MONTANA STATE UNIVERSITY

Learning strategies utilized by Montana nursing students
by Suzanne Frank Lockwood

A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Education
Montana State University
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Abstract:
An emphasis from accreditation agencies on the critical thinking skills of nurses has resulted in a curricular shift to include critical thinking in nursing education.

Therefore, the purpose of this study was to describe the learning strategies used by Montana registered nursing students. Data were collected from 192 participants using (a) the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS), (b) a demographic survey questionnaire, and (c) follow-up cluster focus groups. Learning strategies included metacognition, metamotivation, memory, critical thinking, and resource management. Quantitative analysis techniques included descriptive statistics, univariate procedures of t-test and analysis of variance, and multivariant procedures of discriminant and cluster analyses. Qualitative data were collected from focus group interviews of learners identified in the quantitative data analysis.

The learning strategy profile of the nursing students indicated that they primarily use the areas of metacognition and memory learning strategies. Nursing students use different learning strategies in their personal life versus nursing situations. Other findings revealed that identifying learning strategies was not useful in discriminating between the different types of nursing programs or the different programs located at diverse campus settings in Montana.

Conclusions included that there are four distinct groups of learners in the registered nursing students without regard to program type, campus location, or demographic variables. Groups of nursing students learn in similar ways. While one group utilizes critical thinking skills, most are not using critical thinking learning strategies to any appreciable extent in their educational . programs. There are specific teaching strategies useful for each of the learner groups. Nursing faculty's sharing of their vision of nursing and actual patient experiences are important aspects of Montana nursing students' learning.

Recommendations included that an adult learning strategies course be offered for registered nursing students and that information regarding learning strategies be made available to Montana nursing faculty. The SKILLS instrument may be useful in future studies of critical thinking skills of nursing students. If a specific learner group is investigated, the SKILLS instrument should be modified for that group. Furthermore, focus group interviews should be well planned and included in learning strategies studies which use cluster analysis.

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A thesis submitted in partial fulfillment
of the requirements for the degree

of

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APPROVAL

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This thesis has been read by each member of the graduate committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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Date April 1, 1997

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ABSTRACT

An emphasis from accreditation agencies on the critical thinking skills of nurses has resulted in a curricular shift to include critical thinking in nursing education. Therefore, the purpose of this study was to describe the learning strategies used by Montana registered nursing students. Data were collected from 192 participants using (a) the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS), (b) a demographic survey questionnaire, and (c) follow-up cluster focus groups. Learning strategies included metacognition, metamotivation, memory, critical thinking, and resource management. Quantitative analysis techniques included descriptive statistics, univariate procedures of t-test and analysis of variance, and multivariant procedures of discriminant and cluster analyses. Qualitative data were collected from focus group interviews of learners identified in the quantitative data analysis.

The learning strategy profile of the nursing students indicated that they primarily use the areas of metacognition and memory learning strategies. Nursing students use different learning strategies in their personal life versus nursing situations. Other findings revealed that identifying learning strategies was not useful in discriminating between the different types of nursing programs or the different programs located at diverse campus settings in Montana.

Conclusions included that there are four distinct groups of learners in the registered nursing students without regard to program type, campus location, or demographic variables. Groups of nursing students learn in similar ways. While one group utilizes critical thinking skills, most are not using critical thinking learning strategies to any appreciable extent in their educational programs. There are specific teaching strategies useful for each of the learner groups. Nursing faculty's sharing of their vision of nursing and actual patient experiences are important aspects of Montana nursing students' learning.

Recommendations included that an adult learning strategies course be offered for registered nursing students and that information regarding learning strategies be made available to Montana nursing faculty. The SKILLS instrument may be useful in future studies of critical thinking skills of nursing students. If a specific learner group is investigated, the SKILLS instrument should be modified for that group. Furthermore, focus group interviews should be well planned and included in learning strategies studies which use cluster analysis.

CHAPTER 1

INTRODUCTION

Nursing

Nursing education in the United States has its roots in the outbreak of the Civil War in 1861. Just as the Crimean War spotlighted the activities of Florence Nightingale and the importance of nursing in Europe, the Civil War was an impetus for the development of training programs for nursing in the United States. Responding to the nursing needs created by the war, women volunteered to help, and after a brief training course, they performed nursing duties. In 1861, Dorthea Dix was appointed by the Secretary of War to supervise these new "nurses."

In fact, these women who numbered in the thousands were untrained volunteers. The nursing role of these unsophisticated women brought to the attention of the American public not only the need for nurses but also the desirability of some organized programs of training. The New England Hospital for Women and Children began in 1872 what was considered to be the first graded course in scientific nursing. Within the next year three more schools of nursing were established in the United States

based on the Nightingale model (Kelly, 1992, p. 27). Several major nursing training schools like Bellevue in New York and The Boston Training School endured into the next century. Their success resulted in a massive proliferation of nursing training schools. "In 1880, there were 15; by 1900, 432; by 1909, 1,105, which resulted in hundreds and even thousands of applicants a year" (p. 27) to the more famous hospital schools.

Initially this nursing education was largely an apprenticeship that resulted in students providing much of the work force for the hospitals. Although some formal theory classes were conducted, learning was achieved primarily by "doing." There was no standardization of curriculum or accreditation. The nursing programs were developed to meet the service needs of the hospital rather than the educational needs of the students. Programs varied widely from hospital to hospital. The diploma or hospital nursing programs persisted until the middle of the 1960s when there was a significant decline in enrollments (Kalish & Kalish, 1995, p. 131). This decline was due to a number of factors including the push to have nursing education moved into institutions of higher learning and public reaction to a number of reports that were published around this same time. Elimination of hospital-based nursing programs is particularly true in the western part of the United States (Ellis & Hartley, 1995, p. 58; Kalish

& Kalish, 1995). There are no diploma or hospital-based schools of nursing in Montana, and only one or two remain in the other western states.

Nursing Education

In American society, education has been a key factor for opening doors to power, prestige, and economic security. Early nursing students were all women who in some cases saw nursing as a means out of servitude. In the 1950s and 1960s, there were a number of government studies that scrutinized nursing education. The Brown Report recommended that nursing move away from apprenticeship and into a planned program of education similar to that of other professions. It further recommended that the nursing programs be routinely reviewed for consistency (Brown, 1948). Along with this push for the improvement in nursing education, licensing authorities pressured for a uniform licensing examination for all nurses. By 1951, all licensing jurisdictions adopted a standard passing score throughout the country. The establishment of the State Boards of Nursing grew out of this development (Ellis & Hartley, 1995, p. 87). This same pattern was happening in the Canadian provinces. The State Boards of Nursing today supervise uniform licensing of nurses in their respective states. By 1952, the National League for Nursing (NLN) had a temporary accreditation program in place and was helping

schools of nursing find ways to improve their programs of instruction. "Designated by the United States Department of Education as the accrediting body for all nursing programs, the NLN currently accredits more than 1500 educational programs" of nursing (Ellis & Hartley, 1995, p. 461). Many nursing graduate schools will not admit a nurse who graduated from a non-accredited undergraduate nursing program.

Unlike many other professions that provide a single route of educational preparation, the development of nursing in the United States has resulted in three major educational routes that prepare graduates to write the National Council Licensure Examination for registered nursing. This has resulted in various alternatives and opportunities for a prospective student, but it also has resulted in much confusion. These three avenues continue to be the three-year hospital-based diploma programs, the four-year baccalaureate programs, and the two-year associate degree programs. This diversity presents a real challenge to the educator teaching in a nursing program who is charged with providing a "safe" nursing practitioner. There may not be clear direction to the educator as to how the professional preparation is provided given the differences in purpose, structure, and outcomes that these three different educational programs may follow.

Nursing education suffers from the same economic cutbacks being experienced in all of higher education. Additionally, the changes in health care at large have placed tremendous demands on faculty in nursing programs to provide for quality clinical/patient experiences. The advent of declining in-hospital patient numbers has meant far fewer actual clinical/patient experiences for today's nursing student. "There were 55 million fewer inpatient days in the U.S. hospitals in 1994 than there were just a decade ago" (Aiken, 1995, p. 201). Faculty have had to use alternative means to provide for simulated patient experiences like computer or laser disk simulations to extend the clinical/patient experiences for students. Reduced clinical hours has also had an impact on the amount of time a current nursing student has in actual patient care. This decreases substantially the real-life experiences a nursing student may experience while in the basic educational preparation for nursing clinical practice. Given the rapidly changing technological health care environment, texts and procedures are often outdated within five years of publication. "It is commonly accepted that the half life of knowledge today is about five years, and less in the sciences" (Kelly & Joel, 1996, p. 218). Thus, the use of the same teaching strategies used in the past may not prepare a student for the changing health care arena that the newly graduated nurse will face.

The typical nursing student of today has also changed dramatically. No longer is this an 18-year-old, white female. Now 4% are men, all minorities are represented, and most could be classified as the non-traditional student (Kelly & Joel, 1996, p. 179). Today's typical nursing student is in his/her late 20s in an associate degree program and in his/her mid 20s in a baccalaureate program, is an individual in the midst of changing careers, has children, and is often returning to college after a long absence from a structured learning environment (McCloskey & Grace, 1994, p. 165). The student may not have the best of study skills and often reports high levels of "stress" at being in the nursing program (Brubaker, 1990; Kelly & Joel, 1996; Manderino, Ganong, & Darnell, 1988). Nursing students fit closely the characteristics of adult learners as described by Smith (1982). Adult learners have multiple social roles and responsibilities, have accumulated many experiences, are undergoing various stages of development related to stable and unstable periods, and face educational challenges with anxiety and ambivalence (McCloskey & Grace, 1994, pp. 38-45).

Estimates of retention of nursing students show that nationally the average attrition rate of all nursing students is 15%, and the attrition rate of minority students can be as high as 85% (Courage & Godbey, 1992, p. 36). Additionally, nursing educators must be aware not

only of attrition rates but also of the fact that the nation still faces a nursing shortage that is predicted to extend into the 21st century (Aiken, 1995; Moccia, 1990a; Rimmer, 1990). This shortage in the "mix of nurses by educational background" is not sufficient to meet present and future nursing health care challenges (Aiken, 1995, p. 210).

Nursing is one of the few disciplines experiencing an increase in enrollment. Nursing education has seen a 10% increase in enrollments between 1988-1990, which surpasses the national college increase of 3-4% during this same time frame (McCloskey & Grace, 1994, p. 158). Unfortunately, the vast increase has been in associate degree programs. In 1992, 30% of registered nurses in the U.S. had a baccalaureate degree, 28% had an associate degree, and 38% had a diploma degree in nursing (Moses, 1994, p. 7). This is in spite of growing data that supports a need for a baccalaureate degree in nursing as the minimum preparation for professional nursing practice. Aiken (1995) believes that the future shortage of registered nurses will be at the baccalaureate and higher degree educational levels (p. 202).

Since the publication of the American Nurses Association's Position Paper on Educational Preparation for nurses in 1965, which even then took the stand that the minimum level of education for professional nursing

practice be the baccalaureate degree, little progress has been made toward that goal (Ellis & Hartley, 1995). Sparse research has been focused on the differing length and foci of educational programs in terms of critical-thinking ability and decision-making characteristics of student nurses. To function effectively in today's complex health care system, nurses need both a broad knowledge base and mastery of intervention skills in order to be able to deliver high quality, fiscally-responsible patient care.

The key component of nursing practice, regardless of practice site, is the nurse's ability to process information and to make decisions (Pardue, 1987, p. 354). The thrust of most educational programs for nurses is to enhance students' cognitive abilities and clinical decision-making skills. A study by Pardue (1987) sought to identify the differences in decision-making skills and critical-thinking abilities among associate degree, diploma, baccalaureate degree, and master's degree prepared nurses. Overall, she found that baccalaureate and master's degree prepared nurses used critical thinking more than the associate degree or diploma prepared nurses. However, because the study's design was limited by a newly developed instrument, these results are not generalizable and may be related to other factors.

In exploring a literature review of nursing education's impact on students' ability to problem solve,

think critically, and make decisions, Kintgen-Andrews (1991) found five longitudinal and two cross-sectional nursing education studies. Three of the five longitudinal studies found no significant gains in critical thinking over the periods of their studies. The remaining two seemed to support the impact of nursing education upon critical thinking, but these findings may well be due to the selectivity of the students included. The cross-sectional studies failed to give support to the impact of nursing education on the critical thinking skills of nursing students (pp. 152-154).

Adult Education

Nursing education is one specific type of teaching and learning that falls into the category of adult education. The focus of how adults learn has shifted from teaching to adult learning (Fellenz & Conti, 1989; Kidd, 1976). Leaders in this field such as Knowles (1975) postulate the concept of andragogy which is the "educational mode in which the teacher is viewed as a facilitator of learning, students are perceived as self-directed, and the climate for learning is informal and collaborative" (pp. 5-6). A major part of the definition of andragogy stresses the growth of self-direction in learning and the use of experiences of the learner in the educational process (Davenport, 1987; Knowles, 1975). The similarity between

concepts of andragogy and the struggle to teach nursing clinical decision making and critical thinking which include patterns of knowing lends credence to the notion that nursing programs are adult education programs (Jenks, 1993).

Given that the technological changes are so rapid in the health care arena, it behooves nursing educators to explore new ways to promote lifelong learning. "Nurses are required to synthesize and integrate multiple forms of knowledge to make health-affirming decisions that embody changing values" (Kramer, 1993, p. 406). Paralleling the renewed interest in critical thinking skills within general education, critical thinking has received widespread attention in nursing. It is now also one of the National League for Nursing's (1991a) agreed upon mandatory criteria for baccalaureate nursing program accreditation. Students need to learn how to learn because "it is no longer realistic to define the purpose of education as transmitting what is known. In a world in which the half-life of many facts may be ten years or less, half of what a person has acquired at the age of twenty may be obsolete by the time that person is thirty" (Knowles, 1975, p. 15). Students may well need to be equipped with skills which they can use to direct their own learning.

Nursing students may use a variety of learning strategies in order to acquire the skills necessary to be

successful in the discipline of nursing. Specifically, those skills are primarily the nurse's ability to process information and to make decisions (Pardue, 1987, p. 354). Nursing tasks are performed in real-life situations. Many adult learning tasks are performed with the intent of solving problems in real-life situations. "Such learning usually involves problem solving, reflection on experience, or planning for one of the numerous tasks or challenges of adult life" (Fellenz & Conti, 1993, pp. 1-2). Learning strategies are the techniques or specialized skills that a learner has developed to use in both formal and informal learning situations (McKeachie, 1988a). Learning strategies are the strategies used to solve real-life problems (Conti & Fellenz, 1992). Real-life problems and challenges are what face a practicing nurse every day.

Learning Strategies

The Self Knowledge Inventory of Lifelong Learning Strategies (SKILLS) instrument was developed to measure adult learning strategies in real-life situations (Conti & Fellenz, 1992). "SKILLS is based upon five aspects of learning which are essential to the learning process and that have the potential for improvement through the refinement of learning strategies. These are the constructs of metacognition, metamotivation, memory, critical thinking, and resource management" (p. 65). These

five constructs each contain three associated learning strategies. Metacognition is composed of the strategies of planning, monitoring, and adjusting; metamotivation is composed of the strategies of attention, reward/enjoyment, and confidence; memory is composed of the strategies of organization, using external aids, and memory application; critical thinking is composed of the strategies of testing assumptions, generating alternatives, and conditional acceptance; and resource management is composed of the strategies of identification of resources, critical use of resources, and using human resources.

While the National League for Nursing is now requiring nursing educational programs to demonstrate that critical thinking is a mandatory outcome of baccalaureate nursing programs, there have been no investigations that examine how nursing students learn. The learning strategies identified in SKILLS are ones that nursing students must use, but which ones do they use the most? Are there differences between the associate degree students versus the baccalaureate students? For example, do student nurses use critical thinking more as a learning strategy than memory?

Statement of the Problem

In the United States today there are three distinct higher educational programs for students in the discipline of nursing that qualify an individual to sit for the national licensure exam of which the successful passage provides for a license as a registered nurse. The three programs are the three-year hospital-based diploma program, the two-year associate degree program, and the four-year baccalaureate degree program. In the state of Montana, there are no remaining diploma/hospital based programs, but there are five institutions of higher learning that offer an associate degree or baccalaureate degree in nursing.

The literature sheds little insight into the learning strategies that nursing students use in their learning. Nursing students today are non-traditional adult learners. An emphasis on and questions from the accreditation agencies on the critical thinking skills of nurses has resulted in a lip service shift of curricular focus in nursing programs to include "critical thinking" even during the first year of nursing study in both associate and baccalaureate degree programs.

While there are no studies on learning styles or learning strategies of nursing students, Kintgen-Andrews (1991) summarized the somewhat perplexing literature on critical thinking and clinical judgment. Her review

outlined that nursing education apparently has little impact on the development of critical thinking skills but does improve skill in clinical judgment of nurses. Additionally, she points out that there is no relationship between measures of critical thinking and clinical judgment. This same conclusion was reached in a very recent longitudinal study by Maynard (1996) who reported that there was no change in critical thinking scores of nursing students over their three-year course of nursing study. This study utilized the Watson-Glaser Critical Thinking Appraisal as the instrument to measure critical thinking in nursing students. An inherent problem with this instrument is that its definition of critical thinking does not include the concept of reflection which is a concept included in many other definitions of critical thinking (Brookfield, 1987; Conti & Fellenz, 1993; Ennis, 1985). This consistent finding of no relationship between critical thinking and nursing education may suggest some conceptual problems in the long-standing assumption by nursing educators that critical thinking can be operationalized as clinical judgment or that the concept of reflection is more important than previously thought. It further suggests that the nursing discipline needs to examine how students learn in order to further delineate the processes of critical thinking and clinical judgment.

Nursing curricula have long utilized the behavioral approach with numerous objectives that students are supposed to meet in every single topic. This behavioral approach has been questioned by Em Bevis, a noted authority on the behavioral model who now has become an outspoken advocate of more emancipatory models of nursing education (Tanner, 1993). This change in focus is similar to tenets of adult education especially those advocated by Malcolm Knowles (1975). There may be several learning strategies that students use in combination that allows this transition. Benner (1983) and Tanner, Padrick, Westfall, and Putzier (1987) have studied decisions made by practicing nurses since the mid-'70s but have not examined student nurses' decision making. It is in this academic climate that learning in the discipline of nursing must take place. Given the reduced clinical hours, use of technology to supplement decreased availability of actual patient experiences, heavy course loads, and an emphasis on critical thinking, what learning strategies do student nurses use to learn? Many unanswered questions exist related to the learning patterns for nursing students. For example, if nursing students learn best by real-life experiences, then by cutting clinical experiences are faculty contributing to a decline in better cognitive abilities, i.e., critical thinking and problem solving skills? Which learning strategies do nursing students use

the most? Are there differences in the learning strategies used by associate degree students as compared to baccalaureate students?

Purpose of the Study

The purpose of this study was to describe the learning strategies used by Montana nursing students. This was done by three means. First, a profile of their learning strategies was identified. Second, it investigated if individual learning strategies and selected demographic, educational, and cultural factors can discriminate between various achievement or academic levels of nursing students in the six nursing programs in five institutions of higher learning of Montana. Relationships between the grade point average of students at a college in Montana, their nursing program, and their learning strategies as measured by the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS) were examined. The demographic and educational factors included age, gender, cultural orientation, years of education completed, college class, nursing class, and type of nursing program. Third, cluster analysis was used to determine groups of learners from whom focus groups were formed. Follow-up focus group interviews were utilized to further describe these learners.

Research Questions

This study provided a profile of learning strategies used by Montana nursing students, investigated the relationship between learning strategies used in both personal and nursing professional situations by adult nursing students in the six nursing educational programs in the state of Montana, and uncovered groups of learners in the nursing programs. Four research questions were addressed in the study:

1. Using a modified version of SKILLS, what is the learning strategies profile of Montana nursing students?

2. Using a modified version of SKILLS, is it possible to determine if nursing students use different learning strategies when confronted with a personal-life versus a nursing learning situation?

3. Using a modified version of SKILLS, is it possible to discriminate between groups of associate and/or baccalaureate degree nursing students which are organized by:

   a. Personal life and nursing situations;

   b. Academic achievement as measured by GPA;

   c. Demographics such as age, gender, and nationally;

   d. Educational level in college; or

   e. Associate versus baccalaureate program.

4. Is it possible to identify and describe if distinct clusters or learning groups exist among students in the six nursing programs in Montana based on SKILLS scores of learning strategies used in personal life and nursing situations?

Significance of the Study

The discovery of information that provides insight into which learning strategies are associated with effective learning has great importance for nursing education. This information can be used to develop curricula that maximize the strengths of the student. It can provide validation and/or direction in terms of strategies for teaching critical thinking skills. It may even shed some light on the appropriateness of the current emphasis on critical thinking in the different levels of nursing education. It may provide direction for change in the nursing program which could take the form of a metacurriculum as suggested by Smith (1982). This information may well provide an impetus for the design and development of workshops for nursing faculty around the state which would provide them with information on learning strategies and on the specific learning strategies that nursing students use. Sharing this information with the learners can empower them and lead to improved lifelong learning. Thus, "to encourage lifelong learning and

lifelong self-directed learning we must assist people who want to break their ties with formal education and develop their own strategies for learning" (Apps, 1981, p. 246).

Definition of Terms

Adult education: The "educational mode in which the teacher is viewed as a facilitator of learning, students are perceived as self-directed, and the climate for learning is informal and collaborative" (Knowles, 1975, pp. 5-6).

Critical thinking: A reasonable, reflective thinking focused on deciding what to believe or do. It includes identifying and challenging assumptions, challenging the importance of context, imagining and exploring alternatives, and reflective skepticism (Brookfield, 1987, p. 12).

Learning strategies: The techniques and skills that an individual elects to use in order to accomplish a specific learning task. Such strategies vary by individual and by learning objective. Often they are so customary to learners that they are given little thought; at other times much deliberation occurs before a learning strategy is selected for a specific learning task. (Fellenz & Conti, 1989, p. 1)

Memory: The storage, retention, and retrieval of knowledge. Memory strategies associated with adult

real-life learning are rehearsal, organization, external aids, and memory application (Fellenz & Conti, 1993, p. 18).

Metacognition: Thinking about the process of learning and emphasizing self-regulatory tactics to insure success in the learning endeavor (Fellenz & Conti, 1989, p. 2).

Metamotivation: Tactics and techniques used by the learner to provide internal impetus in accomplishing learning tasks, not necessarily in an established educational program (Fellenz & Conti, 1993, p. 10).

Nursing: In 1980, the American Nurses Association defined nursing as "the diagnosis and treatment of human responses to actual and potential health problems" (Varcarolis, 1994, p. 99). For the purposes of this study, nursing, nursing discipline, and nursing practice are used interchangeably.

Nursing education: The three educational programs of higher learning "that prepare a graduate to be eligible to take the licensure exam for registered nurses" (McCloskey & Grace, 1994, p. 153). For the purposes of this study, only the associate and baccalaureate programs are represented.

Resource management: Identification of appropriate resources, the critical manner in which they are used, and/or the use of human resources in learning

situations or activities (Fellenz & Conti, 1993, p. 2).

SKILLS: Acronym for the Self-Knowledge Inventory of Lifelong Learning Strategies. A learning strategies inventory with established validity and reliability which usually asks respondents to rate 15 learning strategies in 4 scenarios commonly found in everyday life and which call for a learning effort on the part of the respondent (Fellenz & Conti, 1993, p. 2).

Student participants: Full-time students who volunteered for the study and were in good academic standing in their respective nursing educational program.

Assumptions and Delimitations

Assumptions

Two methods were employed in the study in data collection. In the first phase an instrument was used. It was assumed that the most accurate and reliable responses to the instrument used in the study could be best obtained under controlled conditions. Therefore, instruments were distributed and completed by the participants and were collected by the researcher or a colleague of the researcher all within the same session. It was assumed that the participants answered the instrument and biographical questionnaires truthfully and in an unbiased manner.

During the second phase of the study, the selected participants attended and shared their views and strategies in eight separate focus group interview sessions. It was assumed that the focus group participants were truthful in the group discussions. All participants in this study volunteered to respond to the instrument and voluntarily attended the focus groups.

Delimitations

The study was delimited to full-time nursing students enrolled in the six higher education programs of nursing in the state of Montana during the spring semester 1996. Focus groups were delimited by the need for small numbers and representativeness of the population.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Introduction

Trends in health care suggest major changes in nursing practice and, therefore, implications for nursing education. The Health Professions Commission, comprised of 20 members (four of whom were nurses), has restated that the education of health professionals is not in step with the health needs of the American people (Pew Health Professions Commission, 1995). Factors which are shaping the health care delivery system of the future include changing demographics, emphasis on health promotion, escalating health care costs, the movement toward community-based care, and expanding technology (Blancett et al., 1995).

Many of the recent trends in health care reform have continued the need for an increase in registered nurses. While nursing leaders like deTornyay (1996) suggest a temporary supply of nurses as more hospitals close and health care is delivered in the community (p. 147), others continue to predict the shortage of nurses to continue into the 21st century (Moccia, 1990a; Rimmer, 1990). Trends are

for nursing to be delivered in the community and home settings much like at the beginning of the current century. However, community health nursing has gone from "no tech" to high tech in the past 30 years. These trends require that nursing education prepare nurses who can provide care very independently. "Faculty are faced with preparing students for future practice that will be more complex and specialized than it is now" (Oermann, 1994, p. 153).

An increase in non-traditional and second career students entering schools of nursing is a trend that started in the 1980s and is expected to continue. Moccia (1989), the Vice President of Education and Accreditation Services for the National League for Nursing, predicts that nontraditional students will become the norm as the college-age population decreases.

There is every indication that the country's health care system will change significantly within the next decade. Nursing's Agenda for Health Care Reform (National League for Nursing, 1991b) suggests an expanded role for nurses particularly in community based care. The nurse will assume an even greater role in health education and providing information to patients and families for making decisions regarding both their care and the services individuals need to be healthy. The tremendous changes in the health care system are not occurring in isolation, but are taking place within a society that is also changing.

"The skills most needed for the future will be those of problem identification, problem solving, and strategic brokering, that is, connecting those who can identify problems with those who can solve them" (Reich, 1991, p. 134). The most important thing is to prepare thinkers who are curious, skeptical, and courageous. This description surely describes the current and future professional nurse. More often than not a nurse will be faced with identifying several alternatives for an individual or family when faced with decisions in health care. The nurse will have to become courageous if he/she is to practice within the best interest of a family in accordance with legal and ethical standards of practice. Given that there are major changes in the delivery of nursing care and the complexion of nursing students, nursing educators need to explore new ways to promote lifelong learning.

Trends in Nursing Education

Historical Perspective

Some type of nursing care has always existed. Early on, care of the sick was provided typically by women in a person's family. No particular education or experience was needed to provide care. Throughout the history of nursing, an assumption was that nurses could substitute for family members in the provision of care, thereby transferring the

role of care-giver from the family to the nurse (Lynaugh & Fagin, 1988, p. 184). Initially, nurses cared for patients who did not have family members or were poor. However, by the end of the 19th century, it was more common for families to delegate care to nurses.

As nurses became recognized as care-givers for the ill, training programs for nurses were developing. The first such program was initiated in 1860 by Florence Nightingale at St. Thomas's Hospital in London (Oermann, 1991). An apprenticeship model of education was used in which students worked under the tutelage of ward sisters. In the United States, nurses were first prepared for this professional role in the 1870s (Oermann, 1991). Many hospital-based schools opened, and by using students as providers of service, hospitals were able to reduce the real costs of nursing care. Service, rather than education, was the primary purpose of these early schools of nursing. By 1910, only half of the schools of nursing employed nursing faculty members as much instruction was provided by fellow students or physicians (Reilly & Oermann, 1992).

Accompanying the growth of colleges and universities after World War II was an increase in collegiate programs of nursing. In 1951, Mildred Montag proposed an additional level of nursing education. She proposed preparing nurses at the associate degree level in community colleges

(Oermann, 1991). There are still three educational programs which prepare students to sit for the Registered Nurse licensure exam. These include the two-year associate degree program, the three-year hospital based diploma program, and the four-year baccalaureate degree program.

However, diploma programs are rapidly disappearing. "The number of diploma programs has declined from 875 in 1961 to 145 today" (Aiken, 1995, p. 203). The National League for Nursing (1994) indicates that the education of new nurses is currently 68% associate degree, 7% diploma, and 25% baccalaureate degrees. There are no diploma programs of nursing in Montana. Nursing leaders continue to be divided and continue an ongoing debate over entry into practice, but some suggest that there should be more nurses at the baccalaureate degree level (Aiken, 1995). North Dakota now requires the Baccalaureate Degree for entry into registered nursing practice. The Seventh Report to Congress on the Status of Health Personnel in the United States estimates that by the year 2000 the country will have an excess of 156,000 associate degree nurses and a shortage of 428,000 nurses educated at the baccalaureate level (U.S. Department of Health and Human Services, 1990).

Recent Trends in Nursing Education

Since the evidence suggests that nurses will hold greater responsibilities for patient care in the future,

the quality of a nurse's education is very important. It requires that nursing educators examine not only how adult students learn but also the teaching strategies being utilized. Since 1986, there has been a contemporary movement in nursing education proclaimed the "curriculum revolution" (Allen, 1990; Bevis & Murray, 1990; detornyay, 1990; Middlemiss & Van Neste-Kenny, 1994; Moccia, 1990a; Tanner, 1990). This revolution has followed along the suggestions of Goldman (1989) who outlined alternative conceptions of the educational process that would be reflective of major societal changes. In nursing, the health care crisis is directing nursing education toward new ends. This changing focus of education has resulted in a change from nursing curricular content to nursing curricular outcomes, with a major emphasis on helping students learn to think critically (Rane-Szostak & Robertson, 1996, p. 5). The literature has suggested the need for nursing educators to be open to questioning assumptions of past practices and to try new educational methods (Allen, 1990; Bevis & Murray, 1990; deTornyay, 1990; Diekelmann, 1990; Ford & Profetto-McGrath, 1994; Knollmueller, 1994; Moccia, 1990b; Oermann, 1994; Rane-Szostak & Robertson, 1996; Waters, 1990). This curriculum revolution represents a paradigm shift that focuses on the humanistic perspective in nursing education. This focus toward humanism and away from behaviorism

demands changes in teaching and learning approaches and in student-teacher relationships. While this paradigm shift is occurring in nursing, it articulates with a much larger national movement occurring in general education.

The Tyler behavioral model has made considerable contributions to nursing. The Tyler model has helped to lift nursing education "to a highly organized, evaluation-oriented, and regulated group that provides services of reliable quality . . . a quality seen in few other disciplines" (Bevis, 1988, p. 32). As nursing moves from training to education, the limitations of this behavioral approach become evident. Behavioral objectives are not useful for promoting an educative environment, one that fosters seeing patterns and finding meanings to solve problems (Bevis, 1988). A behavioral model makes instruction teacher-centered as opposed to student-centered (Diekelmann, 1988). This promotes passivity in the nursing student and encourages students to process content that will satisfy the teacher's expectations. In 1,000 classroom observations over an 8-year period under a behavioral model "teachers appear to teach within a very limited repertoire of pedagogical alternatives, emphasizing their own talk. This customary pedagogy places the teacher in control. Few activities call for or even permit active student planning . . . [students] rarely plan or initiate anything" (Schor, 1986, p. 187).

On the contrary, active learner participation promotes more holistic teaching and learning. Learners have to become more conscious of their own thinking (Sadler & Whimbey, 1985). Many authors (Bevis, 1988; Brose, 1988; Novak & Gowin, 1984; Poppenhagen, Schuttenberg, & Gallagher, 1982; Van Neste-Kenny, 1992) note the important transformations that occur in the learner as a result of an active teaching-learning approach. These authors note the increased feelings of self-esteem and confidence, the feelings of increased competence, the sense of increased motivation, and the feelings of control and empowerment.

The movement from behavioral education to a focus on learning that is educative where the teacher and the learner are allies in the discovery of knowledge represents a marked change in the meaning of nursing education. Historically, the education of nurses has been strictly pedagogical (I tell; you learn). However, nursing is not alone in its quest to place behaviorism into perspective. The general education literature is refocusing attention on learning theory, humanism, and a more holistic educative process.

Adult Learners

Malcolm Knowles is thought by many to be the grandfather of contemporary adult education. Knowles (1973, 1975, 1980) compares the assumptions about learners

in the pedagogical (traditional) model with the andragogical (adult) model of education. This comparison can be used as a basis for examining student nurses as adult learners.

In the traditional model the learner is a dependent personality while in the adult model the learner is self-directed. The learner's past experience is seen as having little value in the traditional view, but in the adult model the learner's past experience is valued and accepted. Readiness to learn in the traditional model is seen as having the learners told what they have to learn in order to advance to the next level. In the adult model readiness to learn happens when the learner experiences a need to know or to do something in order to perform more effectively in some aspect of their lives. The learner's orientation to learn in the traditional model is the process of acquiring prescribed subject matter content, but in the adult model the learner learns in order to be able to perform a task, solve a problem, or live in a more satisfying way. Lastly, the motivation to learn is viewed in the traditional mode as coming from external pressures, but in the adult model motivation comes from internal sources in the learner such as self-esteem or an enhanced way of life (Knowles, 1980).

While Knowles (1975, 1980) certainly discussed the notion of the adult as a self-directed learner, it was

Stephen Brookfield who explored this concept in depth. He identified several central themes in self-directed learning (Brookfield, 1988). Several of these are particularly applicable if one considers student nurses as adult learners. The use of learning contracts, the value of establishing opportunities for peer learning groups, and the identification of appropriate resources can all be used in the new, self-directed learning model. Brookfield's (1987, 1988) work has extended to the point where he has identified the development of "critical thinking" as the primary goal of adult education. Critical thinking is related to various aspects of nursing education and to the concept of learning strategies in adult education.

Harri-Augstein and Thomas (1991) have looked at self-directed learning and view it as organized learning and learning concentrations. Thomas and Harri-Augstein (1985) point out that individuals do not necessarily learn from their life experiences. Indeed, learning only occurs when those individuals utilize awareness, reflection, and intentional review to analyze and integrate their experiences (Houle, 1985; Long, 1989). Such learning is a deliberate, insightful, and highly skilled activity, which they termed self-organized learning (SOL). Self-organization consists of the ability to converse with oneself about one's own learning processes and to observe, search, analyze, formulate, review, decide, and act on the

basis of such creative encounters. There is a prime emphasis on the affective component along with the cognitive elements. The seven characteristics of self-organized learners are as follows:

1. To be able to accept responsibility for managing one's own learning, rather than to be dependent on other' initiatives and directions.
2. To be aware of, and to control how one learns, specifically:
   a) to recognize one's needs and to translate them into clearly defined purposes for learning;
   b) to recruit appropriate resources and to initiate flexible strategies for achieving the purposes;
   c) to recognize the quality of achieved outcomes;
   d) to critically review this cycle of activity; and
   e) to plan and implement more effective cycles of learning.
3. To appreciate the dynamic nature of the personal learning process, and to strive for greater self-organization.
4. To be able to challenge one's partially developed skills, so that such skills evolve into higher standards of personal competence.
5. To see the value of SOL and to practice it as a way of life.
6. To digest, challenge and redefine SOL in one's own terms.
7. To strive constantly for a "quantum leap" improvement in one's personal capacity for learning. (Thomas & Harri-Augstein, 1985, pp. 72-78)

While some of these characteristics may only be developed within individuals and over time, it seems reasonable and sensible that learning experiences for student nurses, and even practicing nurses, should be planned and conducted in such a way that learners are given

the opportunity to practice as many as possible. These authors emphasize that the process of self-organized learning is conversational, and they promote the use of deliberate learning conversations as the most beneficial process for promoting SOL. A learning conversation is a process of sustaining a conversation with oneself about learning which may be initiatory, innovative, insightful, remedial, rejective, physical, open, committing, spiraling, and/or creative (Harri-Augstein & Thomas, 1991, p. 90). The use of a "learning coach," who temporarily externalizes the learning conversation to make it explicit to the learner, is the role of the teacher.

The literature on adult learning suggests applications to nursing and nursing education, especially in view of the need for nurses to be able to "keep up" with the information explosion and rapid technological changes occurring today. Nurses will need to be able to continue their lifelong learning if they are to stay current in their chosen discipline. Thus, nursing education programs are just the beginning of nursing lifelong learning for those in the discipline.

Critical Thinking in Nursing

Many skills are required for an individual to provide nursing care to both well and sick people in both institutional settings and in the community. One of the

skills that has received much attention both in the adult learning arena and in the nursing literature is critical thinking. The development of this skill is of particular importance to nursing education for it is considered essential for practice (Toliver, 1988; Valiga, 1983), as well as a measure of the quality of baccalaureate nursing programs (National League for Nursing, 1991a).

An issue of current concern for higher education is the measurement of expected educational outcomes of critical thinking (Association of American Colleges of Nursing, 1987; Brookfield, 1987; Ewell, 1988; Lynton & Elman, 1987; Meyers, 1987; Paul, 1990; Young, 1980). While there is consensus on its importance, questions remain regarding how critical thinking is defined and measured. There has been limited study focusing on the development of critical thinking during nursing education and its relationship to nursing practice. What does exist provides little information on the development of the teaching and learning of critical thinking in nursing students.

In Benner's (1984) model of nursing competence, the assumption is that the skill of critical thinking is inherent within nursing practice. Benner has described nursing competence as stages of skill acquisition. These stages are as follows:

> Stage 1: Novice. Beginners have had no experience of the situations in which they are expected to perform. They are taught

about situations in terms of objective attributes; rule governed behavior is limited and inflexible; and rules must be given to guide performance. A new nursing graduate of a program of nursing is seen as a novice.

Stage 2: Advanced Beginner. The individual can demonstrate marginally acceptable performance and has coped with enough real situations to note the recurring meaningful situational components that are termed "aspects of the situation." Aspects require prior experience in actual situations for recognition. The advanced beginner still relies on rules; takes in little of the situation; needs support in the clinical setting for setting priorities in the care of patients.

Stage 3: Competent. The nurse has been in the same position or similar situations two or three years and is able to see own actions in terms of long-range goals or plans. A plan establishes a perspective, and the plan is based on considerable conscious, abstract, analytic contemplation of the problem. At this stage the individual lacks the speed and flexibility of the proficient nurse, but does have a feeling of mastery and the ability to cope with the many contingencies of clinical nursing.

Stage 4: Proficient. The proficient nurse perceives situations as wholes rather than in terms of aspects, and performance is guided by maxims. Perception is a key; it is not thought out, but presents itself based upon experience and recent events. The nurse understands a situation as a whole; perceives its meaning in terms of long term goals; learns from experience what typical events to expect in response to those events; has improved decision-making which becomes a less labored process; considers fewer options and hones in on an accurate region of the problem; uses maxims as guides, but a deep understanding of the situation is required before a maxim is used; and is able to recognize early warning signals. This level is usually found in nurses who have worked with similar patient populations for about 3 to 5 years.

> Stage 5: Expert. This individual no longer relies on an analytic principle to correct understanding of the situation to an appropriate action. Relying on an enormous background of experience, the nurse has an "intuitive grasp" of each situation and zeros in on the accurate region of the problem without wasteful consideration of a large range of unfruitful alternative diagnoses and solutions. There is a deep understanding of the total situation, perceptual acuity, and recognitional ability. The nurse does not rely on analytical tools except when in situations having had no nursing experience. (Benner, 1984, pp. 20-34)

There have been a variety of meanings attributed to critical thinking in the nursing literature. According to Beyer (1987), "the term critical thinking is one of the most abused terms in our thinking skills vocabulary. Generally it means whatever its user stipulates it to mean" (p. 32). Watson and Glaser (1980) described critical thinking as a composite of knowledge and attitudes including (a) 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; (b) knowledge of the nature of valid inferences, abstractions, and generalizations in which the weight or accuracy of different kinds of evidence are logically determined; and (c) skills in employing and applying these attitudes and knowledge (p. 1). This definition forms the basis for the Watson-Glaser Critical Thinking Appraisal, an instrument used by researchers across disciplines (Berger, 1985; Helmstadter, 1985).

Finding that critical thinking was an educational ideal not in widespread practice, one researcher described it as a complex of many considerations, highly sensitive to context and requiring a "critical spirit" for implementation (Norris, 1985). Dialectical reasoning is viewed as an important element of critical thinking (Paul, 1985). An additional description of this concept is that it is an attitude of inquiry involving the use of facts, principles, theories, abstractions, deductions, interpretation, and the evaluation of arguments (Kemp, 1985). "Systematic goal-directed thinking that includes evaluation of the assumptions, processes, and outcomes in making a decision, solving a problem, or formulating inferences from information given" is yet another definition of critical thinking (Halpern, 1987, p. 75). In contrast, critical thinking skills have been categorized into four distinct components: problem solving, decision making, creative thinking, and critical thinking (Smith, 1987). Critical thinking is then defined as the use of the basic thinking processes to analyze arguments and to generate insight into particular meanings and interpretations. Additionally, critical thinking has been viewed as consisting of specific intellectual skills not synonymous with nor encompassing decision making or problem solving. These are identified as separate thinking skills with specific characteristics (Beyer, 1987).

Reflecting a divergent interpretation, Brookfield (1987) described critical thinking as a process which is highly sensitive to context with emotional and rational dimensions. He conceptualizes critical thinking as an active process rather than an outcome. This process has specific components: (a) identifying and challenging assumptions, (b) challenging the importance of context, and (c) imagining and exploring alternatives. Central to this process is the concept of perspective-taking by the individual. When specifically addressing the field of nursing, "it becomes clear that critical thinking is a strongly emotional as well as cognitive process" (Brookfield, 1993, p.197).

Paul (1995) has written extensively on critical thinking. He defines critical thinking as having the three components of (a) disciplined, self-directed thinking which exemplifies the perfections of thinking appropriate to a particular mode or domain of thinking; (b) thinking that displays mastery of intellectual skills and abilities; and (c) the art of thinking about your thinking while you are thinking in order to make your thinking better: more clear, more accurate, or more defensible (p. 526). In this definition, which is consistent with Brookfield's (1993), critical thinking has both a cognitive and an affective component. The attitudinal domain provides the motivation for the use of the cognitive domain in a responsible

manner. The following attitudes are essential to "higher order thinking in real settings":

1. Intellectual Humility--awareness of ones own limitations
2. Intellectual Courage--willingness to examine alternative ideas
3. Intellectual Empathy--ability to imagine self in place of others
4. Intellectual Integrity--uniform application of standards
5. Intellectual Perseverance--willingness to struggle for truth
6. Faith in Reason--belief in the abilities of mankind
7. Intellectual Sense of Justice--sense of impartial judgment. (pp. 129-130)

Not only are there certain attitudes necessary for critical thinking, but there are also universal intellectual standards. Blais and Wilkinson (1993) modified Paul's lengthy intellectual standards into micro-skills and macro-skills for the discipline of nursing. Micro-skills are the most basic, are self-contained, or are skills an individual can practice in isolation. These include:

1. Comparing and contrasting ideals and actual practice
2. Noting significant similarities and differences
3. Distinguishing between irrelevant and relevant facts
4. Recognizing and examining assumptions
5. Evaluating evidence and alleged facts
6. Making plausible inferences, predictions, or interpretations
7. Recognizing contradictions
8. Exploring implications and consequences. (p. 2)

The micro-skills are combined with more complex, higher-level abilities called the macro-skills. Such abilities include evaluating arguments and generating problem solutions. These macro-abilities include:

1. Refining generalizations, and avoiding oversimplifications
2. Comparing analogous situations and transferring ideas to new concepts
3. Developing one's perspective
4. Clarifying issues, conclusions, beliefs, and claims
5. Developing criteria for evaluation; clarifying values and standards
6. Evaluating the credibility of sources of information
7. Raising and pursuing root questions; questioning deeply
8. Analyzing and evaluating arguments, beliefs, theories, actions, policies
9. Generating and assessing solutions
10. Reading critically, clarifying or critiquing texts
11. Listening critically, the art of silent dialogue
12. Making interdisciplinary connections
13. Comparing perspectives, interpretation, theories, and points of view
14. Evaluating perspectives, interpretations, or theories. (pp. 2-3)

Even more recently, Kataoka-Yahiro and Saylor (1994) at the School of Nursing at San Jose State University saw the need for a definition of critical thinking as a basis for nursing judgment. These authors outline the confusing picture of critical thinking in nursing. Since there is no clear definition nor conceptualization of critical thinking in nursing, they proposed a model for critical thinking in nursing that includes five components:

1. Specific knowledge base in nursing
2. Experience in nursing
3. Critical thinking competencies
4. Attitudes for critical thinking
5. Standards for critical thinking.
(pp. 353-355)

As early as 1964, Watson and Glaser saw critical thinking as a composite of attitudes, knowledge, and skills. In 1985, Ennis defined critical thinking as "reflective and reasonable thinking that is focused on deciding what to believe or do" (p. 45). The common themes and common components of critical thinking reveal the need for standards (Blais & Wilkinson, 1993; Conti & Fellenz, 1992; Kataoka-Yahiro & Saylor, 1994; Paul, 1995).

Thus, numerous authors with the exception of Watson and Glaser in 1964 share the view that critical thinking is a reflective process. Jarvis (1987) and Brookfield (1987) introduced the idea of a specific domain or place where critical thinking takes place, and Conti and Fellenz (1992) view this domain as adult learning in real-life situations. Nursing is definitely a real-life situation where decisions are made that can mean life or death, emotional support, education, or the meeting of one or more basic human needs.

Although there are commonalities and overlapping concepts in defining critical thinking, the nursing scholars in this field clearly fail to achieve consensus. Among the various definitions presented, the one used by Watson and Glaser (1964) is the most prevalent in the

critical thinking and nursing research literature despite its failure to include reflection as a component.

Several studies of critical thinking have focused on nursing. These studies have used the Watson-Glaser Critical Thinking Appraisal (WGCTA) as a measurement, thereby subscribing to its definition of critical thinking. There has only been one nursing study to date that did not use the WGCTA. Facione, Facione, and Sanchez (1994) developed the California Critical Thinking Disposition Inventory and in so doing defined critical thinking as "the process of purposeful, self-regulatory judgment; an interactive, reflective, reasoning process" (p. 345). It is too soon to know if this new inventory will adequately measure critical thinking in nursing students or in clinical practice. In nursing it is common to equate critical thinking with problem-solving, analysis of data, clinical decision-making, analysis of data, clinical decision-making or judgment, or the use of the nursing process (Bevis, 1993; Kintgen-Andrew, 1991).

Studies that examined the cognitive development of nursing students report conflicting findings. In one longitudinal investigation, the cognitive development of nursing students to determine changes over the span of an academic year found that students increase in cognitive development from year to year, but this is very minimal. Upon graduation, nursing students are still very dependent

upon others for decision making and problem solving (Valiga, 1983). Three studies that investigated nursing student critical thinking skills report conflicting findings. One found significant improvement in critical thinking from the time students entered a nursing program to the time they graduated (Gross, Takazawa, & Rose, 1987). In the second, WGCTA scores of nursing students between the first and last semesters of the program of study were compared, finding no significant change in critical thinking (Bauwens & Gerhard, 1987). These authors suggested that the WGCTA was not a valid instrument to measure nursing critical thinking. The third investigated the relationship between critical thinking and the ability to formulate nursing diagnoses (make nursing decisions) and found no overall relationship (Matthews & Gaul, 1979).

Nursing competence has been described both as a minimum level of competency (Gove, 1965; McCloskey, 1983; Watson, 1983), and as a higher level of functioning and thinking (Green, 1988; Lynton & Elman, 1987). In studies focusing on the concept of professional competence and its relationship to effective work performance, the development of professional competence was found to require a trio of abilities including cognitive, psychomotor, and affective competencies initiated during the educational process (Stark, Lowther & Hagerty, 1986; Klemp, 1977). Skills developed during the educational experience did not

guarantee competence on the job (Klemp, 1977). Acquisition of competence is initiated by the educational process and developed through professional experiences (Benner, 1984; Booth, 1985; Stark, Lowther, & Hagerty, 1986).

A review of the literature in nursing education with regard to critical thinking reveals that:

> Studies presenting longitudinal and cross-sectional data relevant to the impact of nursing education on generic critical thinking have produced mixed results. Strong support for the impact of nursing education is lacking; the cross-sectional data presented by studies of clinical judgment, for the most part, support the impact of nursing education; the studies that tested both critical thinking and clinical judgment provide practically no evidence of congruence between the two; the relatively few studies that present correlations between critical thinking ability and measures achievement in nursing education produced mixed findings. Strong support for the relationship between critical thinking and success in nursing education is lacking (Kintgen-Andrews, 1991, p. 154).

There are distinct gaps in the nursing literature of critical thinking and its relationship to nursing education or to professional nursing competence. To date, the relationships between critical thinking ability in relation to education or professional experience have not been explored in the literature. To what extent a nursing student develops critical thinking skills during the educational process has not been established. A very recent longitudinal study by Maynard (1996) investigated critical thinking of student nurses from their sophomore to

their senior year in nursing school. The critical thinking ability did not change significantly during the educational experience. Only when several more years passed was there a significant increase found in practicing nurses. Once again, the WGCTA was used as the measurement instrument. While critical thinking was not supported as an educational outcome, probably due to the limitations of the instrument, Benner's (1984) work on professional competency was supported. The study supports the experiential component of competence development. The nursing educational program may only begin this process of competence development and produces the novice nurse. Perhaps critical thinking ability is a process as proposed by Brookfield (1987) and not an educational outcome. If so, a need exists for a different instrument to measure critical thinking as part of lifelong learning in nursing.

Learning Strategies and the SKILLS Instrument

Adults enrolled in higher education nursing programs have a variety of learning needs and challenges related to their chosen career and to their personal lives. The discipline of nursing involves situations in which "real-life learning" is involved. "Real-life learning usually involves problem solving, reflection on experience, or planning for one of the numerous tasks or challenges of adult life" (Fellenz & Conti, 1993, pp. 1-2). Real-life

learning tasks encompass a myriad of possibilities which includes such things as studying for a test, talking to a dying patient's family or the dying patient, or arranging babysitters while participating in clinical experiences. Much of the time involved in real-life learning situations for nursing students can easily become "complicated, involved, and long-enduring" (p. 2).

How can individuals solve problems and overcome challenges related to both nursing and personal learning situations? One way may be through the use of learning strategies. "Learning strategies are the techniques or skills that an individual elects to use in order to accomplish a learning task" (Fellenz & Conti, 1993, p. 1). Several researchers have investigated and contributed to the use of learning strategies (Mayer, 1988; McKeachie, 1988a; Weinstein, 1988). Weinstein (1988) and McKeachie (1988a) have focused mainly on learning strategies used in traditional higher educational settings. However, "what is new with the current interest in learning strategies is that it can be based on an emerging cognitive theory of human learning and memory" (Mayer, 1988, p. 21).

Learning strategies are related to the concept of learning to learn in various ways. The idea that adult learners take charge of their own learning was explored in the field of adult education by Houle (1961) and Tough (1971). Soon Apps (1978) and Smith (1982) offered ways a

self-directed learner could develop study skills in learning how to learn. Fellenz and Conti (1993) furthered these efforts in the development of SKILLS and the study of learning strategies in real-life learning situations.

Learning strategy selection is very complex. Weinstein (1990) names four general areas of learning strategies. These include (a) comprehension monitoring--knowing when you know, knowing when you don't know; (b) knowledge acquisition--building connections between what you already know and new knowledge; (c) active study skills--targeting specifically what the learner does to help acquire information; and (d) support strategies--building and maintaining suitable internal and external environments for learning.

Often learning strategies are linked in a mechanical fashion like in the increase in note taking, better time management, or acquiring information through the memorization of facts. While some educators focus on these lower level skills, others advocate going beyond the mechanical rote process to more critical thinking skills and the application of knowledge. Learning strategies represent higher-order skills which control and regulate the task-specific or practical skills. While they are general in nature, they are the sort of activity needed time and time again in different learning situations. A

learning strategy can be viewed as a complete plan for accomplishing a learning goal (Derry, 1994).

A thorough study of the literature in the fields of adult education and cognitive psychology reveals five important areas of learning strategies (Conti & Fellenz, 1992; Fellenz & Conti, 1993, p. 3). These included metacognition, metamotivation, memory, critical thinking, and resource management. In the Self-Knowledge Inventory of Lifelong Learning Strategies, each of these five areas is composed of three learning strategies; this produces a total of 15 learning strategies that an individual may use in various real-life learning situations. The five areas and their associated learning strategies are as follows: Metacognition--Planning, Monitoring, and Adjusting; Metamotivation--Attention, Reward/Enjoyment, and Confidence; Memory--Organization, Using External Aids, and Memory Application; Critical Thinking--Testing Assumptions, Generating Alternatives, and Conditional Acceptance; and Resource Management--Identification of Resources, Critical Use of Resources, and Using Human Resources.

Metacognition

Metacognition is an individual's ability to plan, monitor, and evaluate one's progress in a learning or problem solving task (Deiz & Moon, 1990). "It is a degree of awareness of the skills, strategies, and resources

needed to perform a task effectively" (p. 175). The concept of manipulations and control of thinking ability in the learning process was outlined by Flavell (1979). Brown (1982) further refined the definition of metacognition as the knowledge and control one has over one's own thinking processes.

From the educational perspective, McKeachie (1988a) defined metacognition as a "individual's awareness of and knowledge about cognition and control and regulation of cognition" (p. 3). This emphasis on individual awareness of how one learns effectively, of what the nature of a task is, and of the appropriate learning strategy to use is important in solving problems or making decisions related to real-life learning tasks (Flavell, 1979). Most researchers agree that the processes of metacognition can be grouped into the three areas of planning, monitoring, and adjusting. However, both Flavell (1979) and Brown (1983) maintain that all of these cognitive processes are interactive and interdependent.

Metacognition planning centers on the best way for one to proceed with a specific learning task. Techniques associated with planning are overviewing, skimming, using one's personal learning style, and determining the purpose of learning tasks (Counter & Fellenz, 1993). Monitoring involves periodic assessment of how well one is proceeding through a learning task or project to determine if the

learning goal is being addressed. Learning strategies used in monitoring situations are self-testing, comparing progress from previous learning situations, asking for feedback, checking new resources for information, keeping track of diverse steps in learning, and comparing progress to standards or models. Adjusting involves examining information to determine what relationship it bears to the learning task and revising the learning process if necessary. Adjustment strategies are seeking feedback, changing one's approach, and deciding when a learning task is finished. Effective learning calls for such modification in order to fine-tune or revise the learning situation.

Metamotivation

Motivation is a difficult concept to define as it is described from many different philosophical, psychological, and educational viewpoints (Conti & Fellenz, 1992). Major educational philosophies argue whether a learner can be externally motivated or internally motivated. In adult education, the emphasis of the discussion of motivation has centered on participation in educational activities rather than on motivating students to learn. In nursing, a major focus of motivation has evolved from Maslow's (1962) theory of needs. Maslow outlined the human needs theory as a basic motivating force of an individual's behavior,

including learning. Maslow's hierarchy of needs includes the basic physiologic human needs like hunger at the bottom of the hierarchy and proceed to higher level needs with self-actualization on the top of the hierarchy. Individuals must meet their basic needs before they can progress through the hierarchy. For example, people have to be free of pain and thirst before they can learn. Maslow contends that an individual will not be motivated to learn if their basic needs for safety and security and their needs for love and belonging are not met.

"Meta" in the term metamotivation "was given to the component to identify it specifically as motivation of the individual to learn and to distinguish it from factors relating to reasons for participation in educational programs" (Fellenz & Conti, 1993, p. 10). This focuses motivation to the educational arena whereas Maslow viewed motivation of the total human organism.

Keller (1987) developed a popular approach to motivation in the Attention, Relevance, Confidence, and Satisfaction (ARCS) Model. Attention focuses an individual's learning abilities on material to be learned. Relevance is the determination of whether or not the learner will continue to attend to a learning task. Relevance can be specific and goal directed or can relate to a general feeling of increased competence, self-efficacy, or control over a learning environment.

Both Keller (1987) and McCombs (1988) believe that a certain level of confidence within learners is necessary for the successful completion of a learning task. To be successful, learners must be confident in their abilities to determine which approaches and strategies will work best for them. "It is clear that continuing motivation to learn is in large part a function of the learner's perceptions of self-efficacy and self-control in learning situations" (McCombs, 1988, p. 142). Meaningful ways of utilizing new knowledge or skills, positive outcomes, and a fulfilling of personal expectations are suggested strategies for instilling satisfaction. Enjoyment and reward include the fun of learning and satisfaction with the outcome of the learning activity. Wlodkowski (1985) maintains that if learners enjoy a learning project or task, they are more likely to be and continue to stay motivated.

Metamotivation learning strategies include attention, reward/enjoyment, and confidence. Attention is a process that focuses a learner's abilities toward a learning task. Many factors can determine the time a learner will pay attention to a given learning situation. These range from curiosity and previous experience to a recognition of the need to learn a specific thing. Reward and enjoyment are related strategies. Reward describes the anticipation of or the recognition of value to oneself after learning a task. Enjoyment includes the fun of learning and

satisfaction with the outcome of the learning activity. Confidence in one's abilities to learn is an important motivational strategy and it reminds the learner of past successes or appeals to feelings of confidence in the learning situation.

Memory

"Memory is the mechanism by which information is stored and retrieved. It is a more abstract process than learning" (Huber, 1993, p. 34). There is an inextricable link between memory and learning. If one does not learn, one cannot remember and without remembering, there is no evidence of learning (Long, 1983).

To understand the effect of memory in personal life and in nursing situations, the various roles of memory must be reviewed. These include memory processes, memory structure, and mediating or influencing factors (Paul & Fellenz, 1993). Memory processes are mental activities that store information in the memory and the activities that make use of that information (p. 13). Mental processes entail encoding or acquisition, storage or retention, and retrieval or recall of information (Zechmeister & Nyberg, 1982).

The encoding or acquisition process occurs when a mental stimulus is received and interpreted and a representation of that interpretation is stored in memory

(Seamon, 1980). "Encoding occurs on many dimensions, including physical, semantic, and syntactic features" (Paul & Fellenz, 1993, p. 14). The type and level of encoding depends on what requirements are necessary to accomplish a learning task.

Retention or storage occurs when it is necessary for a person to use the information as the basis for the later act of remembering or recalling. Retention involves the acts of storing and forgetting encoded information. "Forgetting may be due to the competition for attention produced by prior learning or learning that occurs following the information targeted for retention" (Paul & Fellenz, 1993, p. 14). Retention is affected by three factors. These include the nature of the material, the use of the material, and the way the material is encoded.

Retrieval consists of the four processes of recognition, recall, recollection, and reconstruction. In general, recall and recognition are the two most important aspects of remembering. The ability to remember through recognition is greater than just by recall alone (Paul & Fellenz, 1993, p. 14).

Memory learning strategies include organization, using external aids, and memory application. A fundamental task of memory is to organize knowledge or information. Organizational strategies include structuring with activities such as grouping, mnemonics, and the creation of

memory patterns (Fellenz & Conti, 1993, p. 19). Strategies which rely on manipulation of the environment such as using external aids are useful to the reinforcement of memory tasks; this may involve such things as using appointment books, calendars, or lists or asking to be reminded of certain tasks. Memory application strategies include remembering and recalling mental images in order to make decisions or solve problems.

Critical Thinking

In adult education and adult learning circles, Brookfield (1987) is the acknowledged leader in the study of critical thinking. He defines critical thinking as "a reasonable, reflective thinking focused on deciding what to believe or do. This includes identifying and challenging assumptions, challenging the importance of context, imagining and exploring alternatives, and reflective skepticism" (p. 12). Additionally, "it becomes clear that critical thinking is a strongly emotional as well as cognitive process" (Brookfield, 1993, p. 197).

Bloom (1956) is credited for an early educational definition of critical thinking based on his learning taxonomy. He described analysis, synthesis, and evaluation in learning as parts of critical or creative thinking. Analysis is the breaking down an idea into its various parts so that relationships between ideas and principles

are made clear. Synthesis, on the other hand, is the operation of assembling items to make up new patterns, structures, and plans or sets of operations. Finally, evaluation is the ability to judge the value of ideas, elements, relationships, or related entities using appropriate criteria or standards.

An issue of current concern for higher education is the measurement of an expected educational outcome of critical thinking (Association of American Colleges of Nursing, 1987; Brookfield, 1987, 1993; Ewell, 1988; Lynton & Elman, 1987; Meyers, 1987; Paul, 1990; Young, 1980). The development of this skill is of particular importance to nursing education, for it is considered essential for practice (Toliver, 1988; Valiga, 1983) as well as a measure of the quality of baccalaureate nursing programs (National League for Nursing, 1991a).

Critical thinking learning strategies include testing assumptions, generating alternative, and conditional acceptance. Testing assumptions refers to the adult learner's decision to critically judge assumptions used in the learning task and to evaluate information accumulated concerning the assumptions relative to the learning task (Fellenz & Conti, 1993). Generating alternatives refers to the adult learner's ability to create additional alternatives for task resolution within the context of the learning task. Conditional acceptance refers to the adult

learner's continual review of information after tentatively deciding on a solution. With conditional acceptance, the learner reflects on the solution to determine if adjustments are needed after acceptance of the solution.

Resource Management

Resource management is the "identification of appropriate resources, critical use of such resources, and the use of human resources in learning situations" (Fellenz & Conti, 1993, p. 3). In today's world, learners are challenged with a wide array of informational resources, and it is necessary that they be able to choose the appropriate resources in order to make accurate assessments and decisions and to do appropriate problem solving.

Effective strategies for resource management begin with the identification of and location of resources. The learner must be able to evaluate which resources to use; decide whether they are worth the time, effort, and possible expense required; and assess their own willingness to use a particular resource. For example, Shirk (1983) noted that less than 25% of American adults use the library with any degree of regularity. Some prefer computer information, newspaper or magazines, television, or other people as their learning resources.

Shaaden and Raiford (1984) discovered that most adults do not possess the necessary educational or informational

processing skills to cope with the information associated with technological change. This includes the use of computers, television, magazines, and "how-to" brooks available from various public and private sources.

Tough (1971) found that many adults had significant problems with utilizing learning resources. "Certain persons would not or could not get the required help, and certain printed materials were useless. Even when beneficial help was received from certain resources, much of it cost the learner a great deal of time, money, or frustration" (p. 105). Unexpected barriers can emerge during a learning project. For example, learners may not understand written directions, be able to obtain resources, have little or no study time, find that crucial tasks are too difficult, or lack family support related to their learning projects (Smith, 1982). In addition, adult learners often find "more printed or audiovisual materials available on a topic than they know what to do with . . . [and] reading materials were overly technical or too detailed" (p. 103).

Resource management learning strategies involve the identification of resources, critical use of resources, and using human resources. Identification of appropriate resources in a learning situation must be accompanied by a willingness to use such resources. Selection of resources always varies according to individual learning goals or

needs. Some sources for consideration are print sources, people or models, professionals or experts, and agencies. Critical use of resources involves the need to distinguish between recent and most recent information. Much information today is provided through businesses or agencies having a vested interest in the use made of such knowledge. Human resources can have a powerful impact on learning. Communication skills such as active listening are essential when dealing with other people as potential resources. Other factors include forming a support mechanism, getting and sharing appropriate information with others, and having an outlet for discussion of potential problems with others in a networking chain or group.

CHAPTER 3

METHODOLOGY

Introduction

This descriptive case study investigated the relationship between learning strategies used in both personal and nursing situations by adult nursing students enrolled in either an associate or baccalaureate nursing program at five institutions of higher education in the state of Montana. It utilized the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS) and the two multivariate statistical techniques of discriminant analysis and cluster analysis to study the relationship between learning strategies and selected demographic characteristics of those in the study. It further investigated the learning strategies of this population through focus group interviews.

The study design was that of case study descriptive research. Descriptive research "involves collecting data in order to test hypotheses or answer questions concerning the current status of the subject of the study" (Gay, 1996, p. 14). Descriptive data are "typically collected through a questionnaire survey, an interview, or observation"

(p. 14). A case study is a "bounded system which is an examination of a specific phenomenon such as a program, an event, a process, a situation, or a social group" (Merriam, 1988, p. 10). An additional method utilized in describing a population is through the use of interviews. A way to interview a small group of individuals who have similar characteristics is a focus group (Gay, 1996, p. 224). The study involved a social group comprised of full-time nursing students enrolled at the six registered nursing programs located in institutions of higher learning in the state of Montana. Therefore, participants in this case study were the 296 full-time nursing students enrolled in a nursing program at an institution of higher learning in Montana. To measure their learning strategies used in personal-life and nursing situations and to gather information on certain demographic variables, these students were given a modified version of the SKILLS learning strategies instrument and a biographical survey under controlled conditions. Results from the learning strategies instrument were also used to generate four distinct clusters of learners. A purposive sample of learners in each cluster was used to form focus groups to further evaluate differences between the learning groups in a qualitative manner.

The Setting

Five institutions of higher learning offer either an associate and/or baccalaureate degree in nursing leading to a license to practice as a Registered Nurse in the state of Montana. Thus, the service area served is the state of Montana, which has a population of approximately 800,000, and the bordering states. Each of the five institutions has its own mission, but all the nursing programs must conform to the national standards of nursing education and to legislated statues administered by the Montana Board of Nursing. The five institutions included: Miles Community College, Miles City, associate degree; Salish-Kootenai College, Pablo, associate degree; Montana State University--Northern, Havre, associate and baccalaureate degrees; Montana State University--Bozeman, Great Falls Campus, baccalaureate degree; and Carroll College, Helena, baccalaureate degree. All six of the nursing programs at these institutions are fully accredited by the Montana State Board of Nursing. Additionally, the Montana State University campuses nursing programs are also accredited by the National League for Nursing, a national nursing accrediting agency.

Students come from a variety of backgrounds. These may include students who enter college directly out of high school, who come from Adult Basic Education and the high

school equivalency programs, who are displaced homemakers, who are part of the Job Training Partnership Act program, and who may be changing careers later in life.

Enrollment in these full-time nursing programs is typically at the maximum for the program. Each of the programs has an enrollment "cap" that is dictated by clinical placements. The Montana Board of Nursing requires that only a maximum of 10 nursing students can be at a clinical site with a master's degree prepared instructor present at any given time. This definitely limits and dictates enrollment at each of the institutions. Most students take 3 years to complete an associate degree in nursing and 5 years to complete the baccalaureate degree in nursing. Only students enrolled full-time in the respective nursing programs participated in the study. To be classified as full-time students, the students had to meet all admission requirements for the nursing program and had to be enrolled in nursing classes the second semester of academic 1995-1996. All the nursing programs require their students be in good academic standing to enroll in the nursing courses and require that they maintain good academic standing during the course of nursing study. The definition of good academic standing varies according to school but is consistent with higher education's requirements.

Population

The total population of full-time nursing students during the duration of this study was 296 students. Of these, 181 students were enrolled in the three associate degree programs, and 115 in the three baccalaureate degree programs. They were distributed at the various schools as the specific breakdown follows: 40--Miles Community College, associate degree; 36--Salish-Kootenai College, associate degree; 105--Montana State University--Northern, associate degree; 25--Montana State University--Northern, baccalaureate degree; 60--Montana State University--Bozeman Great Falls Campus, baccalaureate degree; and 30--Carroll College, baccalaureate degree.

Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS)

An instrument to measure various components of adult real-life learning strategies has been developed by researchers at Montana State University--Bozeman. Entitled the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS), the instrument consists of various scenarios that represent real-life learning situations which require various types and levels of learning (Fellenz & Conti, 1993). Following each of the scenarios are 15 questions intended to evaluate which learning techniques or strategies an individual would use to resolve a particular

learning task. The SKILLS instrument was developed to measure important parts of the adult learning process as it takes place when adults encounter real-life learning needs. It emphasizes a process rather than a componential approach. The questions in SKILLS are used to distinguish specific applications of these 15 learning strategies. In SKILLS, learning strategies are categorized into the specific learning areas of metacognition, metamotivation, memory, critical thinking, and resource management (p. 2). These five areas and their associated learning strategies can be seen in Table 1.

Table 1. Components of Self-Knowledge Inventory of Lifelong Learning Strategies.

Metacognition

Definition: Knowing about and directing one's own thinking and learning processes.

Strategies:

Planning--analyzing the best way for one's self to proceed with a specific learning task.
Examples: Follow own learning style, skim or overview, determine purpose or focus, plan.

Monitoring--assessing how one is proceeding through a learning project.
Examples: Review plans, check if on task, compare to accepted standard or model.

Adjusting--directing and improving one's learning processes.
Examples: Evaluate, seek feedback, change approach, decide when done.

Table 1. Continued.

Metamotivation

Definition: Awareness of and control over factors that energize and direct (motivate) our learning.

Strategies:

Attention--focusing on material to be learned.
Examples: Set aside time for learning, resolve to learn, avoid distractions.

Reward/Enjoyment--anticipating or recognizing the value to one's self of learning specific material.
Examples: Recognizing learning as relevant or useful, important or worthwhile, problems of not knowing.

Confidence--believing that one can complete the learning task successfully.
Examples: Feel confident or reassured, remind self of past success, get support from others.

Memory

Definition: The storage, retention, and retrieval of knowledge.

Strategies:

Organization--structuring or processing information so that material will be better stored, retained, and retrieved.
Examples: Elaborate or translate, image, check, pattern, summarize, or fit together, memory devices.

Using External Aids--using external aids to reinforce memory.
Examples: Write down or list, put or display, ask another to remind.

Memory Application--using remembrances, mental images, or other memories to facilitate planning or problem-solving.
Examples: To avoid mistakes, to know what to expect, to select methods, to provide background information.

Table 1. Continued.

Critical Thinking

Definition: A reflective thinking process utilizing higher order thinking skills in order to improve learning.

Strategies:

Testing Assumptions--recognize and evaluate in relation to learning situation.
Examples: Examine accuracy of assumptions, identify relationships, spot inconsistencies, critical acceptance, questioning value sets.

Generating Alternatives--hypothesize but ground options within the given situation.
Examples: Brainstorm or envision future, hypothesize, rank order, identify other solutions.

Conditional Acceptance--reflective and tentative maintenance of principles.
Examples: Question simplistic answers, monitor or evaluate results, predict consequences.

Resource Management

Definition: The process of identification, evaluation, and use of resources relevant to the learning task.

Strategies:

Identification of Resources--knowing how to locate/use best sources of information.
Examples: Modern information sources, print sources, people or models, professional or agencies.

Critical Use of Resources--using appropriate rather than available resources while recognizing their limitations.
Examples: Contact expert or outsider, check second source, observe or ask to check bias.

Using Human Resources--integrating others into the social and political process of knowing.
Examples: Dialogue or discuss, check opinions, listen to all, support from or network with others.

Source: Fellenz, R.A., & Conti, G.J. (1993). *Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS) Manual*. Bozeman, MT: Montana State University Kellogg Center for Adult Learning.

When utilizing the SKILLS instrument, a participant is first asked to select four of the six available scenarios in which the individual is interested. The participant is then asked to assess from the list of 15 associated learning strategies the 5 they would Definitely Use, the 5 they would Possibly Use, and the 5 they would Not Likely Use from the various learning strategies. The participant enters the appropriate corresponding numbers on a score sheet to be tabulated and evaluated later. The general score determines which strategies participants generally prefer in the selected learning situations.

Recent research using the SKILLS instrument suggests that modifying the instrument to specific research applications may enhance its evaluation of specific real-life learning scenarios and situations. McKenna (1991) compared the influences of personal and professional learning situations on real-life learning strategy utilization by school administrators in Wyoming. In his study, he used two of the original scenarios along with two professional ones that he created. Further research revealed that the validity and reliability of this approach remained intact. McKenna, Conti, and Fellenz (1994) noted that "researchers may either use the existing form of SKILLS or create specific scenarios using the established form of SKILLS as a model. Such a choice can allow researchers to tailor their learning strategies instrument

to fit their distinctive need" (p. 263). Yabui (1993) and Moretti (1994) modified the SKILLS instrument in their respective studies on reflective judgment and metacognition of learning strategies and learning strategies of Chief Executive Officers of volunteer non-profit organizations. Likewise, Strakal (1995) modified SKILLS in his study on learning strategies in personal and career development situations by students in post-secondary vocational educational settings. Strakal further recommended that researchers using SKILLS "modify the instrument as part of the research design . . . (and) modify or develop scenarios that are distinctly related to their studies and the data they are attempting to gather" (p. 186). As long as the statements are written and "constructed using similar statements from matched scenarios from the original SKILLS scenarios, validity and reliability will remain intact" (McKenna, Conti, & Fellenz, 1994, pp. 261-263). Therefore, the nursing scenarios of Death and Grief and of Medication Administration were written to be consistent with the format and content of the strategies measured in Cholesterol Level and Pet Care (see Appendix B). Pet Care was used in this study due to its popularity in the study by Conti and Kolody (1995) where it was selected by four-fifths of that study's respondents.

The possible range of SKILLS scores for the learning strategy areas range from 12 to 36. Likewise, the three

individual component learning strategies in each learning area have a range of 4 to 12. The very nature of this scoring forces the scores to be related to each other.

Validity and Reliability of SKILLS

The degree to which an instrument measures what it is actually supposed to measure is called the validity of the instrument (Gay, 1996, p. 138). SKILLS has two relevant types of validity: construct and content. "Construct validity is the extent to which a particular test can be shown to measure a hypothetical construct" (Borg & Gall, 1989, p. 255). Construct validity "is the degree to which a test measures an intended hypothetical construct" (Gay, 1996, p. 140).

Construct validity for SKILLS was established through a literature review which documented the source of the concepts in SKILLS. In addition, an assessment on the constructs was conducted by a group of adult education and educational psychology professors. Robert Sternberg (1990) assessed the SKILLS instrument, and Wilbert McKeachie (1988a) reviewed the constructs and accompanying strategies at a summer institute at the Center for Adult Learning Research. McKeachie provided an independent review of SKILLS, and a group of adult educators performed a critique of the instrument in small groups. Those reviewing SKILLS indicated that the "instrument effectively addressed the

five theoretical constructs of metacognition, metamotivation, memory, critical thinking, and resource management" (p. 70).

"Content validity is the degree to which the sample of test items represents the content that the test is designed to measure" (Borg & Gall, 1989, p. 250). Additionally, content validity "requires both item validity and sampling validity" (Gay, 1996, p. 139). Content validity of the SKILLS instrument was field tested in numerous settings including adult basic education programs, undergraduate and graduate university courses, museums, health-care providers, continuing education programs, and elder-hostel programs (Conti & Fellenz, 1992). In the field tests, a sample set of 253 participant responses confirmed the assessment of the group of adult educators previously mentioned above that the items in SKILLS adequately represented the five conceptual areas of the instrument (p. 70). Sternberg, McKeachie, and the group of adult educators also confirmed the content validity of SKILLS using a similar assessment process as that performed in regards to construct validity.

"Reliability may be defined as the level of internal consistency or stability of the measuring device over time" (Borg & Gall, 1989, p. 257). Reliability for the SKILLS instrument was addressed by calculating a coefficient based on two equivalent forms administered to the same group.

"Equivalent-forms reliability is the most commonly used estimate of reliability for most tests used in research" (Gay, 1996, p. 147). The Cronbach alpha coefficient of the scores was .71. The split-half test of reliability was computed using the Guttman method with a resulting .83 correlation. Another .83 correlation was obtained by applying the Spearman-Brown formula. After statistical analysis was completed, it was determined that all correlations were in the acceptable range and that SKILLS is "a reliable instrument for assessing adult learning strategies in real-life situations" (Conti & Fellenz, 1992, p. 71).

Procedures

Permission from the five colleges/universities which have schools of nursing was requested from the respective nursing directors of the programs in January, 1996, so that SKILLS surveys and focus groups could be completed prior to the end of the spring semester in May. Permission was granted after assurances were provided that the surveys and interviews would only include volunteer and anonymous participants (see Appendix A). The Montana State University--Bozeman College of Nursing also required that permission be granted from the Human Subjects Committee, which gave permission for use of surveys and interviews at their Great Falls Campus providing the biographical data

sheet was modified for this campus. Appendix C contains the biographical data sheet and student statements used at the other four schools and the modified one used at the MSU--Bozeman, Great Falls campus.

Data related to students' learning strategies were gathered through the use of a modified version of the SKILLS instrument (see Appendix B). Two established personal learning scenarios, Cholesterol Level and Pet Care, were preselected from the SKILLS instrument, and two nursing scenarios, Grief and Death and Medication Administration, were written specifically for the study. Pet Care and Cholesterol Level were selected because the study investigated differences in groups of learners in both personal and professional settings. These two personal situations were selected because of their popularity among female respondents in a study conducted in Alberta, Canada, (Conti & Kolody, 1995, p. 79). The nursing scenarios were evaluated by several nursing colleague faculty for content validity. Information related to age, gender, ethnicity, year in college, year in nursing, and level of nursing program was requested of the participants.

To gather these data, the researcher first sent a letter of introduction to each of the sites for distribution a week or two in advance of survey administration to familiarize the students with the study

(see Appendix C). On the date selected by the nursing administrator at the respective sites, this researcher or a nursing faculty colleague attended a regular class session or was available after class for meeting with students at the five geographic sites, presented a brief explanation of the purpose of the study and related research, and had the students complete the survey and biographical forms. The required time for completion of the survey and biographical data sheet was approximately 20 to 30 minutes.

All full-time nursing students were invited to participate. Some choose not to participate and others choose not to stay after class on the days the instrument was distributed. A total of 192 questionnaires were collected from the five sites from a possible 296 full-time nursing students registered for spring semester, 1996. Gay (1996) suggests sampling 10% to 20% of a population in descriptive research studies (p. 124). This study's sample included 65% of the total population.

Following the initial survey research collection, the data were evaluated through discriminant analysis and then cluster analysis using the Statistical Package for the Social Sciences. Discriminant analysis is "a statistical technique which allows the investigation of the differences between two or more groups in relationship to several variables simultaneously" (Klecka, 1980, p. 7). Thus, multiple variables can be considered. This technique is

useful when known and distinct groups exist (Gay, 1996), and was used to explore learning strategies in relationship to data collected on the biographical data sheet.

In addition, cluster analysis was used to determine if distinct groups existed based upon the participants' uses of SKILLS learning strategies. Four such groups were identified in the cluster analysis. Therefore, in order to better describe these groups, a purposive sample of 10 to 15 individuals was taken from each group. These were further divided into two groups. These two groups from each cluster of learners were interviewed in focus groups to add a qualitative perspective to the quantitative data collected in the cluster analysis. All the focus groups were videotaped with the verbal permission from the participants. All participants of the focus groups volunteered to be a part of this portion of the study.

CHAPTER 4

QUANTITATIVE FINDINGS

Introduction

Data were collected from three sources. These were the Self-Knowledge Inventory for Lifelong Learning Strategies (SKILLS), a demographic survey, and focus groups. A total of 192 full-time nursing students completed SKILLS and the demographic data sheets at their respective campuses during the spring semester of 1996. Focus group data were collected following statistical analyses of the SKILLS data in May of 1996. The statistical analyses included frequency counts, *t*-tests, one-way analysis of variance, discriminant analysis, and cluster analysis.

Participants

Data were collected from three sources. These included the scores generated on the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS) instrument taken by student participants, information collected on demographics of the participants through the biographical data surveys, and data collected from student

participant focus groups. A total of 192 students participated in the study.

Demographic data described the participants in the study. Of the 296 total full-time nursing students enrolled during the time of the study, 192 students or 65% of the population participated in the study. Participants included 167 females and 25 males. This gender breakdown reflects a slightly higher number of males than national figures of males and females in the discipline of nursing; the national average in 1992 was 96% female and 4% male with "a slow increase in the number of men entering nursing over the past 10 years" (Kelly & Joel, 1996, p. 178). In this study, 13% were males and 87% were females, showing a greater trend than the national for men entering the discipline of nursing. The average age of the participants was 30 with a range of 19 to 56. Of the participants, 118 (61.5%) were enrolled in an associate degree nursing program while 74 (38.5%) were enrolled in a baccalaureate degree nursing program. The average grade point average (GPA) of the participants was 3.25, and the range was 2.00 to 4.00. Six (3%) of the participants were maintaining a 4.00 GPA, and one (1%) had a 2.00 GPA. The participants reported their ethnicity as follows: 177 (92.2%)--Caucasian, 13 (6.8%)--Native American, 1 (0.5%)--Hispanic, and 1 (0.5%)--Asian. The participants were located at the various campuses with 36 (19%) at the associate degree

program campus in Havre, 48 (25%) at the associate degree program campus in Great Falls, 45 (23%) at the baccalaureate degree campus in Great Falls, 20 (10%) at the associate degree program campus in Miles City, 21 (11%) at the baccalaureate degree program campus in Helena, and 22 (12%) at the associate degree program campus in Pablo.

In a descriptive study, a researcher can use deductive and inductive reasoning to make sense of a set of data. Both types of reasoning were used to describe the learners in the study. "With the inductive approach, researchers function more in a sociological mode. Here the issue is how to tease sense out of the data" (Conti, 1996, p. 67). A deductive approach, on the other hand, allows the researcher to function in a psychological mode which tends to impose sense on the data like dividing participants into predetermined groups prior to the use of statistical procedures. Three types of statistics were used in the deductive portion of the study. Descriptive statistics using frequency counts and comparisons of the resulting numbers were used to describe the characteristics of the students. A univariate approach, the t-test, was used to compare students' SKILLS scores on personal versus nursing situations to determine if nursing students use different learning strategies when confronted with a personal-life versus a nursing learning situation. Discriminant analysis was used to investigate if it is possible to discriminate

between groups of associate and/or baccalaureate degree nursing students which are organized by (a) personal-life and nursing situations, (b) academic achievement as measured by GPA, (c) demographics such as age and gender, (d) educational level in college, or (e) associate versus baccalaureate program. One-way analysis of variance was used to help identify the variables that separated the groups in the cluster analysis. Finally, cluster analysis was used to identify and describe any distinct clusters or learning groups that existed among students in the six nursing programs in Montana based on SKILLS scores. Additionally, focus group interviews were used as an inductive reasoning method to further describe the participants in each of these clusters.

Learning Strategy Scores

The Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS) instrument was developed by faculty and doctoral fellows at the Center for Adult Learning Research at Montana State University--Bozeman. The SKILLS instrument was a response to recognizing the importance of real-life learning and of the impact that learning strategies had on adult learning activities. The original SKILLS instrument consisted of two sets of scenarios with 18 items in each scenario. Later, the items were reduced to 15 for each scenario. For this study, two of the

scenarios from SKILLS were used. Two similar scenarios were developed that focused on a nursing learning situation. All participants took the same SKILLS instrument. Scores gathered by the SKILLS instrument were used to determine the learning profiles of the student participants in the study. Two sets of scores were calculated from information gathered by the SKILLS instrument. These data established a profile of overall scores of the students in the study (see Tables 2 and 3).

Two types of scores were calculated for SKILLS. First, scores were computed for each of the five learning strategy areas included in the instrument. The SKILLS learning strategy scores for the areas of Metacognition, Metamotivation, Memory, Critical Thinking, and Resource Management are listed in Table 2. The possible range of SKILLS scores for the learning strategy areas range from 12 to 36 and the individual component learning strategies

Table 2. Means of Learning Strategies Areas of SKILLS Used by Students.

Learning Strategy	Mean	SD	Range
Metacognition	25.17	2.71	19-31
Memory	24.89	2.66	18-31
Critical Thinking	23.98	2.75	18-32
Resource Management	23.83	3.02	15-32
Metamotivation	21.79	3.31	14-31

range 4 to 12. The five means of the learning strategy areas were similar. All of the means fell within the small range of 21.79 (Metamotivation) to 25.17 (Metacognition). Participants scored lowest in the Metamotivation (21.79) area. Scores in Critical Thinking (23.98) and Resource Management (23.83) were in between. These scores indicate that nursing students tended to use the learning area of Metacognition and Memory slightly more often than Metamotivation, Critical Thinking, or Resource Management. However, since the scores based in individual nursing student learning profiles that flowed from the five specific learning areas of Metacognition, Metamotivation, Memory, Critical Thinking, and Resource Management were in such a narrow range, further analysis of these larger groupings was not performed. Instead, the 15 separate learning strategies were used in additional analyses.

Second, scores were computed for each of the 15 learning strategies within the instrument (see Table 3). These scores showed individual learning profiles of participants. Means of the individual learning strategies ranged from 5.95 for Metamotivation--Reward/Enjoyment to 9.41 for Metacognition--Planning. Three strategies had a range of 4-11, four had a range of 5-12, and the remaining eight had a range of 4-12. Thus, there was much diversity in the group in their use of individual learning strategies. Learning strategies used most by the nursing students

Table 3. Means of Individual Learning Strategies.

Learning Strategy	Mean	SD	Range
Metacognition			
Planning	9.41	1.84	4-12
Monitoring	8.71	1.46	5-12
Adjusting	7.05	1.62	4-11
Metamotivation			
Attention	8.43	1.74	4-12
Confidence	7.41	1.61	4-12
Reward/Enjoyment	5.95	1.72	4-11
Memory			
Use of External Aids	9.15	1.72	5-12
Organization	8.43	1.53	4-12
Memory Applications	7.31	1.64	4-12
Critical Thinking			
Testing Assumptions	8.43	1.44	5-12
Conditional Acceptance	7.51	1.58	4-12
Generating Alternatives	7.32	1.67	4-11
Resource Management			
Use of Human Resource	8.45	1.65	5-12
Identification of Resources	7.87	1.63	4-12
Critical Use of Resources	7.51	1.58	4-12

who participated in the study were Metacognition--Planning (9.41), Memory--Using External Aids (9.15), and Metacognition--Monitoring (8.71). Scores on one strategy were very low at 5.95 (Metamotivation--Reward/Enjoyment). Scores on three other strategies were next lowest with means of 7.05 for Metacognition--Adjusting, 7.31 for Memory--Application, and 7.32 for Critical Thinking--Generating Alternatives, Metamotivation--Reward/Enjoyment (5.95), and the students' mean on the associated strategy of Attention

was 8.43. As there were no other notable variations in the learning areas of Critical Thinking, Memory, or Resource Management no further analysis was conducted.

Scores by Campus

The six registered nursing educational programs in Montana are located on five very diverse campuses. Of the five campuses, Montana State University--Bozeman has nursing students at an extended campus in Great Falls but represents the philosophy of a large engineering school with an emphasis on the liberal arts. It was referred to as the Great Falls BSN program. The other liberal arts college was a small private institution in Montana's capitol. It was referred to as the Helena BSN program. One tribal college offers an associate degree in nursing and is located in western Montana. It was referred to as the Pablo ADN program. The other two associate degree programs in nursing are offered in a small community college on the high plains of eastern Montana, the Miles City ADN program, and at a small four-year college located close to the Canadian border which has an emphasis on technical programs. It was referred to as the Havre ADN program. From these diverse locales and orientations, one might expect differences in the use of learning strategies in the enrolled nursing students.

Therefore, in order to explore for possible differences in learning strategies among the students in each program, learning strategies scores were computed for each campus. Each of the campuses was summarized in regard to the learning strategies used by students at each particular nursing program campus site. The mean scores are listed by learning strategy areas in Tables 4 through 8.

The means as measured by campus related to Metacognition learning strategy use ranged from 24.04 for the campus at Pablo to 26.02 for the BSN campus in Great Falls (see Table 4). Mean scores for Planning ranged from 8.91 at Pablo to 9.84 at the BSN campus in Great Falls. Mean scores for Monitoring ranged from 7.95 at Pablo's campus to 9.40 at the campus in Miles City. Mean scores for Adjusting as measured by campus ranged from 6.81 at the associate degree (ADN) program in Great Falls to 7.47 at the BSN campus in Great Falls.

Table 4. Means of Metacognition Learning Strategies Use by Campus.

Campus	N	Metacognition	Planning	Monitoring	Adjusting
Great Falls-BSN	45	26.02	9.84	8.71	7.47
Miles City-ADN	20	25.95	9.70	9.40	6.85
Havre-ADN	36	25.08	9.33	8.81	6.94
Great Falls-ADN	48	24.98	9.29	8.88	6.81
Helena-BSN	21	24.37	9.09	8.33	6.95
Pablo-ADN	22	24.04	8.91	7.95	7.18

Analysis of the Metacognition area and its associated learning strategies of Planning, Monitoring, and Adjusting showed very little difference in the use of the Metacognition learning strategies by campus. Overall, students used Metacognition learning strategies as a major way to learn. The highest mean area (26.02) was in this learning area. Planning was used the most by all the students with only a difference of 0.18 from the highest mean (9.09) to the lowest (8.91). Adjusting was used by all the students less than Planning, with Monitoring of learning falling in the middle of these two. Again the differences between campuses were very small with a range of less than one (.86) in the use of Adjusting in a learning task.

Nursing students regardless of program or campus site used the learning strategy of Planning in their learning the most in the area of Metacognition. This was a major way nursing students learn, through the planning of their learning. Students spent considerable time planning their learning. However, once they planned their learning, fewer adjustments in the process of learning were needed as indicated by the lower learning strategy means on the associated learning strategy of Adjusting. Nursing students continued some Monitoring of their learning as they proceeded through the learning process until they decided the learning task was complete.

The means as measured by campus related to Metamotivation learning strategy use ranged from 21.09 at the baccalaureate (BSN) campus in Great Falls to 22.68 at the campus in Pablo (see Table 5). Mean scores for the Metamotivation strategy of Attention ranged from 8.08 at the ADN campus in Great Falls to 8.95 at the campus in Helena. Mean scores for Reward/Enjoyment, as measured by campus, ranged from 5.51 at the BSN campus in Great Falls to 6.64 at the campus in Pablo. Mean scores as measured by campus in Confidence ranged from 7.16 at the BSN campus in Great Falls to 7.81 at the ADN campus in Great Falls.

Table 5. Means of Metamotivation Learning Strategies Use by Campus.

Campus	N	Metamotivation	Attention	Reward/ Enjoyment	Confidence
Pablo-ADN	22	22.68	8.77	6.64	7.27
Great Falls-ADN	48	22.04	8.08	6.15	7.81
Helena-BSN	21	21.95	8.95	5.62	7.38
Havre-ADN	36	21.87	8.53	6.03	7.31
Miles City-ADN	20	21.45	8.20	5.95	7.30
Great Falls-BSN	45	21.09	8.42	5.51	7.16

Analysis of the Metamotivation area and its associated learning strategies of Attention, Reward/Enjoyment, and Confidence showed several trends. First, the overall Metamotivation area means were the lowest of the five learning areas. These were 21.09 to 22.68 which are 2 to 3

points lower than the Resource Management area, for example, which means were 22.52 to 24.60. Second, the associated learning strategy of Reward/Enjoyment means of all six campuses were the lowest of any other associated learning strategies. Third, the lowest mean in this entire statistical analysis was in the associated learning strategy of Reward/Enjoyment(5.51).

While the associated strategies of Attention and Confidence were slightly higher overall, there was little difference between the campuses. Nursing students do not enjoy or have much reward of learning with their learning regardless of program or campus site. They had some confidence in their ability to learn by paying attention to what is to be learned. Attention to the learning task is in and of itself a motivating force for nursing students. Overall, nursing students were much more internally motivated by focusing on what is to be learned rather then being externally motivated by seeing the reward of learning. External motivational type learning strategies played the smallest role in learning for nursing students, regardless of campus.

The means related to Memory strategy use ranged from 25.85 at the campus in Helena to 24.05 at the campus in Miles City (see Table 6). Mean scores for the Memory strategy of Organization ranged from 8.14 at the ADN campus in Havre to 9.09 at the ADN campus in Pablo. Mean scores

for Using External Aids ranged from 8.50 at the campus in Havre to 9.95 at the campus in Helena. Mean scores for Memory Application ranged from 7.00 at both Miles City and Pablo to 7.61 at Havre.

Table 6. Means of Memory Learning Strategies Use by Campus.

Campus	N	Memory	Organization	Using External Aids	Memory Application
Helena-BSN	21	25.85	8.76	9.95	7.14
Pablo-ADN	22	25.27	9.09	9.18	7.00
Great Falls-BSN	45	25.07	8.36	9.51	7.20
Great Falls-ADN	48	24.93	8.33	9.08	7.52
Havre-ADN	36	24.25	8.14	8.50	7.61
Miles City-ADN	20	24.05	8.25	8.80	7.00

Analysis of the Memory area and its associated learning strategies of Organization, Using External Aids, and Memory Application showed that all programs scored very similarly. However, this area of learning strategy was used very often by nursing students. The area means ranged from 24.05 to 25.85 which is close to the highest area means in the area of Metacognition (24.04 to 26.02). In the associated learning strategy of Memory Application, the means ranged from 7.00 to 7.61, the lowest of this learning strategy area. In this learning strategy area, the campuses were very similar. The students used the strategy of Using External Aids the most, but they used the strategy of Memory

Application very little. The students did some Organization of their learning, which was consistent with their emphasis on Planning in the Metacognition learning area. In other words, the students regardless of program wanted memory aids, but they did not use the application of memory as often as might be expected in the discipline of nursing. This emphasis of learning strategies suggests an emphasis on learning the procedure such as with a procedure manual rather than on the application of what has been learned. This heavy reliance on Using External Aids as a primary learning strategy for nursing students suggests the focus of learning is on the technical aspects of nursing rather than on more creative thinking.

The means for Critical Thinking strategies (see Table 7) ranged from 23.60 at Miles Community College to 24.76 at Carroll College in Helena. Mean scores for Testing Assumptions ranged from 8.30 at the ADN program of Miles Community College to 8.64 at the ADN program of Salish Kootenai College in Pablo. Mean scores for Generating Alternatives ranged from 6.89 in the BSN program in Great Falls to 8.19 at the BSN program in Helena. Mean scores on Conditional Acceptance ranged from 7.96 at the ADN campus in Great Falls to 8.62 at the BSN campus in Great Falls.

Table 7. Means of Critical Thinking Learning Strategies Use by Campus.

Campus	N	Critical Thinking	Testing Assumptions	Generating Alternatives	Conditional Acceptance
Helena-BSN	21	24.76	8.43	8.19	8.14
Havre-ADN	36	24.36	8.47	7.58	8.31
Great Falls-BSN	45	23.87	8.36	6.89	8.62
Pablo-ADN	22	23.82	8.64	7.00	8.18
Great Falls-ADN	48	23.71	8.44	7.31	7.96
Miles City-ADN	20	23.60	8.30	7.25	8.05

Analysis of the scores for Critical Thinking and the associated learning strategies of Testing Assumptions, Generating Alternatives, and Conditional Acceptance indicated that there was little difference in student usage based on campus in the use of Critical Thinking learning strategies. The overall area mean was lower than the Metacognition and Memory area means. The associated learning strategy of Generating Alternatives was lowest in all programs of the associated learning strategies in the Critical Thinking learning strategies area. Nursing students used the learning strategies of Memory--Using External Aids and Metacognition--Planning much more often than any of the Critical Thinking learning strategies. It is a disturbing fact that nursing students use Critical Thinking--Generating Alternatives least of the Critical Thinking learning strategies. The ability of a nurse to consider all alternatives in a patient situation prior to

decision making is an important aspect of nursing. This minimal use of Critical Thinking learning strategies by nursing students at all the campuses suggests that the focus of student nurses' learning is on procedure not alternatives.

The means as measured by campus related to Resource Management learning strategies use ranged from 22.52 at the campus in Helena to 24.60 at the campus in Miles City (see Table 8). Mean scores for the Resource Management learning strategy of Identification of Resources ranged from 7.56 at the ADN campus in Havre to 8.45 at the campus in Pablo. Mean scores for Critical Use of Resources ranged from 7.29 at the BSN campus in Great Falls to 7.95 at the campus in Miles City. Mean scores for Using Human Resources ranged from 7.62 at the campus in Helena to 9.00 at the ADN program in Great Falls.

Table 8. Means of Resource Management Learning Strategies Use by Campus.

Campus	N	Resource Management	Identification of Resources	Critical Use of Resources	Using Human Resources
Miles City-ADN	20	24.60	8.15	7.95	8.50
Havre-ADN	36	24.20	7.56	7.92	8.72
Great Falls-ADN	48	24.00	7.69	7.31	9.00
Pablo-ADN	22	23.77	8.45	7.50	7.82
Great Falls-BSN	45	23.64	8.02	7.29	8.33
Helena-BSN	21	22.52	7.57	7.33	7.62

Analysis of the Resource Management area and its associated learning strategies of Identification of Resources, Critical Use of Resources, and Using Human Resources showed very little difference between campuses in this learning strategy area. Resource Management as a learning strategy area was not a primary way nursing students learn. The associated learning strategies of Identification of Resources and Using Human Resources have very similar means from 7.56 to 9.00 while Critical Use of Resources means are considerably lower for all campuses. While this area of learning strategy use showed similar trends, there was more variation than in the other four learning areas. Nursing students were likely to locate resources or ask an expert to assist in their learning, but were not as proficient at identifying which resources were the most appropriate. Nursing students, regardless of campus, relied on few resources in their learning.

Scores for Personal-Life and Nursing Situations

This study investigated which learning strategies nursing students at the six nursing programs in Montana used in personal-life and nursing learning situations. To determine if students use differing learning strategies in these situations, participants were given two sets of learning scenarios to evaluate. One set of learning scenarios included two pre-chosen personal life situations

taken from the SKILLS instrument. These scenarios were titled Pet Care and Cholesterol Level. The other set of scenarios included two specially written learning situations tailored to deal with typical nursing situations. These situations were titled Medication Administration and Death and Grief. The two original scenarios from SKILLS were used to generate a score for personal-life learning. Similarly, the two scenarios from nursing situations were used to produce a score for professional learning. Since each type of situation was based on only two scenarios, the possible scores for each learning strategy ranged from 2 to 6 in each situation.

Analysis of the scores showed that students used the learning area of Memory (12.59) the most and Metacognition (12.57) the second most in personal-life learning situations. Students used the same two areas the most in nursing learning situations, although they scored Metacognition (12.59) slightly higher than Memory (12.29). Metamotivation means were lowest in both personal (10.82) and nursing (10.97) situations.

The t-test was used to compare the means of the scores gathered in the personal-life scenarios to the means of scores gathered in the nursing or professional scenarios. "The t-test is used to determine whether two means are significantly different at a selected probability level" (Gay, 1996, p. 477). Separate t-tests were used to examine

differences in the mean scores for each of the five SKILLS learning strategies areas and their associated learning strategies used in personal-life and nursing learning situations. The criterion level used was .05. Table 9 details the means and *t*-tests for the five learning strategy areas of SKILLS. Table 10 summarizes the means and *t*-tests for the 15 SKILLS learning strategies.

Significant differences were found between the personal-life situations and nursing situation scores in the areas of Critical Thinking and Resource Management (see Table 9). There were no significant differences in the areas of Memory, Metacognition, or Metamotivation.

Table 9. *t*-tests for Learning Strategy Areas Used in Personal and Nursing Learning Situations.

Learning Strategy Area	Personal-Life Situation	Nursing Situation	*t* Value	*p*
Resource Management	11.51	12.32	0.17	.001
Critical Thinking	12.36	11.61	0.94	.001
Memory	12.59	12.29	1.73	.085
Metamotivation	10.82	10.97	4.84	.347
Metacognition	12.57	12.59	5.43	.862

The participants used the Resource Management area strategies more in nursing situations than in personal life. However, the reverse of this was true for Critical Thinking. Nursing students use more Critical Thinking learning

strategies in their personal-life learning situations than they do in nursing situations. Because students have more real-life experience in their personal lives, they are able to use more reflection in personal learning than in their nursing student learning. Thus, they are more likely to use an external resource in nursing situations than to engage in critical thinking or a more creative approach.

The individual scores for each of the 15 learning strategies were also compared for the personal-life and nursing learning situations (see Table 10). Analysis of these mean scores showed several areas of interest. Significant differences were found in two of the three learning strategies in the Metacognition area. The Metacognition strategy of Planning scored the highest (4.97) of any mean while the associated strategy of Adjusting scored low (3.3) in nursing situations. However, the Metacognition--Planning mean in personal-life (4.44) is slightly lower. Nursing students use the learning strategy of Planning extensively in both personal and nursing learning situations. However, they use Planning more in nursing situations than in personal-life situations. Adjusting is used less than Planning in this learning area with means in nursing (3.3) and personal-life (3.74). While Adjusting is used somewhat less than Planning in this learning strategy area, it is used more in personal-life than in nursing situations. The Metacognition--Monitoring

Table 10. *t*-tests for Individual Learning Strategies in Personal-Life and Nursing Situations.

Learning Strategy	Personal-Life Situation	Nursing Situation	*t* Value	*p*
Metacognition				
Planning	4.437	4.968	5.36	.001
Adjusting	3.739	3.302	4.07	.001
Monitoring	4.39	4.323	0.74	.460
Metamotivation				
Confidence	3.448	3.953	4.89	.001
Attention	4.468	3.963	4.13	.001
Reward/Enjoyment	2.901	3.052	1.77	.078
Memory				
Organization	3.823	4.604	6.89	.001
Memory Application	3.974	3.323	6.22	.001
Using External Aids	4.792	4.359	4.47	.001
Critical Thinking				
Conditional Acceptance	4.359	3.859	4.35	.001
Testing Assumptions	4.427	4.01	4.35	.001
Generating Alternatives	3.572	3.774	1.63	.001
Resource Management				
Critical Use of Resources	3.349	4.162	7.41	.001
Identification of Resources	4.063	3.802	2.90	.004
Using Human Resources	4.094	4.359	2.60	.010

learning strategy use was the same in personal-life (4.39) and nursing (4.32) situations.

Significant differences were found in two of three learning strategies in the area of Metamotivation. While there is no significant difference between situational student usage of the Reward/Enjoyment strategy, the two lowest means were scored in this associated strategy respectively of 2.90 in personal situations and 3.05 in nursing situations. This is the least used learning strategy by the students in either learning situation. The associated strategy of Attention (4.47) is used heavily in personal-life situations and slightly less in nursing (3.96) situations. Confidence (3.95) is used more in nursing situations than in personal-life (3.45) situations. Nursing students used the Metamotivational learning strategy of Attention heavily in their learning but significantly more in personal-life than in nursing.

Significant differences were found between the personal-life and nursing situations for all three learning strategies in the Memory area. The strategy of Using External Aids had the highest (4.79) mean in personal-life situations and was similar in nursing situations (4.36). Nursing students relied heavily on the learning strategy Using External Aids slightly more in their personal life than in their nursing learning. Organization (4.6) was used more in nursing situations than in personal life (3.82),

which suggests that students organize their learning memory tasks more in nursing than in their personal lives. Application (3.32) is used the least of the Memory learning strategies by nursing students in nursing situations; it is used by them significantly more in personal-life (3.97) situations.

Significant differences were found in all three Critical Thinking learning strategies between personal-life and nursing situations. Testing Assumptions (4.43) was used heavily by the students in personal-life and significantly less in nursing situations. Conditional Acceptance (4.36) was also used more in personal-life than in nursing (3.86) situations. While there is a significant difference in the use of Generating Alternatives between personal-life and nursing situations, the lowest Critical Thinking learning strategy means in both personal-life (3.57) and nursing (3.77) situations were reported here.

Significant differences were found in all three Resource Management area learning strategies used by nursing students between personal-life and nursing situations. Critical Use of Resources was used more in nursing (4.16) than in personal-life (3.35). Identification of Resources (4.06) was used more in personal-life than in nursing (3.80) situations. Using Human Resources was used more heavily in nursing (4.36) than in personal-life (4.09) situations. Thus, nursing students employed Using Human Resources

extensively in nursing situations and only slightly less in personal-life situations.

Thus, nursing students used the learning strategies of Resource Management--Critical Use of Resources and Using Human Resources, Memory--Using External Aids and Organization, and Metacognition--Planning the most in their nursing learning. They used Memory--Using External Aids, Metacognition--Planning, Metamotivation--Attention, and Critical Thinking--Testing Assumptions the most in their personal learning. While Testing Assumptions and Attention to learning are used in personal-life learning situations, this is not seen in nursing learning situations. Rather, in nursing learning situations, Planning, Organization, and Using Human Resources are the primary learning strategies used.

Significant differences were found in 12 of the 15 learning strategies. These included Resource Management--Critical Use of Resources; Memory--Organization, Using External Aids, and Memory Application; Metacognition--Planning and Adjusting; Critical Thinking--Testing Assumptions, Generating Alternatives, and Conditional Acceptance; and Metamotivation--Attention and Confidence. This result of a high number of significant differences in this study supports McKenna's (1991) findings on the influences of personal and professional learning situations on real-life learning. McKenna also found significant

differences between personal and professional learning. He concluded that "through the use of t-tests it was found that school administrators did differ at a statistically significant level in their use of learning strategies in work-related, professional settings" (McKenna, 1991, p. 95). Thus, within their general approach to learning, the participants used different strategies for learning in their personal-life situations than they used in their professional learning situations.

Discriminant Analysis

In addition to using the univariate t-tests as a technique to measure the differences in learning areas and strategies used in personal and nursing situations, the multivariate technique of discriminant analysis was used to further investigate the learning strategies utilized by Montana nursing students. Discriminant analysis is "a statistical technique which allows the investigation of the differences between two or more groups' relationship to several variables simultaneously" (Klecka, 1980, p. 7). In discriminant analysis as with other multivariate techniques, the emphasis is upon analyzing the variables together rather than singly. In this way, the interaction of multiple variables can be considered. Discriminant analysis is useful when known and distinct groups exist. "Unlike univariate analyses which examine individual variables

separately and allow them to be disassociated from the total person who is a synergistic composition of these variables, discriminant analysis examines people on a set of variables to determine if any of them interact in a combination that can explain the person's placement in the group" (Conti, 1993, p. 91).

There are two major uses for discriminant analysis in research. These include the prediction of group membership or the description of multivariate analysis of variance results (Huberty & Barton, 1989). Thus, discriminant analysis can be used to describe the way groups differ or to predict the membership in a group. Each discriminant analysis produces one or more discriminant functions; the total number of functions is always one less than the total number of groups being analyzed. Thus, if discriminant analysis is performed on two groups, one discriminant function is produced. For three groups, two functions are produced, and so on.

While a discriminant function is produced, it may not be useful. The structure matrix is used to clarify and name the function (Conti, 1993, p. 91; Klecka, 1980, pp. 31-34). Researchers who have used discriminant analysis have indicated that these functions should be describable using structure coefficients with a value of .30 or greater (Conti, 1993; Hays, 1995; Hill, 1992; Moretti, 1994; Strakal, 1995; Yabui, 1993). It is necessary to identify

some value because the formula for discriminant analysis produces a discriminant function regardless of whether the function is meaningful. The structure matrix generated by each discriminant analysis contains the coefficients which show the similarity between each individual discriminating variable and the overall discriminant function. When doing analysis of large numbers of variables, it is possible to get functions which have high predictive ability but which correlate with so many of the discriminating variables that it is impossible to determine the meaning of the function. Using .30 as a criterion places a logical restriction on the interpretation of this statistical output (Conti, 1993).

Grouping by Programs

In this study, discriminant analysis was used to describe the combination of variables that could be used to distinguish associate degree nursing students from those in the baccalaureate program. The 192 respondents were placed in two groups. One group was a group of associate degree (118) nursing students (ADN) and the other a group of baccalaureate degree (74) nursing students (BSN).

Two criteria were used for judging the hypothesis that it is possible to discriminate between program groups. The first criterion was that the discriminant function produced by the analysis had to be describable using the structure coefficients with a value of .3 or greater. The second

criterion was that the discriminant function had to correctly classify at least 75% of the cases in the analysis.

Together these two criteria require that the results of a discriminant analysis be meaningful before they are used. Analyses which use a large number of variables can produce functions which have high classification percentages but which offer no clear descriptive power. On the other hand, some analyses produce functions which can be clearly described but which have low classification power. Therefore, in combination these two criteria require that the function be both clearly descriptive and highly accurate in order to be used.

For purposes of the discriminant analysis, the respondents were divided into the two program groups. The set of discriminating variables used to predict placement in these groups consisted of all 15 learning strategies which include Planning, Monitoring, Adjusting, Attention, Reward/Enjoyment, Confidence, Organization, Using External Aids, Memory Application, Testing Assumptions, Generating Alternatives, Conditional Acceptance, Identification of Resources, Critical Use of Resources, and Using Human Resources. The attributes used to distinguish among groups are called discriminating variables. "These variables must be measured at the interval or ratio level, so that means and variances can be calculated" (Klecka, 1980, p. 9). The

same set of 15 discriminating variables was used in all of the discriminant analyses performed.

The pooled within-groups correlations are the correlations for the variables with the respondents placed in their respective program group of either ADN or BSN. A pooled within-groups correlation matrix "is obtained by averaging the separate covariance matrices for all groups and then computing the correlation matrix" (Norusis, 1988, p. B-5). The pooled within-groups correlation matrix of discriminating variables was examined because interdependencies among variables is important in most multivariate analyses (Klecka, 1980, pp. 31-32). That is, in order for multiple variables to be included in an analysis, they should not be sharing variance; a high correlation indicates that variables are indeed accounting for the same variance. The within-group matrix reveals how the discriminant function is related to the variables within each group in the analysis.

The examination of the 105 coefficients in this analysis showed that all were at a sufficiently weak level to retain the variables in the analysis. There were no coefficients at the .5 or .4 level; 2 were at the .3 level; 12 at the .2 level; and the remaining 91 were below the .2 level. Thus, the variables in this discriminant analysis were not related to each other and consequently were not sharing a common variance.

Stepwise selection was used to determine which variables added most to the discrimination between the associate degree students and the baccalaureate students. Stepwise procedures produce an optimal set of discriminating variables. "One way to eliminate unnecessary variables is by using a stepwise procedure to select the most useful discriminating variables" (Klecka, 1980, p. 53). Although there are various methods of selecting variables for inclusion in the discriminant analysis, Wilk's lambda was chosen for this analysis because it takes into consideration both the differences between the groups and the cohesiveness within the groups (p. 54). Because of its approach to variable selection, Wilk's lambda is commonly used in discriminant analysis studies in education. As a result of this stepwise procedure, four variables were included in the discriminant function. The following discriminating variables and their corresponding Wilk's lambda values were selected: Reward/Enjoyment (.63), Using External Aids (.52), Using Human Resources (.36), and Conditional Acceptance (.31). The other 11 variables included in the analysis did not account for enough variance to be included in the discriminant function.

Standardized discriminant function coefficients are used to determine which variables contribute most to the discrimination between groups. By examining the standardized coefficients, the relative importance of each

variable to the overall discriminant function can be established. The standardized coefficients for this function which discriminated the ADN from the BSN students were as follows: Reward/Enjoyment (-.56), Attention (.54), Using External Aids (.49), Conditional Acceptance (.36), and Using Human Resources (-.34).

Another indicator of effectiveness of the discriminant function is the actual discriminant scores in the group (Norusis, 1988, p. B-13). Separation between the groups is defined by the eigenvalue. The eigenvalue is the statistic that gives the ratio of the between-groups sums of squares to the within-groups sums of squares. When there are more than two groups in the analysis, "the function with the largest eigenvalue is the most powerful discriminator, while the function with the smallest eigenvalue is the weakest" (Klecka, 1980, p. 34). However, in this analysis there were only two groups and therefore only one function produced. Here the eigenvalue was .12, which is a low value for classification into program groups.

The discriminant function which was used to classify the cases and which serves as a guide for predicting future placement of respondents into these two groups was as follows:

D = .31 (Attention) - .34 (Reward/Enjoyment) + .29 (Using External Aids) + .21 (Conditional Acceptance) - .21 (Using Human Resources) - 3.3.

The group centroid was -.27 for the ADN group and was .43 for the BSN group.

To summarize the relationship between groups and the discriminant function, the canonical correlation is used. The canonical correlation is a "measure of association which summarizes the degree of relatedness between the groups and the discriminant function. A value of zero denotes no relationship at all, while large numbers (always positive) represent increasing degrees of association with 1.0 being the maximum" (Klecka, 1980, p. 36). The canonical correlation was .32 for this study. When this is squared, it indicates that the groups explain only 10.2% of the variation in the discriminant function.

The percentage of cases correctly classified shows how accurate the discriminate function was in grouping the respondents. This discriminate analysis was 66.5% accurate in classifying cases. It correctly placed 76 (64.4%) in the ADN group and 50 (67.6%) in the BSN group. Thus, since there was a 50% likelihood of correct placement in one of the two groups, this discriminant function was only a 16% improvement over chance in predicting group placement over chance. The minimum criterion that was established for accepting the discriminant function as useful was a 25% improvement over chance with a 75% accuracy rate for placement. Consequently, students in the ADN and BSN

programs cannot be distinguished from each other based on their SKILLS learning strategies scores.

The structure matrix contains the coefficients which show the similarity between each individual variable and the total discriminate function. The variable with the highest coefficients have the strongest relationship to the discriminant function because they show how closely the variable and the overall discriminant function are related. In a study such as this in which the discriminant analysis is used for descriptive purposes, this is the most important information related to discriminant functions which satisfy the acceptance criteria. This elevated importance stems from the fact that interpreting the structure matrix results in naming "the discriminant function so that qualitative terms exist to explain the interaction that exists among the variable in distinguishing among the groups" (Conti, 1988, p. 91; Klecka, 1980, pp. 31-34). This logical process of giving meaning to the discriminant function by interpreting the structure matrix is central and critical to the whole process. In this interpreting process, variables with coefficients of approximately .3 and above are generally included in the interpretation.

Four variables had sufficient coefficients to be included in the interpretation of the meaning of the discriminant function. They were as follows: Reward/Enjoyment (-.63), Using External Aids (.52), Using

Human Resources (-.36), and Conditional Acceptance (.31). Table 11 presents the group means for the four significant learning strategies by program. The ADN students scored higher in two areas than the BSN students. They were higher in both Reward/Enjoyment and Using Human Resources while the BSN students were higher in the areas of Using External Aids and Conditional Acceptance. However, because it failed to adequately classify the student nurses into groups, this discriminant function was not named.

Table 11. Structure Matrix Values for Discriminating Learning Strategies.

		Groups	
Learning Strategy	Correlation	ADN	BSN
Reward/Enjoyment	-.63	6.24	5.50
Use of External Aids	+.52	8.92	9.53
Use of Human Resources	-.36	8.61	8.20
Conditional Acceptance	+.31	8.09	8.46

Thus, a discriminant analysis was calculated to investigate if it was possible to use SKILLS scores to discriminate between ADN and BSN nursing programs. Because only a very weak discriminant function was produced with minimal accuracy in classifying respondents into correct groups and which explained little of the variance, this

analysis was not useful in discriminating between the groups.

Grouping by Campus

To determine if learning strategy usage differed between the students at the respective campus programs, participants were divided into campus groupings. A second discriminant analysis investigated the relationship of SKILLS learning strategies and campus groups. As in the previous analysis, the pooled-within correlation matrix of predictors was examined to determine how the 15 discriminating variables within each of the groups were interrelated. Examination of the 105 coefficients in this analysis showed that they were at a sufficiently weak level to retain all the variables in the analysis. Only 4 coefficients were above the .3 level. These were .34, .33, .32, and .30. The remaining 101 were at or below the .28 level. Thus, the variables in this discriminant analysis were not related to each other and consequently were not sharing a common variance.

Stepwise selection was used to determine if any of the 15 discriminating learning strategy variables discriminated among campus groups. As a result of this stepwise procedure, nine variables were included in the discriminant function. The following discriminating variables and their corresponding Wilk's lambda values were included:

Metacognition--Planning (.67) and Monitoring (.68); Metamotivation--Reward/Enjoyment (.64) and Confidence (.65); Memory--Using External Aids (.66) and Memory Application (.65); Critical Thinking--Generating Alternatives (.68); and Resource Management--Critical Use of Resources (.65) and Using Human Resources (.69). The other six discriminating variables in the analysis did not account for enough variance to be included in the discriminant function.

Standardized discriminant function coefficients generated by the discriminant analysis explain which of the discriminating variables contributed most to the discrimination among campuses. Discriminant analysis produces one less discriminant function than there are groups; however, all of these functions may not be meaningful or significant. Since there were six groups in this analysis, five separate discriminant functions were produced. The discriminating variables that contributed most to the first function were Use of Human Resources (.71), Planning (.59), Monitoring (.57), and Memory Application (.43). The discriminating variables that contributed most to the second function were Critical Use of Resources (.59), Planning (-.42), Reward/Enjoyment (.41), and Generating Alternatives (.41). The discriminating variables that contributed most to the third function were Generating Alternatives (.91), Use of External Aids (.56), and Confidence (.42). The discriminating variables that

contributed most to the fourth function were Reward/ Enjoyment (.52), Confidence (.42), Use of Human Resources (.44), and Use of External Aids. The discriminating variables that contributed most to the fifth function were Monitoring (.60), Memory Application (-.57), and Reward/Enjoyment (.41).

Five discriminant functions were produced in this analysis. The functions were uncorrelated with each other. The first function accounts for the most discriminating power among the groups, and each of the following functions accounts for a decreasing amount of discriminating power. The five discriminant functions for this analysis were as follows:

D = .32 (Planning) + .40 (Monitoring) + .06 (Reward/Enjoyment) + .22 (Confidence) - .15 (Use of External Aids) + .26 (Memory Application) + .19 (Generating Alternatives) + .19 (Critical Use of Resources) + .44 (Use of Human Resources) - 15.60.

D = .25 (Generating Alternatives) - .23 (Planning) - .04 (Monitoring) + .24 (Reward/Enjoyment) - .09 (Confidence) - .25 (Use of External Aids) - .05 (Memory Application) + .37 (Critical Use of Resources) - .16 (Use of Human Resources) + 1.08.

D = .10 (Planning) + .25 (Monitoring) - .08 (Reward/Enjoyment) + .26 (Confidence) + .33 (Use of External Aids) + .08 (Memory Application) + .56 (Generating Alternatives) + .11 (Critical Use of Resources) - .11 (Use of Human Resources) - 12.18.

D = .31 (Reward/Enjoyment) - .13 (Planning) - .17 (Monitoring) + .32 (Confidence) + .25 (Use of External Aids) + .05 (Memory Application) + .03 (Generating Alternatives) - .17 (Critical Use of Resources) + .28 (Use of Human Resources) - 5.43.

D = .42 (Monitoring) - .08 (Planning) + .24 (Reward/Enjoyment) + .12 (Confidence) + .13 (Use of External Aids) - .34 (Memory Application) - .05 (Generating Alternatives) + .28 (Critical Use of Resources) - .11 (Use of Human Resources) - 2.65.

The group centroid is the average discriminant score for each group. The group centroids for each of the five functions are displayed in Table 12.

Table 12. Group Centroids for Discriminant Functions.

	Group Centroids				
Group	Function 1	Function 2	Function 3	Function 4	Function 5
1	+.41	+.38	-.04	-.15	-.18
2	+.40	-.13	+.03	+.35	+.03
3	-.19	-.44	-.12	-.19	-.05
4	+.41	+.16	+.04	-.35	+.31
5	-.68	+.11	+.71	+.01	-.02
6	+.88	+.34	-.45	+.17	+.06

None of the five discriminant functions were highly associated with discriminating among the groups. The eigenvalues for the five functions were as follows: .25, .09, .09, .06, and .02. These low eigenvalues produced low canonical correlations between the functions and the groups. These correlations were .45, .29, .28, .24, and .13. When these correlations are squared, the strongest one could account for only 19.8% of the variance due to the groupings by programs. Since the size of the eigenvalues is related to the discriminating power of this function and since high

eigenvalues indicate greater discriminating power for the functions (Klecka, 1980, p. 35), these weak eigenvalues reveal that none of the functions are powerful in discriminating between the groupings of nursing students by programs. The percentage of cases correctly classified showed how accurate the discriminant functions were in grouping the participants. Together, the five discriminate functions were 36.5% accurate in correctly classifying the "grouped" cases (see Table 13). Although this is more than double the chance placement rate of 16.7%, the correct placement is so low for all the groups that the functions are not useful for application in the nursing field.

Table 13. Correct Classification of Cases by Group.

Groups	Cases	Correctly Predicted	% Correct
1	36	14	38.9
2	48	14	29.2
3	45	14	31.1
4	20	5	25.0
5	21	10	47.6
6	22	13	59.1

The structure matrix generated by the discriminant analysis contained the coefficients which showed the similarity between each individual variable and the total discriminant function. The discriminating variables that

contributed most to the interpretation of the first function were Use of Human Resources (.55), Monitoring (.46), and Use of External Aids (-.38). The discriminating variables that contributed most to the interpretation of the second function were Use of External Aids (-.49), Reward/Enjoyment (.44), Critical Use of Resources (.43), Generating Alternatives (.40), and Planning (-.39). The discriminating variables that contributed most to the interpretation of the third function were Generating Alternatives (.70), Use of External Aids (.38), and Reward/Enjoyment (-.34). The discriminating variables that contributed most to the interpretation of the fourth function were Confidence (.53), Reward/Enjoyment (.47), Planning (-.44), Use of External Aids (-.37), Monitoring (-.33), and Identification of Resources (-.32). The discriminating variables that contributed most to the interpretation of the fifth function were Memory Application (-.66), Monitoring (.63), Reward/Enjoyment (.34), and Generating Alternatives (-.33). However, because of the low discriminating power of all of the five functions, none were named.

Thus, a discriminant analysis was calculated to examine if campus group membership could be distinguished based on SKILLS usage learning strategy scores of nursing students. Because of the low percentage of variance explained by the discriminant function between groups and the low percentage of accuracy of prediction into the groups by the

discriminant functions, this analysis was not useful in discriminating among the campus groups.

CHAPTER 5

CLUSTER ANALYSIS

Introduction

In addition to t-tests and discriminant analysis, this study used cluster analysis to determine if distinctive groups of learners could be identified based on SKILLS learning strategy scores. Cluster analysis is a statistical technique that allows researchers to study relatively homogeneous groups or "clusters" that may share common characteristics (Aldenderfer & Blashfield, 1984). It can be used in the social sciences as an enhancement to quantitative research (Fellenz & Conti, 1989; Hays, 1995; Strakal, 1995; Yabui, 1993).

"Cluster analysis is a powerful multi-variate tool available to adult educators for inductively identifying groups which inherently exist in the data. Its power lies in its ability to examine the person in a holistic manner rather than as a set of unrelated variables" (Conti, 1996, p. 67). Thus, it can be used to add a varied perception to data that are gathered in research studies. It can enhance a study by providing or discovering a structure that is not evident by simply crunching numbers. "Clustering methods

are used to discover structure in data that is not apparent by visual inspection" (Aldenderfer & Blashfield, 1984, p. 76).

The cluster analysis was calculated using the 15 learning strategies of SKILLS. Data related to participants' learning strategies were gathered through the use of a modified version of the SKILLS instrument (see Appendix B). All 192 participants were included in the analysis.

Cluster analysis using Ward's method was conducted on the 192 participants. Ward's method is a technique used in cluster analysis for the formation of the cluster. It was used in this study because "it is designed to optimize the minimum variance within clusters and tends to create clusters of relatively equal sizes" (Aldenderfer & Blashfield, 1984, p. 43). It is a preferred method in social science research. "Ward's method has been virtually ignored in the biological sciences, but has been widely used in many of the social sciences" (p. 43).

While cluster analysis is being used more widely and is accepted in general by researchers, it should be noted that there is not a "right" method to determine the selection of cluster groups. While the social sciences have attempted to adopt formal rules, heuristic approaches are most common in the selection of clusters. As there are no established formal procedures for choosing clusters, researchers are

cautioned that different numbers of clusters from the same sample set can produce different results (Aldenderfer & Blashfield, 1984, pp. 54, 58).

Multiple potential cluster solutions were examined. Using the regular cluster procedure in SPSS-PC, two-cluster through seven-cluster solutions were calculated using the 15 learning strategies of SKILLS. The four-cluster solution was determined to be the most appropriate for this data set based on the distribution of participants in each group. Participants were distributed among the four groups as follows: Intuitives--50; Reinforcers--48; Independents--39; and Retainers--55. The rationale used in naming and describing these groups was based (a) upon the quantitative data from the clusters and from follow-up analyses and (b) upon qualitative data from focus group interviews with participants from the various groups.

Differences Among Groups

After the four-cluster solution was chosen, means for each of the 15 learning strategies in real-life situations were calculated for each cluster group. A one-way analysis of variance (ANOVA) was performed on each of these 15 variables to determine if there were significant differences among the four cluster groups (Hays, 1995; Strakal, 1995; Yabui, 1993). Variables on which the groups differed significantly were retained in the analysis to

characterize and assist in naming the groups. Participants in the four groups differed significantly on 13 of the 15 variables. Significant differences (see Table 14) existed in use of Metacognition--Planning and Adjusting; Metamotivation--Attention, Reward/Enjoyment, and Confidence; Memory--Organization, Using External Aids, and Memory Application; Critical Thinking--Testing Assumptions, Generating Alternatives, and Conditional Acceptance; and Resource Management--Identification of Resources and Critical Use of Resources.

The one-way analysis also determined that there were two learning strategy variables that did not show significant differences among the four clusters (see Table 15). Since these two variables did not show significant differences, they were not considered as characteristic of any of the clusters and were not useful in classifying and naming the four groups determined in the cluster analysis. The variables showing no significant differences in real-life learning situations and therefore not included in classification or naming of cluster groups were Metacognition--Monitoring and Resource Management--Using Human Resources.

Information related to the demographic variables of age, gender, and grade point average was also analyzed to further assist in distinguishing between and naming of the four clusters. This information was gathered by the use of

Table 14. ANOVA of Learning Strategies Different Among Clusters.

Strategy	df	SS	MS	F	p
Planning					
Between	3	188.18	62.73	25.74	.0001
Within	188	458.13			
Adjusting					
Between	3	32.73	10.91	4.36	.0054
Within	188	470.76	2.50		
Attention					
Between	3	112.89	37.63	15.17	.0001
Within	188	466.23	2.48		
Reward/Enjoyment					
Between	3	101.04	33.68	13.72	.0001
Within	188	461.54	2.46		
Confidence					
Between	3	79.65	26.55	12.10	.0001
Within	188	412.47	2.19		
Organization					
Between	3	103.20	34.40	18.70	.0001
Within	188	345.78	1.84		
Using External Aids					
Between	3	152.17	50.72	23.12	.0001
Within	188	412.45	2.19		
Memory Application					
Between	3	43.13	14.38	5.73	.0009
Within	188	417.74	2.51		
Testing Assumptions					
Between	3	35.66	11.89	6.22	.0005
Within	188	359.46	1.91		
Generating Alternatives					
Between	3	95.72	31.91	13.82	.0001
Within	188	433.9	2.31		
Conditional Acceptance					
Between	3	108.37	36.12	15.09	.0001
Within	188	450.08	2.39		
Identification of Resources					
Between	3	165.9	55.23	30.71	.0001
Within	188	338.58	1.80		
Critical Use of Resources					
Between	3	34.26	11.42	4.84	.0029
Within	188	443.72	2.36		

Table 15. ANOVA of Learning Strategies Not Different Among Clusters.

Strategy	df	SS	MS	F	p
Monitoring					
Between	3	6.12	2.04	.96	.4125
Within	188	399.13	2.12		
Using Human Resources					
Between	3	17.64	5.88	2.21	.0883
Within	188	499.94	2.66		

a demographic survey (see Appendix C). Results from this analysis showed that there were no significant differences between the four groups on any of these three demographic variables. Thus, these demographic variables were not used in describing or naming of the clusters.

The means of the 12 learning strategy variables for each of the four clusters were used to help identify the important characteristics of each group. Following the one-way analysis of variance, Tukey post hoc tests were also used to identify the groupings for each of the significant variables. The means for the learning strategies for each group are displayed in Table 16.

Research Question 4 asked if it was possible to identify distinct clusters or identify learning groups among nursing students in Montana based on their SKILLS scores of learning strategies. The results of the cluster analysis on the 15 learning strategies showed that four learning groups

Table 16. Means of Cluster Groupings on Learning Strategies.

Learning Strategy	Intuitives	Reinforcers	Independents	Retainers
Metacognition				
Planning	7.9	10.5	9.3	9.9
Adjusting	7.7	6.2	7.2	6.8
Metamotivation				
Attention	8.1	9.3	9.2	7.5
Reward/Enjoyment	5.6	6.5	7.0	5.1
Confidence	7.6	7.3	8.5	6.6
Memory				
Organization	8.3	7.3	9.2	9.0
Using External Aids	8.5	8.1	9.8	10.2
Memory Application	8.1	6.9	7.1	7.1
Critical Thinking				
Testing Assumptions	8.2	9.0	7.8	8.6
Generating Alternatives	8.5	6.9	6.8	7.0
Conditional Acceptance	9.2	7.6	7.3	8.6
Resource Management				
Identification of Resources	7.0	8.2	6.8	9.1
Critical Use of Resources	7.2	8.0	6.8	7.8
Size of Group	50	48	39	55

did have distinguishable characteristics that identified participants who used similar learning strategies. Therefore, Research Question 4 was answered in the affirmative since it was possible to determine that distinct clusters existed among Montana nursing students.

Focus Group Interviews

In order to supplement the quantitative cluster analysis used in this case study, focus group interviews

were held with participants from each of the four learning groups identified by the cluster analysis. "In case study research of contemporary education, some and occasionally all of the data are collected through interviews" (Merriam, 1988, p. 71). Researchers are finding that a combination of quantitative and qualitative analyses can add meaning to research findings, especially those that address a sociologic concept such as learning. For example, Hays (1995), Strakal (1995), and Yabui (1993) recommended in their respective studies that a qualitative follow-up method could be a very useful addition to a research study when used with cluster analysis.

Focus groups are basically group interviews although not in the sense of an alternation between the researcher's questions and the participants' responses. Instead, the reliance is on interaction within the group, based on topics provided by the researcher. The researcher takes the role in the focus group as that of a moderator. The data that focus groups produce are transcripts of the group discussions (Morgan, 1988, pp. 10-11). As Yabui (1993) stated:

> A qualitative follow-up method can be an extremely useful component when used with cluster analysis. Interviews of participants after the data were analyzed would help in answering questions raised about the learning experiences of the participants and the reason they used the learning strategies they identified in SKILLS. It would also contribute greatly in providing a better

> description of each cluster learner group. (p. 128)

In this study, focus groups were used as a supplement to data collection rather than as a self-contained means of gathering information. The primary goal of using focus groups was to gain participants' insights related to their use of learning strategies and to discuss their individual methods for learning. Focus groups were formed by placement in a cluster; thus, the focus group participants were parts of the larger cluster groups. In following the recommendations of Strakal (1995), a total of eight focus groups were organized. Two focus groups were organized from each cluster. Strakal conducted only one focus group for each cluster in his study of personal and career development situations. However, he concluded that "the study would have been enhanced by holding additional numbers of focus group sessions for each cluster" (p. 194). In this study, individuals were organized into focus groups by requesting that they attend a small group discussion. Each of the eight groups met independently from the others. Permission was granted by each group participant to audio and videotape the focus group discussions so that responses could be reviewed and analyzed at a later time.

While there is no singular set of instructions or techniques available to determine the best or proper type of interview format for a given situation,

> researchers seeking guidance for interview construction find available an overwhelming array of instructions, suggestions, protocol frames, and prescriptions. Within this massive literature, contradictions abound. Consequently, researchers are best served by seeking and following guidelines for interview construction that are consistent with the goals and designs of particular research projects. (Goetz & LeCompte, 1984, p. 124)

The format of group interviews can be useful in bringing the researcher into the domain of the participants of interest. In such a situation, a number of individuals are brought together and encouraged to talk about the subject of interest (Morgan, 1988). In this study, students were asked to discuss their learning behaviors in a focus group setting.

> [Although the] interview is normally a one-on-one relationship, for many purposes interviewing in groups is appropriate. Not only does it save time, but, if behavior one is trying to understand takes place in a group interaction setting, the group interview will yield a better picture of this phenomenon. (Issac & Michael, 1990, p. 13)

In this study, focus group interviews were used to supplement the quantitative data collected in the cluster analysis and not meant to be a quantitative means of gathering information that could be empirically analyzed. The main goal was to obtain the perspectives of learning from the participants' point of view in an effort to enhance the quantitative data gathered in the cluster analysis. The focus groups served here as a tool to better describe and to give greater meaning to the quantitative findings.

Fourteen members from each cluster were selected in each of the four clusters identified by the cluster analysis and asked to participate in the focus groups. This number of participants was determined to be an adequate representation based on criterion-based sampling where samples are chosen based on criteria rather than on numbers (Goetz & LeCompte, 1984). Criterion-based selection is a method of sampling that allows the researcher to establish the criteria, bases, or standards necessary for participants to be included in a case study (Merriam, 1988). In this study, one of the criteria was that the participant be from the associate degree or baccalaureate nursing programs in Great Falls or Havre. Because of the great distances in Montana, focus groups were conducted at two of the sites. The focus group membership was representative of the population in that each group had members of both associate and baccalaureate programs, had younger and older members, and several groups had males participating.

The fourteen participants from each cluster were further divided into two groups of seven and asked to participate in a small group discussion related to their learning strategy use. Ultimately, due to schedule conflicts, the actual numbers of focus group participants were as follows: Intuitives--4 and 6, Reinforcers--4 and 8, Independents--5 and 3, and Retainers--7 and 6. These group sizes are acceptable according to Yalom (1975), a noted

group psychotherapist. He stated, "My own experience and a consensus of the clinical literature suggest that the ideal size of an interactional therapy group is approximately seven, with an acceptable range of four to nine members" (p. 284).

Each group was led through a discussion based on a list of questions that were developed specifically for their learning cluster (see Appendix D). This technique follows the recommendations of a number of researchers who feel that questions to be asked during focus group interviews should grow directly from the research questions that were the impetus for the research (Goetz & LeCompte, 1984; Merriam, 1988; Patton, 1990; Stewart & Shamdasani, 1990). Further, Strakal (1995) recommended that the focus group questions must be "relevant to the study" (p. 195).

Strakal (1995) also recommended that the researcher conducting the focus group interviews be "familiar with interviewing techniques through literature review or actual training" (p. 191). This author is a Certified Clinical Specialist in Adult Psychiatric/Mental Health Nursing and has conducted both inpatient and outpatient group therapy and individual assessment interviews for the past 10 years. Thus, this researcher was well versed in conducting group interview sessions and was very comfortable in the role of moderator for the focus group sessions.

Participation and input from all members of the focus groups were substantial with sessions lasting approximately one and one-half hours each. In all eight groups, the moderator had to direct termination of the discussion at one and one-half hours or the discussions would have continued. The members of the focus groups were very willing to share the ways they learn. Naming of the four groups came from validation by participants in the focus groups of the cluster analysis. All four names came from suggestions by one or more of the individual participants. Pertinent focus group comments have been noted to substantiate cluster analysis information. There were few contradictions between cluster analysis quantitative information and focus group interactions. During all eight focus group discussions, each group had distinguishable characteristics that identified learners who verbalized using similar learning strategies. A summary of cluster findings of the four learner groups is included in Appendix E.

Intuitives

Intuitives have a convoluted way of describing their learning. These learners need time and freedom to explore all aspects of a learning task and need time to complete a learning task. They do not do well with time limits in their learning. This group of learners is most confident when they can apply their learning. They try many

approaches to their learning and make many necessary adjustments to their learning approaches. They like to study alone and are uncomfortable trying to teach others something that they have successfully mastered. There were 50 members in the Intuitives group.

Intuitives had high learning strategy means in the Critical Thinking--Conditional Acceptance (9.2) and Generating Alternatives (8.5) learning strategy areas. This group scored next highest in the Memory--Using External Aids (8.5) and Organization (8.3) learning strategy areas. These learners had low means in the learning strategy areas of Metamotivation--Reward/Enjoyment (5.6) and in Resource Management--Identification of Resources (7.0) and Using Human Resources (7.20).

Intuitives differed from the other three groups of learners by scoring highest in the Critical Thinking area of Conditional Acceptance and high in the use of Memory areas of Using External Aids and Memory Application. These scores indicate that these learners use hypothesizing and application of their learning or the use of past experience of their learning to help them remember more than the other groups. These learners consider many possibilities in their learning and use some memory aids to assist them in their learning. Comments from the two focus groups for this cluster supported these quantitative data.

Several of the students commented that they really did not know how they learned or added that they needed to apply their learning to make it meaningful. For example:

> Personally, I really don't know how I learn; I try different things all the time. I don't know--I think I use the shotgun approach. I have to leave it alone for awhile; then I have to do hands-on learning to learn it. I have to hook it on to something from my past to learn it. I have to read the material then put it with something I already know. I don't memorize names; I look at the whole. I learn best when I can see and touch it--like a cadaver. I got to touch the heart strings; then I could learn it [the anatomy of the heart]. I go any which way the wind takes me in my learning. I hate to try and teach anybody anything because I don't even know how I learned it in the first place.

When asked about the use of mental images, this group of learners agreed that they do not memorize things. Instead, they use mental images as a aid to their learning:

> I think everything I do is specifically related to a diagram or chart that rattles around in my head. I never memorized spelling words. I would just visualize the list in my head; then when I needed to spell a word, I would pull up the list until I saw the word I wanted in my mind.

When confronted with a difficult learning task, Intuitives need time to "sort through the material" and to be able to relate the new knowledge to past experience. While several of the students said they would "ask someone," others said they would "look it up." All agreed with the fact that they have to "go at my own pace and take it a little at a time." One student said that she "had to get easier biology books" when confronted with chemistry after a

20 year gap in her formal education so she could "understand the terms." Another student gave the following example of his need for "hooking things on to what I already know":

> When we were learning to give injections, this was something I had no past experience with or knowledge of. What helped me the most was to take the syringes, vials, and needles home so I could fiddle with them. After I messed with them to see how far they would shoot the fluid and how hard I had to press the plunger, I realized they were like a suction cup, something I already knew about and that I was familiar with. Then I felt like I knew what they [the syringes] actually did.

This group differs from the other three groups especially in their use of Conditional Acceptance. Several students discussed their need to question simplistic answers. When asked to discuss the use of generating hypotheses, the students agreed that they did this "all the time." Representative comments confirm this use of hypothesizing and Conditional Acceptance:

> I don't believe that there is a simple answer to anything; there are just too many variables. I'll debate the variables even if they have nothing to do with the answer. I ask what if, what if, what if for as long as I have time. I keep at something by looking at all the sides or every conceivable possibility. Then I run out of time for the stuff I'm supposed to be studying.

Intuitives discussed their need for time to reflect on their learning, another part of Conditional Acceptance. One student talked about her need to "leave it [the material] alone" for a period of time so she could "think about it." Another student agreed with this by saying that she often

finds that she eventually does "learn it, but not in time for the test."

Intuitives also varied from the other groups by their low score on the Metamotivation--Reward/Enjoyment learning strategy. This may also indicate that these learners do not rely on how others feel about the strategies they use to complete their learning tasks. In addition, their low mean on Confidence may be due to their assurance that they will complete the learning tasks successfully and do not have a need to remind themselves of past successes and getting support from others. Student comments supported that Intuitives are not overly concerned with the enjoyment of learning:

> If I want to do something, I'll do it myself. School is not fun for me, but I'm not concerned with it being fun. The social support doesn't really matter. While I enjoy learning, its simply a means to an end for me.

Intuitives also scored low in the Resources Management--Identification of Resources and Critical Use of Resources learning strategy areas. It may be that this group of learners uses these strategies less than the other groups because they are constantly spending their learning time looking at all the possibilities. The focus group participants' comments also suggested that this group of learners is solitary. Thus, they may place a lower priority on networking or even the importance of other resources. One student's comments represent this solitary approach:

> I think the hardest thing for me was chemistry. I'm not good at math, especially story math problems. I flunked it my first year. Then I got a D in it the next semester, but I also flunked out of college by that time. Then I came here, and I had to do it again. But by my doing it and doing it myself, I was able to pass it. I find I have to be able to see it myself, like the [math] equations, before I can learn it. So now I just practice over and over by myself.

Other comments supported this solitary approach in which "I'm not comfortable in a group" and "I am a loner; I have always been that way." However, "if I were in a group, I would want to be in control of the group."

Based on their high and low learning strategy means, the 50 members of this group can be described as solitary learners who hypothesize, question simplistic answers, reflect on their learning, and visualize more than the learners in the other three groups. They do not see learning in school as enjoyable nor are they concerned with how others feel about the strategies they use to complete their learning task. Additionally, they make many adjustments in their learning as they proceed through the learning task. One older student commented:

> It seems that I go down a path when I am learning something, but I take many turns in the road before I feel like I've learned something. When I do, the light bulb goes on, and then I've got it forever. I couldn't tell you how I got there. I've never been able to figure it out. There are all these little pieces out there that I pick up, and somehow they come together. I just work at it until I get it. I've never been worried about being successful. Here I am getting a BSN degree, but I really have never been able to figure out

> how I learn. I definitely have to do it on my own.

When asked what a teacher could do to enhance or facilitate their learning, the Intuitives overwhelmingly responded by asking for visual cues and application opportunities for the learning. Intuitives want to "see it, do it" or "show me, tell me." Another Intuitive learner put it this way, "I need more than one dimension so I can get involved. I liked the role playing we did in Psychiatric Nursing class." Others agreed with this by saying they wanted "physical involvement." That is, Intuitives want hands-on practice or applications. One Intuitive recommended that a teacher:

> Take five minutes to stop and show us an application to what the book is saying would be. Examples that relate to the topic are really helpful, like your [instructor] story of the patient who refused blood transfusions and how that related to the legal/ethical content we were reading about.

Teachers can do a number of things to help Intuitives in the classroom. The students suggested that teachers summarize and relate the learning back to the big picture. Intuitives appreciate it when teachers "summarize the big picture for me." Other attributes of teachers that enhance the learning of Intuitives are:

(a) Slow down--teachers need to slow down,
(b) Be organized,
(c) Take time to answer questions,
(d) Provide outlines,
(e) Allow for class discussions,
(f) Give eye contact,

(g) Don't bring up your personal biases,
(h) Show us an openness and willingness to be approached,
(i) Provide clear expectations.

There are also some factors that inhibit the learning of Intuitives. Those in this group do not really like group work. Intuitive learners complain that "I never learn anything in a group because the group dynamics get in the way." Reinforcing their solitary nature, they point out, "I can never learn in a study group. I've tried them, but I do better by myself." While they like many examples, stories that do not relate to the material at hand are very distracting to them.

While most characteristics of good teaching suggest the use of humor, humor does not matter to the Intuitives. Intuitive learners complain that, "unless the joke relates to what we are studying I usually don't even get it."

These two characteristics of not liking group work or humor in learning are counter to the established adult education learning theory and teaching strategies. It may be that this contradictory finding is because these students have experienced meaningless group work. One student remarked, "It does me no good to be put in a group where we are told to 'discuss' the topic, but with no accountability--the teacher leaves the room for an hour."

Reinforcers

Reinforcers have a planned, focused approach to learning with an emphasis on motivation in the form of attention to learning. This attention to learning is reinforcing, in and of itself, to this group of learners. These learners eliminate distractions in their learning environment to assist their learning. Reinforcers question simplistic answers and are more concerned with major concepts than with memorizing individual facts. Reinforcers enjoy their learning and find teaching something to others as reinforcing to their learning. These learners work well under pressure and constantly remind themselves of past learning successes. There were 48 members in the Reinforcers group.

Reinforcers had high learning strategy means in the Metacognition area of Planning (10.5) and the Metamotivation area of Attention (9.3). Critical Thinking--Testing Assumptions (9.0) was the next highest mean. This group had low learning strategy means in the areas of Metacognition--Adjusting (6.2), Metamotivation--Reward/Enjoyment (6.5), Memory--Application (6.9), and Critical Thinking--Generating Alternatives (6.9).

Reinforcers are very different from the Intuitives who try many different approaches to learning. Reinforcers focus on the learning task at hand and plan a very systematic approach to their learning. This emphasis on

Planning may explain their low score on the Metacognition learning strategy of Adjusting. Changes in their approaches are not necessary for these learners because they start out with a specific plan to their learning. Several of the students in this group referred to themselves as "list makers." While this group of learners do not generate alternatives like the Intuitives, they do question simplistic answers and are not very concerned with memorization. For them:

> I don't do well with memorizing bunches of data, so I know the major concepts; then I figure it out from there. I always hated the tests where they say to list 5 of 7 of something. I always end up with less than what was asked for.

Unlike the Intuitives who use a "shotgun" approach to learning, the Reinforcers want to know exactly how to proceed in their learning and spend time in planning their learning. In fact, one student in this group said, "I don't want to use the shotgun approach; I want to know that what I'm doing [in my learning] is a good use of my time." Seven of her peers agreed with a student who discussed this emphasis on focused planning:

> I have to know the whole picture before I can begin--like the syllabus in a course. Then I make lists of how I will proceed. I like things to follow in a progression. I have to do one thing at a time or I'm afraid I'll miss something. So I put things in order then cross things off my list as I go.

Another student commented on her unsuccessful use of memory devices or aids:

> If I memorize one of those mnemonic devices, I will remember it and not the terms or words I was supposed to learn. My memory for memorizing data is extremely short term. No, I don't highlight. If I did, I would highlight the whole book which doesn't help me at all.

Reinforcers are very concerned about focusing on their learning. Unlike the Intuitives, who want to "see it," this group focuses on learning by "hearing it." One student commented that she would "watch a video" so that she could "hear" it. All of the students in the group of eight agreed with the student who said:

> I have to sit in the front of the classroom so I can listen. I feel tremendously insecure about not being able to memorize or that I can't spew out the facts, but I really like to talk it through with someone else. I sometimes tape the lectures so I can play them again. I really enjoy teaching something to someone else because it reinforces my learning when I talk through it.

When faced with a difficult learning task, Reinforcers overwhelmingly said they would "ask someone." Since they definitely want to hear it, Reinforcers utilize a human resource who can verbally explain a question or concern to them. Reinforcers in particular discussed the value of a mentor in their learning. The group members agreed with a male student's description of a mentor:

> A mentor or teacher is someone who would take an interest in me as a person. That's who I can learn from. It's someone who knows how important it was for them to have someone who took an interest in them at one point along the way. It has to be someone who is very flexible and patient. It helps if the person takes time to make sure people are in a comfortable environment. It is that person who has already been there. I

> really hope I can do this [be a mentor] for somebody someday.

Along with this group's focus on learning where seeing the big picture is important so that they can then plan their learning, Reinforcers enjoy their learning. They are very different from the Retainers, who describe learning as a job. When asked if this group saw learning as a job, everyone of these learners agreed with the student who said, "It's not a job when you are actually doing it." Another student commented:

> Definitely! I really enjoy learning. I think its important to like what you are doing. My teachers in fifth grade thought I had a reading problem and called my parents in. But it's just that I thought the story was not interesting. I'll never forget it; my mom was so upset with me.

Other Reinforcers agreed with the student who felt that "I don't study the subjects I don't enjoy." For Reinforcers, "I learn what I enjoy."

When asked if they reminded themselves of past successes as a way to stay motivated, one student said, "Yes, I do that all the time." Another commented, "I'll pull out a paper that I did well on and reread the positive comments." However, two others said they use pressure as a way to stay motivated. While one preferred to "wait till the last minute to do a paper," the other felt that "I do much better under pressure. It helps me to be focused." Yet another commented on how motivating it is for her to

"cross out each item as I complete it" on her list of things to do or "get done."

Reinforcers discussed the reflective nature of their learning in questioning assumptions. They especially look at the specifics and relationships in any assumption and question its personal applicability. One student said, "I question assumptions; I don't just take them at face value. The credibility of the source is important to me." For one Reinforcer, it is important to:

> Look at how the assumption would affect me. Like with AIDS, I would look at how it relates to others. Is this the health care worker who is infected? If so, then how will this person affect others? I would also look at the long term effects.

Another student added with this example, "How would this individual feel about this diagnosis? That's one aspect I would look at." One Reinforcer explained the relationship of examining the specifics to personal application as follows:

> Look at the specifics first. Then I would ask how it affects me. I would then ask what do I need to do for this to work for me. In other words, how does it benefit me, and how could I act on this for the benefit of someone else?

Since Reinforcers plan their learning and focus on it in many ways, they are quite self-directed in their learning. The students agreed that they were very self-directed. A 56-year-old student summarized this self-directedness:

> When Charles Lindberg was asked about flying and praying, he said, "Never ask God for the things I can take care of myself." I figure I can take care of it myself.

The Reinforcers are self-directed, motivated learners who enjoy learning and stay very focused on their learning tasks. While they want to see the big picture at the beginning of a learning task, they focus their learning by breaking it down into smaller more manageable parts. By completing one part before moving on to the next, they are reinforced and continue to be motivated to continue on the learning task. These learners remind themselves of past successes and look for the specifics and relationships in assumptions which they then apply to their personal situations. Unlike the Intuitives, this group of learner works better under pressure or with time limits.

When asked what a teacher could do to enhance or facilitate their learning, the Reinforcers had a very hard time generating many suggestions. While the other three learning clusters provided many suggestions when confronted with this question, the two focus groups of Reinforcers were very quiet. This relates to their way of learning. They are so self-directed and motivated that they will learn in spite of the teacher. Tell them the big picture, and they plan their own learning. However, they did have some suggestions for things the teacher could do to help them learn more effectively. These included:

(a) Provide examples,
(b) Conduct group discussions,
(c) Use case studies,
(d) Use personal examples or stories that relate to the topic,
(e) Do anything that makes it fun, like the Jeopardy Game, and
(f) Use humor.

The Reinforcers discussed how important it is for them to have a teacher share what and how they think. The participants agreed that a teacher can do this through sharing some personal experiences. One example that a student shared was that:

> Its helpful for you [instructor] to share personal experiences. When you [the researcher] were talking about grief and the loss of your own brother and the loss of any relationship, I nearly started to cry. I had lost a boyfriend seven years ago, and it hit me that this grief stuff really does stay with you like you talked about in lecture. But when you used that personal example, it made me realize that the lost of even a friendship really does affect us. This personal side put it in perspective for me.

The sharing of clinical experiences by a teacher was mentioned by all four learning clusters as an enhancement of learning for nursing students. One of the Reinforcers said, "I think the nursing faculty could do a better job here [of sharing personal and nursing experiences]. I think they could do it much more than they do for the students."

The students also added some attributes of teachers that they felt enhance their learning. These included:

(a) I want to feel that the teacher is on my side,
(b) I want the teacher to take me seriously,
(c) I want the teacher to be knowledgeable,

(d) Enthusiasm on the part of the teacher,
(e) Teachers who show that they value what they are teaching, and
(f) Teachers who show students that they know what it is like to have been there and are willing to share that experience with students in a way that does not put students down.

Independents

Independents have a focused, ritualistic, and motivated approach to learning tasks. This group of learners has little interest in resources or the Critical Thinking aspects of learning. This group is very mistrustful of resources and has a need to discover their own answers in their learning. While Independents need a specific environment in which to study, they also enjoy support of their learning from others. They do not like to study in groups, but enjoy studying with one other person. While these learners are very motivated to learn, they are overwhelmed with both the big picture and too many resources in their learning activities. There were 39 members in the Independents group.

Independents had high learning strategy means in the Metamotivation--Attention (9.2) and Confidence (8.5) learning strategy areas, in the Metacognition--Planning (9.3) learning strategy area, and in the Memory--Organization (9.2) and Using External Aids (9.8) learning strategy areas. This group had low learning strategy means in the Resource Management areas of Identification of

Resources (6.8) and Critical Use of Resources (6.8), and in all three Critical Thinking learning strategy areas of Testing Assumptions (7.8), Generating Alternatives (6.8), and Conditional Acceptance (7.3).

Like members of the Reinforcers, Independents can be described as learners who focus on the material to be learned, avoid distractions, and set aside time to complete learning tasks. While both these groups of learners use Planning in their learning, the Independents differ significantly from the Intuitives and the Reinforcers by their indifference to resources or to any significant use of Critical Thinking learning strategies. Unlike the Reinforcers who use the big picture as a way to plan their learning, Independents are overwhelmed by the big picture of a learning task. All of the Independents agreed that:

> It is overwhelming to me to have the big picture. So I focus on the little pieces so that I don't panic. I panic [if I have the big picture]. It's overwhelming to look at the entire nursing program. So I look at much smaller parts [of the program].

Independents are highly motivated, and all members of both focus groups agreed that this was the case for them. They shared several ways in which they increase their motivation. The Independents are motivated by both internal factors and external factors. Internal motivation comes through their confidence in their own abilities to succeed

in the learning task. The "need to know" of these learners is an internally motivating force for them.

> The need to know is my motivation; that's what drives me. It [learning] is a building thing for me. I find it so interesting that I feel like I can't get enough so I read some more.

Another internal motivational strategy used by the Independents includes the confidence that comes from reminding themselves of past success. One of the Independents stated:

> I remind myself every day and every semester that I am getting better grades, which means I only try harder. First I tried to get all C's; then I started getting all B's, and now I want to get all A's next semester.

An older female student added:

> Now I am back in school after all these years and I am being successful. I tell myself that I am doing OK. I know that I will finish this program. Maybe I will even go on to graduate school.

The Independents gain internal motivation from their confidence in their learning. They also benefit from external support from others, especially family members. The participants agreed that this was true for them. One student commented about the importance of family support:

> My family has been more motivating than I thought it would be for me. I certainly wouldn't want to quit now. What kind of a role model would I be for my oldest daughter who just started college? Oh, you know, if its OK for mom to drop out, then what does that say to your kid?

One of the other Independents, a single parent with a toddler and two other children at home, added:

> My children's support has meant so much to me. They know that my school books stay on the dining room table and nobody touches them, not even the little one.

The Independents have a solitary approach to learning. They described this even in the names they suggested for their group of learners. One student described this individual approach by naming her group this way, "I think we are the Lone Rangers."

This solitary approach is necessary for the Independents because they need to eliminate distractions so that they can focus on their learning. One way the Independents eliminate distractions is by controlling their learning environment. One student described the need for a specific learning environment:

> It [being able to learn] is a physical thing for me. I can't have voices around me. I have to have some background noise like the washer or dryer going in the background of the house. I find I have to have that little bit of noise, but it can't be voices or music like the TV. I tried to study in the library here, but it didn't work because the silence was deafening. Then one time, my relatives came. I tried to study in our bedroom, a place I don't usually study in, and I couldn't do it at all.

Another student added, "I can only ever study with one other person or I get too distracted." This need for a specific study place that is set up in a ritualistic way where distractions are at a minimum was described this way by another Independent:

> I have one place to study and that's the dining room table. Everyone knows not to touch any of

> Mom's stuff on the table. In fact, we don't ever eat in the dining room anymore because that's where my books are. It's funny, I have a desk and a computer in the other room, but that's not where I can study. I find I can only study at that one table by myself.

Independents agreed with the Intuitives about group work and study groups. They cited the increased number of distractions for them in a group. One gave this example:

> I have tried to learn in groups, but I find that I start to focus on the social aspects, like clothes, dates, weekend plans and it is so easy not to focus on the topic at hand. I stopped going to study groups for the same reason. We always got off the subject. I do better with just one other person.

When confronted with a difficult learning task, Independents want to discover "the answer" on their own. If they ask an expert, it has to be "somebody with lots and lots of experience." Generally they agreed with the student's comment that "I have to find out for myself first. Then I have to be very organized, but I'd either look it up in a book or watch it if I could." Independents are mistrustful of resources. This is due to their "need to know and need to find out the answer" for themselves, the very nature of their independent approach to learning.

> I'd probably look it up in several books. Then I might ask someone, but I have to trust the resource. I have to test it out for myself before I just will believe it or accept it. I never take anything at face value. I have always tested things out for myself.

Independents organize their learning and use some memory aids. However, unlike the Retainers who use

mnemonics extensively, Independents use writing things down and reading to assist in memory storage. One participant described the process as:

> I don't often use mnemonics. I might use one if someone gave it to me. I do much better if I write it down and then read what I wrote to remember it. I did use one of those mnemonics one time that I can think of. I remember at orientation the Vice Chancellor woman was telling us to "Use mnemonics, they really work." I was all for the learning how to learn stuff so I thought that this was a pretty good hint. She gave us an example of one about the planets, but I don't even remember that one. Since this hint came from her, I thought I would try it. It's been a year since I saw her. Does she still work here? And I haven't used any. I read it; then I write it down. There's something about writing it down that works for me.

Independents agreed that they like to have fun with learning and are not very concerned with resources. When asked if they like to have fun with learning, the response was a resounding "Yes." One student pointed out, "It is a lot easier to joke about what you are learning than to take it so seriously." Another remarked, "I like to make a game out of it; I learned so much in those games that you [the instructor] did [with us in class]." "It seems that nursing is so serious. I started to realize that I was not smiling as much as I used to and decided to lighten up."

Independents are overwhelmed if they are presented with too many resources. This may account in some measure for their low Resource Management learning strategy area scores. While this group of learners is independent in their

learning, they are not critical of the resources they choose. This may be due to a fear of being overwhelmed by two many resources and leads them to a feeling that they need to rely on authoritative sources or to an insecurity in their learning. For example, one student pointed out:

> I would take you at your word as an instructor. I would not want to use other resources because they would just make me even more confused.

Independents have a need to "find out for myself" but point out the overwhelming nature of too many sources for them. One student remarked:

> When there are so many books like at the beginning of last fall, I just felt totally overwhelmed. I looked at the pile of books we had to have for nursing and really was stressed just by looking at all of them. I feel like that when I go into the library sometimes too. It's like where do I start?

Lastly a student summarized this lack of a variety of use of resources by this group and their need to find out on their own when he said:

> I have to do this on my own, so I wouldn't ask many people. I have to trust the source, and I don't trust too many. So I would just go find out for myself probably from one book. I have to make sure that I know it for myself.

When asked what a teacher could do to enhance their learning, the Independents gave some of the same recommendations as the other three groups. However, they were unanimous in their request for "humor." They also asked for "outlines," "visuals," and "hands-on" experiences. It was important to this group like the others for their

teachers to be "organized" and "enthusiastic." Again, this group emphasized that a "human element" be included to really enhance their learning. One student provided this example:

> I think the human element is the most important. I'll just use you [instructor] as an example. If there isn't a human element, you know, it can be really intimidating. When you walk in the room with this badge that says Suzanne F. Lockwood, Nurse something, MSN and all that across your chest. . . . You need a bigger chest for all those initials to fit on. Well, for us, the little greenhorns, By God, I think she has to be a genius. All that schooling, all that learning, all that experience. . . . We think that this must be small potatoes for you. But then when you tell us a story like in grief about the death of your brother, I thought, "That's just Suzanne." Not the MSN, CN, XYZ and on and on. I think that as a group that really helped in how we respect you because you gave us something that was such a moving example that we could really associate our learning to. I so appreciated, and I think the other students did too, that for a minute there you were just Suzanne, not the professor.

The Independents are highly motivated, focused learners who enjoy their learning. This groups' motivation comes from their curiosity in learning and need to know. They are internally and externally motivated learners. They need their own space and time to devote to their learning and do not learn as well in groups. Their learning environment needs to be fairly structured to minimize distractions. They use the strategies of reading and writing down the material that they are learning instead of using other memory devices. Independents plan their learning but are overwhelmed by too many resources or the big picture.

Independents use very little critical thinking in their learning.

Retainers

Retainers sequentially focus on planning their learning and have a high use of memory learning strategies. This group of learners uses very few motivational strategies and wants to see the big picture of any learning activity before proceeding with the task. This group of learners is good at identifying resources and memory retention. Retainers do not enjoy learning in formal educational settings. There were 55 members of the Retainers group.

Retainers had high learning strategy means in the learning strategy areas of Metacognition--Planning (9.9), Memory--Using External Aids (10.2) and Organization (9.0), and in the Resource Management--Identification of Resources (9.1). These learners had low learning strategy means in all three learning strategy areas of Metamotivation. Reward/Enjoyment (5.1) was the lowest of any of the four groups while Confidence (6.6) and Attention (7.5) were not much higher.

Retainers differ from the other three groups in two significant areas. First, this group does not use motivational learning strategies as do the Reinforcers and the Independents. Second, Retainers do not use many critical thinking strategies like the Reinforcers or

Intuitives. Unlike the Reinforcers, who especially enjoy learning, the Retainers see learning as a job in the formal educational setting. They are good at identifying resources unlike the Independents who use resources the least of the groups. The Critical Thinking learning strategies are utilized very little by the Retainers. Additionally, this group memorizes what they are learning to a large extent unlike the other three groups.

All participants in the Retainers' focus groups agreed that they view learning as a job. This group of learners may include some of the adults of whom Brookfield (1986) says,

> It is often the case that the most significant learning we undergo as adults results from some external event or stimulus that causes us to engage in an anxiety-producing and uncomfortable reassessment of aspects of our personal, occupational, and recreational lives. This external stimulus may be a calamitous event, such as being fired. . . . The learning in which we are forced to engage as a result may be unsought and may have many painful aspects. Nonetheless, we may regard such learning as highly significant. (p. 22)

Several of the members' comments that follow confirm this concept that not all learning is fun. One male student commented that he "could only use my back in labor related jobs for so long, then I was severely burned on the job and I had to change careers so I can eventually support my family." When asked about a label for this group of

learners, one member suggested "Job Seekers." Several other representative comments:

(a) Learning is a job,
(b) It's not fun and games,
(c) I do think of it as a job,
(d) You have these chores to do and I see school or learning like my chores,
(e) I feel like I should be out there earning money for my family, but since I am in school, I think of this as my job for now until I can get a nursing job and,
(f) I view it [being in school] as a job. Then if I could make it fun, I will; if not, well then I just treat it as a job.

Memorization for these learners involves a variety of techniques that involve Using External Aids, Memory Application, and Organization of their learning. Some specific memory techniques include the use of mnemonics, imaging, organization, use of color, and repetition. Some of the memory strategies can be either external or internal. External aids include the use of appointment books, to-do lists, or asking for someone else remind them of things to be done. Internal memory aids include mental rehearsal, repetition, and the use of mnemonics. Mnemonics are defined as devices used to enhance memory such as rhymes or associations related to the material to be learned (Zechmeister & Nyberg, 1982). Use of Memory learning strategies is a primary way the Retainers learn. One student provided this example of repetition:

> I've always memorized. I use repetition. I hear it, see it, write it, see it, read it, and then talk it. And I've used mnemonics devices all the time. I remember in second grade I saw an example

> of a mnemonic device in a book, and I've used them ever since.

One student's way to do repetition is that "I read it, and reread it, and reread it until I remember it." Another student shared an example of her learning with mental practicing or rehearsal:

> This example is about giving a shot. I would read about it, then practice it on a dummy, then I would rehearse it in my mind over and over. I remember using the pillow, the one we had to give a shot to ten different times [learning to give an injection], and I would go over each step in my mind as I thought about that pillow. I watched myself giving the shot over and over till I thought I got [remembered] all the steps to giving an injection.

Retainers use mental rehearsal frequently. The students agreed that "first I would read about it, and then I would rehearse it over and over in my mind before I would even practice it."

The other participants agreed that they used mnemonic devices frequently in their learning. One student said, "Oh, I use those all the time." Some of the students said they make their own memory devices while others said they use ones others made up "from parts of words." Other students discussed the use of color as a memory device. One student commented:

> Writing is a big thing for me. I use color to highlight. Then I think back over the page and remember according to the color on the page. I use different colors for the things I think are important.

Another student commented on the importance of writing things down as a memory aid, another form of repetition:

> I have to write it down, or I won't remember it. There's just something about the act of using a paper and pencil. I can read it in the book, but unless I actually write it down, I can't seem to remember it.

Along with the memory aids already mentioned, a student commented on the importance of esthetics in her study environment to assist in her memory retention:

> Neatness is important. I can't study at home if it's messy, and my notes have to be neat or I can't remember what's in them. I find that if my notes are a mess, I won't even use them. I would have to copy or type them in a neat order before they will be useful to me.

Another student agreed with this need for neatness in her study environment when she pointed out that "the house can't be messy or I can't study there."

The Retainers agreed that they do look for resources, especially the human kind that they consider "an expert." Most of the students said that they would "keep asking" until they found out what they wanted. The participants agreed with one student's comment about the identification of resources. He said:

> I like to research whatever it is and see what a text has to say so I have a foundation first. Then I would go look for someone who I respect to ask. I like to see what the experts say. I'll always look at the owner's manual before I try to do something on my car or before I call the mechanic.

Retainers do several things when confronted with a difficult learning task. These involve the use of human resources, of mental images, and of repetition. Although the Retainers SKILLS scores revealed a high use of Identification of Resources rather than Use of Human Resources, their comments revealed that a primary resource that they identified was people. When they need a resource, it is common for Retainers to "find somebody and ask them to demonstrate" or to "talk to someone who knows." One student uses a role model in this situation: "I like to observe people or nurses who I think know what they are doing and how they present themselves."

Retainers like to have the big picture in the organization of their learning. One said, "I have to be able to see the end result before I can even begin." Another added, "I have to know what the goal is. Then my learning has to go in sequence, or I get very frustrated." One Retainer remarked:

> Chemistry was something totally new for me, and I didn't have anyone to ask. So before I did an experiment, I would look up all the possible reactions for each chemical that might be so I would know what to expect.

Retainers need the big picture prior to beginning the learning task. However, they then break the big picture into smaller more manageable learning parts in order to go about their learning. One Retainer "breaks things into fragments" to help with her learning. The other students

agreed that they want the big picture, but then they too break it down into manageable parts much like the Reinforcers. One student commented:

> I make a list, then I take each item in order. I cross them off as I go. I often write down my objectives even for the day and cross them off as I go.

Another student in this group disagreed with making lists because "if I made a list, then I would lose the list." However, she agreed that she also broke learning tasks into parts in order to make her learning manageable.

When asked what a teacher can do to enhance or facilitate their learning, the Retainers had many suggestions. First and foremost, the students agreed on the need for repetition: "I love it when you [instructor] repeat things three times." They also gave these following suggestions:

(a) Visual cues,
(b) Humor,
(c) Games,
(d) Provide the correct spelling of new terms,
(e) Define new terms,
(f) Use simple terms,
(g) Stories that apply to the topic,
(h) Structured group activities, and
(i) Outlines.

Retainers feel it is important for the teacher to be organized.

> The first few minutes and the last few minutes of a class are the most important for me because that's usually when a teacher tells the students what will be covered during the class and at the end what's coming up or is due. It helps me be organized so I try never to be late, and I stay

> until the end of every class because I don't want to miss what I think are the most important parts of any class.

In addition to a teacher being organized, the Retainers also outlined the attributes of a teacher who enhance their learning. These included:

(a) A teacher who shows mutual respect for the students,
(b) A teacher who is personally involved,
(c) Teachers need to shows enthusiasm and interest,
(d) Teachers who are sincere and patient, and
(e) Teachers who show encouragement.

Retainers believe that students need to be held accountable as much as possible in class by the instructor. They agreed that their learning was improved if teachers saw to it that this student accountability was enforced. Accountability of the student means that the instructor expects students to be prepared for and to participate in class and to be respectful of all members in the class. One student summed this up by pointing out:

> It does me no good to participate in a group activity if there is no accountability. Several times I have been in groups in class where the teacher told us to discuss the material for the next hour with no guidelines or questions. Then the teacher would just leave the room and not come back. Well, this is not helpful to me. It would have been so much better if we knew we were going to have to report back to the class either that day or the next day or something. This was a waste of our time, and the other people in the groups agreed. In fact, after that we would all just go home because we figured we could read it [the material] for ourselves.

The Retainers are a group of learners who memorize much of what they learn through the use of repetition and mnemonic devices. They are not very concerned with motivation as they view learning as a job in the formal educational setting. While this group of learners view learning as a job, this job is very important to them. While they are good at identifying and using human resources, they use few critical thinking learning strategies in their learning activities. This group of learners plans their learning, is quite sequential in their approach to learning, and is easily distracted during the learning task.

CHAPTER 6

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

Nursing education is clearly only a beginning of lifelong learning for individuals who enter the discipline of nursing. "The key component of nursing practice, regardless of practice site, is the nurse's ability to process information and to make decisions" (Pardue, 1987, p. 354). Educators in the nursing field have focused much attention not only on the ability of a nurse to process information but also on how it is that a nurse arrives at decisions for patient care. This attention has especially involved critical thinking to the extent that critical thinking is now a required educational outcome by national accrediting agencies in nursing. Nursing educators, like their colleagues in other disciplines, have struggled to define and measure critical thinking. Nursing education to date has failed to show an impact on the critical thinking abilities of nursing students (Kintgen-Andrews, 1991, p. 154).

It is obvious to educators that individual differences exist in how students approach learning. Regardless of the

educational setting, learners use various strategies to accomplish their learning needs. These learning strategies are those techniques or specialized skills that the learner has developed to use in both formal and informal learning situations (McKeachie, 1988b). Learning strategies are "the techniques and skills that an individual elects to use in order to accomplish a specific learning task. Such strategies vary by individual and by learning objective" (Fellenz & Conti, 1989, pp. 7-8). Researchers such as Conti and Kolody (1995), Hays (1995), Hill (1992), Kolody and Conti (1996), Strakal (1995), and Yabui (1992) have found that various groups of learners can be distinguished by the learning strategies that they use based on the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS). Five learning strategy areas are included in the SKILLS instrument. The areas include Metacognition, Metamotivation, Memory, Critical Thinking, and Resource Management.

Given the rapid changes in the health care industry, the growing interest in how nurses do critical thinking in their decisions about patient care and the need for lifelong learning in the discipline of nursing, a knowledge of learning strategies may provide a potentially important link to the individual nursing student's success. This may well impact the success of nursing education in meeting the

challenges of providing quality education in a health care environment of shrinking resources.

Therefore, the purpose of this study was to expand upon the growing area of learning strategy research by describing the learning strategies of adult nursing students at the six registered nursing (RN) programs in Montana. It investigated the relationship between learning strategies used in both personal and nursing situations, differences in learning strategies used by members of the various nursing programs, and whether demographic variables had an impact on student selection of learning strategies. Lastly, the study identified and described four distinct groups of nursing student learners. A total of 192 nursing students participated in the study; 167 were females and 25 were males. Although there were 15 non-Caucasian students in this study, their numbers were not sufficient to warrant the analysis of ethnicity as a separate variable in this study.

Data were collected at the five campus sites during the early part of spring semester, 1996, from nursing students who volunteered to participate in the study. Two of the six nursing programs are located at the same site, thus there were only five sites. Data were gathered from several sources: (a) a demographic survey, (b) Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS), and (c) focus group responses. The 192 nursing students who completed both the SKILLS and the demographic surveys were

included in both discriminant and cluster statistical analyses. Two focus group interviews per learner cluster were conducted at two geographic sites during April and May of 1996 to further describe the learner clusters.

A deductive approach to data analysis was employed first. Multivariate analyses were used. The multivariate procedure of discriminant analysis was performed on the data in order to determine if nursing students from the two different degree programs of nursing, associate and baccalaureate, used different learning strategies. In addition, discriminant analysis was used to determine if the nursing students at the various sites used different learning strategies. Using an inductive approach, cluster analysis was then employed to discover if there were clusters of participants who think and learn in the same manner. Four distinct cluster groups were identified in this study. Members from each of the learner clusters were interviewed in focus groups.

Profiles of Learners

The study investigated if there was a difference in the learning strategies used by nursing students in Montana in personal versus nursing situations. Scores gathered by the SKILLS instrument were used to determine the learning profiles of the student participants. The SKILLS scores for the learning strategy areas of Metacognition, Metamotivation,

Memory, Critical Thinking, and Resource Management revealed that participants scored low in the Metamotivation (21.79) area. Scores in Critical Thinking and Resource Management were 23.98 and 23.83, respectively. Montana nursing students tend to use the learning strategy areas of Metacognition and Memory more often than Metamotivation, Critical Thinking, or Resource Management.

Scores computed from each of the 15 learning strategies within the SKILLS instrument revealed individual learning strategy profiles of the participants. Means of the individual learning strategies ranged from a low 5.95 for Metamotivation--Reward/Enjoyment to 9.41 for Metacognition--Planning. A pattern similar to the area means of learning strategy use revealed that nursing students used the individual learning strategies of Metacognition--Planning and Monitoring and Memory--Using External Aids the most in their learning. They used Metamotivation--Reward/Enjoyment the least in their learning. Thus, they use the learning strategies in the areas of Metacognition and Memory more than those in the learning strategies areas of Metamotivation, Critical Thinking, or Resource Management.

The *t*-test was used to compare the means of the SKILLS scores gathered in the personal life scenarios to the means of the scores gathered in the nursing or professional scenarios. All of the personal-life learning situation means fell within the range of 10.82 (Metamotivation) to

12.59 (Memory). The scores from the nursing situations revealed a similar pattern with the low mean of 10.97 for Metamotivation but with a different high mean of 12.59 for Metacognition. Significant differences were found between the personal-life situations and nursing situations scores in the areas of Critical Thinking and Resource Management. There were no significant differences in the areas of Memory, Metacognition, or Metamotivation. Analysis of the scores showed that students used the learning area of Memory (12.59) the most and Metacognition (12.57) the second most in personal-life learning situations. In the two areas that showed significant differences between personal and nursing situations, the students used the Resource Management area learning strategies more in nursing than in personal situations. However, the reverse of this was true for Critical Thinking. The students used the Critical Thinking area learning strategies more in personal-life than in nursing situations. Metamotivation means were low in both personal (10.82) and nursing (10.97) situations.

Significant differences were found in 11 of the 15 individual learning strategies between personal and nursing situations. These included Metacognition--Planning and Adjusting; Metamotivation--Attention and Confidence; Memory--Organization, Using External Aids, and Memory--Application; Critical Thinking--Testing Assumptions, Generating Alternatives, and Conditional Acceptance; and

Resource Management--Critical Use of Resources. The Metacognition--Planning learning strategy had the highest (4.97) of any mean while its associated learning strategy of Adjusting scored low (3.30) in the nursing situations. The Memory strategy of Using External Aids was the highest (4.79) in personal-life situations. Metamotivation--Reward/Enjoyment had the two lowest means for personal (2.90) and nursing (3.05) learning situations.

Discriminant Analyses

The first discriminant analysis examined if it was possible to discriminate between the type of nursing program based upon the learning strategies used by the students in each program. The two types of programs were the associate degree nursing program and the baccalaureate degree nursing program. The analysis indicated that only four variables had sufficient coefficients to be included in the discriminant function. This discriminant function analysis was only 65% accurate in classifying cases and provided only a 15% improvement over chance in group placement. Based on this analysis, it was not possible to distinguish nursing program based on SKILLS learning strategy scores.

To determine if learning strategy usage differed between the students at the respective campus programs, participants were divided into program campus groupings. A second discriminant analysis investigated the relationship

of SKILLS learning strategies usage and campus group. Five discriminant functions were produced in this analysis. However, none of the functions were named because of the low discriminating power of all of the five functions and because these functions were only 36% accurate in classifying the student nurses in the correct group. Thus, it was not possible to distinguish program campus group membership based on learning strategy scores.

Cluster Analysis

Cluster analysis procedures were used to determine if it was possible to identify distinct clusters of nursing student learners based on SKILLS scores. This process identified four specific learner groups. Each group had distinctive characteristics based upon the learning strategies used by the group. The demographic variables of age, gender, and grade point average were not significant in distinguishing among these groups of learners. Two focus groups were held with members of each cluster to provide additional data in naming and describing the clusters. The focus groups were videotaped.

Based on the quantitative and qualitative data, the groups were named the Intuitives, the Reinforcers, the Independents, and the Retainers. Participants were distributed among the four groups as follows: the Intuitives--50, the Reinforcers--48, the Independents--39,

and the Retainers--55. The Intuitives are learners who need time to consider their learning and make many adjustments in their approaches to learning. The Reinforcers are highly motivated learners who enjoy learning and who focus on concepts rather than individual facts. The Independents structure their learning environment to assist in their learning and are overwhelmed by the big picture of a learning activity or too many resources. The Retainers use memory retention as a primary method of learning, use a sequential approach to learning, and are not concerned with reflection or motivation in their learning.

Nursing Student Learners

Conclusions

Groups of nursing students in Montana learn in similar ways without influence from their respective nursing program approach.

Distinct learner groups exist within the full-time nursing students in the six registered nursing programs in Montana. These groups are not influenced by the demographic variables of age, gender, or grade point average.

Nursing students approach professional learning differently than learning for personal situations.

Distinct learner groups exist among the full-time nursing students in the six registered nursing programs in Montana. The results of the discriminant analysis showed that it was not possible to predict or distinguish learners in a nursing program based on campus or the type of nursing

program. Thus, the different types of nursing student learners are equally distributed at all of the programs and at all of the campuses. When combined with the cluster analysis data, these distinct learner groups are found at all programs.

From the results of the cluster analysis, four distinct groups of learners exist in the Montana registered nursing programs. These four groups are named the Intuitives, the Reinforcers, the Independents, and the Retainers. Demographic variables were not significant in the way nursing students use learning strategies. These groups are compatible with the findings by Kolody (1997). In her study of 1,143 learners in Canadian two-year colleges, Kolody found five distinct learner groups. Although the groups were given different names and although they differ slightly in some characteristics, each of the groups of nursing students is very similar to one of the groups identified by Kolody. Kolody's study was general in nature and was representative of all of the students at five two-year schools in Alberta. This study had a smaller population and contained learners with a narrower learning focus. Nevertheless, the similarities among the groups suggests that the descriptions of the groups of learners in each of the studies is stable and that these nursing groups are a subset of Kolody's more general groups. However, the description of the subset of groups is more specific to

learners in a nursing program. Kolody's groups were named the Navigators, the Monitors, the Critical Thinkers, the Engagers, and the Networkers. Kolody's Critical Thinkers match the Intuitives in this study the closest of the groups. Their descriptions are very similar. The Navigators are similar to the Retainers as both of these groups of learners are frustrated with a casual approach to learning and pursue learning as a job. The Monitors are very similar to the Reinforcers. While Kolody's Monitors use Monitoring as a major way to learn, this study's Reinforcers use Attention to their learning the most. The Engagers are similar to the Independents in their need for exploration of learning. Both groups use Confidence in their learning and while the Engagers use more Monitoring than the Independents, they both share a passion for learning or the "need to know." Finally, the group of learners that was not found in the nursing students is the Networkers. This may have to do with the more serious nature of nursing students. The Networkers were described as learners who integrate others into the social processes of learning and who focus on the process of learning rather than the output. Nursing students do focus on the outcome of their nursing programs and in that manner alone are much more focused learners.

Recommendations

An adult learning strategies course should be designed and offered at all five campuses that offer a registered nursing program in Montana.

Nursing students in Montana should be given the SKILLS inventory on admission to their respective nursing program so that students can be made aware of what strategies they are currently using.

Nursing students in Montana should be given information on the four groups of learners for self-understanding and understanding of the learning by their peers.

Nursing students and faculty should be made aware of the different learning approaches used in professional and personal learning.

Both nursing faculty and administrators at the colleges in Montana who offer registered nursing programs should be informed of the four groups of nursing student learners and that they are present on all campuses.

Providing students with information about adult learning strategies can maximize their cognitive abilities in the course of their study. Both faculty and students could benefit from a course that discusses the importance of knowing what learning strategies are and how they can be applied to academic settings. Students could also be advised as to which other students learn in a similar fashion to them. Knowledge of how to learn and the practicing of lifelong learning strategies are consistent with Kidd (1976), Knowles (1973, 1975, 1980), and Smith (1982) who emphasize adult education as a place where lifelong learning skills are either learned or practiced. This emphasis on learning can help students to make their

learning focused and efficient. Therefore, an adult learning strategies course should be designed and offered at all five campuses that offer a registered nursing program in Montana.

Since all Montana campuses are seeing an increase in nontraditional students, faculty and students can benefit from a course that discusses the importance of knowing what learning strategies are and how they can be applied to academic settings. Knowledge of adult learning principles and learning strategies use can enhance the curricula, teaching methods, and the learning success of the students both in nursing and non-nursing courses of study. Included in the course could be the information on the differences in learning strategy approach when a nursing student approaches personal or professional learning. Information on the four groups can be included in the course or offered in some other type of in-service training for students, faculty, and administrators.

Nursing Students and Critical Thinking

Conclusions

Nursing students in Montana use more critical thinking learning strategies in their personal-life learning situations than they do in their nursing learning situations.

While one group of nursing student learners utilizes critical thinking learning strategies, most nursing students are not using critical

thinking learning strategies to any appreciable extent in their nursing educational programs.

The use of critical thinking learning strategies are not associated with the type of program in which a student is enrolled.

Although diverse learning groups exist, all groups acknowledged that they learn best from teachers who include personal nursing experiences in their teaching.

While tremendous lip service has been given to curricular development that includes content and activities in critical thinking in nursing education, it appears that it is only that. Nursing programs say they are teaching critical thinking, but the students in this study reported that they are not using critical thinking strategies to any appreciable extent in their nursing education learning.

Nursing students in registered nursing programs in higher education do not differ in their use of critical thinking learning strategies by program. Only one learner cluster, the Intuitives, use critical thinking strategies extensively in their learning. Students from both programs indicated a significantly higher use of critical thinking learning strategies in personal rather than in nursing situations. The Intuitives who make up approximately one-fourth of the Montana nursing students use critical thinking learning strategies extensively in their learning. However, that leaves three-fourths of the Montana nursing students who use critical thinking learning strategies minimally in their learning.

Benner (1984) sees the newly graduated nurse as a Novice, one who has "rule governed behavior [which] is limited and inflexible" (p. 20). While the assumption is that the skill of critical thinking is inherent within nursing practice, this skill may not appear until the student has tangible patient experiences to relate to in actual practice. This is the reflective part of critical thinking. Given that students' clinical time has been decreased in all nursing programs, it may be that nursing students do not have enough "real" patient experiences to allow for the development of critical thinking in their entry level programs of study. Critical thinking may only develop after graduation from the pre-service program and when the individual is in actual nursing practice. Benner sees an Expert Nurse as one who "has an intuitive grasp of each situation and zeros in on the accurate region of the problem without wasteful consideration of a large range of unfruitful alternative diagnoses and solutions" (pp. 31-32). This has to do with the reflective nature of critical thinking. The nurse reflects back to some other patient experience or experiences and makes much more efficient decisions regarding patient care. Schon (1987) discusses this same type of situation in his work on the reflective practitioner.

To date, nursing education has failed to impact the critical thinking skills of nursing students

(Kintgen-Andrews, 1991). This study supports that a nursing student is a Novice upon graduation and only about one-fourth of them use critical thinking learning strategies to any extent in their nursing practice. The Intuitives have always used the Critical Thinking skill of Generating Alternatives in their learning, but the other three groups use Critical Thinking strategies very little in their learning. Intuitives said, "Oh, I do that all the time" when asked about hypothesizing in their approach to learning. However, the others are not learning these general critical thinking skills which can be applied to their learning.

Recommendations

> Nursing faculty need to teach critical thinking skills to the Reinforcers, Independents, and Retainers and to allow for practicing of critical thinking skills by the Intuitives in their teaching of nursing.
>
> In their teaching of nursing, faculty need to incorporate their own clinical experiences into their teaching of nursing students.

All four groups of learners indicated that they wanted their nursing faculty to share clinical experiences in the course of the nursing curriculum much more than was currently occurring. This was summed up by the student who declared that "I think the nursing faculty could do a much better job with this [sharing clinical experiences]. They miss many opportunities to bring in clinical examples." A

method for making the learning "real" through sharing personal clinical experiences is a way to increase the learning base for nursing students. The students say they need this "base" or "something I can hook it onto" so that they can then draw upon the base and begin to do critical thinking. A baccalaureate nursing student even commented that when she found herself in an actual nursing crisis situation, the way she thought about it was:

> I remembered you [nursing instructor] telling us about a time when you gave a narcotic medication intravenously and the patient had an immediate, severe, life threatening allergic reaction. And I thought, now what did Suzanne do? I remembered you sent for the crash cart. So that's just what I did.

It would be especially useful if specific critical thinking strategies would be introduced during the delivery of the nursing curriculum to attempt to measure an increase in critical thinking over time. To date, nursing education has failed to show any significant impact on the critical thinking ability of nursing students (Kintgen-Andrews, 1991). The Watson-Glaser Critical Inventory has been the primary instrument used in studies of critical thinking in nursing education. This tool's definition of critical thinking does not include the concept of reflection or the affective component of critical thinking and thus does not measure all aspects of critical thinking as defined by current leaders like Brookfield. The reflective nature of critical thinking is included in the more recent views of

critical thinking. In any good research design, minimally, the research tool selected should use the same definition of a concept as the researcher's definition. The Watson-Glaser (1980) tool does not include the crucial area of reflection. Instead, if defines critical thinking as the

> composite of knowledge and attitudes including: 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; knowledge of the nature of valid inferences, abstractions and generalizations in which the weight or accuracy of different kinds of evidence are logically determined; and skills in employing and applying these attitudes and knowledge. (p. 1)

If a researcher accepts the reflective nature of critical thinking as postulated by Brookfield (1987) and Schon (1987), then a different instrument needs to be used in future studies of critical thinking in nursing education.

Nursing Education

Conclusions

Nursing education faculty impart few critical thinking strategies to Montana registered nursing students so that students incorporate this skill into their professional learning.

Actual patient situations are important for Montana nursing students in their learning.

Nursing faculty share little of their clinical vision of nursing in their teaching with Montana nursing students.

Demographic variables are not meaningful in describing the learning profiles of nursing students in Montana.

There are specific teaching strategies that nursing faculty can use to enhance the learning of the four distinct types of Montana nursing student learners.

Group work must be meaningful to be an effective teaching and learning strategy for Montana nursing students.

Due to limitations of the instrument, the Watson-Glaser Critical Thinking Inventory, provides an incomplete description of the critical thinking skills of nursing students.

Approximately three-fourths of the nursing students in Montana use critical thinking learning strategies far less than Memory or Metacognition--Planning learning strategies in their learning. While the Intuitives use critical thinking learning strategies in their learning, there are three other groups of learners who use critical thinking learning strategies very little in their learning. To date, there have been no studies in nursing that support nursing education's impact on the critical thinking skills of nursing students (Kintgen-Andrews, 1991). All of the studies to date have used the Watson-Glaser Critical Thinking Inventory as a way to measure critical thinking skills. However, the definition of critical thinking used in this older instrument does not include the reflective aspect of critical thinking.

While there is not consensus on the definition of critical thinking, to use an instrument based on a definition that does not include the concept of reflection on learning adds little to the currently evolving knowledge

of this concept. Brookfield (1987) defines critical thinking as "a reasonable, reflective thinking focused on deciding what to believe or do. It includes identifying and challenging assumptions, challenging the importance of context, imagining and exploring alternatives, and reflective skepticism" (p. 12). Given the limitations of the Watson-Glaser Critical Thinking Inventory, researchers need to be very careful in continuing to use this instrument in nursing studies on critical thinking.

Even Bevis (1993), a noted proponent of the behavioral model for years, has now advocated a change in the standard behavioral model of nursing education to a more emancipated model. This study certainly lends credibility to that move. In order for students to have the environment in which to learn or practice adult learning strategies including critical thinking, the whole curricular emphasis needs to shift so that nursing faculty are treating students as adult learners.

Smith (1982) believes that within the context of adult education adult learners either learn the skills of lifelong learning such as critical thinking or have a place to practice these skills. The Intuitives can practice critical thinking in their nursing programs. However, the Reinforcers, the Independents, and the Retainers need to first be given instruction on how to do critical thinking

before they can practice this necessary skill in the discipline of nursing.

Given that demographics do not impact learning strategies, it may be time for researchers to use alternative ways to look at learning. Perhaps researchers need to be the "reflective practitioner" (Schon, 1987) and use other means to investigate learning. Instead of using a psychological, unidimensional approach to the study of learning, it may be time to use a multidimensional, sociological approach to learning. A linear approach to the description of a complicated process such as learning requires expanded research approaches for description and definition.

There are specific teaching behaviors and techniques that teachers can implement which nursing students say will facilitate their learning. Common to and emphasized by all four learner groups was the request that nursing faculty share their vision and practice of nursing with their students. The Intuitives want teachers to share nursing examples that relate to the topic and to "physically involve" them in their learning with applications of the nursing learning. One Intuitive said, "I need more than one dimension so I can get involved in my learning. I really liked the role playing we did in psychiatric nursing class." The Intuitives need for these examples to relate directly to the topic at hand, or they are distracted. They also want

the examples to be current. Several Intuitives viewed examples from teachers as negative because the examples were not from current practice. The Reinforcers want their teachers to "provide examples, case studies, and personal examples." Several Reinforcers commented on how important it was for their teachers to be "role models" for them and to share "what and how you [the instructor] think." Other Reinforcers supported their group member who said, "I think the nursing faculty could do a better job here" of sharing personal nursing experiences with them. The Independents emphasized the "human element" in the sharing of nursing examples with them. They suggested that mutual respect was supported when nursing faculty were willing to occasionally share a personal example when it allowed for the association of their learning. Lastly, the Reinforcers really want nursing examples that "relate to the topic," and are repetition of the topic.

Other attributes and behaviors of teachers that focus group members identified included sincerity and enthusiasm by all except the Intuitives. The Intuitives want their teachers to be organized, willing to take time to answer questions, and able to "summarize the big picture for me." The Retainers want their teachers to encourage them in their learning, and the Reinforcers desire teachers "who are on my side." All groups commented on the need for their teachers to be "knowledgeable" and "human." All of the groups except

the Intuitives wanted their teachers to include humor in their teaching. This lack of a desire for humor by the Intuitives is contrary to adult teaching and learning theory which says that adult learning is facilitated by humor. This may have more to do with humor being used inappropriately by faculty members in front of students.

Another finding that is contrary to adult learning theory is that of the use of small group work. Both the Reinforcers and the Independents said they did not learn well in groups. The Independents only wanted to study with one other person, and the Reinforcers said they were distracted in groups. This may have to do more with the fact that the group work was not meaningful or structured. One Reinforcer gave an example of being in a group that had no accountability and felt that "it was a waste of my time."

While all the groups want nursing faculty to share what it is like to be a nurse with them, the groups were clearly different in their needs and suggestions for teaching strategies that facilitate student nursing learning. Their learning needs in regard to the big picture are quite different. The Reinforcers need the big picture so that they can plan their learning. This group is extremely motivated and if a teacher gives them the big picture and shares their vision of nursing, the Reinforcers will plan and do their learning with few other teaching strategies needed. The Intuitives want teachers to summarize the big

picture for them and to have the big picture written down somewhere for reference. The Independents do not want the big picture ever as they are overwhelmed by it. They want teachers to tell them the parts of learning to be accomplished. The Retainers only want to hear the big picture initially in their learning, then they break it down for themselves.

Another area where the learning needs are different depending on learner group and can be adjusted by the teacher involves the use of group work. The Intuitives want opportunities for "physical involvement" in their learning including group work. This group of learners also needs very clear expectations defined for them. One Intuitive, "I really liked the role plays we did in psychiatric nursing."

The Independents are overwhelmed with too many resources or expectations. Both the Intuitives and the Independents want their teachers to be organized in their teaching because they have difficulty being organized in their learning. The Retainers want repetition and definitions while the other three groups do not need this repetition or definitions. Both the Retainers and the Intuitives want active participation in the form of games and structured group work. One student commented, "I learned so much in those games you [the instructor] did, like Jeopardy." The Retainers want teachers to hold students accountable, and the Reinforcers want teachers to

set up activities so that they can teach something to others.

Unlike the Reinforcers, the Intuitives, Independents, and Retainers all request visual cues and outlines or written handouts. The Reinforcers want to "hear" the material; consequently these students often sit in the front of the class so they can hear better.

The students from all four distinct learner groups emphasized the importance of faculty sharing actual nursing clinical experiences to facilitate their nursing education. "Why don't we just go to the hospital and do it [our learning] there? I mean, there doesn't seem to be much point in our making beds in the lab. Let's do it all where it is real to us." However, as with all their learning, these hands-on activities must be meaningful. The students emphasized the importance of "hands-on" and "doing it" types of learning activities for them both quantitatively and qualitatively. One student said this extremely well, "You know you can tell me to push on someone's bladder and it will make them urinate. But until I actually do it and watch it happen, I won't learn it." The number of comments and consistency among groups on comments by participants on the need for "hands on" learning supports patient experiences. This strongly indicates the need for continued actual patient experiences in nursing education.

Based on the students' comments about not wanting to do group work in their learning, it is apparent that educators must make group work meaningful for it to be an effective teaching method in nursing education. Both the Independents and the Intuitives commented on group learning exercises that only frustrated their learning. Following active participatory methods of teaching, group work needs to have clear expectations and outcomes to be effective. It requires planning by the nursing educator so that it can be an effective teaching method. Some of the students in this study who experienced meaningful group work commented positively about those learning experiences as with "I really liked those role plays we did in psych nursing."

Recommendations

Nursing faculty need to be encouraged to participate in clinical practice as part of their teaching duties.

Nursing faculty need to be informed as to just how important it is for nursing student learning for them to share relevant clinical experiences with their students much more than they are currently doing.

Nursing faculty should be given in-service education on the components of critical thinking and teaching methods to incorporate this information.

Current clinical hours for students should be maintained.

Nursing faculty need to have in-service education on active participatory methods of teaching.

Nursing faculty need to make group work in nursing education meaningful for students.

Nursing faculty should be informed of the four types of learners they may encounter in the classroom and of strategies that enhance the learning for each group.

Nursing educators should examine the teaching strategies in use now and compare them to what nursing students say facilitates learning.

Nursing educators should be provided professional development opportunities that will allow for the open discussion of both teaching and learning strategies used in their nursing programs.

Nursing faculty should use the teaching strategies appropriate for each group of learners in their teaching situations.

The students' need for learning about the discipline of nursing through examples of clinical practice has implications for teaching. Nursing faculty must somehow combine actual clinical practice with their teaching of nursing education. A nursing educator needs to stay current with nursing practice, so that current, clinical examples can be shared with students.

The nursing students in this study identified many teaching strategies that nursing faculty can use in nursing education which will enhance learning. There are specific teaching strategies that nursing faculty can use to enhance or facilitate the learning of the four distinct types of nursing learners identified in this study. Teaching strategies that were common to all four groups of learners included the use of humor, use of examples, provision of

outlines or handouts, visual cues, clear expectations, and the use of current clinical examples that relate to the material. The teaching strategies unique to the respective learning group follow:

Intuitives

1. Provide application opportunities for the learning,
2. Provide learning activities that physically involve students,
3. Summarize the "big picture" for students,
4. Allow for class discussions,
5. Provide clear expectations for students,
6. Take time to answer questions, and
7. Present information in an organized manner.

Reinforcers

1. Provide the "big picture,"
2. Allow for group discussions,
3. Use case studies,
4. Share personal experiences when it relates to subject,
5. Be enthusiastic and knowledgeable, and
6. Be a positive nursing role model.

Independents

1. Provide for "hands-on" experiences,
2. Share your human element with personal examples,
3. Be organized and enthusiastic,
4. Break the learning task into smaller parts,
5. Provide for activities that allow for "discovery," and
6. Provide a safe learning environment.

Retainers

1. Repeat things at least three times,
2. Structured group activities and games,
3. Give definitions of terms and use simple terms,
4. Hold students accountable,
5. Show enthusiasm and sincerity,
6. Provide prompt feedback to students, and
7. Encourage students.

It is important for faculty to have a well defined concept of not only critical thinking but also the theoretical base from which they determine their own philosophical base. It is from the philosophical base that one decides the purpose of nursing education, the roles of teacher and learner, and the teaching style that evolves. Through opportunities for open discussions among the nursing educators a better understanding of the need for sharing of clinical experiences with students can be identified and acknowledged.

Through these discussions, nursing educators can have an avenue of discussion of the concept of critical thinking in the nursing curricula and a forum through which entry level nursing competencies can be readdressed. It is also an avenue for nursing educators to reinforce the need for clinical experiences for students and themselves.

Discipline of Nursing

Conclusions

> Nursing students will need reinforcement and ongoing education for continued development of critical thinking skills in order to possess these skills upon graduation and entry into nursing practice.

Nursing education programs are the beginning of lifelong learning for individuals who enter the discipline of nursing. Only one-fourth of the nursing students practiced the skills of critical thinking during their

nursing programs. These graduates will continue to develop and refine their critical thinking skills as graduates. However, three-fourths of the nursing graduates were only introduced to critical thinking skills in their nursing programs. These graduates will need mentoring or close supervision in the first months or year of nursing service while they practice their newly acquired critical thinking skills. Nursing service administrators may need to reexamine the way in which they expect new nursing graduates to function. While groups exist within the nursing students, these groups do not vary despite program or campus. They do not vary based on age, grade point average, gender, or program of study. The Reinforcers especially identified the importance of the role of a mentor for them in their learning. Nursing administrators may want to offer several options to newly graduated nurses in how they become oriented to the work place. The Reinforcers could do best with a mentor. The Intuitives may want a mentor or someone to "show" them how its done. The Independents may need one identified resource to access, and the Retainers could benefit from written procedure manuals close at hand.

Recommendations

Administrators and educators in the discipline of nursing will need to provide ongoing support and in-service training of new graduates of registered nursing programs to allow for a transition into the profession for nursing graduates.

Administrators of nursing service institutions will need to be aware that graduates of nursing programs are at the Novice level of competency and will need mentoring or supervision for at least a period of time before they are at the Competent nursing professional level. This time frame for transition into the Nursing profession can easily be six months to one year for graduates of associate or baccalaureate nursing programs.

Nursing Researchers

Conclusions

SKILLS is a useful tool to measure critical thinking learning strategies in nursing students.

Given the problem of nursing education's lack of impact on critical thinking in nursing students, use of this tool may be a new avenue for future research into the critical thinking concept in nursing education. It can be important in nursing education studies to use an instrument like SKILLS which takes into account the "reflective" (Brookfield, 1993) nature of critical thinking. The Intuitives use of Critical Thinking learning strategies was demonstrated both quantitatively and qualitatively. Additionally, the minimal use of Critical Thinking learning strategies by the students in the other three groups was also demonstrated. It was not possible to predict or to distinguish learners in a nursing program based on the

campus or the type of nursing program. In this study, there were no significant differences in learning strategy selection based on program or campus membership. Nursing students in Montana learn in similar ways without influence from their respective nursing program approach. Likewise, the type of learner cluster did not depend on demographic variables which are often used as a basis for research of learning. Therefore, SKILLS can be used with all learner groups to investigate the Critical Thinking learning strategies of nursing students.

Recommendations

Nursing researchers may want to use SKILLS as an instrument to be used in future studies of critical thinking in nursing students.

Nursing researchers should look to new multidimensional views to study learning in nursing students.

Future research should build upon the cluster findings of this study by identifying which of the teaching strategies outlined by the students are the most useful to nursing student learners and if these teaching strategies can make a significant difference in a student nurse's learning.

In the future, nursing researchers need to use a multidimensional view of the process of learning. A multidimensional approach to learning can include multiple realities which will provide a sociological perspective to the field. An Intuitive offered this suggestion to nursing faculty: "I need to be involved in my learning from more than one dimension for it to be meaningful to me." This

student was referring to using more than one reality for her learning. Researchers need to consider more than traditional classroom learning when investigating learning. The concept of learning strategies, the influence of the social environment, the new delivery systems including distance learning, self-directedness in learning, and the changing role of a teacher to that of facilitator are only some of the realities that can be used in future studies in adult learning. The traditional view of investigating learning through demographic variables lends little to the field. Thus, nursing researchers wanting to add to the field of adult nursing learning will need a willingness to examine this concept from more than one dimension. This multidimensional view can be applied to the component of learning critical thinking as well. While the National League of Nursing defines critical thinking as a mandatory educational outcome, it probably needs to be viewed and investigated as a process.

SKILLS and Learning Strategies

Conclusions

SKILLS measures general approaches to learning situations; individuals use different learning strategies for different kinds of life tasks.

SKILLS and the concept of learning strategies are practical tools to assist adults who enroll in any of the registered nursing Montana college programs to successfully complete their program of study.

SKILLS is a practical tool to determine if nursing students in Montana use different learning strategies in personal-life versus nursing learning situations.

Focus groups are an effective way to supplement quantitative data from cluster analyses with qualitative data from detailed descriptions of the clusters.

Effective focus group interviews require planning for content and setting.

The students in this study indicated that their use of learning strategies was significantly different when they approached a personal learning situation versus a nursing learning situation. Their choice of learning strategies changed depending on the life task at hand. Of particular interest was that the students used significantly more critical thinking learning strategies in their personal learning and significantly more resource use in their nursing learning.

As the work place changes and agricultural changes continue in Montana, many adults may seek a career change or retraining. Nursing is a very well-enrolled program of study and has seen an increase in older adults entering college after a long hiatus from formal education. These adults come from varied backgrounds, knowledge bases, and experiences. Gaining knowledge of their own learning strategies may be a good foundation for many of these students to begin their nursing education. "Research has demonstrated that one way to influence the manner in which

students process new information and acquire new skills is to instruct them in the use of learning strategies" (Weinstein, 1988, p.25). SKILLS has been shown to be a practical tool for use in learning settings such as the two-year colleges (Hays, 1995). SKILLS is a tool that could help individuals begin learning how to learn and capitalize on their cognitive strengths. This could well contribute to the successful completion of their nursing programs of study.

Nursing students in Montana use the learning areas of Metacognition and Memory more than they use the areas of Metamotivation, Critical Thinking, or Resource Management. Based on the use of a t-test, it was possible to determine that nursing students use different learning strategies in personal-life situations than in nursing or professional learning situations. Significant differences were found in 12 of the 15 learning strategies. Nursing students use significantly more Resource Management strategies in nursing situations and more Critical Thinking strategies in their personal learning situations. These data support the notion of modifying SKILLS to fit the research situation (McKenna, Conti, & Fellenz, 1994; Moretti, 1994; Strakal, 1995; Yabui, 1993). Like the school administrators in McKenna's (1991) study and the students in Strakal's (1995) study, this study also found that SKILLS was a practical tool to determine

differences in learning strategy use in personal-life and nursing learning situations.

Students used different learning strategies in their personal-life than in nursing situations. These findings support the assumption that learning strategies are the specific "techniques or skills that an individual elects to use to accomplish a learning task" (Fellenz & Conti, 1989, p. 7).

Focus groups were used in this study as a way to supplement the quantitative data from the cluster analysis. The descriptions from the focus groups not only validated the cluster analysis data, but also provided additional insights into just how the groups differed in their approaches to learning. Information regarding teaching strategies common and unique to each learner group was revealed. The learner group participants shared examples of positive and negative group work and their overwhelming need for nursing clinical examples in nursing education. Much of the data obtained through the focus groups were not readily apparent or accessible in the quantitative data alone.

In order for focus groups to be an effective data collection method, a researcher needs to plan for both the content of group discussions and the physical setting for the focus groups. Focus group questions should grow directly from the research questions that were the impetus for the research (Goetz & LeCompte, 1984; Merriam, 1988;

Patton, 1990; Stewart & Shamdasani, 1990). When selecting a physical site for focus groups, particular care is necessary for a setting that affords confidentiality and privacy for participants. Strakal (1995) recommended that the researcher conducting the focus group interviews be "familiar with interviewing techniques" (p. 191). Additionally, this researcher found that an eye to a professional production is necessary if focus groups are videotaped. Attention to quality audio and video equipment, the need for an experienced camera person, and good lighting are all necessary for the tapes to be of production quality.

Recommendations

Researchers using SKILLS should specifically modify the instrument as part of their research design.

Researchers should modify the SKILLS instrument so that it includes either all personal or all professional situations when implemented with specific groups of learner.

Should SKILLS be used in future nursing studies, SKILLS should be modified to include all nursing situations.

Researchers using cluster analysis and including focus group interviews must carefully plan these early in the study design including tailoring specific questions pertaining to the learning cluster.

Researchers planning to videotape the focus group interviews must give particular attention to the lighting, audio, and place for the interviews.

Skills looks at general approaches to learning. Thus, if a researcher wants to study a specific population, the

researcher should modify SKILLS to study the population being examined. A researcher can do that by making SKILLS either general or modified to the population the researcher is investigating.

It was found that by conducting two focus groups for each learning cluster, a better description of the cluster was forthcoming. Also by having questions tailored to the group, there was no domination of the group by any one member or lack of discussion in the groups. The use of a seasoned group leader was very helpful in keeping the groups on task. In fact, the leader had to end most of the sessions at one and one half-hours or the discussions would have continued.

Each of the sessions was videotaped. However, the quality of the videotapes was not as good as expected due to poor lighting, poor audio, or poor focus. For the video to put a "face" to the group, it behooves the researcher to find a studio in which the focus groups can be conducted, to have quality camera and audio equipment, and to have a trained camera person do the actual taping. Of the eight videotapes in this study, one of the videotapes had no audio, one tape was badly out of focus, and one tape's audio had very poor quality. Thus, the use of the resultant combination videotape is sorely limited by human and equipment failures. If the videotaping is not conducted with an eye to a professional production, the videotaping of

the focus group interviews may not be worth the researcher's efforts.

While this study described the learning strategies used by the four learner groups in nursing education, it also solicited and had student input into what teaching strategies are helpful to students in their learning. However, future research is needed into which of these strategies is most useful to students. Given that demographics do not impact learning strategies, it may be time for researchers to use alternative ways to look at learning. Perhaps researchers need to be "reflective practitioners" (Schon, 1987) and use other means to investigate learning. Instead of using a psychological unidimensional approach to the study of learning, it may be time to use a multidimensional sociological approach to learning. A linear approach to the description of a complicated process such as learning requires expanded research approaches for future description and investigation.

Thus, this descriptive case study provides quantitative and qualitative information characterizing nursing students enrolled in one of the six registered nursing educational programs in Montana who were examined with regard to their preferred learning strategies. This descriptive study strongly supports Benner's (1984) view of competency in nursing not only in the baccalaureate programs but also in

the associate degree nursing programs. Benner's theory of nursing competence describes a new graduate of a nursing program as a Novice. A Novice nurse uses rule-guided behavior to function as a nurse with critical thinking processes coming after some time in practice. Four groups of learners exist in each of the nursing educational programs at each of the schools. These groups of student nurses use the same learning strategies regardless of program or campus. Three-fourths of Montana student nurse learners are not using critical thinking as a preferred learning strategy. The assumption has been that critical thinking is inherent in the discipline of nursing. However, nursing education must be more effective in teaching critical thinking skills to students and to also allow for the practicing of those critical thinking skills in current nursing educational programs. This has great implication for nursing education and practice in Montana and perhaps far reaching implication for nursing education nationally. One of these implications is the ongoing need for quality patient experiences by the nursing students within the nursing program of study. These real-life patient applications of theory in practice reinforce the reflective nature of critical thinking and may encourage development of critical thinking in the academic setting. Perhaps it is time that nursing educators stop arguing over requirements

for entry into nursing practice and focus on developing the lifelong learning needed in today's nursing discipline.

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APPENDIXES

APPENDIX A

PERMISSION TO CONDUCT RESEARCH

January 25, 1996

Ms. Laura Lennau
Department of Nursing
Miles Community College
2715 Dickinson St.
Miles City, MT 59301

Dear Ms. Lennau:

The MSU--Bozeman Department of Adult Education would like to invite your participation in a study of the learning strategies used by nursing students in Montana. As you are aware, the NLN is requiring Critical Thinking in BSN curriculum. This study of learning strategies will address critical thinking as well as other learning strategies used by nursing students in both personal and nursing situations. It may well provide some direction for the profession about lifelong learning and thus has implications for nursing education.

This letter is to formalize permission to conduct this educational survey at Miles Community College as part of my doctoral dissertation research. I would like to survey a population of volunteer participants of your nursing program. The survey consists of a questionnaire that asks participants to rank which learning strategies they would use in various personal learning and nursing learning situations. It will take about twenty minutes to complete. This information will then be compiled to indicate each student's learning profile. The participants' identities will be strictly confidential. Students can request a copy of their personal learning profiles if they desire. These will be mailed to these students upon completion of the scoring process.

Data will be collected during or immediately following a regularly scheduled class period. I have spoken with faculty in most of the programs and they have indicated support for the study. I hope to collect data during the end of February or the beginning of March, 1996. I will contact you by phone in a week regarding the scheduling of the survey. Attached are copies of participant statement, biographical data sheet, and a copy of the actual instrument. Enclosed please find a copy of the complete proposal for your review or review by your nursing faculty.

Please indicate by your signature that you concur to grant approval for the study and return to the address below. Thank you very much for your support and encouragement.

Best regards,

Suzanne F. Lockwood, R.N., M.S.N., C.S.
Associate Professor, MSU--Northern
Box 7751, Havre, Montana 59501
(406) 265-4149

_____
Signature & Title*

_____
Print your Name and Title

_____
Date

*Permission granted by telephone.

January 25, 1996

Dr. Maureen Quinn
Department of Nursing
Carroll College
1601 North Benton Ave.
Helena, MT 59625

Dear Dr. Quinn:

The MSU--Bozeman Department of Adult Education would like to invite your participation in a study of the learning strategies used by nursing students in Montana. As you are aware, the NLN is requiring Critical Thinking in BSN curriculum. This study of learning strategies will address critical thinking as well as other learning strategies used by nursing students in both personal and nursing situations. It may well provide some direction for the profession about lifelong learning and thus has implications for nursing education.

This letter is to formalize permission to conduct this educational survey at Carroll College as part of my doctoral dissertation research. I would like to survey a population of volunteer participants of your nursing program. The survey consists of a questionnaire that asks participants to rank which learning strategies they would use in various personal learning and nursing learning situations. It will take about twenty minutes to complete. This information will then be compiled to indicate each student's learning profile. The participants' identities will be strictly confidential. Students can request a copy of their personal learning profiles if they desire. These will be mailed to these students upon completion of the scoring process.

Data will be collected during or immediately following a regularly scheduled class period. I have spoken with faculty in most of the programs and they have indicated support for the study. I hope to collect data during the end of February or the beginning of March, 1996. I will contact you by phone in a week regarding the scheduling of the survey. Attached are copies of participant statement, biographical data sheet, and a copy of the actual instrument. Enclosed please find a copy of the complete proposal for your review or review by your nursing faculty.

Please indicate by your signature that you concur to grant approval for the study and return to the address below. Thank you very much for your support and encouragement.

Best regards,

Suzanne F. Lockwood, R.N., M.S.N., C.S.
Associate Professor, MSU--Northern
Box 7751, Havre, Montana 59501
(406) 265-4149

_____
Signature & Title*

_____
Print your Name and Title

_____
Date

*Permission granted by telephone.

January 25, 1996

Dr. Jackie Swanson
Chairperson Department of Nursing
Montana State University--Northern
P. O. Box 7751
Havre, Montana 59501

Dear Dr. Swanson:

The MSU--Bozeman Department of Adult Education would like to invite your participation in a study of the learning strategies used by nursing students in Montana. As you are aware, the NLN is requiring Critical Thinking in BSN curriculum. This study of learning strategies will address critical thinking as well as other learning strategies used by nursing students in both personal and nursing situations. It may well provide some direction for the profession about lifelong learning and thus has implications for nursing education.

This letter is to formalize permission to conduct this educational survey at MSU--Northern as part of my doctoral dissertation research. I would like to survey a population of volunteer participants of your nursing program. The survey consists of a questionnaire that asks participants to rank which learning strategies they would use in various personal learning and nursing learning situations. It will take about twenty minutes to complete. This information will then be compiled to indicate each student's learning profile. The participants' identities will be strictly confidential. Students can request a copy of their personal learning profiles if they desire. These will be mailed to these students upon completion of the scoring process.

Data will be collected during or immediately following a regularly scheduled class period. I have spoken with faculty in most of the programs and they have indicated support for the study. I hope to collect data during the end of February or the beginning of March, 1996. I will contact you by phone in a week regarding the scheduling of the survey. Attached are copies of participant statement, biographical data sheet, and a copy of the actual instrument. Enclosed please find a copy of the complete proposal for your review or review by your nursing faculty.

Please indicate by your signature that you concur to grant approval for the study and return to the address below. Thank you very much for your support and encouragement.

Best regards,

Suzanne F. Lockwood, R.N., M.S.N., C.S.
Associate Professor, MSU--Northern
Box 7751, Havre, Montana 59501
(406) 265-4149

_____
Signature & Title*

_____
Print your Name and Title

_____
Date

*Permission granted by telephone.

January 25, 1996

Ms. Jacque Dolberry
Department of Nursing
Salish-Kootenai College
Hwy 93
Pablo, MT 59855

Dear Ms. Dolberry:

The MSU--Bozeman Department of Adult Education would like to invite your participation in a study of the learning strategies used by nursing students in Montana. As you are aware, the NLN is requiring Critical Thinking in BSN curriculum. This study of learning strategies will address critical thinking as well as other learning strategies used by nursing students in both personal and nursing situations. It may well provide some direction for the profession about lifelong learning and thus has implications for nursing education.

This letter is to formalize permission to conduct this educational survey at Salish-Kootenai College as part of my doctoral dissertation research. I would like to survey a population of volunteer participants of your nursing program. The survey consists of a questionnaire that asks participants to rank which learning strategies they would use in various personal learning and nursing learning situations. It will take about twenty minutes to complete. This information will then be compiled to indicate each student's learning profile. The participants' identities will be strictly confidential. Students can request a copy of their personal learning profiles if they desire. These will be mailed to these students upon completion of the scoring process.

Data will be collected during or immediately following a regularly scheduled class period. I have spoken with faculty in most of the programs and they have indicated support for the study. I hope to collect data during the end of February or the beginning of March, 1996. I will contact you by phone in a week regarding the scheduling of the survey. Attached are copies of participant statement, biographical data sheet, and a copy of the actual instrument. Enclosed please find a copy of the complete proposal for your review or review by your nursing faculty.

Please indicate by your signature that you concur to grant approval for the study and return to the address below. Thank you very much for your support and encouragement.

Best regards,

Suzanne F. Lockwood, R.N., M.S.N., C.S.
Associate Professor, MSU-Northern
Box 7751, Havre, Montana 59501
(406) 265-4149

_____
Signature & Title*

_____
Print your Name and Title

_____
Date

*Permission granted by telephone.

APPENDIX B

SKILLS INSTRUMENT AND ANSWER SHEET

Directions and Answer Sheet for SKILLS
(Set 3)

First: Read the four scenes dealing with real-life learning situations.

Second: After you have read the four scenes, turn to the pages for these scenes that describe various learning strategies that you might use in these situations. For each scene, select the 5 learning strategies that you would Definitely Use, 5 that you might Possibly Use, and 5 that you would Not Likely Use. Enter the corresponding number for each of these 5 items in the proper box below.

Death and Grief	**Pet Care**	**Medication Administration**	**Cholesterol Level**
Definitely Use	Definitely Use	Definitely Use	Definitely Use
Possibly Use	Possibly Use	Possibly Use	Possibly Use
Not Likely Use	Not Likely Use	Not Likely Use	Not Likely Use

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Real-Life Learning Situations
(Set 3)

DEATH AND GRIEF

Your nursing curriculum has just covered death and the grief process in patients. The faculty believes that nursing students must be tested on nursing content covered in order to demonstrate competency and to prepare you to be a safe practitioner. **How likely are you to use the following learning strategies in preparing for this test over grief and loss?**

PET CARE

You have agreed to watch your friends' pet during their extended vacation. Your friends love their pet. The pet unexpectedly begins to act very strangely, and you do not know what to do. **How likely are you to use the following strategies in finding out how to care for the pet?**

MEDICATION ADMINISTRATION

Nurses have the legal responsibility of medication administration. As a student nurse you are learning the nursing standards related to administering medications. This includes all routes such as oral and injectable drugs. **How likely are you to use the following strategies to learn everything you need to learn and remember about medication administration before you actually administer drugs?**

CHOLESTEROL LEVEL

You have recently visited the doctor and discovered that your cholesterol level is well above a healthy level. You have been advised to regulate this condition through diet. You are now left with the task of learning about proper nutrition and of changing your eating habits. Your next checkup is in six weeks. **How likely are you to use the following strategies in learning what you need to do in order to change your eating habits?**

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DEATH AND GRIEF

Your nursing curriculum has just covered death and the grief process in patients. The faculty believes that nursing students must be tested on nursing content covered in order to demonstrate competency and to prepare you to be a safe practitioner. **How likely are you to use the following learning strategies in preparing for this test over grief and loss?**

Directions: Select the 5 strategies from the following list of 15 that you feel you would definitely use and place the number of these strategies on the lines in the *Definitely Use* box of the answer sheet. Select 5 other strategies that you might possibly use and place the number of these strategies in the *Possibly Use* box of the answer sheet. Select 5 other strategies that you would least likely use and place the number of these strategies on the lines in the *Not Likely Use* box of the answer sheet.

1. Start the learning by looking at materials to determine what is most important to study
2. Making up your mind to study this content because you want to pass this test
3. Asking your instructor whether there is additional material to help students prepare for this test
4. Thinking about the advantages and disadvantages of being successful on this exam
5. Reminding yourself periodically that you want to continue in this chosen profession
6. Checking out answers in your study guide with a faculty member when you disagree with answers provided
7. Stopping to ask yourself questions while studying to see if you are remembering specific information
8. Studying confidently for the test because you are sure you will pass if you do study
9. Developing visual images in your mind, such as picturing a page in the text, to help you remember
10. Finding another nursing student taking the test who can quiz you over the material
11. Making a list of the things you have trouble remembering in order to review them often before the test
12. Asking yourself whether there might be a better way of studying for the test
13. Thinking about past experiences you have had taking exams so you can avoid difficulties on this test
14. Deciding to stop studying when you feel you are prepared for the exam
15. Thinking through the differences between things you learn that may help you pass the test and those that may actually improve your nursing skills in dealing with patients faced with death and loss

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MEDICATION ADMINISTRATION

Nurses have the legal responsibility of medication administration. As a student nurse you are learning the nursing standards related to administering medications. This includes all routes such as oral and injectable drugs. **How likely are you to use the following strategies to learn everything you need to learn and remember about medication administration before you actually administer drugs?**

Directions: Select the 5 strategies from the following list of 15 that you feel you would definitely use and place the number of these strategies on the lines in the *Definitely Use* box of the answer sheet. Select 5 other strategies that you might possibly use and place the number of these strategies in the *Possibly Use* box of the answer sheet. Select 5 other strategies that you would least likely use and place the number of these strategies on the lines in the *Not Likely Use* box of the answer sheet.

1. Thinking through what kind of information and facts you want to learn
2. Setting aside a specific time when you are going to study medication administration
3. Checking the computerized catalog at the college library to see if there are additional resources on giving medications
4. Looking for the overall framework of standards of care that govern medications
5. Stopping to think how nice it will be to have a patient tell you that you give good shots
6. Checking with some expert to see if your text is a trustworthy source for information about drugs
7. Comparing your understanding of how to give medications safely with another nurse to see what else you might need to learn
8. Stopping to reassure yourself that you can find the information on drugs that you need in order to safely administer them to patients
9. Painting a mental picture of a clinical area where you are successfully giving medications to a patient
10. Discussing your ideas with other nurses who have been giving medications for a long time to see see if their insights are different from what you are learning
11. Jotting down notes about the major points you want to remember
12. Asking yourself if there are other ways besides what you have studied to give medications to patients
13. Reflecting on similar experiences that you may have had that give you insight into the attitudes and techniques that work best for you
14. Deciding when the information you have is adequate for you to safely administer medications to patients
15. Accepting your instructor's method for giving medications but continuing to look for new innovations in technique

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PET CARE

You have agreed to watch your friends' pet during their extended vacation. Your friends love their pet. The pet unexpectedly begins to act very strangely, and you do not know what to do. **How likely are you to use the following strategies in finding out how to care for the pet?**

Directions: Select the 5 strategies from the following list of 15 that you feel you would definitely use and place the number of these strategies on the lines in the *Definitely Use* box of the answer sheet. Select 5 other strategies that you might possibly use and place the number of these strategies in the *Possibly Use* box of the answer sheet. Select 5 other strategies that you would least likely use and place the number of these strategies on the lines in the *Not Likely Use* box of the answer sheet.

1. Identifying what you need to know in this unexpected situation to care for the pet
2. Admitting to yourself that you need to begin immediately paying close attention to the pet's behavior
3. Beginning to form a list of resources you might use to check the pet's behavior
4. Questioning whether there are things other than illness that could be causing the pet's strange behavior
5. Reminding yourself of how hard it would be to tell your friends that something happened to their pet
6. Checking with several other people who should be knowledgeable about this type of pet to see if all give similar advise
7. Checking to see if what you are finding out is helping you understand the pet's behavior
8. Reflecting on your experience with other pets to reassure yourself that you can take control of this matter
9. Watching for patterns in the pet's behavior so you will remember exactly how the pet is acting
10. Discussing the pet's behavior with someone who has a similar type of pet
11. Writing down changes in the pet's behavior so you will be able to describe them to others
12. Checking whether the pet's behavior could be due to your friend's absence
13. Recalling similar experiences with other pets to figure out what to look for
14. Deciding if you have enough information to make a decision to begin to care for the pet
15. Testing one of the suggestions you have gotten to see if it changes the pet's strange behavior

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CHOLESTEROL LEVEL

You have recently visited the doctor and discovered that your cholesterol level is well above a healthy level. You have been advised to regulate this condition through diet. You are now left with the task of learning about proper nutrition and of changing your eating habits. Your next checkup is in six weeks. **How likely are you to use the following strategies in learning what you need to do in order to change your eating habits?**

Directions: Select the 5 strategies from the following list of 15 that you feel you would definitely use and place the number of these strategies on the lines in the *Definitely Use* box of the answer sheet. Select 5 other strategies that you might possibly use and place the number of these strategies in the *Possibly Use* box of the answer sheet. Select 5 other strategies that you would least likely use and place the number of these strategies on the lines in the *Not Likely Use* box of the answer sheet.

1. Making a plan that will help you learn enough about cholesterol and eating habits
2. Focusing on learning about good diet practices instead of just worrying
3. Getting a book that has recipes for a low cholesterol diet and information on cholesterol from your local book store
4. Checking for other ways of lowering your cholesterol besides changing your diet
5. Reminding yourself how nice it would be to reduce your cholesterol significantly by your next visit to the doctor
6. Setting up an appointment with a dietician to help you make sense of all the information you have been receiving and hearing about
7. Checking to see if what you are learning is actually helping you solve your cholesterol problems
8. Reminding yourself you have been able to learn new health practices before
9. Organizing high cholesterol foods into certain categories to help remember what foods to avoid
10. Calling several friends who have had high cholesterol to discuss what lifestyle changes worked best for them
11. Placing a cholesterol information sheet on your refrigerator as a reminder to change your eating habits
12. Studying various eating habits so you can set prioritize on which changes will have the most impact on lowering your cholesterol
13. Reflecting on previous experiences you have had with diets to know what techniques and attitudes work for you
14. Revising your learning method if you find you are becoming confused
15. Deciding to implement a specific low-cholesterol diet with the understanding that you will periodically check its effectiveness

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APPENDIX C

BIOGRAPHICAL DATA SHEET

Montana State University--Bozeman
Learning strategies Study in Nursing Students

For the Participant

Directions: Montana State University--Bozeman is conducting a study to better understand the learning strategies used by nursing students in the six nursing programs in the state of Montana. One part of the study is to obtain a general overview of the different learning strategies used by nursing students in both personal and professional situations. Another part of the study is to determine if different variables such as age, gender, level of program, or different nursing programs affect these learning strategies. Therefore, if you are willing to complete the attached survey and biographical data sheet, it is understood that you are granting permission for the researcher to link strategy uses and biographical variables to determine your learning profile.

All information which is reported in this study will be reported as group data; therefore, your responses will remain totally anonymous. However, if you would like a personal and private copy of your learning strategies results, please indicate so on the appropriate space on the Biographical Data form.

Thank you very much for your participation.

Biographical Data

This biographical data complements the research project conducted on learning strategies used in personal and professional nursing situations. Your answers are strictly confidential. Thank you for your assistance.

---

1. Social Security: _____ (Will be used only for computer identification as an identification number)
2. Age:_____
3. Gender: Male_____ Female_____
4. Current GPA: _____
5. Nursing Program: ADN _____ BSN _____
6. Level in Nursing Program: ADN Level I_____ Level II_____

   BSN Junior_____ Senior_____
7. Ethnic Background: Caucasian_____ Black _____ Hispanic _____

   Native American Indian _____ Asian _____
8. Campus: Havre_____ Great Falls, ADN _____ Great Falls, BSN _____

   Miles City _____ Pablo _____ Helena _____

Would you like a copy of your learning profile? _____Yes _____No

If you answered yes and/or are willing to be contacted at a later date to participate in a focus group to discuss how you learn, please complete the following:

1. Name: _____
2. Address: _____ (This semester)
3. Phone: _____ (This semester)

Montana State University--Bozeman
Center for Adult Learning Research
Biographical Data

This biographical data compliments the research project conducted on learning strategies used in personal and professional nursing situations. Your answers are strictly confidential. Thank you for your assistance.

---

1. Social Security: _____ (Used as computer identification only)
2. Age:_____
3. Gender: Male_____ Female_____
4. Current GPA: _____
5. Nursing Program: ADN _____ BSN _____
6. Level in Nursing Program: ADN Level I_____ Level II_____
   BSN Junior_____ Senior_____
7. Ethnic Background: Caucasian_____ Black _____ Hispanic _____
   Native American Indian _____ Asian _____
8. Campus: Havre_____ Great Falls, ADN _____ Great Falls, BSN _____
   Miles City _____ Pablo _____ Helena _____

Would you like a copy of your learning profile? _____ Yes _____ No
IF Yes, please provide Name and Address where we can mail your results below:

1. Name: _____

2. Address: _____

If you would be willing to be contacted later in the semester to participate in a focus group to discuss the way you learn with some of your fellow nursing students and this researcher, please indicate below. The focus groups will be determined based on statistical analysis of the data collected through the SKILLS instrument and biographical data responses. Only a selective number of students will be contacted. The focus groups are a way to collect subjective data to add to the objective data already collected. It is a way to better describe the learning in nursing students and can have implications for future nursing education. This would involve an hour or hour and one half of your time outside of school in a neutral location in Great Falls to discuss how you learn with your colleagues. By participating in a focus group you may learn more about the ways you learn and you would be contributing to nursing research. The risks involved in a focus group are that you may experience some anxiety in sharing how you learn with others. This is a completely voluntary activity, one you may withdraw from at any time. Should you volunteer to participate and need to withdraw for any reason, you may do so simply by contacting this researcher, Suzanne F. Lockwood at (406) 265-4149. All responses will be totally confidential and your anonymity will be protected in any follow up reports. The consent forms and data will be kept in a locked cabinet for five years and then will be destroyed.

If we may contact you to give you more information about these focus groups later in the semester, please provide your name and a phone number where we may contact you:

1. Name: _____

2. Phone: _____ (This semester)

APPENDIX D

FOCUS GROUP QUESTIONS

Cluster I

Questions:

1. The analysis suggests that your type of learner is very self-directed in that you make adjustments to improve your learning.
   - Do you do this and, if so, how?
   - What are examples?
   - Would you evaluate/seek feedback?
   - Would you describe yourself as self-directed?

2. The analysis also suggests that you are not overly concerned with memorizing facts, but are more likely to use an application of memory to do problem solving. Would you comment?
   - Are you concerned with avoiding mistakes?
   - How important is it to you to know what to expect in a learning situation?
   - Do you need the "big picture"?
   - Use of mental images?

3. When you are faced with a difficult learning task-- one that is completely out of your realm and you can't draw upon past experiences--
   - How do you go about finding out about it (statistics, IV's, IM's)?
   - What would be the first thing you would do?
   - Where would you go, who would you ask?

4. The analysis suggests that you are a learner who would tend to generate hypotheses or question simplistic answers in your learning instead of just memorizing facts. Could you comment on this?
   - What ways do you do this?
   - Use of rank ordering or brainstorming?
   - Do you ever predict other solutions or envision the future?
   - Ever come up with options?

5. The analysis suggests you are not overly concerned with the enjoyment of learning - learning doesn't have to be or isn't fun. How do you see learning?
   - How do you see yourself motivated?
   - Are the social aspects of learning important to you?
   - Do you need social support?
   - Do you usually feel confident about your learning?
   - How do you reinforce that confidence for yourself?

6. How can a teacher enhance or facilitate your learning? What are the things a teacher can do to make your learning better for you?

Cluster II

Questions:

1. The analysis suggests that this group focuses on learning or what is to be learned, but is not overly concerned with memorization. Would you comment?
   - How do you focus on the material?
   - Have you always done this?
   - How do decide on the techniques to do this?
   - So you really are not concerned with memorizing - how do you go about studying for a test?

2. The analysis also suggests you look for the best way for you to proceed with a learning task. Is this true for you?
   - What are some of the ways you do this?
   - How do you plan your learning?
   - Is the "big picture" important for you? In what ways?
   - What works best for you?

3. When you are faced with a difficult learning task, one that is completely new to you (like statistics or injections), one that you can't draw upon from past experience, how do you go about it?
   - Who do you ask?
   - Where would you go?

4. The analysis suggests that it is very important for you to enjoy learning. Is this true and would you talk about that?
   - Do you view learning as a job?
   - How do you get motivated?
   - What are some ways that you use to stay motivated?
   - Anyone remind themselves of past successes?

5. The analysis suggests that you are a self-directed learner. Does this "fit" for you?
   - How do you direct your learning?
   - Any specific things that you do?
   - Have you always done these things?

6. Please comment on how important the social aspects of learning are for you?

7. What are the ways you would learn more about an assumption? For example, an assumption that is presented with a theory or with a new standard of practice? How would you evaluate this for yourself?
   - Would you be more interested in specifics, generalities, or both?

8. How can a teacher enhance or facilitate your learning? What are the things a teacher can do to make your learning better for you?

Cluster III

Questions:

1. The analysis suggests that you are very motivated to learn. Would you comment?
   - What are ways that energize you to learn?
   - What are examples of the ways you focus on your learning?
   - How do you stay confident about your learning?
   - Ever remind yourself of past successes?

2. The analysis also suggests that you not only recognize the value in learning, but also that you like to have fun with learning. Does this "fit" for you?
   - If so, how?
   - How important is it for you to enjoy your learning?
   - What are some ways that make learning fun?

3. If you are faced with a learning task that is completely out of the realm or your past experience (statistics or injections), how do you go about finding out about it?
   - What would be the first thing you would do?
   - Have you always done this?
   - How organized would you be?
   - Is there anyone you would ask?

4. The analysis suggests that you are highly interested in learning, but that you also would not be too concerned with resources. Do you think this is accurate?
   - How do you go about finding out about resources?
   - Have you always done this or has this changed over time?

5. The analysis suggests that you are first a motivated learner, but that you also do some planning about your learning and that you do use memorization to some extent? Does this seem right to you?
   - What kinds of planning do you do?
   - What kinds of memory devices do you use?

6. If you are given a simplistic answer to a question you ask, how do you respond?
   - Would you tend to think of all the possibilities or just accept what was provided?
   - If you wanted to know more, how would you go about finding out about it?

7. How can a teacher enhance or facilitate your learning? What are specific things that a teacher can do to help you learn?

Cluster IV

Questions:

1. When you are faced with a learning situation, how do you go about identifying or locating the best sources of information?
   - What works for you?
   - How did you pick this up?
   - Have you always done this or where did you learn this technique?

2. The cluster analysis suggests that you are very good at storing information - in other words that you have a good memory - would you agree?
   - What kinds of things do you do to help you remember?
   - What works/What doesn't?
   - Do you use any kind of memory devices?

3. When you are faced with a difficult learning task, one that is completely new to you or completely out of your realm, and you can't draw upon your past experience, how do you go about finding out about it?
   - Where would you go?
   - Who would you ask?
   - What would be the first thing you would do?

4. The cluster analysis showed that this cluster of learner doesn't place a lot of emphasis on the enjoyment of learning. I wonder if you view learning as a job?
   - It looks like you chart a course and follow it whether you enjoy it or not. Could you talk about this?
   - So is it important for you to enjoy your learning?
   - What becomes important for you in your learning?

5. If in your learning, you are presented a very simplistic answer to some idea or question, what would you do to learn more about it?
   - How might you approach this?
   - How would you ask?
   - Where would you go?

6. What are the things a teacher can do to facilitate or enhance your learning?
   What are specific things that a teacher can do to help you learn?

APPENDIX E

SUMMARY OF CLUSTER FINDINGS

Summary of Cluster Findings

Intuitives

Definition:	Learners who make many adjustments in learning and rely on the learning strategies in the area of critical thinking.
Characteristics:	Generate alternatives, practice conditional acceptance, test assumptions, as well as making many adjustments in learning. Use external aids in memory retention. Do not do well with time limits or multiple choice tests.
Teaching Strategies:	Allow for practical applications of learning, provide examples from personal experiences, structure activities that require student involvement and problem-solving approaches. Organize topics and provide clear expectations.

Reinforcers

Definition:	Learners who are highly motivated and cognizant of their learning through a focused, planned approach which they enjoy.
Characteristics:	Rely on planning and attention to their learning through concepts. Use external aids, organization, testing assumptions, and the identification and critical use of resources. Do not memorize facts. Need the big picture.
Teaching Strategies:	Provide the big picture of a learning task including schedules, opportunities for group discussions and case studies. Be a positive role model.

Independents

Definition:	Learners who are passionate, ritualistic learners who plan and attend to their learning, and who are easily distracted.
Characteristics:	Rely heavily on confidence as well as planning and attention to learning. Arrange their physical environment to eliminate distractions. Overwhelmed by too many resources or the big picture.
Teaching Strategies:	Provide for safe and trusting learning atmosphere. Encourage personal exploration of learning in meaningful group work. Break learning tasks into manageable parts.

Retainers

Definition:	Learners who follow a learning task as a job. Use memory learning strategies as a primary way to learn.
Characteristics:	Rely heavily on planning, organization in the form of lists, and using external aids and identification of resources. Use traditional memory techniques. Frustrated by a casual approach to teaching and learning.
Teaching Strategies:	Provide schedules and deadlines, give prompt feedback and use repetition. Outline objectives, use visual cues, summarize main points and encourage students.

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