independent and impersonal and to maintain an acceptable distance between emotions and ideas" (Mackeracher, 1996, p. 200).

Claston, Ralston and Mesoff as stated in Garity (1985, p. 13) provide a summary of the differences in interpersonal characteristics between field dependent and field independent individuals as follows:

Table 3
Interpersonal characteristics between field dependent and field independent individual

Field Dependents	Field Independents
• Favor passive, spectator role in learning process	• Favor active participant role in learning process
• Maintenance-oriented; demonstrate cooperation, collaboration, and participation	• Task-oriented; test out opinions, ideas, hypotheses
• Take on facilitator and process roles in groups	• Take on leadership roles in groups
• More effected by criticism; will change opinion/ideas to conform to peer pressure	• Less affected by criticism, will not conform to peer pressure
• Look for verbal and nonverbal feedback; difficulty in accepting positive feedback (tend to discredit/disassociate the source) and negative feedback (tend to deny or repress it)	• Less influenced by feedback (grades and evaluations)
• Motivated by social approval, warmth expressed by others, and acceptance of the group	• Motivated by meeting challenges
• Do not direct hostility outward; seek emotional and physical closeness to others	• Able to direct hostility outward, to distance self from others
• More sensitive to faces and social cues	• Less sensitive to social cues
• Less sense of differentiation for others	• Self-differentiated

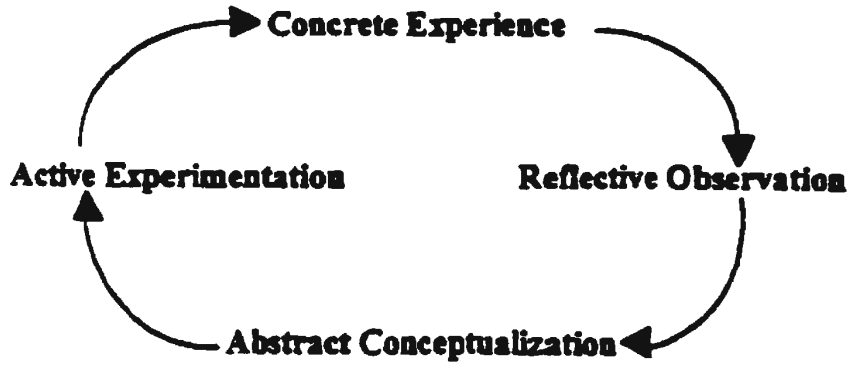
The Group Embedded Figures Test (GEFT) is one of the instruments used to measure the field dependent/independent learning style. Accordingly to Cleverly (1994),

> Where a learner has a bias to one or the other of these styles of learning, then the educational implications are clear. The global bias of the field-dependent will be a disadvantage in unstructured learning situations especially if a mass of unrelated material has to be searched for the significant points. The field-independent learner will have more difficulty with the social dimensions of learning-this is especially pertinent in nurse education where all knowledge in centered on human beings (p. 441).

The Information Processing Style Model

There are several information processing style models. One information processing model, developed by D. A. Kolb in 1976, builds on the work of Dewey, Lewin and Piaget. It comprises of a learning cycle and is a four-step process. (Figure 1 below).

Figure 1
Experiential learning cycle



Source

Marilla D. Svinicki and Nancy M. Dixon (1987).

> The axes of the figure represent the two dimensions of the learning task. The vertical dimension (concrete experience to abstract conceptualization) represents the input of information from either experience or abstractions. The horizontal dimension (reflective observations to active experimentation) refers to the processing of information by either internally reflecting on the experience or externally acting upon the conclusions which has been drawn (Svinicki & Dixon, 1987, p. 141).

Learning in this model is viewed as a "four stage cycle: 1) concrete experience, followed by 2) observations and reflection, which leads to 3) formation of abstract concepts and generalizations, resulting in 4) hypothesis which will be tested by future actions leading to new experiences" (Cavanagh, Hogan & Ramgopal, 1994, p. 178). Kolb tested this model on adult learners focusing on the strengths and weakness of particular learning styles.

According to Sutcliffe (1993) Kolb's learning style inventory (LSI) describes experimental learning in four modes, namely diverger, assimilator, converger and accommodator.

> Divergers, combining concrete experience and reflective observation, are interested in people and are feeling-oriented. They like viewing situations from several perspectives in order to discover and identify potential problems or opportunities. Linking reflective observations and abstract conceptualization, assimilators prefer working with concepts and abstract ideas rather than people, and organizing disparate observations into coherent and integrated explanations. Convergers join abstract conceptualization with active experimentation. They are more technically oriented, like to make decisions and apply their problem-solving skills in practical ways. Accommodators blend active experimentation and concrete experience. They are considered risk taking, action-

oriented, and pragmatic. Accommodators solve problems in an intuitively trial-and-error manner (Haislett, Hughes, Atkinson & Williams, 1993, p. 65).

The LSI tool is an indicator of the way an individual learns and it gives an individual guidance in how to solve problems, set goals and make decisions. "While adults enter learning experiences with personal styles and tend to start there, they also use other styles less often and less productively" (Brundage & Mackeracher, 1980, p. 47).

The Instructional Preference Model

Many of the personality type learning style models are based on theory by psychologist Carl Jung. Heinrich (1988) states that "in simplest terms, this theory explains personality similarities and differences by identifying ways people prefer to take in and make use of data from the world" (p. 34).

The Meyers-Briggs Type Indicator (MBTI), designed in 1962 to measure teaching/learning styles, is considered to be a reliable and valid instrument in determining individual learning styles. (See table below). The tool contains 16 categories and is used extensively in industry and education. It measures 4 dimensions of personality: extraversion and introversion, sensing and intuitive, thinking and feeling, and judging and perceiving. Worthington and Clay (1995) state that:

> Briefly the MBTI establishes four bi-polar preferences with an individual having preferences on each of the poles. While most people use all the preferences from time to time, the MBTI asserts that people have natural tendencies to revert to varying degrees to one end of each pole ..... While many people are familiar with the MBTI as a personality inventory, it is also accepted as a learning style inventory. Keirsey and Bates describe in detail how the MBTI personality types reveal learning preferences styles (p. 96).

Table 4
Bi-Polar Explanation of MBTI

How Individuals Derive Energy	
Introvert (I)	**Extrovert (E)**
Derives energy from Self, reflects, draws energy from reflection	derives energy from other people draws energy from internal processing interactions with others
Thinks then talks	talks to think
How Individuals Receive Information	
Sensing (S)	**Intuitive (N)**
Obtains information from senses and in small pieces (building blocks)	obtains information from the big picture
uses information that is practical, relevant	uses information for pattern building
likes "real" and "actual"	likes future possibilities
How Information is Processed (The Lenses Used to Process Data)	
Thinking (T)	**Feeling (F)**
Processes through a logic filter	processes through a humane filter
Asks "does this make sense?"	asks "what is the value of this?"
Prefers cause/affect	assesses effects on people
How Decisions Are Made	
Judging (J)	**Perceiving (P)**
Wants closure on decisions	wants flexibility in decisions
Likes order and structure	likes options and change
Does it now	prefers to wait if possible

The Kiersey Temperament Sorter tool is based on the MBTI. The types are regrouped into four categories to facilitate easier use by people who are not familiar with psychology. The categories are more suited to the general population and are easier to use. To assist in using temperament types to individualize learning experiences, the Keirsey Temperament Sorter is a

tool that is easy to use and has worthwhile applications for many learning activities. The four temperament types include:

> **The Sensation-Perceiving Type:** The sensation-perceiving (SP) people are process-oriented....excel at solving crisis situations. This type of learner benefits from a completely organized teaching situation, which offers information immediately applicable in a practical way.
>
> **The Sensation-Judging Type:** Sensation-judging (SJ) people are cautious, thorough, and accurate; they are very product oriented.... As a learner, SJ individuals may want to be content to provide guidelines that will help to increase the effectiveness of their nursing practice by enhancing routines and clarifying roles and responsibilities.
>
> **The Intuition-Thinking Type:** Intuition-thinking (NT) people are "idea" people who want to conceptualize and design...This type of learner may thrive when given the opportunity to develop new ideas for achieving goals or nursing practice. The creativity may challenge instructors and classmates to envision the best possible way of providing care.
>
> **The Intuition-Feeling Type**: Intuition-feeling (NF) people are both personal and personable....This type of learner or teacher is able to create an environment where people have freedom, autonomy, and self-direction....The adult NF learner may be able to be an effective support person as self-exploration and critical thinking are analyzed (Abruzzese, 1992, p. 40).

The four learning styles models described provide a framework for adult teaching and learning. They provide the educator with an awareness of learner preferences and the student

with self knowledge (Sims & Sims, 1995). According to Pat Guild, as stated in Brandt (1990), learning styles can be advantageous in three different approaches namely:

- know thyself
- know the other person you're interacting with
- the third approach is diagnostic/prescriptive (p. 10).

Learning style inventories are important to both learners and educators as they promote an awareness of their personal learning styles and their strength and weakness as learners and educators. It must be remembered in using these instruments that each inventory measures different things (Merriam & Caffarella, 1999). Learning style characteristics can be summarized as different ways of processing information: i) each person has his/her own way to learn things; ii) individuals' learning preference is another important aspect, for example less structure as opposed to more structure, methods of instruction, role playing vs lecture, levels of detail of instruction, and environmental considerations such as lighting and noise; and iii) learning styles are not fixed depending on the situation in which we find ourselves (Dr. Marilyn Thompson, personal communication).

Motivation to Participate

How adults learn and why they participate in learning is described by Houle's (1961) study on adults. He conceived three categories that describe adults' general orientation to learning-namely: goal-oriented learners, activity-oriented learners and learning-oriented learners.

> Goal-oriented learners use learning to gain specific objectives...learning is a series of episodes, each beginning with the identification of a need or interest. Activity-oriented learners, participate primarily for the sake of the activity. They may take a course to

> escape loneliness or an unhappy job situation. Learning-oriented learners pursue learning for its own sake...possess a fundamental desire to know and to grow through learning. (Cross, 1981, p. 82).

Houle indicated that people do not have to fit into one category only. All adults could be seen as goal-directed learners. This is evident because all adults generally are involved in formal education during the young adult years. Middle adults and older adults are involved in learning throughout the middle years, for example for career mobility, and job requirements. Social needs can be seen in the selection of learning by most adults which could place them as activity-oriented learners. The learning-orientation category of older age adults is oriented to learning new things for enjoyment and interest. "Growth needs relate to such personal goals as improving job skills, obtaining a salary increase, developing professionally, meeting new people, developing trust relationships, learning for the pleasure of learning, expanding knowledge, extending oneself and so on" (Brundage & MacKeracher, 1980, p. 37).

Self concept is related to motivation and is one of the assumptions of Knowles' (1980) research on adult learning. All adults generally see themselves as taking responsibility for their own lives and making their own decisions. Readiness to learn is associated with development tasks and the requirements of various social roles. Havighurst (as quoted by Knowles, 1980), "identifies ten social roles of adulthood: worker, mate, parent, homemaker, son or daughter of aging parents, citizen, friend, organization member, religious affiliate and user of leisure time" (p. 51). These roles change as we move through the phase of adulthood thereby changing readiness to learn. The role of the worker is to get a job, the person then turns his/her attention to keeping the job for example learning the required skills, once the job is secure the individual seeks promotions and becomes ready to learn how to be effective in a management role. The

next role for that individual (as he/she is ready for retirement) is to acquire some knowledge about retirement and to seek substitutes for work (Knowles, 1980).

According to Brookfield (1985), the educational purpose of adults is to meet the needs of learners.

> Underlying this assumption are two other assumptions. The first of these is that adults are naturally self-directed learners...our task as educators is to facilitate a non-directive release of latent learning potential so that adults can realize learning goals they have set for themselves. The other assumption regarding learning... is that it is a fulfilling experience in self actualization in which educator intent and learner needs are matched in a marriage of perfection (p. 44).

Summary

The concepts of learning styles are well documented in the literature and provide the adult educator with guidance in the teaching of adults. There is a diversity of reasons why adults enter into further education. Some will be looking for information only, while others want to increase their knowledge in cognitive and psychomotor skills that have immediate application to their life situations. There are others who will be there just for the sake of learning. Adults participate in different types of learning, organized learning activities, self-directed learning and courses for academic credit. According to Knowles (1985), in any group of adults there will be a wide range of individual differences in terms of background, learning style, motivation, needs, interests and goals. Therefore, given this diversity, adult education becomes a challenge for educators who must place emphasis on individualizing teaching and learning strategies.

Lifelong learning is characteristic of adult learners. Adult educators need to develop an awareness of this process. The complexity is essential that educators continue to monitor and

participate in research on how and why adults learn, and in turn learn how to apply knowledge in their instruction.

The first section of this folio examined the learning styles in the context of the adult learner. An understanding of the principles of adult learning is key to addressing individuals' learning preferences. These principles enable educators to enhance their teacher effectiveness and enable students to build on their learning style strengths.

Colucciello (1999) states that problem solving, interests and social behaviors are attributes of an individuals' learning style. "It would seen plausible then that individuals' modes of learning preference may be related to their critical thinking dispositions" (p. 295). It is evident from the literature review that individual learning styles provides the avenue upon which to effectively teach critical thinking skills. In the next section I will provide an overview of the literature with emphasis on the nursing literature, on critical thinking.

Paper II

Critical Thinking

Critical thinking is defined in many ways. According to Jones and Brown (1991) "critical thinking is not one single way of thinking but rather a multidimensional cognitive process" (p. 530). Catalano (2000) states that "things that are more difficult to define tend to have many definitions that may or may not overlap" (p. 96). Bateman (1999) describes the critical thinking perspective to include "four basic concepts: identifying assumptions; checking the accuracy and validity of these assumptions; considering alternative perspectives; and taking informal actions" (p. 140). The word "critical" is derived from the Greek, meaning to question, to discern, to choose, to evaluate and to make judgement. A reason for thinking critically is to become aware and reflective of our role and identity in the world, in relation to things, events, and other people. This paper will examine critical thinking in post secondary education first from a broad educational perspective and then from a nursing perspective.

Literature Overview

Critical thinking is a broad concept. There is no consensus of a single definition among the education scholars. "There is no standard definition of critical thinking. This is because critical thinking is a complicated and intricate process" (Rane-Szostak & Robertson, 1996, p. 5). Various authors have defined critical thinking applicable to their discipline, and agree that critical thinking is an objective that is essential for an effective education.

The concept of critical thinking is not new, "the origin of critical thinking can be traced at least as far back as Socrates (459-399 B.C.) who left us the legacy of the Socratic method"

(Morgan, 1995, p. 336). According to Morgan (1995), the Socratic method of questioning ideas and definitions reflect contemporary views of problem solving and thinking.

There have been many meanings attributed to critical thinking. The term critical thinking is one of the most abused terms in our thinking skills vocabulary. Generally it means whatever its users stipulate it to mean (Woods, 1993). Meyers (1986) compares critical thinking to the pleasure of playing around with ideas which is clearly not related to problem solving. "A central element in critical thinking is the ability to raise relevant questions and critique solutions without necessarily posing alternatives" (p. 5).

Ennis (1989) emphasized that the focus of critical thinking is "a reasonable reflective thinking focused on deciding what to believe or do" (p. 4). This definition broadens the scope of critical thinking as all behavior is based on what one believes and decides to do. According to McPeck (1981), critical thinking is discipline-specific and depends on the knowledge of what constitutes good reasoning in a discipline and, thus, requires extensive knowledge of the subject matter.

Norris (1985) found critical thinking to be an educational ideal that was not widespread in practice. He described it as complex of many considerations, highly sensitive to context and requiring a "critical spirit" for implementation. Seigel (1980) defines critical thinking as being moved by reasons...to generate and to seek out reasons.

Daly (1998) stresses the importance of Dewey's (1916) influence on the critical thinking debate which puts forth the idea that thinking came from a state of ambiguity, resulting in a predicament requiring an individual to reflect on all solutions or alternatives. This is in contrast to Meyers (1986) view on critical thinking.

> Dewey suggested that critical thinking is a subset of the reflective process involving thorough assessment, scrutiny and the drawing of conclusions in relation to the issue at hand...The importance of critical thinking in this process according to Dewey is that problems are subject to healthy skepticism...Dewey's view of education is that it should facilitate a reflective process, be student centered and realistic in order to develop students both intellectually and morally (p. 324).

There are many definitions of critical thinking found in the literature emphasizing goals, process, scope or characteristics. Although there are commonalties and overlapping concepts in defining criteria for critical thinking, the authors have failed to achieve consensus. In reviewing these definitions, it is clear that memorization is not part of critical thinking. According to Morgan (1995), "Critical thinking by any definition is far removed from the rote memorization" (p. 339).

Educational disciplines view critical thinking as an outcome of learning. Seigel (1980) sees critical thinking as an educational ideal. He identifies three reasons for teaching critical thinking. The first reason relates to the facilitation of students' self-sufficiency and autonomy. Thus, recognition is given to the right of independent judgment and evaluation. The second relates to the empowerment of students to control their own destiny and the encouragement of inquiry, exploration of alternatives and critical analysis. The use of this encourages students to view their own beliefs, values and attitudes objectively, thus freeing them from unjustified and unsupported ideas. The third reason relates to promoting rationality as the use of reason. When students understand the impact their attitudes, values and beliefs have on their view of the world, they begin to apply rational thought to their behavior.

The goals and purposes of critical thinking are, according to McPeck (1981), "to produce autonomous thinkers who are not taken in by faulty argument, weak evidence or "trendy" opinions, and can face life's problems as people capable of making rational decisions about whatever should confront them" (p.35). These problems and decisions are applicable to self, society, as well as academic or cognitive problems. As noted by McPeck (1981), the goal of becoming rational human beings should be taught to students, since this requisite knowledge and skill is not innate. The success of nurturing autonomous thinking is dependent upon the attitude of the teacher and the atmosphere of the classroom.

> The reasoning process develops over time...We can teach skills to school-age children, we will enhance their ability to understand the world around them, to sort out the conflicting ways to respond to challenges, opportunities, irritants and threats and to help them learn how to tolerate dissent, complexity, frustration and uncertainty-necessary abilities in today's world (Goodman & Goodman, 1991, p. 3).

It is important for students to develop thinking and reasoning abilities needed to process the ever increasing amount of information that is presently available. "Critical thinking is necessary today because the amount of information available through computers and the media seems to have outstripped people's abilities to process and use that information" (Meyers, 1986, p. 1). According to Daly (1998):

> Critical thinking is currently a highly valued educational outcome throughout the educational spectum, but particularly so in relation to higher and professional education. International concerns have focused upon citizen's thinking abilities and thus the nations' abilities to function and compete in complex societies and economics. Educationalists

are questioning the wisdom of teaching content as opposed to teaching how to think as a means of dealing with relentless information and change (p. 323).

Nursing Literature Review

Critical thinking in nursing, as in the general literature on critical thinking, is an elusive concept that has as many definitions as there are authors who attempt to define it. Bandman and Bandman (1995) define critical thinking as "the rational examination of ideas, inferences, assumptions, principles, arguments, conclusions, issues, statements, beliefs and actions" (p. 5). In formulating this definition, the authors considered Seigel's theory of critical thinking in education, students' autonomy, empowerment of students and promoting rationality. Kurfiss, as stated in Hickman (1993), defines critical thinking as:

> An investigation whose purpose is to explore a situation, phenomenon, question, or problem to arrive at a hypothesis or conclusion about it that integrates all available information and that therefore, can be convincingly justified (p. 37).

The National Council for Excellence in Critical Thinking Instruction defines critical thinking as:

> ...the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing and evaluating information gathered from or generated by observation, experience, reflection, reasoning, or communicating as a guide to belief and action. The council put forth two aspects of critical thinking. The first is a set of information and belief generating and processing skills and abilities, and the second is the habit, based on intellectual commitment and using these skills and abilities to guide behavior (Woods, 1993, p. 65).

As noted by Woods (1993), Watson and Glaser saw critical thinking abilities as three components consisting of knowledge, skill development and attitudes of the practitioners. They developed an assessment tool to measure critical thinking which is used widely to measure the extent of critical thinking in students. Adams, Stover and Whitlow (1999) states that:

> Watson and Glaser (1964) authored the Watson-Glaser Critical Thinking Appraisal (WGCTA), first published in 1942 and the predominant tool used to assess critical thinking ability. They defined critical thinking as a composite of attitudes, knowledge, and skills, including:
>
> 1) Attitudes of inquiry that involve an ability to recognize the existence of problems and an acceptance of the general need for evidence in support of what is asserted to be true.
> 2) Knowledge of the nature of valid inferences, abstractions, and generalizations in which the weight or accuracy of different kinds of evidence are logically determined.
> 3) Skills in employing and applying the above attitudes and knowledge (p. 112).

The WGCTA is used by many disciplines and as pointed out by Adams, Stover & Whitlow (1999) the use of this instrument to measure critical thinking in the nursing discipline may not capture the critical thinking abilities required of this population. "The WGCTA measures critical thinking ability in broad, non specific terms...thus raising the possibility that the results may not be reflective of the critical thinking skills of the unique nursing population" (p. 112).

Facione, Facione and Sanchez (1994) liken the attributes of the ideal critical thinker using the Delphi description to the nurse with ideal clinical judgement as follows:

> The ideal critical thinker is habitually inquisitive, well informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgements, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit (p. 345).

In her study, Maynard (1996) used Benner's (1984) stages of skill acquisition as the conceptual framework to measure the critical thinking abilities of beginning nursing student to practicing nurse. "The assumption made that the skill of critical thinking is inherent within nursing practice" (p. 12). Benner (1984) identified five stages of nursing practice.

Stage 1: Novice Beginners have had no experience in the situations they are expected to perform, and rely upon rules and textbooks to perform. A new graduate would be a novice.

Stage 2: Advanced beginner The individual demonstrates minimum acceptable performance. At this level, the nurse relies on more experienced colleagues to assist him or her in priority setting.

Stage 3: Competent The nurse has had two or three years experience in the same nursing situation. This has provided opportunity for the nurse to gain some efficiency and organization skills in the management of patient care.

Stage 4: Proficient The proficient nurse perceives situations as wholes rather than in terms of aspects; a perception based on experience. This level describes the nurse who has worked with similar patient populations for approximately 3 to 5 years.

Stage 5: Expert The individual no longer relies on an analytic principle to connect understanding of the situation to an appropriate action. This experienced nurse has an "intuitive

grasp" of each situation and possess a understanding of the total picture except in situations where he or she has no experience.

In reviewing these definitions of critical thinking, as applied to the nursing profession, specific areas are revealed. These areas are information gathering, skill development, knowledge or subject, and attitudes. "There is no universal definition or conceptualization of critical thinking; however, in the nursing literature, critical thinking often takes the form of a problem-solution process" (Ford & Profetto-McGrath, 1994, p. 341). The literature clearly indicates that the process of critical thinking is complex. According to Catalano (2000), critical thinking is creative, logical, rational and reflective. It challenges rituals and assumptions, is free of bias and prejudice, and is action oriented. "Critical thinking is based on reason and reflection, knowledge and instinct derived from experience. It has also been defined as "the art of thinking about thinking". It is both an attitude about and an approach to solving problems" (p. 95).

The Nursing Process

Before applying the concept of critical thinking to the nursing profession, it is necessary to describe the nursing process. This process is synonymous within the discipline of nursing. It is an organized, systematic approach used by nurses to meet the individualized health care needs of their patients. Alfaro-LeFevre (1999) states that:

> The nursing process is a systematic method of giving humanistic care that focuses on achieving desired outcomes (results) in a cost-effective fashion. It's systematic in that is consists of five steps...It's humanistic in that it's based on the belief that as we plan and deliver care, we must consider the unique interests ideals, and desires of the health care consumer (person, family, community) (p. 4).

The nursing process is used by nurses worldwide to describe the delivery of nursing care. Its origin can be traced back to 1955 when L. Hall a nursing theorist described nursing care as a process. According to Wilkinson (1996), the term **nursing process** was used to describe a series of steps describing the process of nursing by several nursing authors such as Dorothy Johnson, Ida Jean Orlando, and Ernestine Wiedenbach. "Since then, it has evolved from a three-step process to a five-step process" (p. 5). The American Nurses Association (ANA) (1973), and the Canadian Nurses Association (CNA) (1987), developed standards for evaluating the delivery of nursing care based on the nursing process. As well both licensing bodies, the ANA and the CNA, organize their licensure examinations around the nursing process. "Since then, the nursing process has been accepted by virtually all nurses as a basis of their practice" (Wilkinson, 1996, p. 5).

The nursing process is used by nurses to provide efficient nursing care through the use of a written plan of care. The characteristics of the nursing process as defined by Wilkinson (1996) are: dynamic and cyclic; client centered; planned and goal-directed; universally applicable; problem-oriented; and a cognitive process. It is recognized as the foundation for professional nursing practice, and provides the professional nurse with a framework for decision making and problem solving in everyday practice and situations. This process consists of five phases namely: assessment, diagnosis, planning, implementation and evaluation.

Alfaro-LeFevre (1999) provides a brief description of the steps of the nursing process as follows:

1. **Assessment.** You collect and examine information about health status, looking for evidence of abnormal function or risk factors that may contribute to health problems such as smoking. You also look for evidence of client strengths.

2. **Diagnosis (Problem Identification).** You analyze the data (information) and identify actual and potential problems, which are the basis for the plan of care. You also identify strengths, which are essential to developing an efficient plan.
3. **Planning.** Here, you do four key things:

   Determine immediate priorities: Which problems need immediate attention? Which ones can wait? Which ones will nursing focus on? Which ones will you delegate or refer to someone else? Which ones required a multidisciplinary approach?

   Establish expected outcomes (goals): Exactly what do you expect the patient or client to accomplish, and in what time frame?

   Determine interventions: What interventions (nursing actions) will you prescribe to achieve the outcomes?

   Record or individualize the plan of care. Will you write your own plan, or will you adapt a standard plan to meet your patient's specific situation?
4. **Implementation.** You put the plan into action-but you don't just act. You act thoughtfully:

   Assess the person's current status before acting. Are there any new problems? Has anything happened that requires an immediate change in the plan? **Perform the interventions,** monitoring the person carefully and making changes as needed. What's the response? Do you need to change something? You don't wait until the "formal" evaluation period to make changes if something needs changing today.

   Report and record. Are there any signs you must report immediately? What are you going to chart, and where and how are you going to chart it?
5. **Evaluation.** You determine whether the desired outcomes have been achieved,

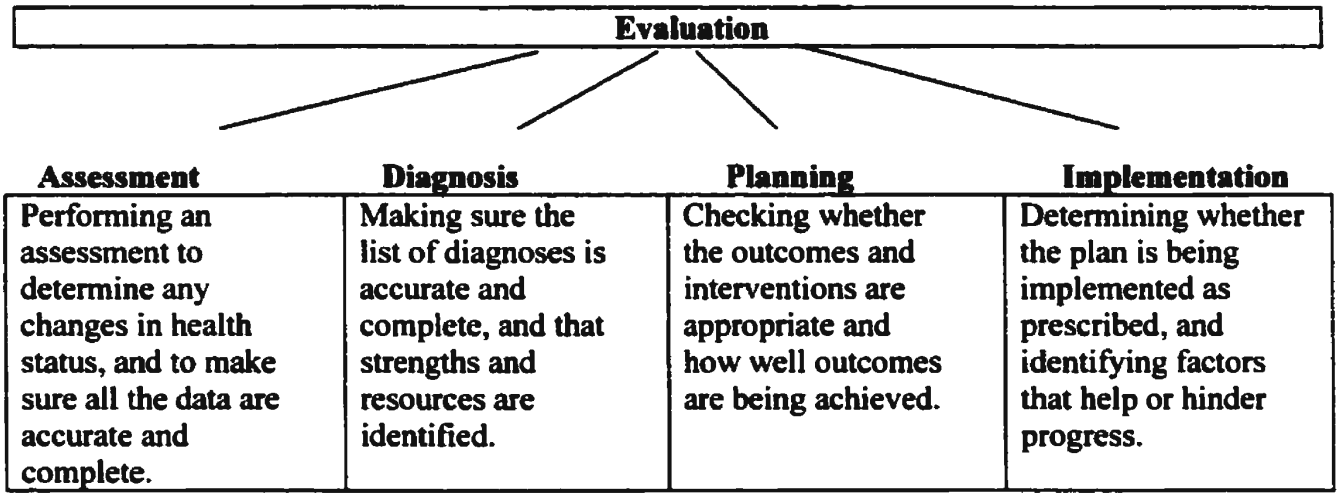
whether the interventions were effective, and whether changes need to be made; then you change or terminate the plan as indicated.

How does the person's health status compare with the expected outcomes? Is your patient able to do what you planned? If not, why? Are there new care priorities?

If you achieved the outcomes, is the person ready to manage his care on his own? Do you need to make referrals for health promotion? What made the plan work? What could have been done to make things easier?

The steps are not linear but are interrelated (Appendix A). The last step evaluation is related to all of the preceding steps and involves reassessment of the total nursing plan of care to determine whether the expected outcomes were accurate and effective. Evaluation involves examining all of the steps, as illustrated in figure 2.

Figure 2
Nursing process evaluation step



(Alfaro-LeFevre, 1994, p. 9).

The nursing process is seen as a decision making approach that promotes critical thinking in nursing. It is compared with the scientific method of solving problems. The steps are similar in the two approaches, as they proceed from identification of the problem to evaluation of the solution. One difference though is that the scientist identifies the problem first and then collects the data. By contrast, the nurse collects the data and then determines the problem. The process provides a framework for collecting data, interpreting the findings in terms of nursing problems/diagnosis and developing a plan of action to resolve the problem. According to Pardue (1987), the cognitive processes required to implement the nursing process are "analogous to those defined as critical thinking ability" (p. 356). The nursing process is the link between education and practice for the student nurse. "It is the instrument that promotes and fine tunes critical thinking skills as the student enters the role of practitioner" (White, Beardslee, Peters & Supples, 1990, p. 11).

Wilkinson (1996) equated the cognitive skills required by nurses to the intellectual skills used in the nursing process namely: creative thinking, critical thinking, problem solving and decision making. The critical thinking concepts, described by Catalano (2000), identifying the problem, gathering pertinent data, identifying and challenging assumptions, beliefs, ideas and issues and imagining and exploring alternatives creatively can be paralleled with the steps of the nursing process as described earlier.

The nursing process focuses on benefits to both patients and nurses. Alfaro-LeFevre (1994) provides the following summary of the use of the nursing process: It

- Expedites diagnosis and treatment of actual and potential health problems, reducing the incidence of (and length of) hospital stays.
- Creates a plan that is cost-effective, both in terms of human suffering and monetary expense.
- Has precise documentation requirements designed to improve communication and to prevent errors, omissions, and unnecessary repetitions, leave a "paper trail" that can later be followed for evaluating patient care and for the purpose of doing studies that can advance nursing and improve the quality and efficiency of health care.
- Prevents clinicians from losing sight of the importance of the human factor.
- Promotes flexibility and independent thinking.
- Tailors interventions for the individual (not just the disease).
- Helps patients and significant others realize their input is important and strong points are assets, nurses to have the satisfaction of getting results. (p. 11).

The goal of this process then is to serve as a guide for professional practice. To effectively apply the nursing process, an understanding of the theoretical foundations is

necessary. Craven and Hirnle (1992) state that "the process of information require the cognitive skills of logical and inductive/deductive thinking as well as the decision-making and diagnostic processes (p. 88). Nurses, through the use of the nursing process, specifically by identifying an appropriate nursing diagnosis and intervention, learn to make professional judgements based on their own interpretation of the information and suggest resolutions to the problem. This goal then is to reach a decision through deductive thinking.

In summary, the nursing process is advantageous to nursing education and nursing practice because the national licensure examination and the standards for nursing care center around this international approach to nursing care delivery. It is also postulated to promote critical thinking in the practice setting

Research on Critical Thinking

As noted by Pless and Clayton (1993), nursing research on critical thinking has not found any relationship of critical thinking to either judgement or success in nursing. Kintgen-Andrews (1991) conducted a literature review of studies on critical thinking and clinical judgement. The following is a summary of her findings: There is:

- Strong support lacking for the impact of nursing education on generic critical thinking.
- Practically no evidence to support congruence between critical thinking and clinical judgement.
- Strong support lacking for the relationship between critical thinking and success in nursing education.

Kintgen-Andrews (1991) compared her findings of nursing studies to research conducted with the discipline of education, mainly the syntheses by Norris (1985) and a review by

McMillan (1987). The results of studies in education demonstrated similar findings to hers. In particular the insights offered by Norris and McMillan namely:

- Critical thinking is a complex process and the present tools for measurement are not adequate to address all aspects of the process.
- There is a need for greater understanding of how critical thinking occurs.
- The time frame necessary for change in critical thinking ability.
- The interest in, and the familiarity, with the subject matter influences a person's critical thinking skills.
- Not all disciplines require the same kinds of reasoning skills.

The focus of education is now changed from cumulative content to curricular outcomes with the emphasis on helping students to think critically. "Educators are now viewing students as active learners rather than passive receptors of information. Nursing programs must now demonstrate that students are developing specific critical thinking skills including analysis, reasoning decision-making and independent judgement (Rane-Szostak & Fisher Robertson, 1996, p. 5).

In recent nursing literature, several nursing authors have put forth the view that the nursing process model alone is not an adequate conceptualization of critical thinking. The health care system is undergoing a metamorphosis at an accelerated rate requiring nurses to "synthesize and integrate multiple forms of knowledge to make health affirming decisions that embody changing values" (Kramer, 1993, p. 406). According to Catalano (2000) "At a fundamental level, the nursing process is a type of critical thinking. Unfortunately, in the health care system of the future, a nurse's critical thinking skills must go far beyond those of the basic nursing process" (p. 73).

The paradigm shift from in patient acute care to ambulatory and community-based settings, as well as the technology revolution in the delivery of patient care require nurses to be proficient critical thinkers.

Given the importance of critical thinking in nursing practice it now becomes a necessity to develop appropriate ways to measure it. In order to develop critical thinking measuring tools, it becomes imperative to develop a clear definition of critical thinking. Choosing the appropriate methods to measure critical thinking poses a challenge for nurse educators and provides a focus for research.

Many models have been put forth in the literature exploring various ways in which nursing programs can assist students to become active learners. According to Rothwell and Kazanas (1998) "in the most general sense...a model is a simplified or abstract representation of a process, device, or concept. A model of any king is designed to help understand a problem, situation, process, or device". (p. 5). The five models described below provide a focus for nursing education and nursing practice in the development of critical thinking. They also provide basis for future research.

Critical Thinking Models

Kataoka-Yahiro and Saylor (1994) based their model on five components of critical thinking for nursing judgement as follows: specific knowledge, experience, competencies, attitudes and standards (Appendix A). The model was developed to serve as a guide to future research and educational strategies in the promotion of critical thinking in nursing practice. The components of the model are linked to three levels of critical thinking in nursing namely: basic, complex, and commitment. According to Kataoko-Yahiro and Saylor (1994) critical thinking is more than the scientific methodology or the nursing process. It involves a more

transactional/transformational direction and, as such, the nursing process does not fully capture the critical thought required in the discipline of nursing. The model "defines critical thinking as follows: The critical thinking process is reflective and reasonable thinking about nursing problems without a single solution and is focused on deciding what to believe and do" (p. 352).

The three levels of critical thinking included in the model are adapted from the work of W. Perry (1970).

Basic. At this level, answers to complex problems are right or wrong. This level is an early step in the development of reasoning ability in each particular area of nursing.

Complex. At this level, the nurse's best answer to a problem may be, "It depends". Nurses at this level realize that alternative solutions exist, each with benefits and cost. A common example of the need for complex thinking is the consideration of deviation from standard protocols or rules when complex client situations have to be taken into account there may be more than one solution, but the nurse has not made a commitment to any one solution.

Commitment. At the complex level, one may be aware of the complexities of alternative solutions yet defer from commitment to any one solution. At the commitment level, however, the nurse chooses an action or belief based on the alternatives identified at the complex level. Although there are times when a nurse functions at the basic level, the goal is to reach the commitment level. The levels of critical thinking in this model reflect a developmental approach. The model suggests that critical thinking ability moves up and down the hierarchy of levels, depending on the nurse, but commitment is the ultimate goal (Kataoka-Yahiro & Saylor, 1994).

Ford and Profetto-McGrath (1994) developed a conceptual model that deviates from the concept of critical thinking as merely problem solving. Their model postulates that critical thinking in nursing is more complex, going beyond the realm of problem solving. It proposes a paradigm shift from curriculum as product to curriculum as praxis. The model known as the "visual model of critical thinking within a curriculum-as-praxis perspective", has three elements: knowledge, critical reflection, and action (Appendix C).

> **Knowledge:** For the emancipatory interest, knowledge extends the limits of the presenting situation to include the larger sociopolitical, historical, and economic contexts so as to address the fundamental power relationships implicit in the situation
>
> **Critical reflection:** There are two aspects to critical reflection. One relates to a critical examination of one's own practice. The other relates to the need for a critical understanding of the situation and of the way the system works to maintain the status quo.
>
> **Action:** Two essential features of taking action within this model of critical thinking are "improvement and involvement". Improvement is a consequence of taking the appropriate action in a specific context. Involvement implies responsibility, and it means acting with others to effect change (p. 343).

A model by O'Neill and Dluhy (1997) proposes a framework for promoting critical thinking and diagnostic reasoning in nursing practice. This model examines how nurses think and how that thinking is put into action.

> Although critical thinking is an essential skill in a complex society, it assumes an even greater import within a changing and dynamic health care system. At the same time, it would be shortsighted for nurses to focus solely on critical thinking. Another necessary

> thinking skill that clearly falls within the realm of effective practice is that of diagnostic reasoning, the process or determining the patient's health status (p. 825).

In comparison, diagnostic reasoning seeks to correctly identify the problem and critical thinking is the process of selecting the right action/s to solve the problem.

O'Neill and Dluhy's (1997) developmental model (Appendix D) examines three levels of nursing practice the student, the novice nurse and the experienced nurse. It describes the knowledge acquisition, storage and utilization of the above levels of nursing practice from a developmental perspective and the predominate reasoning style of each.

> **Undergraduate Students:** Undergraduate students learn primarily in classroom settings and with initial clinical practice. Their knowledge becomes configured into representations of clinical problems with the information initially stored as single examples.
>
> **Beginning clinician:** Reasoning during this period progressively moves away from rigid rules and follows an analytical pattern of rational, deliberate thinking.
>
> **Experienced clinician:** After approximately 3 years of domain-specific experience, the clinician has been exposed to many variations in responses in specific populations. The experienced clinician has an effective organizing system, as well as recognition mechanisms to match the present situation to patterns in memory, and to identify resemblances between them. (p. 829).

These models provide for a basis for movement from a transmission/transactional education position to a more transactional/transformational position. "While information may be transmitted to the learner through various teaching modalities, knowledge requires the active involvement of the learner with information. In other words, it is through a cognitive process

that information is transferred into knowledge" (Ford and Profetto-McGrath, 1994, p. 344). The models are a foundation for future research and educational strategies.

Summary

The importance of critical thinking has been well documented in the current literature. Its applicability to schools of nursing and its importance in the practising profession has been demonstrated. The paradigm shift in the health care delivery system require nursing professionals to think critically in all practice settings. The continued research will improve the teaching strategies used to apply the concept of critical thinking and can enhance the development of critical thinking skills among student, and graduate nurses.

> Critical thinking is a combination of an attitude of inquiry, supported by a knowledge base and enhanced by skill in application. Critical thinking is an approach to inquiry where faculty, students and practicing nurses examine more effective answers (Miller & Malcolm, 1994, p. 73).

Nurses today are required to process information and make complex decisions making it essential that they continue to monitor and participate in research on critical thinking. The development of the thinking ability of nurses is a major aim of the profession and a vital tool in preparing nurses to deliver safe, effective and autonomous patient care delivery.

As stated in the first paper incorporating learning style preference in the classroom provides opportunities for students to experience a variety of learning styles. Exposing students to other ways of learning is key to the concept of critical thinking. Using a variety of teaching activities and strategies will accommodate a broad range of student learning styles. (Davis, 1993). Because critical thinking and problem solving are necessary in preparing students to work in complex environments it is necessary that educators understand learning styles in order

to facilitate students critical thinking abilities. The next section will explore various ways in which this can be accommodated.

Paper III

The Development of Critical Thinking and Learning Styles in Nursing Education

Critical thinking is essential in all domains of nursing. According to Bandman and Bandman (1995), the nursing profession is undergoing a period in which it is being called upon to define its purpose, educational practice, practice roles, theory, and research. "This is therefore, an auspicious time in which to use canons of critical thinking and logic to inquire openly into the assumptions, beliefs, goals, and values that characterize nursing" (p. 4).

In practice, nurses who work in direct patient care, use critical thinking skills to reach decisions in the delivery of that care. The diversity and complexity of the health care environment necessitates nurses to process information and organize it into meaningful patterns. The decisions reached must be chosen from a number of nursing actions available to them, requiring nurses to make sound clinical judgements. "Nursing judgements involve selecting and organizing pieces of data to support conclusions. Sorting and organizing information, recognizing patterns and assembling evidence to support conclusions are the hallmarks of critical thinking" (Case, 1994, p. 101).

In the direct patient care role nurses also utilize critical thinking skills through participation in the quality improvement process which establishes standards in the improvement and evaluation of nursing care delivery, delegation of patient care to licensed practical nurses, modeling critical thinking, and through collaboration. "Because the process of collaborating share characteristics with critical thinking, we can view collaborating as an interpersonal form of critical thinking" (Case, 1994, p. 102).

Nurses who work in management and executive role, are also involved in decision making and sound clinical judgement which require critical thinking skills. These skills are different from nurses who work in direct patient care. The administrative nurses are directly concerned with operationalizing the organizational mission statement, participating in strategic planning and directing quality improvement and monitoring evaluation (Case, 1994). These nurses, in other words, use all the characteristics of critical thinking, such as generating ideas, seeing different angles, maintaining open mindedness, questioning and seeking solutions. The practice of nursing therefore is complex and domain specific.

> The complexity of nurses' clinical reasoning arises from nursing's focus on dealing with the health and health deficits of human beings as complex holistic organisms, who comprise individual ontological constructs, perspectives, abilities, levels of physical and cognitive functioning, expectations, responses and coping mechanisms. Nursing practice requires the primary acquisition, search for, discrete discrimination between, and application of appropriate domain-specific declarative and procedural knowledge, in analyzing or constructing arguments whilst caring for unique patients amidst constantly changing technologies, environments and concomitant philosophies. Practice such as this is often conducted in the face of: multiple and competing pathologies or therapies; unique physical structure; idiosyncratic social, gender, cultural or religiously related norms and conventions; cognitive status; and the availability of human and non-human resources. (Daly, 1998, p. 329).

The responsibility of nursing education then is to prepare students to meet the challenges required of them as graduate nurses in order to practice in such a complex working environment. This can only be accomplished through the process of fostering critical thinking. "The challenge

to researchers is to determine 'if it's there;' i.e. is it evident more often than not in the natural reasoning tendencies of nursing students and nurse practitioners?" (Daly, 1998, p. 330).

This paper will examine the importance of critical thinking skills in nursing. It will examine how learning styles impact on students' critical thinking skills in the development of nursing programs. Teaching to accommodate the individual student's learning style is an important aspect in facilitating the critical thinking abilities of students.

The Importance of Critical Thinking in Nursing

The importance of critical thinking is well documented in the nursing literature and is deemed to be essential within the nursing profession. Paralleling the renewed interest within the educational field in general, critical thinking has become a focus in nursing (Kintgen-Andrews, 1991; Miller & Malcolm, 1990. According to Daly (1998):

> The notion of critical thinking in relation to nursing has only recently begun to appear in the literature. The reasons behind the emerging interest in this construct appear to be threefold as follows:
>
> - healthcare and informational changes.
> - epistemological changes in nursing ideology; and
> - organizational and cultural changes in nursing education (p. 326).

Nurses are required to be safe, competent and skillful practitioners in their profession. Decision making is a daily part of nurses' work in a society in which health care is being reshaped on a continuous bases. Economics, the aging population, population diversity, technology and information or information technology is moving health in a direction from the traditional hospital-based, physician directed health care to ambulatory and community based settings. This paradigm shift in health care will require nurses to have well-developed decision-

making skills (Catalano, 2000). The conclusions they reach lead them to choose and implement particular nursing actions from a list of all possible nursing actions available to them. Although research has not consistently demonstrated a strong relationship between critical thinking and clinical judgements, characteristics of critical thinking match characteristics of sound clinical decision making (Case, 1994).

The nursing profession is undergoing a shift away from a prescriptive, task orientated, problem solving practical domain to a more emancipatory direction. Mesirow (1981) as stated in Platzer, Blake and Ashford (2000) describes the emancipatory domain as:

> concerned with self-knowledge, self-reflection and a critical self-awareness of the social and institutional forces which we assume and take for granted as beyond individual human control. Learning in this domain calls for methods which help learners to identify real problems...learners need access to alternative meaning perspectives in order to critique their assumptions (p. 690).

This direction places emphasis on individualized and holistic care and is in keeping with the demands of nursing practice in today's health care environment. According to Snyder (1993) as stated in Dobrzykowski (1994), "Effective critical thinking skills are vital in order to provide competent, safe care of clients and families, manage shorter hospital stays, use increasingly sophisticated technologies, and implement changing and challenging care philosophies" (p. 272). Baker (1996) states that:

> As nursing moves into a more autonomous community-based practice, the challenge for nurse educators is to assist students to develop greater thinking skills, improve awareness of self and environment, and to facilitate nurses' ongoing learning from their daily practice (p. 19).

In this paradigm shift the nurse is required to exercise sound nursing judgement based upon applicable general nursing knowledge to meet the individualized nursing needs of each patient. This places greater emphasis on nurses' thinking skills and less on the practical nursing skills (Daly, 1998). According to Kataoka-Yahiro and Saylor (1994), "Increasingly, the characteristic that distinguishes a professional nurse is cognitive rather than psychomotor ability" (p. 351).

The education of nurses is moving from diploma based programs into a higher education stream. In Canada, all provinces are initiating a mandate to have a bachelor of nursing as entry level to practice. This move is intended to increase critical thinking and problem solving in nursing students. In Newfoundland and Labrador, this direction for nursing education is now implemented. Glen (1995) as indicated in Daly (1998) states that "one such distinguishing qualitative indicator of higher education, in which there exists general agreement is that of critical thinking and the intellectual maturity that it confers" (p. 327).

Recognized within the process of higher education in the current environment of financial restraints and programme duplication, among other factors, is the need to measure educational outcomes. One such outcome is critical thinking. Barnett (1987) as stated in Glen (1995) indicate that:

> The ever changing and increasing complex state of knowledge development is demanding higher-order thinking skills in students of all disciplines. In virtually every academic discipline, critical thinking has been adopted as an education goal. There is, therefore, almost universal agreement that one of the defining characteristics of higher education is that any programme of studies worthy of the name of higher education should offer the student significant opportunities to develop her critical abilities (p. 170).

Glen (1995) maintains that there are four areas that require further development of critical skills in any professional education: formal knowledge, professional practice, professional ideology, and values. (Appendix E). These areas are interdependent and can be considered as a framework for the advancement of critical thinking in professional education within the domain of higher education.

The advancement of knowledge and technology require nursing education to focus on the enhancement of students' critical thinking and problem solving skills. This focus will ensure that graduate nurses will be able to meet the challenges of the health care system in the 21st century.

The study and practice of nursing is very demanding. It is vital that nurse educators become aware of the challenges needed to attain the goal of preparing nurses in the complexity of problem solving. Therefore, it is a prime responsibility for nurse educators to ensure that the curriculum and teaching strategies enhance these skills.

Developing Critical Thinking in Nursing

Learning is synonymous with critical thinking. It is a change in human learning which is not associated with physical growth. According to Schunk (1996), it is "an enduring change in behaviour or in the capacity to behave in a given fashion resulting from practice or other forms of experience" (p. 445). This definition infers that the learning experience takes place with the learner, is internal and initiated by the learner. According to Quam (1998), learning evokes a change in insights, behaviors, perceptions, or motivation or a combination of all four. It is a discovery of personal meaning and ideas and is a result of experience. The three domains of learning are cognitive, affective and psychomotor. To promote critical thinking in nursing curriculum all three domains have to be included.

Case (1994) has maintained that three domains of competency (cognitive, psychomotor and affective) are of equal importance in order for student nurses to be skillful in the practice of nursing. Cognitive and psychomotor skills are evident in most nursing courses because of the well developed taxonomies in these areas (Woods, 1993). The affective competencies are not clearly delineated which may be because the content that needs to be taught is not understood by faculty. Faculty may have difficulty in deciding about the skills to be taught because of the lack of clarity about the teaching of affective learning instruction (Klaassens, 1991). It is essential that the development of the affective domain be addressed by nurse educators in order to prepare nurses to make informed and enlightened decisions in solving complex health problems. However, "reliance on content coverage and objective testing are deeply embedded in the educational culture of many nursing education programs" (Loving & Wilson, 2000, p. 70).

Competencies in the affective domain assist the students' ability to be empathetic. Woods (1993), in discussing interviewing techniques with patients, concludes that the nurse must have an awareness of self before he/she can develop a therapeutic relationship with the patient. This relationship must be established before the nurse can help the patient resolve his/her problems. To be aware of self means conscious awareness of feelings, beliefs, values and attitudes. White, Beardslee, Peters, and Supples (1990) state that the concepts of beliefs, values and attitudes must be understood in relation to the affective domain. They define beliefs as perceptions of reality that have significant meaning to the individual. Values, as defined by White et al (1990), are judgements about the worth of an object, person, group, belief or event. Attitudes represent a feeling for or against a person, object, belief or event. Therefore an understanding of self is essential to the nurse especially in today's health care system in which ethical decisions are part of nurses' daily practice.

> As health care technology continues to advance into the twenty-first century, it will become more and more difficult for nurses to make these ethical decisions. Many nurses feel the need to be better prepared to understand and deal with the complex ethical problems that keep evolving as they attempt to provide care for their clients (Catalano, 2000, p.111).

Kintgen-Andrews (1991) and White et al (1990), have likened the nursing process with the development of critical thinking. "Heavy emphasis on (the step of) the nursing process would lead to the expectation that involvement in nursing education would lead to critical thinking ability" (Kintgen-Andrews, p. 152). White et al (1990) state "the nursing process was first applied to the educational setting as a way to organize students' thought processes" (p. 16).

The development of any program begins with the identification of a need/problem. Teaching critical thinking skills to nursing students has been identified as a need and a desirable outcome in nursing education by national and international bodies. The development of critical thinking in schools of nursing is seen as an objective by the Canadian Association of University Schools of Nursing (CAUSN). This accreditation body for university nursing programs, includes in its statement on baccalaureate nursing education, that one of the foundational abilities of schools of nursing is to assist students to develop their critical thinking ability. The Canadian Nurses Association (CNA) also recognized critical thinking as an essential component of nursing practice. CNA accreditation criteria require schools of nursing to emphasize the development of critical thinking in their curricula as indicated in The Blueprint for the Criterion-Referenced Nurses Registration Licensure Examination. According to Catalano (2000).

> In today's rapidly changing health-care environment, there is an ever-increasing need for health-care professionals who are educated to practice at the highest level. It is

> imperative that the schools that will be educating future nurses be responsive to the changes, challenges, and demands of an ever sophisticated and technologically advanced health-care system. Nursing education is an important part of a much larger network of health-care systems, including the service and practice sector, government and regulatory agencies, and licensing and credentialing institutions (p. 91).

In keeping with this goal, The Centre for Nursing Studies, Bachelor of Nursing (Collaborative) Program has included in its philosophy a broad statement which emphasizes an educational climate that fosters the characteristics of critical thinking in its students and states that "This approach to nursing education prepares graduates, able to think critically, who will shape the profession's current and future responses to ethical, political, economic, health and nursing issues" (Centre for Nursing Studies student handbook, 1999-2000, p. 10). The philosophy of any educational agency provides direction to educate the students. Miller (1995), as indicated Gray and Herr (1998) states that "philosophy provides a unifying theory for guiding education activity" (p. 171).

In keeping with the philosophy of the Bachelor of Nursing (BN) (Collaborative) Program, each nursing course has an objective to teach critical skills. According to Abruzzese (1992) "objectives are congruent with and reflect the philosophy, purpose and goals of the organization" (p. 55). Objectives are different from goals in that they are more precise. They state what the learner outcome will be as a result of the learning experience. Kemp and Rodriquiz (1992) state that objectives "narrow the scope of what is to be learned and spell out particular performances that needs to be demonstrated from the topic or skill before training is complete" (p. 283).

An example of a Community Health Nursing Course in the BN program includes an objective that states that each student at the end of the course will be able to use critical thinking skills in meeting the health needs of patients in community health nursing. Students' critical thinking skills in this course are facilitated by the use of mulitmodal teaching/learning strategies for example group work, clinical journals, role playing, debated/argumentation, surveys, peer review and caseload management (Ann Kearney (course leader), personal communications).

Videbeck (1997) developed a critical thinking model which provides nurse educators with a visual guide to the process of implementing and evaluating critical thinking in the development of nursing curriculum. The model (Appendix F) reflects the steps followed in the curriculum development process and the various components of each step.

Loving and Wilson (2000) adopted this model when infusing/implementing critical thinking strategies into their nursing curriculum through a faculty development program. In the first phase, defining critical thinking, the authors adopted Paul's (1995) definition of critical thinking with the rationale that inherent in the preparation of nurses would be the attribute to examine their own and others' thinking. Therefore Paul's notion that critical thinking is thinking about one's thinking as a way to improve thinking is the goal of critical thinking learning. Paul's model was also used as a guide to leveling objectives within the four year nursing program (Appendix G). This was done with the belief that critical thinking would be consistent among courses and that critical thinking skills would reflect progression throughout each year of the program.

In the third phase (planning teaching-learning strategies), selected teaching strategies was initiated and modeled through informal seminars with the faculty members. Interested faculty

then initiated these strategies, for example use of journals, questioning, elements of reasoning, in designing learning activities for their course delivery.

The evaluation and final phase was done by comparing critical thinking in courses offered prior to and following the faculty development program. The most notable difference was the way in which critical thinking methods was included in the various nursing courses, namely they were more explicit than implicit.

Learning styles and Critical thinking

An individual's learning style impacts upon that persons behavior, personality, and choices. According to Colucciello (1999):

> An individual's learning style has broad influences on various facets of personality and behavior. Cross included problem solving, interests, and social behavior as examples of attributes that are influenced by one's learning style. It would seem plausible then that individuals' modes of learning preference may be related to their critical thinking dispositions (p. 295).

Many studies have been conducted on the learning style preference of students in an effort to increase the effectiveness of the teaching/learning process (Griggs, Griggs, Dunne & Ingham, 1994). The most frequently used instrument in these studies, the Learning Style Inventory (LSI), was developed by Kolb. Colucciello (1999) found that her "study corroborated previous studies" results relative to learning styles of nursing students. Accommodator, diverger, and converger were the primary ways of learning...with accommodator being the predominant style" (p. 299). The other finding in this study was the positive correlation between critical thinking and the learning mode of reflective observation.

The recommendations of the Colucciello (1999) study recommended further research to explore new ways to assess nurses' critical thinking skills and the relationship between critical thinking and learning styles. "It is also suggested that opportunities to experience a variety of learning styles be provided to students because adaptive learning competencies assist in many of the life experiences that will be encountered in complex work situations". (p. 300). The diverger learning style can be best accommodated through the use of printed or visual forms of instructional materials. Brainstorming is also effective for this learning style. The assimilator learning style learn best through exploration of ideas and concepts within the context of case studies. The converger benefits from structured learning experiences such as can be provided with guidelines and protocols. The accommodators prefer 'hands on' experiences and so would learn better through role-playing and games simulations. "By using the four learning modes and styles as a guide or framework in the design of teaching activities, assimilation of knowledge is more likely to occur" (Colucciello, 1999, p. 300).

A literature search on learning styles revealed that the majority of studies in nursing were in schools of nursing. Griggs et al (1994) state that "abstracts between 1978 and 1993 identified 69 studies that had been conducted on learning styles in the fields of nursing...the preponderance of these studies were at the undergraduate level in schools of nursing" (p. 42).

The nursing authors have identified the importance of determining the preferred learning styles of nursing students.

> Faculty are often unaware of the message given by the way in which we teach, the priorities we set, and the way we interact with students. If one believes that there are different types of learning styles, then it may follow that a teacher would choose teaching modalities that are supportive of their own learning styles (Nagata, 1996, p. 69).

Identifying nursing students' learning styles has implications for nursing practice. According to Jambunathan (1995), the implications for present and future practice involves the trend in nursing education from nurse generalist to nurses being educated in more specialized, advanced roles, for example nurse practitioner.

The nurse educator needs to be aware of different learning styles in order to maximize his/her teaching. An underlying assumption held by faculty is that they know best. They view themselves as in charge of curriculum and student learning. The teaching methods they choose often fit their mode and so become the preferred teaching style with no consideration for the appropriateness of that style to the content of the lecture or of the students' learning style. Quam (1998) states that:

> Teaching styles describe the behaviors, methods, and the communication process used to transmit information. Teaching style encompasses those qualities that are consistent in all situations and in all content areas...Style refers to the overt means by which teachers convey their attitudes (philosophy) about the teaching/learning transactions. Teachers do have definite opinions about teaching methods and these relate strongly to their classroom practice (p. 19).

Miller and Malcolm (1990) state that nursing faculty hold common assumptions about students. These include:

- Beginning students do not know how to problem solve.
- Mistakes are always bad, costly and to be avoided.
- There is a "best" way to think about problems.
- What is taught is what is learned.
- All students are plus or minus one standard deviation from the mean.

- Certainty is good whether it is client outcomes or student actions.
- Complex clients are desired, as these clients are most sick.
- A standardized nursing care plan fits all clients.
- Begin with less complex learning and progress to more complex ones.
- Students should be able to make decisions upon graduation.
- Student should be capable of working in any clinical area upon graduation.
- The nurse program philosophy has been operationalized.
- Faculty knows best (p. 71).

These assumptions need to be examined with a view in which students and educators engage in an interactive and dynamic teaching-learning process.

Griggs et al (1994) found in their study that although the Kolb instrument did measure individual learning style, the instruction tended to be group focused, for example if the learning style of the group majority was identified as 'accommodator', then the instruction tended to fit this style. They recommended further studies on individual interventions of students as opposed to research that focused mainly on groups. These included:

1. Individual chronobiologic energy levels, for example students learn better when experiences are matched with their learning-style time preferences.
2. Identifying individual perceptual (auditory, visual, tactile or kinesthetic) preference.
3. Students environmental learning style preference, for example informal seating, soft lighting or traditional classroom seating in a brightly lit room and
4. If individual students prefer learning alone, with peers, with an instructor, or in groups. Thus researchers need to refrain from hypothesizing that a single group learning style exists.

Instead, they need to identify individual styles. To be effective, instruction must accommodate all styles in every class" (Griggs et at, 1994, p. 42).

Teaching Critical Thinking Skills

There is an abundance of literature available to help educators in methods for teaching critical thinking. Which methods to use depends on the educator's philosophy. Quam (1998) states that:

> The way you teach is explained by your philosophy. It describes what you believe in and exposes your values. While it is an integral part of your teaching self, it is malleable, and subject to continual evaluation and reshaping. Embrace the idea that teaching requires certain skills, and that it is equally important to understand theories and principles that govern our teaching (p. 19).

Adopting a humanistic philosophy to teaching in an educational climate fosters individuality, independence, and a caring commitment between learners and educators as opposed to educators being patronizing, authoritative, hierarchical, technical and often mechanical. According to Schunk (1996):

Numerous humanistic principles can apply in the classroom. Some important principles that can be built into instructional goals and practices are:

1. Show positive regard for students.
2. Separate students from their actions.
3. Encourage personal growth by providing students with choices and opportunities.
4. Facilitate learning by providing resources and encouragement. (p. 405).

Abruzzese (1992) stresses the need for educators to adopt a humanistic education approach which promotes the partnership of learners and educators.

The incorporation of humanism results in an emphases on individuals in terms of their need to be treated as adult learners, their need for classes directed by their level of practice, and their needs for critical thinking skills and for an understanding of temperament types (p. 30).

In developing curricula "Watson and Glaser's (1964) definition and research on critical thinking suggest three areas of attitude, knowledge and skills could be evaluated in a nursing curriculum in order to identify their impact on the development of critical thinking in students" (Miller & Malcolm, 1990, p. 69). These components namely: attitudes, knowledge, and skills all relate to faculty, students and teaching methods.

Attitudes of faculty and students are the result of life's experiences and affect the teaching-learning situation. Attitudes involve how people feel about what they do and is concerned with mindset, openness, willingness to listen and interpretation of situations from both students and faculty. Many different factors affect students' attitudes about education, for example age, life experiences, health, cognition, family modeling and cultural backgrounds. Therefore, given this diversity, attitudes and assumptions about education have a tremendous impact in any learning environment. A student's view of education may be in the traditional method, for example teacher instructs and student listens. Success in nursing with this view often results in the students' attitude of wanting to having concrete answers in the delivery of patient care. Creative solutions in this case threaten students' security of being correct. In this instance, students will need to experience the attitude of freedom without having to fear reprisals and the risk of harm to the patients. To accomplish this faculty needs to develop an environment in which the student becomes a creative thinker while ensuring the safety of patients. There is a need of order and structure for curriculum and nursing courses, but there should also be flexibility built in the design to promote and develop critical thinking skills in students. The

attitudes, knowledge base and skills of faculty have influence on how curriculum is developed and how courses are organized and presented to accomplish this task.

Teaching Strategies to Foster Learning Styles and Critical Thinking

Teaching strategies that encourage critical thinking in students are widely available in the nursing education literature and in the education literature in general. An underlying theme emerges which advocates using a variety of teaching methods to assist students to incorporate different approaches to learning. To teach adults effectively, educators need to consider individual differences in students, including differences in learning styles. An individuals' preference for learning impacts his/her critical thinking abilities. "When learners are given opportunity to experiment and learn in their dominant mode, learning is more effective" (Synder, 1993, p. 209.

When educators use a variety of teaching strategies, each student is given the opportunity to experience at least a portion of the learning experience in his/her preferred style. Also, from a critical thinking perspective, it enables students to broaden their learning style by exposing them with more ways of learning. Learning occurs most effectively when the student is actively involved. "When students are engaged in active learning, they are doing things, and also thinking about what they are doing" (Quam, 1998, p. 79).

According to Loving and Wilson (2000), nurse educators have traditionally focused on content coverage and objective testing in nursing programs. This educational philosophy espouses the view that **"Faculty teach. Students learn** or, at least, they demonstrate that they have received what the faculty is teaching" (p. 70). Videbeck (1997) states that lecture is the most used method of teaching. This method alone will not foster the critical thinking abilities of students as it lends itself to learning by rote memory. Rote memory will not allow students to

develop critical thinking strategies that require nurses to give individualized nursing care in unpredictable circumstances.

To promote critical thinking in nursing curriculum, nursing authors advocate using multimodel teaching methods. Ishida, McKnight, Solem, Tanaka and Wong (1994) state that this direction creates a caring environment which lends itself to conducive learning. These teaching modalities provide students with ways of becoming active participants in the learning process which appeal to the diversity of the student population. The use of free writing, through journal writing, both in and out of class encourages creative analysis, syntheses and problem solving. Baker (1996) suggests journal writing is one way students can use reflective and analytical thinking in nursing practice. Brown and Sorrell (1993) states that... "the interaction between students and faculty occurs through writing in clinical journals. Thus the clinical journal becomes a valuable opportunity for faculty to teach critical thinking directly, involving students actively in analyzing and evaluation of their practium experience" (p. 17). Another strategy offered by Davis (1993) is use of debate. "Two people exchanging points of view can often hold a class's attention more than a single speaker" (p. 136). Debates entail many components of critical thinking namely analyzing and evaluating, critiquing and constructive arguments. White et al (1990) proposed ethnography as another strategy to enhance critical thinking. They state that "ethnography is an inductive qualitative methodology in which an informant provides data that the interviewer analyses and interprets" (p. 18). This method is most appropriate for senior nursing students. It is designed to teach students to comprehend, analyze and evaluate information applicable to health care consumers.

The age of technology has allowed students through computer programs to practice critical thinking skills using the nursing process in a non threatening environment. "The students

can explore all possible alternatives, make decisions and receive immediate feedback without compromising the patient safety" (Klaassens, 1994, p. 18). Also, this teaching method (computer assisted learning and videotapes) enables many aspects of nursing programs to be taught by self instruction, for example the Back Injury Prevention Program.

In today's economic environment of downsizing and budget crunching delivering large lecture courses is a reality. Teaching critical thinking in lecture delivery to a large class number poses a tremendous challenge to the classroom teacher. Davis (1993) suggest this can be best accomplished by breaking the class into small groups, engaging the entire group and making use of alternatives to lecturing. Abegglen and Conger (1997) state that students learn best through active learning. "If faculty expect students to think critically, then students must practice and faculty must role model critical thinking. One way to model critical thinking is through group discussion and problem solving" (p. 453). A teaching method for group discussions can be case studies, where each student group is presented with a scenario and asked to reach a group decision. This method encourages participation and exposes students to other peer's point of view thereby promoting/fostering critical thinking. Brainstorming could be a teaching technique which would involve the entire class. This method involves posing an open-ended question and asking the students to reflect for a short time and offer as many suggestions as possible without judging their validity. It allows for creativity among all students.

Case (1994) points out, however, that these methods are time consuming in terms of efficiency and delivery and require thoughtful planning on the part of the classroom instructor. However, when time is at a premium, the goal of active learning should not be abandoned. Other less elaborate methods such as exercises, games, role-playing, fill-in handouts and questioning can be utilized to accomplish this goal.

In nursing curricula, faculty need to develop strategies to enhance the critical thinking skills of students. "Learning to think critically takes practice-practice in maintaining an attitude of openness in inquiry, in learning to ask questions, in examining underlying assumptions, in examining inferences and in interpreting and evaluating arguments" (Miller & Malcolm, 1994, p. 71).

Research

The challenge for nursing programs is "to demonstrate where and how they teach and measure critical thinking in the curriculum" (Catalano, 2000). Many authors have conducted research studies on how to measure and evaluate critical thinking in nursing schools. (Adams, 1999; Colucciello 1997; Duckscher 1999; Miller and Malcolm 1990; Sedlak, 1997; Videback 1997). All agree that critical thinking is complex and difficult to measure or define. Adams (1999) reviewed 20 studies from 1997 to 1995 that measured changes in critical thinking abilities of professional nursing students. Eighteen of the 20 studies used the Watson-Glaser Critical Thinking Analysis (WGCTA). Her review showed that there was "no consistent evidence that nursing education contributed to increasing the critical thinking abilities of nursing students" (p. 116). Her results are in line with other similar reviews conducted in 1992 and 1993. In her discussion, Adams (1999) offered several explanations for the results of the research into critical thinking abilities namely:

- A lack of a clearly research definition.
- No specific tool to measure critical thinking skills for the discipline of nursing.
- The post test to measure critical thinking skills in nursing students is being administered too soon after the pre test for the change to be reflected in standarized scores.

- The general critical thinking skills is not applicable to the nursing students.
- Real life situations may be necessary to encourage creative thinking in nursing students.
- The lack of knowledge re the teaching strategies used to teach critical thinking skills prior to the student testing.

The results of three studies of critical thinking in nursing have shown that the relationship between critical thinking abilities and skills and nursing education neither confirm nor deny any relationship.

These unexpected conclusions warrants further research. According to Videbeck (1997), research is needed to establish the relationship between critical thinking and clinical judgement, the nursing process and problem solving. Other areas of research would help establish the level of critical thinking that is suitable for undergraduate nursing programs and also the most efficient ways to teach it.

Summary

The study and practice of nursing style is very demanding. It is vital that nurse educators become aware of the challenges needed to attain the goal of preparing nurses to work in a complex health environment. Providing an active learning environment will help accomplish that goal. Such an environment provides students with an opportunity to reflect and use higher order thinking skills, for example analysis, synthesis and evaluation (Quam, 1998).

It is paramount that nurse educators be knowledgeable of the principles of learning styles in teaching critical thinking. This will create a climate of respect and collaboration. The delivery and instruction of nursing courses should be focused and goal orientated. The focus is the facilitation of learning and the goal is to deliver efficient and effective teaching. The learner

characteristics/styles assists the educator in deciding which methods, teaching content and resources are needed in the promotion of critical thinking skills.

Conclusion

The principles of adult learning are well documented in the literature and provide the educator with guidance in teaching adults. An awareness of these principles is paramount in understanding the learning needs of adults enrolled in post secondary education institutions today. Educators are faced with the challenge of accommodating a diverse student population. Examples of this diversity include adults possibly entering education programs for the first time, adults seeking a career change and adults who wish to advance in their present career. According to Quam (1998), this non traditional student body can be attributed to a shift in demographics resulting from a reentry of women in the 1960's, the influx of students over 25 years and a decrease in students under 25 years.

Andragogy or adult learning theory places emphasize on self-direction and the notions of learning style or the preference an individual has for learning. This theory has implications for nursing education. A goal of nursing education is to prepare nurses who engage in complex problem solving. Nurses are required to be safe, competent and skillful practitioners in the profession. Decision making is a daily part of nurses' work and the conclusion they reach lead them to choose and implement particular nursing actions from a list of available possible nursing actions. Therefore, nursing has to be concerned with how style influences the learner.

Learning is a lifelong process, acquiring new knowledge improves the ability to think. Learning and learning theories provide educators with insight into the diversity of learning in adults. This knowledge assists instructors "to identify their own theory of learning and discover

strategies for facilitating learning that are most congruent with their theory" (Merriam & Caffarella, 1991, p. 137).

Adult developmental theories highlight the individual differences in learners which serve to enhance the basic principles of andragogy. The individual differences point the direction for educators to adapt their teaching strategies to accommodate the differences in learner abilities, styles, and preferences. Adult learning style models based on personality, information-processing and instructional preference are examples of the individual difference in the adult learner (Knowles, Holton & Swanson, 1998). Incorporating the adult learning principles into the classroom exposes students to a wide array of learning experiences and enhances their critical thinking abilities.

Critical thinking is a goal in all educational settings aimed at promoting and enhancing student education. The complexity for the work place advocates academic institutions to include critical thinking in their curricula. In the nursing profession critical thinking is seen as paramount in the education of nursing students. Dobrzykowski (1994) points out that "effective critical thinking skills are essential in providing competent and safe nursing care, manage shorter hospital stays, use increasingly sophisticated technologies, and implement changing and challenging care philosophies" (p. 272). The challenge for nurse educators is to develop strategies to enhance the critical thinking abilities of the students. A recommendation evident in most nursing studies on critical thinking and as highlighted by Coluccrello (1999) is the need to find "new ways of assessing learners' critical thinking skills. The challenges put forth earlier in the paper folio of large student classes, technology, limited time frames for teaching, and student diversity questions how effective nurse educators can be in teaching critical thinking. Acknowledging these challenges provides direction for future research in meeting these barriers.

Many creative strategies to teaching critical thinking skills are available in the literature. Understanding the advantages and disadvantages of these strategies will assist in choosing which methods to use (Quam, 1998). A key in facilitating critical thinking skills lies in program development and incorporating instructional design to meet the needs of the individual differences of learners.

The components of instructional design provides a framework which can facilitate critical thinking. The goal provides the purpose or direction. If clearly stated, it indicates the overall outcomes expected from the course. The content identifies the skills and knowledge to be taught. The learner characteristics assists the instructor in deciding which methods, teaching content and resources are needed. Through this component an instructor can utilize creative teaching methods in his/her delivery of the content. The objectives serve as a guide to the instructor. This step provides effective instruction because well stated objectives are a way of measuring students' learning and performance. The teaching methods need to be appropriate to both the content and the learner, to ensure effectiveness of the instructor. The support services include the things that are necessary to carry out the teaching/learning methods (learning resources, equipment, etc). The final component of instructional design which is paramount to the effectiveness of the instruction is the evaluation. This step is continuous throughout the process, is multifaceted, and is a measure of the learning in relation to the objectives.

One key to addressing individual learning styles and teaching critical thinking concepts is through a variety of teaching strategies. Critical thinking should not only be reflected in the mission statement and philosophy of the educational institution but should also be operationalized in the classroom. In addition more research is needed to develop ways to teach

and measure the outcome of critical thinking skills in nursing students who must be prepared to work in a complex working environment.

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