



Learning strategies of Alberta college students
by Rita Charlene Kolody

A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Education
Montana State University
© Copyright by Rita Charlene Kolody (1997)

Abstract:

Increasingly adult educators are turning to the concept of learning strategies as a means of exploring individual differences in learning. Learners use various strategies to accomplish their learning needs. Using the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS), researchers have found that various groups of learners can be distinguished by learning strategies. This study expanded the learning strategies investigation to adult learners at five two-year colleges in Alberta. The purpose of the study was to identify the learning strategies used by students at these colleges, to investigate the relationship between learning strategies and demographic variables, and to explore patterns of learning of distinct groups that existed in the sample.

The sample included 1,143 learners. Differences in the use of learning strategies were found when the participants were grouped according to gender, type of program, age, and grade point level. Several multivariate analyses using discriminant analysis failed to produce any powerful functions although weak differences were found in the areas of grades, gender, program, and age.

The multivariate technique of cluster analysis, however, did produce a solution with five clear and distinct clusters. Navigators use successful role models to develop their formula for success and are focused learners who chart a course and follow it. Monitors are comparative learners who measure their success according to others' standards. Networkers are learners who constantly adjust their learning strategies and make heavy use of external aids and human resources. Critical Thinkers are the learners who make heavy use of all critical thinking strategies and of memory applications. Engagers are the passionate learners who love to learn and learn with feeling.

The two major conclusions from this study are that distinct groups of learners exist in adult learning situations and that learning strategies are not linked to various demographic variables. Imposing sense upon the data through preconceived groupings with discriminant analysis was not the best way to uncover differences in uses of learning strategies. Instead, cluster analysis and supportive qualitative techniques which allow the data to expose its own patterns were more productive. Based upon the groups found in this way, recommendations were made for teachers, students, and researchers.

LEARNING STRATEGIES OF ALBERTA
COLLEGE STUDENTS

by
Rita Charlene Kolody

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

of
Doctor of Education

MONTANA STATE UNIVERSITY--BOZEMAN
Bozeman, Montana

April 1997

D378
K8344

ii

APPROVAL

of a thesis submitted by

Rita Charlene Kolody

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.

Gary J. Conti
Dr. Gary J. Conti
Chairperson, Graduate Committee

4-17-97
Date

Approved for the Major Department

Gloria Gregg
Dr. Gloria Gregg
Head, Major Department

April 18, 1997
Date

Approved for the College of Graduate Studies

Robert L. Brown
Dr. Robert L. Brown
Graduate Dean

4/27/97
Date

GOLD CREST

25% COTTON



STATEMENT OF PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a doctoral degree at Montana State University--Bozeman, I agree that the Library shall make it available to borrowers under rules of the Library. I further agree that copying of this thesis is allowable only for scholarly purposes, consistent with "fair use" as prescribed in the U.S. Copyright Law. Requests for extensive copying or reproduction of this thesis should be referred to University Microfilms International, 300 North Zeeb Road, Ann Arbor, Michigan 48106, to whom I have granted "the exclusive right to reproduce and distribute my dissertation for sale in and from microform or electronic format, along with the right to reproduce and distribute my abstract in any format in whole or in part."

Signature *Rita Charlene Kolody*
Date *April 10, 1997*

ACKNOWLEDGEMENTS

My utmost appreciation to Dr. Gary Conti, my graduate chair, for his expert guidance and encouragement from the inception of this project through its completion. His wisdom, friendship, and regard for professional development were fundamental to my success. I also wish to thank my graduate committee, Dr. R. Fellenz, Dr. D. Herbster, Dr. W. Lieshoff, Dr. N. Millikin, and Ray Babcock, for their insight and valued direction.

A special note of gratitude to my husband, Gary, and children, Christopher, Sara, and Jameson, for their treasured love, patience, and support. Love also to my parents, Neil and June Judkins, whose precious lessons in life initiated a quest for discovery.

Thank you to Linda for technical support, to the research assistants at Grande Prairie College, Keyano College, Mount Royal College, and Red Deer College for coordinating the study at their sites, and to the many faculty and students at each of the five colleges who participated in the study. Also, much appreciation to my colleagues at Medicine Hat College and in the MSU Adult Education Program for their support of my research.

TABLE OF CONTENTS

	Page
LIST OF TABLES	viii
ABSTRACT	ix
1. INTRODUCTION	1
Adult Learning	1
Learning Strategies	4
Reflective Practice and Canadian Colleges	7
Statement of the Problem	10
Purpose	11
Research Questions	12
Limitations of the Study	13
Definition of Terms	13
2. REVIEW OF THE LITERATURE	16
Adult Learning	16
Four Orientations to Learning	18
Principles of Effective Practice	21
Learning Strategies	24
Metacognition Strategies	27
Planning	28
Monitoring	28
Adjusting	29
Metamotivation Strategies	30
Attention	31
Reward/Enjoyment	32
Confidence	33
Memory Strategies	34
Organization	35
External Aids	36
Memory Application	37
Critical Thinking Strategies	37
Testing Assumptions	38
Generating Alternatives	38
Conditional Acceptance	39
Resource Management Strategies	39
Identification	41
Critical Use	41
Human Resources	41
Canadian Community Colleges	42

TABLE OF CONTENTS--Continued

	Page
3. METHODS AND PROCEDURES	47
Introduction	47
Population	49
Sampling	50
Instrument	51
Validity	52
Reliability	55
Procedures for Data Collection	55
Overview of Data Analysis	57
4. QUANTITATIVE FINDINGS	61
Statistical Profile of the Learners	63
Discriminant Analysis	68
Grades	71
Gender	77
Program	80
Age	83
Summary	87
5. IDENTIFYING GROUPS OF LEARNERS	89
Cluster Analysis	89
ANOVA of the Clusters	91
Interview Data	95
Navigators	98
Monitors	103
Critical Thinkers	109
Engagers	114
Networkers	120
Discriminant Analysis on Clusters	123
Function 1	124
Function 2	126
Function 3	128
Function 4	129

TABLE OF CONTENTS--Continued

	Page
6. CONCLUSIONS & RECOMMENDATIONS	132
Summary	132
Profiles of Learners	133
Discriminant Analysis	134
Grades	134
Gender	135
Program	135
Age	136
Cluster Analysis	136
Conclusions	137
Implications and Recommendations	140
Teaching	140
Teaching Navigators	142
Teaching Monitors	143
Teaching Critical Thinkers	143
Teaching Engagers	144
Teaching Networkers	144
Students	145
Research	146
Epilogue	149
REFERENCES	151

LIST OF TABLES

Table	Page
1. Number of Respondents from Each Participating College	51
2. Age Frequency of Participants	64
3. Program Frequency of Participants	65
4. Distribution of Grade Point Averages	65
5. Ethnicity of Participants	66
6. Means of Learning Strategies Areas of SKILLS Used by Participants	67
7. Means of Individual Learning Strategies of SKILLS Used by Participants	68
8. Cluster Frequency Distribution	91
9. ANOVA of Significantly Different Learning Strategies in Clusters	92
10. ANOVA of Demographic Variables among Clusters	93
11. Means of Cluster Groupings on Learning Strategies and Demographic Variables	95
12. Participants of Qualitative Interviews	97

ABSTRACT

Increasingly adult educators are turning to the concept of learning strategies as a means of exploring individual differences in learning. Learners use various strategies to accomplish their learning needs. Using the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS), researchers have found that various groups of learners can be distinguished by learning strategies. This study expanded the learning strategies investigation to adult learners at five two-year colleges in Alberta. The purpose of the study was to identify the learning strategies used by students at these colleges, to investigate the relationship between learning strategies and demographic variables, and to explore patterns of learning of distinct groups that existed in the sample.

The sample included 1,143 learners. Differences in the use of learning strategies were found when the participants were grouped according to gender, type of program, age, and grade point level. Several multivariate analyses using discriminant analysis failed to produce any powerful functions although weak differences were found in the areas of grades, gender, program, and age.

The multivariate technique of cluster analysis, however, did produce a solution with five clear and distinct clusters. Navigators use successful role models to develop their formula for success and are focused learners who chart a course and follow it. Monitors are comparative learners who measure their success according to others' standards. Networkers are learners who constantly adjust their learning strategies and make heavy use of external aids and human resources. Critical Thinkers are the learners who make heavy use of all critical thinking strategies and of memory applications. Engagers are the passionate learners who love to learn and learn with feeling.

The two major conclusions from this study are that distinct groups of learners exist in adult learning situations and that learning strategies are not linked to various demographic variables. Imposing sense upon the data through preconceived groupings with discriminant analysis was not the best way to uncover differences in uses of learning strategies. Instead, cluster analysis and supportive qualitative techniques which allow the data to expose its own patterns were more productive. Based upon the groups found in this way, recommendations were made for teachers, students, and researchers.

CHAPTER 1

INTRODUCTION

Adult Learning

Despite great efforts made by an instructor to create a stimulating classroom environment with varied teaching strategies, the educator has remarkably little control over the learning. Although Knowles (1970) asserts that "the behavior of the teacher probably influences the character of the learning climate more than any other single factor" (p. 42), it is ultimately the learner who determines the level of acquisition, interpretation, or assimilation of material. "Without taking away from the important role played by the teacher, . . . what the student does is actually more important in determining what is learned than what the teacher does" (Shuell, 1986, p. 429). Contributing factors that govern this learning may be the student's past experiences, content meaningful to the individual learner, willingness to become involved with the subject matter, and the set of "tools" that the student possesses to enhance learning. Therefore, to facilitate a truly successful adult learning experience, a teacher must skillfully direct the

focus away from the role of the instructor and toward that of the learner.

This learner-centered approach has been the locus of change as the field of adult education has evolved over the past 15 years to focus on adult learning rather than on adult education. J. Roby Kidd (1973) viewed this new emphasis on learning as the implication that adult education was finally moving from a field of practice toward a field of study.

As a field of practice, the emphasis in research and conceptual development had been on providing services, with learning viewed simply as one component of educational programs. But a shift to a field of study with the individual learner as the central concern opened whole new realms, such as self-directedness and individual development, to the field. (Fellenz & Conti, 1989, p. 1)

The very term, adult education, suggests a focus on the educator; however, adult learning implies that the emphasis be directed to the learner. In 1983, Peter Jarvis recognized the beginning of this change and affirmed that "the aims of the educational process are about the learners rather than about the profession or the wider society" (p. 41).

Adult learning theories often reflect the philosophy of Thomas Paine, an 18th century political writer who is recognized as a leading influence on the Age of Revolution. His works exhibit his belief in natural reason and natural rights, political equality, tolerance, civil liberties, and the dignity of man (Aldridge, 1984). Although these ideals

were considered revolutionary at the end of the 18th century, they are the very ideals being applied today in adult education. The empowerment of today's adult learners to become knowledgeable and involved with their own learning is the vision that Paine saw for all people. "It is only by tracing things to their origin that we can gain rightful ideas of them, and it is by gaining such ideas that we discover the boundary that divides right from wrong, and teaches every man to know his own" (cited in Adams, 1975, p. 215).

Malcolm Knowles has further developed this learner-centered concept, which has gained much acceptance in the field of adult education. He coined the term "andragogy" for this practice.

It has come to mean an educational mode in which the teacher is viewed as a facilitator of learning. Students are perceived to be self-directed. The relationship between teacher and student is personal and trusting. The climate for learning is informal and collaborative. Teaching . . . can be described as dialogical. (Grubbs, 1981, 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, p. 6; Knowles, 1968).

Andragogy is based upon student-centered, self-directed methodologies. As students better understand their own learning strategies, the more empowered they are to enhance

their personal learning. "Trends in adult education and cognitive psychology that advance the understanding of the individuality of learning experiences and that promote learner self-knowledge and control of personal perceptions and judgements provide for potential empowerment of the individual" (Fellenz & Conti, 1989, p. 23).

Smith (1982) explored the concept of learning how to learn and concluded that:

A central task of learning how to learn is developing awareness of oneself as a learner Self understanding links directly to learning how to learn when learners become sensitive to, and in other words, more aware of themselves as learners. . . . Learning how to learn involves a set of processes in which the individual learner acts at least partially as his own manager of change, and his focus of change is his own self-concept and learning processes. (p. 57)

This requires that the learner be able to conceptualize his own learning process, be able to pay some attention to how he goes about learning, and thrust himself into managing the process (p. 30). To become successful in this process, learners must also recognize distinct strategies, which are specific to their individual learning patterns and behaviors.

Learning Strategies

Educators have long searched for a definitive explanation for the distinctions between individual learners. Intelligence, cognition, teaching theories, and

learning styles have all been examined, yet none has accounted for the various approaches learners take to accomplish their specific learning needs. Consequently, adult educators are increasingly turning to the concept of learning strategies as a means of exploring these individual differences.

Regardless of the type of setting, learners use various strategies to accomplish their learning needs. Learning strategies are those techniques or specialized skills that the learner has developed to use in both formal and informal learning situations (McKeachie, 1980). While learning styles refer to the inherent ways that people process information, learning strategies deal with the way people approach specific learning situations (Conti & Kolody, 1995).

"Recent research on teaching and learning has focused on the active role of the learner in student achievement" (McKeachie, 1980, p. 23). Techniques, tactics, and methods which enhance effective learning have been called learning strategies. The strategies are external behaviours developed by an individual through experience with learning which the learner "elects to use in order to accomplish a learning task" (Fellenz & Conti, 1989, p. 7). The learning strategies a student uses can have an effect upon their academic achievement (Mayer, 1987).

Researchers in the fields of education and psychology have noted the importance of the concept of learning

strategies. McKeachie (1980) and Weinstein, Zimmerman, and Palmer (1988) have advocated an approach to learning which incorporates teaching a variety of skills thought to be linked to academic performance. McKeachie (1980) has investigated links between types of attention or concentration; memory aids such as grouping, automatization, and visualizing; the use of elaboration as a memory aid; and the vital role of motivation in learning. Weinstein et al. (1988) and Mayer (1987) have researched how students process information and other behaviours learners engage in during learning. Other researchers have focused on the role of learning strategies used in real-life learning situations (Fellenz & Conti, 1989).

Learning strategies can be divided into five component areas (Conti & Fellenz, 1991; Fellenz & Conti, 1989). These are Metacognition, Metamotivation, Memory, Critical Thinking, and Management of Resources. Metacognition can be thought of as the executive control of learning. It is composed of planning how to go about learning, monitoring how well the plan is being carried out, and adjusting the plan depending on progress toward the learning goal. Metamotivation deals with how individuals build and maintain internal motivation to complete learning tasks. Memory as it relates to learning strategies involves (a) how a learner organizes new information into knowledge already known, (b) the use of external memory aids such as item lists, and

(c) self-knowledge about personal memory and knowledge of strategies that are useful in remembering (Fellenz, 1993, pp. 5-8). Critical thinking involves how one discriminates and reflects upon learning material. Management of learning resources relates to how learners identify and critically use appropriate sources of information. All of these aspects of learning strategies are thought to play an integral part in how much and how well students achieve in learning situations (McKeachie, 1980).

Since the recent development of the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS), researchers such as Hill (1992), Yabui (1993), Hays (1995), Conti and Kolody (1995), Kolody and Conti (1996), and Lockwood (1997) have found that various groups of learners can be distinguished by the learning strategies which they use. The metamorphosis experienced in the field of adult learning over the past 15 years not only has provided the basis that allows the identification of these distinct groups, but it has also provided the foundation and the need for further study to determine the reasons for these differences between groups of learners.

Reflective Practice and Canadian Colleges

To date, the majority of the research using SKILLS has been conducted in the United States. Many of these studies have involved various college environments (Hays 1995; Hill,

1992). However, demographic populations of the American college differ from those found in Canada. Can one assume that these findings of those studies conducted at an American college are generalizable to two-year Canadian college students? Too often, decisions made in Canada are dependent upon information generated from research conducted in America. Schon (1987) suggests that professionals no longer need to rely upon others' research findings. As "reflective practitioners," they should be creating their own knowledge in their specific fields of expertise.

Schon's model of professional knowledge emanates from "the reflective practitioner"--one whose practice is based upon two processes that he has coined as "knowing-in-action" and "reflection-in-action." His model of knowing-in-action assumes that knowing is in the actions of professionals, and he describes it as "the characteristic mode of ordinary practical knowledge" (Schon, 1983, p. 54). Based on Houle's (1980) work in adult education in various professions, Cervero (1988) supports Schon's opinion that the research generated by universities is an important source of information for knowing-in-action but that it must be incorporated with reflection-in-action. Otherwise, it has little chance of becoming part of a practitioner's repertoire (p. 45). Schon's (1983) suggestion for "bridging the two worlds" of applied science and reflection-in-action

is to create a setting in which "practitioners learn to reflect on their own tacit theories of the phenomena of practice, in the presence of representatives of those disciplines" (p. 32). The ideal arrangement would then be to have practitioners in the field conducting their own research and creating their own knowledge in cooperation with experts in that discipline. "The two kinds of theories should be made to engage each other, not only to help academicians exploit practice as material for basic research but also to encourage researchers in academy and practice to learn from each other" (p. 321).

As the literature base on SKILLS increases, reflective practitioners in Canada should, therefore, generate their own knowledge base. This can be done by looking at what makes the two-year Canadian colleges unique, by conducting studies of Canadian college students that identify various groups of learners, and by examining the reasons for these differences (Conti & Kolody, 1995).

Despite their diversity, the academic curricula of Canadian colleges are organized into five basic functions; collegiate, career, general, compensatory or remedial, and community education. Although institutions vary in emphasis, most colleges offer some form of each function. As vocational education is intended to develop skills and related knowledge to prepare for employment, general education emphasizes critical thinking, developing values,

understanding traditions, respecting diverse cultures, and applying acquired knowledge throughout life.

As the faculty emphasis of Canadian colleges is upon teaching, institutions are committed to professional development that will help staff improve instruction and student learning. The Alberta College and Institute Faculty Association (ACIFA) is an association of autonomous faculty associations of the 13 public colleges and technical institutes throughout Alberta, and ACIFA represents over 4,000 faculty members. Through a cooperative venture between ACIFA and the research resources of Montana State University and by building upon a learning strategies study initiated at the Medicine Hat College (Conti & Kolody, 1995), reflective practitioners from five colleges throughout the province are engaged in "creating new knowledge" by participating in a province-wide, field-based study examining the learning strategies used specifically by college students in Alberta (Kolody & Conti, 1996).

Statement of the Problem

The goal of adult educators is to optimize the level of their students' learning. As the learning process is better understood, adult educators can be more successful at unlocking the mystery of how individuals learn. If teachers can help learners understand their personal learning process, learners are then empowered to take this knowledge

of their learning and apply it to lifelong learning experiences. "An appreciation of one's learning style, the development of strategies that promote learning, and an insight into metacognitive processes enable people to exert control over learning processes and outcomes" (Fellenz & Conti, 1989, p. 23).

The examination of learning strategies provides teachers with a means to increase their effectiveness in the teaching-learning process. 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).

Prior to this study, most of the research on learning strategies has been conducted in the United States. However, as Schon suggests, Canadian educators no longer need to rely on a generic profile of students and the strategies which they use. Reflective practitioners in Canada can create their own knowledge base by examining the specific learning strategies of their own students.

Purpose

The purpose of this study was (a) to identify the learning strategies of adult learners at two-year colleges in Alberta; (b) to investigate the relationship of these learning strategies to academic success, gender, age, and

program of study; and (c) to explore patterns of learning of distinctive groups of learners that may exist. Once distinct groups of learners were identified, the reasons for these differences were then investigated by qualitative and quantitative means to describe these groups.

Research Questions

This study investigated the learning strategies used in real-life learning situations by Canadian college students. The use of specific learning strategies was measured with SKILLS. To accomplish this, the following research questions were asked.

1. What is the learning strategies profile of students in the Canadian two-year colleges?
2. Among Canadian college students, is it possible to use learning strategies scores as measured with SKILLS to discriminate between the most successful learners and least successful learners as measured by their grade point average?
3. Among Canadian college students, is it possible to use learning strategies scores as measured with SKILLS to discriminate between groups formulated by the following demographic variables: gender, age, and program of study?
4. Is it possible to identify distinct clusters of learners in Canadian colleges using SKILLS?
5. If distinct groups of learners exist, how can these clusters be described?
6. If distinct groups of learners exist, what differentiates one group from another?

Limitations of the Study

Because of the confidentiality of the study due to the release of the students' GPA by the respective registrar, individual institutions were reluctant to release the names of students for the qualitative phase of the study, even when it was assured there was no wish to tie the student's name to the GPA. Therefore, it was only possible to secure participants for the qualitative phase of the study at Medicine Hat College (MHC). Further, since programs at Medicine Hat College are only one or two years in duration, many of those students who had participated in the quantitative study at MHC were no longer students and were difficult to locate when the qualitative phase was conducted the following year.

Definition of Terms

ACIFA: Acronym for Alberta Colleges and Institutes Faculty Association. This is the collective organization at a provincial level with an appointed representative from each of the individual college and faculty associations.

Community Colleges and Institutes of Technology: Non-degree-granting institutions that offer a variety of one, two, or three year training programs. Most community colleges are public institutions stressing the "open door policy" and financially supported largely by governments. Programs range from adult basic education to university transfer courses, and they include vocational technical training and specialized training for semi-professional jobs in such fields as agriculture, industry and engineering, health services, business, and public service.

Critical Thinkers: Those learners described in this study as those who rely heavily on a variety of traditional critical thinking skills.

Critical Thinking: "Identifying and challenging assumptions, challenging importance of context, imagining and exploring alternatives, and reflective scepticism" (Brookfield, 1987, p. 12).

Engagers: Those learners described in this study as passionate learners who involve all five senses in their learning and learn best when they are actively engaged in a meaningful manner with the learning task.

GPA (Grade Point Average): The term commonly used in schools which refers to the overall average of all of the grades that a student has received.

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, 1988, p. 1).

Memory: Learning strategies which help adults in remembering in real-life learning situations. These include rehearsal of information, organization and elaboration of information, use of external aids, and the application of self-knowledge about memory and use of mnemonic techniques (Fellenz, 1990, p. 5-9).

Metacognition: "Thinking about the process of learning an emphasizing self-regulatory tactics to insure success in the learning endeavor" (Fellenz & Conti, 1988, p. 2).

Metamotivation: "Tactics and techniques used by the learner to provide internal impetus in accomplishing learning tasks." These are based on a model developed by Keller (1987) which emphasizes focusing attention, anticipating reward, fostering confidence, and enjoying learning activities.

Monitors: Those learners described in this study as being cognizant of their learning progress, who closely monitor their learning, and who learn best from example.

Navigators: Those learners described in this study as focused learners who chart a course for learning and follow it. These learners rely heavily on the learning strategy of planning.

Networkers: Those learners described in this study as learners who make frequent use of human resources and integrate others into the social and political process of learning.

Post-secondary Institutions: A wide range of institutions including universities, public and private colleges, and institutes of technology that offer programs to those having completed grade 12 or its equivalency.

Resource Management: The "identification of appropriate resources, critical use of such sources, and the use of human resources in learning" (Fellenz & Conti, 1993, p. 3).

SKILLS: An acronym for the Self-Knowledge Inventory of Lifelong Learning Strategies. This is a learning strategies inventory with established validity and reliability which asks respondents to rate 15 learning strategies in scenarios commonly found in everyday life and which call for a learning effort on the part of the respondent. Participants in this study responded to four scenarios.

Technical Training: Instruction that "combines development of skills with scientific and technological studies" (Campbell, 1971). For the purpose of this study, "technical training" is used interchangeably with the terms "technological" and "vocational."

Tertiary: Post-secondary institutions possessing either degree-granting or non-degree-granting status (Campbell, 1971).

Transfer: Studies that provide credits toward a baccalaureate degree.

CHAPTER 2

REVIEW OF THE LITERATURE

Adult Learning

The learning process has captivated the interest of scholars, social scientists, psychologists, and educators for centuries. Yet with centuries of research and study on the process of learning, the definition of the concept still remains nebulous. Gagne (1970) offers a simplistic yet somewhat inadequate definition of learning as "a change in human disposition or capability, which can be retained, and which is not simply ascribable to the process of growth." Mezirow (1990) more comprehensively defines learning as the process of making a new or revised interpretation of the meaning of an experience, which guides subsequent understanding, appreciation, and action. Rather than attempt to define learning, it may be more practical to look at the results or the outcomes of learning. Gagne (1970) recognizes the five kinds of learning outcomes as intellectual skills, verbal information, cognitive strategies, motor skills, and attitudes. Even more consequential than the outcomes, however, is the process of learning. Basic assumptions in the process include the passage of information through the

senses into either short- or long-term memory by the level of attention and the perception of the learner. Yet, it is also recognized that the learning process is dynamic, intricate, and individualized.

The fact that learning cannot be clearly defined perhaps creates an even greater need for discourse and theory. Some knowledge of learning theories is essential for every practitioner to understand why certain methods or techniques can be applied and to understand, apply, or reject new proposals that are presented (Kidd, 1973). Some knowledge of theory always aids practice. It also may stimulate new forms of practice. Kidd further postulates that a research worker also ought to be guided by theory. Theory provides a set of assumptions as a starting point to guide what is done to be tested by experiment or to serve as a check on observations and insights. Until agreement is reached about what constitutes learning, it can be expected that there will be more than one theory to explain all that is meant by the term. Yet each theory is grounded in not only one's philosophy of education but also on one's philosophy of life.

Although there is not one absolute definition of learning or its theory, there is a general consensus of three components that constitute the concept of learning how to learn--learner needs, learning style, and training. Smith defines learning how to learn as possessing or acquiring the

knowledge and skill to learn effectively in whatever learning situation one encounters (1982).

Four Orientations to Learning

Merriam and Caffarella (1991) have categorized the dozens of learning theories into four orientations to learning--the behaviourist, cognitivist, humanist, and social learning. The behaviourist orientation includes learning theorists such as Skinner, Pavlov, Thorndike, Watson and Guthrie who view the learning process as a change in behaviour caused by stimuli in an external environment. The purpose of education for the behaviourist is to produce behavioural change in desired direction. They view the teacher's role as one of arranging the environment to elicit the desired response. Behaviourists evaluate learning by measuring the degree to which behavioural objectives were reached. These objectives seek to overtly define learning competencies, skill development, and training.

Although behaviourists insist that all learning requires reinforcement, the cognitive orientation holds that reinforcement does not actually produce learning but rather that it provides a signal about what to do or a reason for doing it. Learning theorists included in the cognitivist orientation are Piaget, Koffka, Ausubel, Gagne, and Bruner. These theorists view learning as an internal mental process such as insight, information processing, memory, and

perception. The degree of learning is determined by the learner's level of internal cognitive structuring (intelligence). The purpose of education is to develop the capacity and skills to learn better, and it is the role of the teacher to structure the content of the learning activity and to develop in the learner a conscious awareness of learning how to learn.

Ausubel (1968) refers to the learning process as acquiring particular meanings from the potential meanings presented in the learning material and of making them more available.

When an individual learns logically meaningful propositions, he does not learn their logical meaning per se but the meaning they have for him. . . . The cumulative residue of what is meaningfully learned, retained, and forgotten, determines how knowledge is psychologically organized . . . and the traces of the learning task by an established system provides anchorage for the new material, and thus constitutes the most orderly, efficient, and stable way of retaining it for future availability. (p. 222)

Cognitivists also agree that insight is another facet of the learning process and is a result of reorganization of perceptions into newly discovered structures. This was demonstrated by Kohler, a Gestalt theorist, in experiments with the great apes in which problem solving was achieved by the process of insight learning.

Humanists such as Maslow (1954) and Rogers (1983) view the learning process as a personal act to fulfil the learner's potential. The level of learning is greatly

determined by the learner's affective and cognitive needs. The purpose of education is for the learner to become self-actualized and autonomous, and it is the teacher's role to facilitate the development of the learner as a whole person. The principles of adult education fall under the humanist orientation with tenets such as andragogy and self-directed learning (Knowles, 1970). The humanistic approach to the delivery and purpose of adult education is to "provide a warm, accepting environment and to give learners frequent opportunities to direct their own learning."

Keefe (1982) provides a brief summary of the development of the humanist theory with:

Socrates, in utilizing what is known today as the Socratic method, sought to foster individual development. Rousseau, in Emile, addressed the needs of the individual. John Dewey, in his monumental work at the beginning of the twentieth century, focused on the learner as an individual. (p. 43)

However, Maslow (1954) describes the humanist theory of adult education best when he states that the purpose of adult education is to facilitate the development of the learner into a whole person--a self-actualized, autonomous human being.

The fourth orientation is that of social learning and is developed by theorists such as Freire (1970), Bandura (1977), and Rotter (1954). They view the learning process as interaction with and observation of others in a social or political context. Learning occurs through interaction,

behaviour, and environment. The purpose of education is social action, and the teacher's role is to model and guide new roles and behaviour. The outcomes of the social learning orientation are socialization, social roles, and mentoring.

Principles of Effective Practice

As Brookfield (1986) has observed, a distinct but similar set of adult learning principles has been devised by each of Gibb, Miller, Kidd, Knox, Brundage and Mackeracher, Smith, and Darkenwald and Merriam (p. 31). From these, Brookfield compiled a list of principles of effective practice for the educator to consider when planning and facilitating the teacher-learner transaction. These principles include mutual respect, a learner-centered approach, active participation, meaningful content with immediate use, self-direction and climate building of both the physical and emotional environment (pp. 9-20).

One of the major characteristics of adult learning is that it is often undertaken for immediate application in real-life situations. Thus the phrase "real-life learning" has been used to distinguish typical adult learning from the academic learning of formal situations that is usually spoken of as studying or educating (Fellenz & Conti, 1989). Sternberg (1986) describes eight differences between real-life learning and the learning typical in academic or test-taking situations.

Ideas on ways in which learning is shaped by forces within and/or outside the learner vary with each learning theorist and include such aspects as emotional development, physiological functioning, age trends, social class level, personality, attention, reinforcement, and motivation. In his theory regarding how adults learn, J. R. Kidd (1973) pointed out the importance of the affective domain.

The interests, needs and motivations of any learner, are primarily a matter of emotions, not intellect. . . . It is also worth noting not only that emotions influence learning, but that there are many similarities between the "field of emotion" and the "field of learning." Both learning and emotion are aspects of the same process of adjustment to environmental situations which the person must make continuously. (p. 95)

Knox (1977) analyzed the relationships among learning and a variety of aspects of education--personality traits and abilities, intelligence, environmental factors affecting intellectual, social and emotional development, and age trends.

Physiological functioning has some association with learning ability. This is reflected in the decline in later life in performance on learning tasks that are fast paced, involve physical skill, and are grouped in the category of fluid intelligence. . . . Another factor associated with learning ability and age is social class level and especially extent of education. As each generation has attained higher levels of formal and informal education, performance on tests of learning ability has been higher in young adulthood and has maintained the relative advantage at successive ages (Schaie, 1974). . . . A third factor associated with learning ability is personality (Schaie and Strother, 1968). An individual's outlook can greatly affect the approach taken to a

learning task, including a test of learning ability. Feelings of alienation, hopelessness, and defensiveness can discourage an individual from trying something new. (pp. 422-423)

Merriam and Caffarella (1991) consider three subconcepts to increase competency in learning: learners' needs, a person's learning style, and training, which is organized activity, or instruction. The teacher or learning facilitator in adult education, must understand both the characteristics and motivations of adult learners in order to select teaching techniques that suit the learner's needs (Seaman & Fellenz, 1989).

Malcolm Knowles (1950), reflecting the increasingly popular thinking of Carl Rogers, writes:

Teaching is a process of guided interaction between the teacher, the student, and the materials of instruction. . . . Teaching, like medical practice, is mostly a matter of cooperation with nature. The function of the teacher is to guide the student into the kind of experiences that will enable him to develop his own natural potentialities. (pp. 31-33)

Thus, Knowles redefined the term andragogy as "an emerging technology for adult learning" involving the following seven step process:

1. Set a cooperative learning environment.
2. Create mechanisms for mutual learning.
3. Arrange for a diagnosis of learner needs and interests.
4. Enable the formulation of learning objectives based on the diagnosed needs and interests.
5. Design sequential activities for achieving the objectives.
6. Execute the design by selecting methods, materials, and resources.

7. Evaluate the quality of learning experience while rediagnosing needs for further learning. (p. 54)

Practitioners can help adults understand age trends in learning abilities and recognize the other factors that are also associated with learning ability (Knox, 1977). Such understanding is also useful to practitioners themselves as they plan educational activities for various categories of adults.

Learning Strategies

Educators have long searched for a definitive explanation for the distinctions between individual learners. Intelligence, cognition, teaching theories, and learning styles have all been examined, yet none has accounted for the various approaches learners take to accomplish their learning tasks. Consequently, adult educators have begun to examine the concept of learning strategies as a means of exploring these individual differences.

In any given setting, learners use various strategies to achieve their learning tasks. Learning strategies are those techniques or specialized skills that the learner has developed to use in both formal and informal learning situations (McKeachie, 1980). While learning styles refer to the inherent ways that people process information and are not easily changed or are slow to change, learning

strategies deal with the ways people approach specific learning situations. The strategies are external behaviours developed by an individual through experience with learning which the learner "elects to use in order to accomplish a learning task" (Fellenz & Conti, 1989, p. 7). Learning strategies are "more a matter of preference; they are developed throughout life and vary by task. While the effectiveness of a particular style relates to the individual, the success of strategies depends more on the situation" (Fellenz & Conti, 1993, p. 4).

"Recent research on teaching and learning has focused on the active role of the learner in student achievement" (McKeachie, 1980, p. 23) and includes those techniques, tactics, and methods which enhance effective learning. The learning strategies a student uses can have an effect upon their academic achievement (Mayer, 1987), and a learner's effective choice of learning strategies "usually results in greater learning" (McKeachie, 1980, p. 3). "The skills or techniques selected to accomplish the task often have a great influence on the success of that learning activity. Adeptness and insight in the use of learning strategies appears to be a significant part of one's ability to learn how to learn (Fellenz & Conti, 1993, p. 3). The learner's ability to select the appropriate learning strategies for a specific task may then well prove a fundamental educational tool to enhance mastery of material.

Although researchers in the fields of education and psychology have concentrated on various aspects of the term, all have noted the importance of the concept of learning strategies. McKeachie (1980) and Weinstein et al. (1988) support an approach to learning which involves teaching a variety of skills believed to be linked to academic performance. Accordingly, McKeachie (1980) has investigated links between types of attention or concentration; memory aids such as grouping, automatization, and visualizing; the use of elaboration as a memory aid; and the vital role of motivation in learning.

Weinstein et al. (1988) and Mayer (1987) have researched how students process information and other behaviours learners engage in during learning. Weinstein et al. (1988) defines learning strategies as "behaviors and thought that a learner engages in during learning and that are intended to influence the learner's encoding process" (p. 315) and further suggests that such strategies may be designed to affect the motivational state or the manner in which one acquires, organizes, or integrates new information (Fellenz & Conti, 1993, p. 3).

Fellenz and Conti have focused on the role of learning strategies used in real-life learning situations by adults. As such, they have identified five areas of learning strategies upon which to center their investigation. "The phrase real-life learning has been used to distinguish

typical adult learning from the academic learning of formal situations that is usually spoken of as studying or educating" (Fellenz & Conti, 1993, p. 4). This approach to learning strategies can be measured with the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS) (Conti & Fellenz, 1991). This valid and reliable instrument consists of real-life learning scenarios with responses drawn from the areas of metacognition, metamotivation, memory, critical thinking, and resource management. Each of these five constructs consists of three learning strategies (Conti & Fellenz, 1991; Fellenz & Conti, 1989).

Metacognition Strategies

Metacognition is defined as the knowledge and control over one's thinking and learning (Brown, 1985). It is a conscious, reflective endeavour; it is one that requires the learner to analyze, assess, and manage learning activities. With the development of the concept of metacognition by Flavell (1979) and Brown (1985), the importance of the learner's self-understanding became apparent in academic success. Smith (1982) concluded that "a central task of learning how to learn is developing awareness of oneself as a learner" (p. 57). In his theory of intelligence, Sternberg (1986) concludes that important to practical intelligence is the ability of the learner to capitalize on strengths and minimize or compensate for weaknesses. Consistent with

Sternberg's metacomponents of cognition, the three learning strategies involved in the area of metacognition in the SKILLS instrument are Planning, Monitoring, and Adjusting. Flavell (1979), Brown (1985), and Sternberg (1986) all contend these processes are interactive and dependent on each other (Counter & Fellenz, 1993, p. 9).

Planning. Planning a learning activity assumes that learners have accepted responsibility and have taken control over their learning experience. They know how to elicit purpose from both themselves and the situations and how to organize and identify the steps essential to the learning process (Yussen, 1985). "Important elements of the learning situations are noted and strategies are previewed to determine how best to proceed with the situation" (Counter & Fellenz, 1993, p. 9). Ways to implement metacognitive planning include overviewing, focusing on purpose, and acknowledging one's learning style. Specifications are created in the process of planning with a unique prescription being developed for each learning activity (Scribner, 1986). Planning builds in flexibility so strategies can be chosen to meet precisely the right conditions on the least effort criterion.

Monitoring. During the process of learning, various things can happen to interfere with attention or understanding, so monitoring becomes an important part of

metacognition as one goes through the learning process. By monitoring, learners assess their progress through a learning project. In this process, they are cognizant of their learning progress and closely monitor their learning by checking to see if they are on task and by comparing their progress to accepted standards or models. Some strategies that can be used in monitoring include self-testing, comparing progress from previous learning situations, asking for feedback, checking new resources for information, and keeping track of diverse steps in learning (Fellenz & Conti, 1989). Others include the practice of questioning (a) the value of the knowledge to one's self, (b) potential applications of the material, or (c) the relationship of what is being studied to other material. Comprehension monitoring is another factor in this strategy and "involves establishing learning goals, assessing the degree to which these goals are being met, and, if necessary, modifying the strategies being used to facilitate goal attainment" (Weinstein et al., 1988, p. 294).

Adjusting. Metacognitive adjusting involves the learner modifying and revising learning plans in relationship to the evaluation of the learning progress. Successful learning occasionally requires modification in order to respond to changing learning situations. Strategies used to adjust learning activities include revising one's learning plan,

changing learning strategies, restructuring learning to satisfy one's knowledge level, and developing techniques to help match the learning task to one's own personal learning characteristics (Fellenz & Conti, 1989).

Metamotivation Strategies

Just as metacognition addresses the concept of one's knowing and understanding one's own learning patterns, metamotivation deals with one's knowing and understanding how or why one is motivated to participate or remain in a learning activity. Metamotivation is the awareness of and control over factors that energize and direct one's learning (Fellenz, 1993, p. 12). Deci and Ryan (1985) describe energization as a response to needs that are innate to the organism as well as to those that are acquired through interactions with the environment (p. 3). Direction is the behavior taken to do something or to reach some goal. Focusing on the internal processes involved in adult learning, motivation in real-life learning situations has been called "metamotivation." The prefix "meta" is used to differentiate the concept from external motivation prevalent in traditional education institutions (Fellenz & Conti, 1989).

When discussing these motivational forces, both Rubenson (1977) and Boshier (1973) believe that motivation for learning is a function of the interaction between

internal psychological factors and external environmental variables, or at least the participant's perception and interpretation of environmental factors. This "perceived" situation may or may not be the "real" situation.

Motivation is regarded as an aspect that shapes adult learning. "An important functional role of motivation is to contribute to the maintenance of positive self-views and perceptions of self-efficacy and personal control that underlie the ability to change negative attitudes toward learning" (McCombs, 1988, p. 142). The students' sense of competence is also important to learning (McKeachie, 1980).

Adult educators tend to use the term "participation" rather than motivation when referring to why adults engage in formal educational programs (Cross, 1982). This is because adult learning is a voluntary activity. Boshier (1973) further adds that:

Both adult education participation and dropout can be understood to occur as a function of the magnitude of the discrepancy between the participant's self concept and the key aspects (largely people) of the educational environment. Nonparticipants manifest self/institution incongruence and do not enroll. (p. 260)

Attention. One of the three learning strategies of motivation identified in SKILLS is attention. This is focusing on the material to be learned. Kidd (1973) notes that a high attention level, which he calls engagement, is crucial to successful learning. The key to learning is

engagement--a relationship between the learner, the task or subject matter, the environment and the teacher (p. 266).

One of the factors of learning is attention.

If students are going to learn, they typically have to be paying attention. However, there is also learning without conscious attention, but generally speaking you are going to learn more if you try to pay attention. . . . Attention is a capacity in which certain things are in focus. (McKeachie, 1980)

From Keller's (1987) ARCS model of strategies, "attention involves the arousal of interest in learners, the stimulation of an attitude or inquiry, and the maintenance of attention" (Fellenz, 1993, p. 15). It can be influenced by curiosity, interest created from previous experience, or a deliberate recognition of a need to learn (Fellenz, 1993, p. 15). Important to attention is the dedication of time and the creating a suitable environment that allows for a minimum of distractions. Researchers such as Dunn and Dunn (1978) and Farley (1988) conclude that factors that influence learning include light, sound, temperature, the time of day, and biological rhythms.

Reward/Enjoyment. A second component of the metamotivational learning strategies is reward or enjoyment. This is anticipating or recognizing the value to oneself of learning specific material, having fun, or experiencing satisfaction with the learning activity (Fellenz & Conti, 1989). Consistent with all metamotivational strategies, the

affective domain is once again the dominant factor in learning with this component. The reward for learning can result from very specific, goal-oriented activities or from a feeling of increased competence or control over an environment. Motivation results from people's attempts to achieve and maintain order in their lives (Conti, 1991). Enjoyment "appears to be a more important motivational factor in real-life learning than in formal learning situations where external motivators such as grades or certificates often dominate" (Fellenz & Conti, 1993, p. 16). Personal growth, increase in self-esteem, helping others, working as part of a team for a worthwhile project, feeling good about accomplishments, or pride in the results of an activity are all recognized as strategies that motivate learners to embark upon and to sustain a learning experience.

Confidence. Confidence in one's ability to learn is one of the essential elements in motivation (Keller, 1987). One of the very important factors in educational participation is the self-esteem of the individual. Those who evaluate themselves negatively are less likely to expect success (Rubenson, 1977), and poor success is likely to be due to the learner's perceived incongruence with the educational environment (Boshier, 1973). "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). The examination of learning style factors confirms that "expectancy scores consistently correlated with achievement of adult students. . . . Belief that one can complete the learning task successfully is an important factor in motivation to learn" (Fellenz & Conti, 1993, p. 16).

Memory Strategies

Memory is "the capacity of humans to retain information, to recall it when needed and recognize its familiarity when they later see it or hear it again" (Wingfield & Byrnes, 1981, p. 4).

The process of learning and memory are so closely related and interdependent that it is often difficult to determine whether we are concerned with one phenomenon or two . . . one who does not learn has nothing to remember, and without memory there is no evidence of learning. (Long, 1983, p. 58)

Memory is "viewed in its relationship to adult learning and the influence it can have on decision making and consequent human behavior" (Paul & Fellenz, 1993, p. 24). "The intended application of the material to be remembered also affects the degree of attention given a topic. Selective attention is the process of allocating attentional resources to one object or event over another" (pp. 21-22). Thus, meaningful material is retained longer than that which is not.

"Metamemory is practical knowledge acquired about our own memory capacities and what we must do to remember; or simply, what people know about how they remember" (p. 22). Learners can improve their memory performance and the efficiency of their learning by developing metamemory skills; thus, difficulties encountered in learning may not be due to the inabilities of the learner but rather may be the result of not using the appropriate memory strategy for the learning task (Wingfield & Byrnes, 1981).

The mental activities used to store, retain, and retrieve knowledge are called memory processes. These processes are accomplished either through internal or external memory strategies. Internal memory aids are strategies in which all efforts to remember are completed by the individual within their own thought processes. External memory techniques rely on the interaction of the mental processes of the individual and the manipulation of the environment to insure recall (Paul & Fellenz, 1993, p. 23). The memory strategies used in the SKILLS model include Organization, External Aids, and Memory Application.

Organization. Organization refers to the manner in which the memory reorders or restructures information from that in which it was originally presented (Seamon, 1980). Successful strategies entail arranging the material to be learned in patterns that direct the retrieval process.

Norman (1982) identifies relationships among concepts and events as semantic networks and states that a major property of memory is the richness in relationships that can be depicted from these networks.

Organization strategies used in the SKILLS model include several activities used to process information so that material will be better stored, retained, and retrieved. While mnemonics is one internal memory device used to enhance memory, visualization, imagery, and the forming of associations and connections are others often used to form stable memories from experiences and to enhance recall (Zechmeister & Nyberg, 1982). Chunking is the organization of information into sets, thereby reducing the overall number of categories to be remembered (Paul & Fellenz, 1993, p. 23). When information is chunked, individuals seem to be able to remember and deal with larger amounts of data (Miller, 1987). Such grouping definitely improves the total amount of information that is retrievable (McKeachie, 1980; Zechmeister & Nyberg, 1982).

External Aids. The SKILLS model uses several external aids that involve the learner controlling the environment in some manner to enhance recall. External aids include the reviewing of material (Zechmeister & Nyberg, 1982), the use of appointment books, making lists of things to do, placing

visual items on display, and asking others to provide reminders at relevant times.

Memory Application. Strategies related to application of memory involve the use of those internal strategies involved in memory organization for the purpose of planning, completing, and evaluating learning. In adult real-life learning, memory application is used for self-improvement, problem solving, and critical thinking; such applications range from acquiring a new physical skill to developing the knowledge and political skills necessary for community action (Paul & Fellenz, 1993, p. 25).

Critical Thinking Strategies

Critical Thinking is a reflective thinking process utilizing higher order thinking skills in order to improve learning. Although problem-solving and decision-making skills are at times included as part of higher-order thinking processes, critical thinking has a more general and more important goal; it is improving individual and societal learning (Fellenz, 1993, p. 30). "As our society has entered more deeply into an information age, our appreciation for the value of higher order thinking skills has increased" (p. 30). Moreover, adult educators such as Horton (1990) and Freire (1970) deem critical thinking skills and praxis to be the catalyst of social change and democratic justice.

The SKILLS model of Critical Thinking strategies is based on Brookfield's (1985) four components outlined in Developing Critical Thinkers. Brookfield's approach to critical thinking is applied to real-life situations and is composed of (a) identifying and challenging assumptions, (b) challenging the importance of concepts, (c) imagining and exploring alternatives, and (d) reflective skepticism. The SKILLS Critical Thinking strategies, based on these components include Testing Assumptions, Generating Alternatives, and Conditional Acceptance of General Knowledge.

Testing Assumptions. "The process of challenging assumptions presumes the ability to identify these assumptions and the willingness to examine them. Because they have often been taken for granted over long periods of time, their limitations are not readily noticed" (Fellenz, 1993, p. 31). The SKILLS model uses a number of specific activities to measure the challenging of assumptions in real-life learning situations. These "invite respondents to examine the accuracy or the acceptance uncritically given to an assumption while others prompt them to identify relationships, spot inconsistencies, or question value sets" (p. 32).

Generating Alternatives. Exploring alternatives when engaged in critical thinking or problem solving is vital in

the complex, multiple-solutioned situations common to real life (p. 32). The SKILLS instrument measures the learner's preference to hypothesize while grounding options within a given situation and include strategies such as brainstorming or envisioning the future, ranking the order of alternatives, and identifying alternate solutions (p. 33).

Conditional Acceptance. Advocating reflective skepticism to avoid absolutes or over simplifications, Brookfield (1987) claims that "considering and imaging alternatives leads to the development of a particularly critical cast of mind, especially where any claims for universal truth or validity of an idea or practice are concerned" (pp. 20-21). As monitoring results and evaluating consequences are evidence of critical thinking, the SKILLS model uses these strategies to measure Conditional Acceptance along with other activities such as questioning simplistic answers and predicting consequences.

Resource Management Strategies

Learning strategies that lead to effective use of resources can have a positive effect on the learning process (Fellenz, 1993, p. 37), and management of these resources is an important aspect in finding solutions to real-life, everyday problems. The number and variety of sources available imply a need to choose wisely so the teaching of learning strategies should include "techniques for

identifying and acquiring appropriate learning resources" (Fellenz & Conti, 1989, pp. 4-5).

The location and selection of materials involves a variety of processes that are specific to personal preference. Although one may begin a search at a local library using newspapers, magazines, or books, fewer than 25% of American adults use the library with regularity (Shirk, 1983). While some adults prefer electronic sources of information such as the television or computer, others feel the best sources of information in real-life learning situations are other people.

Environmental factors may also influence the learner's preference for locating materials. The learner's environment, how much time is available, how difficult it is to procure the materials, and the learner's ability to tell what are good information sources will also impact resource management (Hill, 1992, p. 46). Many adults do not perform the task of locating materials very well (Shadden & Raiford, 1984). Some materials may be too difficult to understand or may enter into too much detail. Occasionally, there are so many printed or audiovisual materials available that it is difficult to choose the most relevant (Smith, 1982; Tough, 1971). The SKILLS model measures the learner's preference to identify, evaluate, and use resources relevant to the learning task.

Identification. Using effective strategies for resource management involves the identification and location of the best possible source of information which may include modern information sources, print sources, people, models, professionals, or agencies (Fellenz, 1993, p. 36). A concern of the learner at this point can include the learner's willingness to use a particular source. The learner must judge whether obtaining the resource is equal in value to the time, energy, and expense in gathering it (Tough, 1971).

Critical Use. A second strategy addressing effective use of resources involves critical reflection about the material and selection of the most appropriate resource rather than simply those that are readily available. Considerations in evaluating the resources may include the timeliness of the material or the potential bias of the source. This can involve the critical evaluation of information presented by an organization seeking support (Fellenz & Conti, 1989). Strategies used in the SKILLS instrument to measure the critical evaluation of resources include contacting an expert or an outsider, checking the information with a second source, and observing or asking questions to check for bias.

Human Resources. The third resource management strategy used in the SKILLS model is integrating others into the social and political processes of learning. This involves

more than simply using others in learning situations. It entails "dialogue that involves listening to people with different opinions or insights into issues as well as the use of discussion to think through or study problems. In some situations, the support provided by human resources may be as important as the information they contribute"

(Fellenz, 1993, p. 37). This support and networking are strategies considered important in the measurement of a learner's preference in incorporating the use of human resources in their learning process.

Canadian Community Colleges

Prior to the 1950s, Canadian education consisted of four components: elementary and secondary schooling; higher education (universities); trade and vocational training provided in specialized institutions; and adult education, which was often provided informally by volunteers without public funding. The inception of the Canadian community college into the Canadian education system arose out of the failure of the university curriculum to meet the needs of young people who wanted a vocational education rather than one to develop intellectual capacities (Dennison & Gallagher, 1986).

As new institutions were established during the 1960s, the term "post-secondary education" or sometimes "tertiary education" became popular as a collective label to include

all formal education after secondary school, which included both degree and non-degree programs (Cohen & Brower, 1987). The community college differentiates from the university in that it is a non-degree-granting public or private institution that offers vocational or university transfer studies in programs of varying lengths. A one-year program usually offers a certificate; a two-year program leads to a diploma. Some colleges also offer university transfer courses that may include one, two, or three years of study.

Canadian colleges operated in contrast to a far more democratic educational tradition in the United States. In America, public education was viewed as the route to material success and the evidence of social responsibility that provided equal opportunity for the populace (Gleazer, 1980). However, Canadian education has remained primarily under the influence of the British school system with its sharp distinction between the secondary schools and the universities. Over the years, Canadian educators have tended to totally accept the assumption that subject matter is distributed along an hierarchical scale of values. For example, certain studies such as English literature or mathematics are acceptable and appropriate to college curricula; others such as carpentry or cosmetology are not. By tradition, certain subjects belong in the university; others do not.

However, research and positive experiences in America caused the Canadian system to re-evaluate the purpose and function of post-secondary education in Canada, and America became a major influence on the ways in which the Canadian college system developed to respond to newly identified needs. However, change is slow, and although many Canadians subscribe to the American approach, elitist British roots still reside in an institutional emphasis on university transfer and in content-driven, teacher-centered curricula (Dennison, 1995). One area of stark contrast between the two systems, however, is the public funding in Canada for adult education programs such as literacy and Adult Basic Education (ABE).

Similar to the American system are the principles and traditions of the public community college which is being modelled after the public school system and guided by the same axioms. In both countries, the three prevalent foundations are universal opportunity for a free public education, local control and support of the educational institution, and a relevant curriculum to meet the needs of the individual and of the nation.

Monroe (1972) describes the objectives and functions of the community college shared by both nations. The first objective is to offer a comprehensive curricula that includes liberal arts, occupational fields, adult and continuing education, remedial education, and professional

education. The second objective is to maintain an open-door principle to admit all high school graduates or those over the age of 18. The third objective is to respond to the community orientation. This involves serving the specific needs of a geographic area, meeting the vocational needs of the community, providing an educational opportunity for students from middle- and upper-lower class families, and providing leadership and research services to the community.

There are many similarities in the functions of the community college in both in America and Canada (Monroe, 1972, pp. 32-35). These include:

Transfer Curricula. The transfer curriculum is a basic part of all community colleges. Colleges which primarily began as technical institutes or vocational schools have found that they must eventually add liberal arts to their curriculum.

Citizenship and General Education. General education courses designed to meet citizenship needs have become a requirement to provide the students with leadership training and an awareness for social responsibility.

Occupational Training. The community college is increasingly becoming the agency to train students for entry-level positions that require sophisticated, technical knowledge. The community college must also retrain employees for new jobs as old ones become obsolete.

General Studies. These courses have a liberal arts content and for many students offer more prestige than the vocational courses and may be recognized with an associate degree.

Adult and Continuing Education. The adult education function is predicted to greatly expand as jobs require more training and the general level of education increases.

Remedial Programs. Most community colleges now offer remedial work in language, reading, and mathematics to prepare students for college or university programs.

Counselling and Guidance. There is an increasing need for guidance services to assist students in dealing with both personal and academic problems while attending school.

Similar issues are shared by community colleges in both the Canadian and American college systems. Both will require increased funding to keep up with the rapid pace of technological change. Both will need to expand their international context by developing an edge in international trade, global markets, and technological competition. Unemployment and new employment issues will have to be addressed to provide training for changing employment patterns such as entrepreneurship, home-based offices, and cottage industries. In addition, as the population ages and as multicultural and regional diversity increases, the community college will be a major source of training and leadership in each society.

CHAPTER 3

METHODS AND PROCEDURES

Introduction

This research project consisted of two parts. The first phase was causal-comparative in nature to investigate the relationship of learning strategies to a variety of educational and demographic variables. Causal-comparative research attempts "to determine the cause, or reason, for existing differences in the behavior or status of groups of individuals" (Gay, 1996, p. 321). Phase 2 of the project involved identifying and describing clusters of learners that existed in the sample. After the clusters were identified by their learning strategy characteristics, qualitative focus groups and personal interviews with learners from each cluster were conducted to discuss their learning patterns and preferences and to determine why and how the groups differ. A discriminant analysis of the clusters was then conducted to determine the process that separates the groups (Conti, 1996, p. 71).

This inquiry into adult learning strategies arose out of a workshop conducted for faculty at a two-year college in Medicine Hat, Alberta. As the initial purpose of the seminar

was to look at teaching styles and their effects on student learning, a professor of adult education from an American university was invited to share his expertise on the topic. Participants of the workshop expressed an interest in further exploring the learning patterns of their students, so the presenter was invited back to assist the faculty in this investigation. In following Schon's recommendation to create one's own knowledge base, a study was then initiated to examine the learning strategies of the students at Medicine Hat College (Conti & Kolody, 1995). This study expanded on the Medicine Hat College study and sought to replicate a previous study that used the SKILLS instrument to explore the learning strategies of students in tribal colleges in Montana.

This original study using SKILLS in a college setting, which was conducted by Hill (1992), was an investigation into adult learning strategies at seven tribal colleges in Montana. The purpose of the study was to determine if learning strategies could be used to differentiate between the most successful and the least successful learners at the colleges as measured by grade point average. Hill's study determined that a student's preference of learning strategies could be used to distinguish between the groups. The discriminant function that explained the differences between the two groups of learners was Uncritical Acceptance. Those who received the highest grades

uncritically accepted elements in the learning environment while those who critically questioned factors related to learning received the lower grades.

When this study was then replicated at the Medicine Hat College, the findings were not consistent with those of the tribal colleges in Montana. When the students were grouped similarly according to grade point average, discriminant analysis failed to produce any significant differences between the two groups based on their preference of learning strategies (Conti & Kolody, 1995).

Through information sharing within the Alberta Colleges and Institutes Faculty Association (ACIFA), other colleges in Alberta became interested in the results of the Medicine Hat College study. This interest initiated the idea that this study should be conducted on a province-wide basis.

Population

According to Statistics Canada (1995), the province of Alberta had a total population of 2,716,200 in 1994. Full- and part-time students attending college during the 1994 totalled 41,947 (p. 47). The province of Alberta has 13 two-year colleges and institutes. To arrange Phase 1 of this study, the researcher met with the professional development coordinators of these colleges and institutes to propose that the Medicine Hat College study be replicated at those institutions interested and able to participate. As a

result, five colleges agreed to participate in the province-wide study and to provide a representative sample of students from each institution. The population from these five colleges totalled 13,486 students. In addition to Medicine Hat College, these schools included Grande Prairie College, Keyano College, Mt. Royal College, and Red Deer College.

The five colleges in the study provided representation from north, south, and central Alberta as well as from both urban and rural settings. Medicine Hat College is located in a southern, rural farming community of fewer than 50,000 residents. Grande Prairie College and Keyano College are both located in rural communities of fewer than 50,000 in the north of the province. Red Deer College is centrally located in a city of 75,000, and Mt. Royal College is located in Calgary, a city of 800,000 situated in the center of the province.

Sampling

The sample was drawn from the five participating two-year colleges in the province of Alberta, and included 1,143 learners. In order to secure a representative sample, data were gathered from various programs within each college. Table 1 summarizes the number of respondents from each college. Participants ranged in age from 17 to 71; females represented 70.5% of the sample, and 29.5% was male.

Table 1. Number of Respondents from Each Participating College.

College	Frequency	Percent
Red Deer	390	34.1
Medicine Hat	324	28.3
Grande Prairie	217	19.0
Mt. Royal	137	12.0
Keyano	75	6.6

Based on a formula for sample size originally developed by the United States Office of Education, Krejcie and Morgan (1970) generated a table with recommended sample sizes for random sampling (pp. 607-610). For a population of 50,000, the recommended sample size is 381. Roscoe (1975) recommends that when using a multivariate statistical technique "the sample size should be several times (preferably 10 or more times) as large as the numbers of variables" (p. 184). As this study used a total of 18 variables with 15 variables from SKILLS and 3 demographic variables, a required sample size would be 180. Using either guideline, a sample size of 1,143 well satisfies the minimum sample size required.

Instrument

As Phase 1 of this study involved the examination of adult learning strategies, the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS) was used. This instrument was developed at the Center for Adult Learning

Research at Montana State University. This valid and reliable instrument consists of six real-life learning scenarios based on Shirk's (1983) learning categories. Within each scenario, a series of questions is asked that correspond with each of the learning strategies being measured. The respondent is asked to select four scenarios and to identify five strategies for each category labelled "Definitely Use," "Possibly Use," and "Not Likely Use." The responses are drawn from the areas of metacognition, metamotivation, memory, critical thinking, and resource management (Conti & Fellenz, 1991). Each of the five areas consists of three specific learning strategies:

Metacognition: Planning, Monitoring, and Adjusting;

Metamotivation: Attention, Reward/Enjoyment, and Confidence;

Memory: Organization, External Aids, and Memory Application;

Critical Thinking: Testing Assumptions, Generating

Alternatives, and Conditional Acceptance; Resource

Management: Identification of Resources, Critical Use of

Resources, and Use of Human Resources. SKILLS has two forms

of six scenarios; both forms were used in this study.

Validity

Validity of an instrument refers to the degree to which an instrument measures what it is actually supposed to measure (Cates, 1985; Gay, 1996). In research dealing with education, the three most important types are construct,

content, and criterion-related validity (Kerlinger, 1973, p. 457). The two types which are relevant to SKILLS are construct and content validity (Conti & Fellenz, 1991).

Construct validity is the degree to which the instrument assesses a particular aspect of human behaviour (Borg & Gall, 1983). It is the extent to which the instrument measures the hypothetical construct which is used to explain behaviour (p. 281). Construct validity for SKILLS was established through literature reviews and obtaining judgment from a number of adult education professors and educational psychologists (Conti & Fellenz, 1991). Extensive literature reviews were also done for each of the five constructs. The findings from the review by the adult education professors and educational psychologists and from the literature review were then categorized into real-life learning areas which were developed by Shirk (1983). A group of adult education professors reviewed the instrument and the theory underlying its constructs. Educational psychologists who reviewed the instrument included Wilbert McKeachie and Robert Sternberg. The conclusions reached by the reviewers indicated that the instrument effectively addressed the five theoretical constructs of metacognition, metamotivation, memory, critical thinking, and resource management (Conti & Fellenz, 1991).

Content validity is the degree to which an instrument measures an intended content area. It requires both item

validity and sampling validity (Gay, 1996). Item validity for SKILLS was established by field testing the instrument with diverse groups of adult learners in various learning situations throughout the United States; these settings included adult basic education programs, undergraduate and graduate university courses, museums, health-care providers, continuing education programs, and elderhostel programs (Conti & Fellenz, 1991). This field testing involved 253 respondents and gathered responses to both sets of six scenarios. The groups who participated in the field testing ranged from 17 to 73 years of age. The mean age of the adults in the field test group was approximately 37 years of age. Almost two-thirds (62.8%) of the group were female. The group was well educated with approximately three-fourths having graduated from high school.

The participants in the field tests were from a number of locations in the United States. They represented varying population levels: large cities of over 250,000--29.8%; cities of 100,000 to 250,000--5.3%; towns of 1,000 to 20,000--21.8%; and rural areas under 1,000--9.6%. These cities, towns, and homes were located in the west, southwest, and midwest regions of the United States. English was the main language spoken by 91% of the respondents. A wide variety of occupations were represented by the field test groups. These included educators, students, clerical workers, farmers, blue-collar workers, and homemakers. The

responses of the field-test group confirmed the findings of the expert reviewers (Conti & Fellenz, 1991).

Reliability

Reliability of an instrument is the degree to which a test consistently measures what it is supposed to measure. "Reliability is expressed numerically, usual as a coefficient; a high coefficient indicates high reliability" (Gay, 1996, p. 162). Reliability for SKILLS was addressed by calculating a coefficient based on two equivalent forms administered to the same group (Conti & Fellenz, 1991). This is the "most acceptable and most commonly used estimate of reliability for most test used in research" (Gay, 1996, p. 165). The coefficient of the scores was .71; the Spearman-Brown and Guttman split-half analyses each produced a correlation of .83 and are an accurate indicator of the reliability of SKILLS (Conti & Fellenz, 1991). Since these scores were above the .7 level, SKILLS was judged as a "reliable instrument for assessing adult learning strategies in real-life situations" (Conti & Fellenz, 1991).

Procedures for Data Collection

Data were collected in Phase 1 of the study by administering SKILLS to a representative sample of students at each of the five participating colleges in Alberta. Permission to conduct the survey was obtained from each

college president once it was assured that the study would include only volunteer and anonymous participants. One instructor from each college acted as the research assistant for that location and was responsible for choosing those classes that provided a representative sample of their college. A general solicitation was distributed to all instructors that encouraged them to involve their class in this study to examine the learning strategies of the students in their institution. The research assistant then gathered the volunteer instructor names and checked their classes to a list of programs offered at that college. No instructors interested in participating were refused. However, if a program area had no representation, then the research assistant contacted instructors in that area to be solicited for such. With the sample complete for each college, classes were randomly assigned one form of SKILLS.

To help standardize the completion of SKILLS, the instructions for completing SKILLS were included at the top of the answer sheet. In addition to being printed, these instructions were also read to the students by the instructor administering the inventory before the student completed SKILLS. The students were informed that there were six scenarios to be examined. They were asked to select four scenarios that had the most relevance for them. They were then asked to rate the 15 questions provided for each scenario.

Demographic and educational information was gathered from the students prior to the completion of the SKILLS instrument to further analyze the relationship between learning strategies and student achievement. The demographic information solicited included a student identification number to ensure anonymity, program of study, program major, ethnicity, and age. Once the research assistants had forwarded the completed survey data sheets to the researcher, the registrar from each college then provided further information that matched student identification numbers with gender and grade point average.

Overview of Data Analysis

Data analysis was conducted in two phases. Phase 1 used the multivariate analysis techniques of discriminate analysis. Data were collected from SKILLS and from the demographic data sheets and entered into Dbase III Plus, a data management software program used for data organization and analysis. The Statistical Package for Social Sciences (SPSS/PC+) computer statistics program was used to analyze the statistical data.

Discriminant analysis is used because:

[It] is concerned with the grouping of people and with analyzing the interrelationship of multiple variables to determine if they can explain a person's placement in a specific group. 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 various 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)

As in Hill's (1992) study, students were grouped by GPA, and the individual learning strategies of SKILLS were used as the discriminating variables. The two groups used in the analysis were those who were in the highest and lowest 15% of the group; 15% corresponds with one standard deviation from the mean (Conti & Kolody, 1995).

In Phase 2, cluster analysis was then used to further explore the use of learning strategies (Conti & Fellenz, 1989; Hays, 1995; Strakal, 1995; Yabui, 1993). "Cluster analysis is a powerful multivariate 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). Once clusters were identified, other qualitative and quantitative techniques were used to help name and describe the clusters (p. 67). Analysis of variance is a useful tool for determining which variables are related to each cluster and for determining how the variables are associated with the cluster. After the five-cluster solution was selected, means for each of the 15 learning strategies in SKILLS were calculated for each cluster group. A one-way analysis of

variance was conducted for each of the 15 variables to determine if there were significant differences among the five clusters (Hays, 1995; Yabui, 1993). Variables on which the groups differed significantly were retained in the analysis to characterize and assist in naming the groups. Finally, a discriminant analysis was conducted with the clusters as the grouping variable to determine the process that distinguished the clusters from each other.

Unfortunately, this statistical process only provides insights into the numeric data and does not provide additional material for a rich description of the clusters. To achieve this, supplementary data was needed. These data were secured through individual focus groups with representative learners from the various clusters. Insights from the quantitative data analysis were used as a guide for planning the protocol for the interviewing sessions (Strakal, 1995, pp. 189-197). The qualitative data gathered through this process was combined with the quantitative data, and together this expanded data source provided a more comprehensive and accurate description of the clusters. Through a series of learning strategies studies in Montana (Conti & Fellenz, 1989; Conti & Kolody, 1995; Hays, 1995; Kolody & Conti, 1996; Strakal, 1995; Yabui, 1993), a triangulation process has been developed for interpreting cluster compositions. Triangulation is defined by Guba (1978) as testing one source against another to satisfy

validity of interpretation. This process involves using the existing quantitative data and gathering additional qualitative data (Conti, 1996, p. 70).

Thus, Phase 2 of the study involved identifying clusters in the data and describing them through a combination of quantitative analyses and by collecting qualitative data through focus groups and personal interviews that helped to describe and name the clusters. Since five distinct groups of learners were identified in the quantitative process, group and individual interviews of learners within each cluster were conducted. The purpose of these interviews was to elicit responses from the participants that described their learning patterns and preferences to determine why and how the clusters differ (Kolody & Conti, 1996, p. 200). As Strakal (1995) recommends, discussion questions were specifically designed for each cluster to ensure relevancy to the groups' preferred learning patterns.

CHAPTER 4

QUANTITATIVE FINDINGS

Educational research involves the human power of reason. This reasoning can take either a deductive approach, an inductive approach, or a combination of the two. Deductive reasoning is processing a generalization down into a specific application. Inductive reasoning is forming generalizations based on observations. Using deductive or inductive reasoning exclusively is of limited value, but using deductive and inductive reasoning together as integral components of the scientific method of research is very effective (Gay, 1996).

The goal from educational research follows from the goal of all science, namely, to explain, predict, or control educational phenomena. The major difference between education research and other scientific research is the nature of the phenomena studied. It is considerably more difficult to explain, predict, and control situations involving human beings, by far the most complex organisms. There are so many variables, known and unknown, operating in any educational environment that it is extremely difficult to generalize or replicate findings. (p. 7)

Quantitative research is clearly deductive. The quantitative researcher isolates the variables to be studied, formulates in advance a specific statement of a problem and a specific hypothesis to be tested, collects

standardized data from all participants, analyzes the data and states conclusions related to generalizability (p. 212).

With the deductive approach, researchers impose sense on the data by asking questions of the data that are meaningful to the researcher and which the researchers bring to the study based upon their knowledge, experience, and intuition. Multivariate statistical procedures such as discriminant analysis (Conti, 1993; Klecka, 1990) allow the researcher to function in the psychological mode by dividing learners into predetermined groups to examine if this categorization produces the differences which were hypothesized. (Conti, 1996, p. 67)

Qualitative research is inductive. The qualitative researcher seeks to derive and describe findings that promote greater understanding of how and why people behave the way they do (Gay, 1996, p. 211).

With the inductive approach to research, researchers function more in a sociological mode. Here the issue is how to tease sense out of the data. Rather than imposing sense upon the data, the goal is to have meaning and understanding emanate from the data itself. (Conti, 1996, p. 67)

Both methods of inquiry were used in this study to determine if learners differed in their use of learning strategies and if distinctive groups of learners could be identified based on SKILLS learning strategy scores. This research project consisted of two parts. The first part was causal-comparative in nature to deductively investigate the relationship of learning strategies to a variety of educational and demographic variables. Causal-comparative research is that in which the researcher attempts to determine the cause or reason for differences between groups

of individuals--in effect, the major variable that has led to this difference. "Such research is referred to as 'ex post facto (Latin--'after the fact') since both effect and the alleged cause have already occurred and are studied by the researcher in retrospect" (Gay, 1996, p. 322).

The second part of the study was descriptive and was approached inductively. Cluster analysis was used to identify the groups which inherently existed in the data (Conti, 1996). To help name and describe these clusters, analysis of variance and discriminant analysis were conducted. Since five distinct groups of learners were identified by this quantitative process, personal interviews were conducted to collect supplementary qualitative data to further assist in describing the clusters. The purpose of these interviews was to elicit responses from the participants that described their learning patterns and preferences to determine why and how the clusters differ.

Statistical Profile of the Learners

The sample for the study included representation from all program areas at five Canadian two-year colleges. It was selected to ensure a representative sample from each college. The Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS) was used to measure learning strategies. There are two sets of scenarios for SKILLS. Both have established reliability and validity. Each class was

randomly assigned one form of SKILLS. Set 1 was completed by 401 students, and 742 students answered Set 2.

A total of 1,143 college students participated in this study. The group ranged in ages from 17 to 71 with a mean age of 23.8. Two-thirds of the respondents were in the 17-23 year age group. The remaining one-third ranged in age from 24-71 (see Table 2). The gender distribution in this study was 781 (68.3%) females and 362 (31.7%) males; since the provincial distribution is 59.1% females 40.9% males (Statistics Canada, 1995), the portion of females in this study was slightly higher than the average.

Table 2. Age Frequency of Participants.

Age Groupings	Frequency	Percent	Cumulative Percent
17	2	0	0
18	181	16	16
19	217	19	36
20	144	13	48
21	97	9	57
22	70	6	63
23	47	4	67
24-30	175	16	83
31-40	148	13	96
41-71	42	4	100

Since the majority of courses offered at two-year colleges are certificate and diploma programs, it was not

surprising that almost 65% of the participants were in certificate and diploma programs (see Table 3).

Table 3. Program Frequency of Participants.

Program	Frequency	Percent
Certificate/Diploma	721	63.1
University Transfer	398	34.8
Undeclared	24	2.1

The overall grade point average on a four-point scale for the group ranged from .33 to 4.0 with a mean of 2.84 (see Table 4). As in Hill's study (1993), least successful students were those in the lower 15 percentile and the most successful students were those in the highest 15 percentile.

Table 4. Distribution of Grade Point Averages.

Value	Frequency	Percent	Cumulative Percent
0.00 -1.97	127	13	13
1.98 -3.68	810	69	82
3.69 -4.00	206	18	100

Overwhelmingly, 90% of the respondents were Caucasian (see Table 5). This Caucasian predominance is representative of the general population of the province of Alberta.

Table 5. Ethnicity of Participants.

Ethnicity	Frequency	Percent
Caucasian	1,003	87.8
Asian	36	3.1
Aboriginal	31	2.7
Hispanic	10	.9
Black	5	.4
Undeclared	58	5.1

The overall profile for two-year college students throughout the province revealed a divergent group of learners; no single learning strategy area or specific learning strategy was predominant. In scoring SKILLS, respondents receive three points for each item that they would Definitely Use, two points for one that they might Possibly Use, and one point for an item that they would Not Likely Use. Since there are four scenarios which each have one learning strategy item in them, the range of the total possible score for each learning strategy is 4 to 12. Similarly, since there are three learning strategies in each learning strategy area, the range of possible scores for the learning strategies areas is 12 to 36. All the group means were near the middle of the range (see Table 6). Resource Management was the learning strategy area most preferred by the participants, while Metamotivation was the least common learning strategy area relied upon by the students.

Table 6. Means of Learning Strategies Areas of SKILLS Used by Participants.

Areas	Mean	SD	Range
Resource Management	25.48	3.27	15-34
Memory	24.12	2.97	15-34
Critical Thinking	23.88	3.01	15-33
Metacognition	23.16	2.83	14-32
Metamotivation	22.92	3.38	14-33

The 5 learning strategies areas are composed of 15 individual learning strategies. Each area has three learning strategies. The distribution of scores revealed that Testing Assumptions, which is a Critical Thinking learning strategy, and Critical Use of Resources, which is a Resource Management learning strategy, were the two learning strategies most commonly preferred by the participants. The Metamotivation learning strategy of Reward/Enjoyment was the strategy least relied upon by the students. Although the strategies had individuals who scored at the extremes, the overall group means were near the middle of the group. With a possible range of 8, the divergence between the highest and the lowest mean was 1.81; this represents 22.6% of the possible range. Collectively, these scores show little divergence in learning strategies when the participants are viewed as a group (see Table 7).

Table 7. Means of Individual Learning Strategies of SKILLS Used by Participants.

Learning Strategies	Mean	SD	Range
Testing Assumptions	8.85	1.64	4 -12
Use of External Aids	8.85	1.78	4 -12
Identification of Resources	8.79	1.70	4 -12
Planning	8.72	1.80	4 -12
Use of Human Resources	8.67	1.69	4 -12
Attention	8.48	1.87	4 -12
Critical Use of Resources	8.02	1.74	4 -12
Organization	7.95	1.76	4 -12
Generating Alternatives	7.75	1.64	4 -12
Confidence	7.40	1.94	4 -12
Memory Application	7.32	1.74	4 -12
Critical Acceptance	7.28	1.74	4 -12
Monitoring	7.23	1.57	4 -12
Adjusting	7.21	1.71	4 -12
Reward	7.04	1.78	4 -12

Discriminant Analysis

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, 1990, p. 7). In discriminant analysis as with other multivariate techniques, the emphasis is upon analyzing the variables together rather than singly; the purpose of multivariate procedures is to examine the interaction of the multiple variables (Conti, 1993).

"Discriminant analysis requires the researcher to make

meaningful decisions about the data and to impose sense upon it" (p. 90).

Discriminant analysis can be used either to describe the way groups differ or to predict membership in a group. In this study, discriminant analysis was used to investigate if learning strategies could be used to identify the ways groups differed. For these analyses, the 1,143 participants were grouped according to success in college as measured by grade point average, gender, program of study, and age. In addition, discriminant analysis was used to identify the process that separated the clusters which were found in the cluster analysis (Conti, 1996, p. 71).

Two criteria were used for judging if it was possible to discriminate between those in the group using the discriminating variables related to learning strategies. 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 (Conti, 1993, p. 93). The second criterion was that the discriminant function had to correctly classify at least one-half of the cases beyond the chance placement than might occur in the group.

Discriminant analysis produces a discriminant function regardless of the meaning or the statistical significance of the function. Therefore, the researcher has to have established criteria for determining if the function can be

"judged as good and useful" (p. 93). The first criterion accomplished this by examining the structure matrix produced in the analysis. The structure matrix shows the correlation between the individual discriminating variables and the overall discriminant function (Klecka, 1990, p. 31). If several of the variables do not have a coefficient of at least .3, it is impossible to discern the meaning of the function. In analyses which use a large number of variables, it is possible to get functions which have high predictive ability but which correlate with so many of the variables that it is impossible to decipher the meaning of the function (Hill, 1992). Thus, this criterion requires that the discriminant function must have clarity in order to be judged good and useful.

The second criterion requires the discriminant function to account for a significant amount of variance before it can be judged good and useful. "The percentage of cases classified correctly is often taken as an index of the effectiveness of the discriminant function. When evaluating this measure it is important to compare the observed misclassification rate to that expected by chance alone" (Norusis, 1988b, p. B-13). Chance simply refers to the probability of the person randomly being placed in the group. "The probability of occurrence of any one of a set of equally likely events is one divided by the number of events" (Roscoe, 1975, p. 140). This probability is

expressed in percentages when referring to the classification rate for a discriminant function. The criterion that was used in this study was that in order for the discriminant function to be judged as useful, it had to correctly classify not only those possible by chance but also an additional 50% of that number. For example, in a two-group analysis, the discriminant function had to correctly classify 75% of the cases; this represents the 50% due to chance place and an additional 25% which is one-half of the 50% chance placement.

Together these two criteria require that the results of a discriminant analysis be good and useful before being accepted to describe the differences in the groups. These criteria were necessary because analyses which use a large number of variables can produce functions which have high classification percentages but which offer no clear descriptive power. Other analyses produce functions which can be clearly described but which have low classification power. Therefore, the combination of these two criteria requires that the function be both clearly descriptive and highly accurate in order to be used.

Grades

Discriminant analysis was used to describe the combination of variables that could be used to distinguish the most successful learners from the least successful

learners as determined by their grade point average (GPA) based on a 4-point scale. Thus, for purposes of analysis, the 1,143 respondents were placed in three groups (see Table 4). One group of 127 contained individuals who had a GPA lower than 1.98. The other group of 206 was made up of those students with a GPA higher than 3.68. Those students whose GPA fell between the range of 1.98 -3.68 were placed in the middle group. This group totalled 810 cases and was not used in this analysis. Like in Hill's (1992) study, this constituted groups composed of the 15% with the highest and lowest grades. Thus, these are the students who are approximately one standard deviation from the mean. By looking at groups that are distinctly different from the classification variable and by having a buffer zone between them, chances of finding meaningful differences are increased (Yabui, 1993).

The set of discriminating variables used to predict placement in these groups consisted of the learning strategies found in SKILLS. The 15 separate variables in this set were 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 Use of Human Resource.

The pooled within-groups correlations are the correlations for the variables with the respondents placed in their groups of either most successful or least successful learners. The pooled within-groups correlation matrix of discriminating variables was examined because interdependencies among variables is important in most multivariate analyses. 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-groups 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. Only 11 coefficients were at the .2 level; and the remaining 94 were all 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 most successful and the least successful learners. Stepwise procedures produce an optimal set of discriminating variables. Although there are various methods of selecting

variables for inclusion in the discriminant analysis, Wilks's lambda was chosen for this analysis because it takes into consideration both the differences between the groups and the cohesiveness within the groups. Because of its approach to variable selection, Wilks's lambda is commonly used in discriminant analysis studies in education. As a result of this stepwise procedure, 5 variables were included in the discriminant function. The following discriminating variables and their corresponding Wilks's lambda values were selected: Reward/Enjoyment--.98; Planning--.95; Adjusting--.95; Critical Acceptance--.95; and Using External Aids--.95. The other 10 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 the groups. By examining the standardized coefficients, the relative importance of each variable to the overall discriminant function can be determined. The standardized coefficients for this function which discriminated the most successful from the least successful learners were as follows: Reward/Enjoyment (.82); Planning (.41); Critical Acceptance (.39); Using External Aids (-.31); and Adjusting (.25). Thus, Reward/Enjoyment contributed about twice as much as Planning, Critical Acceptance, and Using External Aids and about four times as

much as Adjusting in discriminating between most successful and least successful learners.

The percentage of cases correctly classified shows how accurate the discriminant function was in grouping the respondents. This discriminant function was 61.6% accurate in classifying cases. It correctly placed 78 (61.4%) in the least successful learning group and 127 (61.7%) in the most successful learning group. Thus, the discriminant function is an 11.6% improvement over chance in predicting group placement. Consequently, it demonstrates that least successful and most successful learners cannot be distinguished on the basis of their preference for learning strategies.

The discriminant function which was used to classify the cases into these groups was as follows:

$$D = .23 (\text{Planning}) + .15 (\text{Adjusting}) + .48 (\text{Reward/Enjoyment}) - .17 (\text{Using External Aids}) + .23 (\text{Critical Acceptance}) - 6.64.$$

The group centroid for the least successful learning group was .306, and it was -.189 for the dropout group. The canonical correlation is a measure of the degree of association between the discriminant scores and the groups and was .24 for this study. When this is squared, it indicates that the groups explain only 5% of the variation in the discriminant function.

The structure matrix contains the coefficients which show the similarity between each individual variable and the

total discriminate function. The variables with the highest coefficients have the strongest relationship to the discriminant function. These coefficients are used to name 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 process that distinguishes the groups from each other. Since the overall purpose of discriminant analysis is to describe the phenomenon that discriminates the groups from each other, 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.

Two variables had sufficient coefficients to be included in the interpretation of the meaning of the discriminant function. They were Reward/Enjoyment (.75) and Using External Aids (-.40). However, because of the low percentage of variance explained by the discriminant function and because of its lack of accuracy in placing

people into the correct group, the discriminant function was not named.

Thus, a discriminant analysis was calculated to investigate the research question that it was possible to use a variety of variables related to learning strategies to discriminate between most successful and least successful learners at the two-year colleges. Based on 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 function, it was determined that it is not possible to use learning strategies to discriminate between groups categorized by grade point average.

Gender

An analysis was conducted to investigate if two-year college students in Canada differed in their learning strategy usage. For purposes of this discriminant analysis, the respondents were grouped according to gender. The set of discriminating variables used to predict placement in these groups consisted of the 15 learning strategies found in SKILLS.

The pooled within-groups correlations are the correlations for the variables with the respondents placed in their groups of either gender. The examination of the 105 coefficients in the pooled within-groups correlations in

this analysis showed that all were at a sufficiently weak level to retain the variables in the analysis. Only eight coefficients were at the .2 level; and the remaining 97 were all 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 genders. As a result of this Wilks' lambda stepwise procedure, nine variables were included in the discriminant function. The following discriminating variables and their corresponding Wilks's lambda values were selected: Use of External Aids--.97; Monitoring--.96; Confidence--.96; Critical Use of Resources--.96; Memory Application--.96; Reward/Enjoyment--.96; Use of Human Resources--.96; Attention--.96 and Testing Assumptions--.96. The other six variables included in the analysis did not account for enough variance to be included in the discriminant function.

The standardized coefficients for this function which discriminated between the genders were as follows: Use of External Aids (.67); Monitoring (.46); Confidence (.41); Identification of Resources (.37); Memory Application (.34); Reward/Enjoyment (.33); Use of Human Resources (.25); Attention (.21); and Testing Assumptions (.15). Thus, Use of External Aids, Monitoring, and Confidence contributed about

twice as much as Use of Human Resources, Attention, and Testing Assumptions in discriminating between genders.

The percentage of cases correctly classified was 60.28%. The classification correctly placed 219 (60.5%) in the male group and 311 (39.8%) in the female group. Thus, the discriminant function is a 10.3% improvement over chance in predicting group placement. Consequently, it demonstrates that gender cannot be distinguished on the basis of learners' preference for learning strategies.

The discriminant function which was used to classify the cases into these groups was as follows:

$$D = .11 (\text{Attention}) - .29 (\text{Monitoring}) + .18 (\text{Reward/Enjoyment}) + .21 (\text{Confidence}) + .38 (\text{Use of External Aids}) - .20 (\text{Memory Application}) + .93 (\text{Testing Assumptions}) + .21 (\text{Identification of Resources}) + .15 (\text{Use of Human Resources}) - 7.35.$$

The group centroid for the male group was $-.318$, and it was $.147$ for the female group. The canonical correlation was $.21$ for this study. When this is squared, it indicates that the groups explain only 4% of the variation in the discriminant function.

Three variables in the structure matrix had sufficient coefficients to be included in the interpretation of the meaning of the discriminant function. They were as follows: Use of External Aids ($.48$); Monitoring ($.46$); and Memory Application ($.41$). Because of the low percentage of variance explained by the discriminant function and the lack of

accuracy in classification, the discriminant function was not named.

Thus, a discriminant analysis was calculated to investigate the research question that it was possible to use a variety of variables related to learning strategies to discriminate between genders. Based on 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 function, it was determined that it is not possible to use learning strategies to discriminate between groups categorized by gender.

Program

For purposes of the discriminant analysis, the respondents were divided according to program of study. The program areas were University Transfer program and the Certificate/Diploma program. The set of discriminating variables used to predict placement in these groups consisted of the 15 learning strategies found in SKILLS.

The pooled within-groups correlations are the correlations for the variables with the respondents placed in their groups of either University Transfer or Certificate/Diploma program. The examination of the 105 coefficients in the pooled within-groups correlations in this analysis showed that all were at a sufficiently weak level to retain the variables in the analysis. Only eight

coefficients were at the .2 level, and the remaining 97 were all 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 programs. As a result of this Wilks' lambda stepwise procedure, five variables were included in the discriminant function. The following discriminating variables and their corresponding Wilks's lambda values were selected: Memory Application--.98; Reward/Enjoyment--.98; Use of External Aids--.98; Generating Alternatives--.98; and Organization--.98. The other 10 variables included in the analysis did not account for enough variance to be included in the discriminant function.

The standardized coefficients for this function which discriminated between the programs were as follows: Memory Application (.51); Reward/Enjoyment (.49); Use of External Aids (.48); Generating Alternatives (.29); and Organization (.27). Thus, Memory Application, Reward/Enjoyment, and Use of External Aids contributed almost twice as much as Generating Alternatives and Organization in discriminating between programs.

The percentage of cases correctly classified was 55.14%. The classification correctly placed 223 (56.0%) in the University Transfer group and 327 (45.4%) in the

Certificate/Diploma group. Thus, the discriminant function is a 5.14% improvement over chance in predicting group placement. Consequently, it demonstrates that program of study cannot be distinguished on the basis of learners' preference for learning strategies.

The discriminant function which was used to classify the cases:

$$D = .15 \text{ (Organization)} - .27 \text{ (Reward/Enjoyment)} \\ + .27 \text{ (Use of External Aids)} + .29 \text{ (Memory Application)} + .18 \text{ (Generating Alternatives)} \\ - 5.17.$$

The group centroid for the University Transfer group was .203, and it was -.112 for the Certificate/Diploma group. The canonical correlation was .15 for this study. When this is squared, it indicates that the groups explain only 2% of the variation in the discriminant function.

Four variables in the structure matrix had sufficient coefficients to be included in the interpretation of the meaning of the discriminant function. They were as follows: Reward/Enjoyment (.62); Use of External Aids (.52); Memory Application (.52); and Generating Alternatives (.38). Because of the low percentage of variance explained by the discriminant function and the lack of accuracy in classification, the discriminant function was not named.

Thus, a discriminant analysis was calculated to investigate the research question that it was possible to use a variety of variables related to learning strategies to

discriminate between program of study. Based on 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 function, it was determined that it is not possible to use learning strategies to discriminate between groups categorized by program areas.

Age

For purposes of the discriminant analysis, the respondents were divided according to age (see Table 2). The following age groupings were used: groups of students under the age of 20, those 20 through 23 years of age, and those over 23 years old. The set of discriminating variables used to predict placement in these groups consisted of the 15 learning strategies found in SKILLS.

The pooled within-groups correlations are the correlations for the variables with the respondents placed in their groups of students under the age of 20, those 20 through 23 years of age, and those over 23 years old. The examination of the 105 coefficients in the pooled within-groups correlations in this analysis showed that all were at a sufficiently weak level to retain the variables in the analysis. Only 8 coefficients were at the .2 level; and the remaining 97 were all 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 three age groups. As a result of this Wilks' lambda stepwise procedure, eight variables were included in the discriminant function. The following discriminating variables and their corresponding Wilks's lambda values were selected:

Reward/Enjoyment--.97; Generating Alternatives--.96; Use of Human Resources--.96; Adjusting--.96; Critical Acceptance--.96; Memory Application--.96; Critical Use of Resources--.96; and Planning--.96. The other seven variables included in the analysis did not account for enough variance to be included in the discriminant function.

Two canonical discriminant functions were produced in the analysis. The standardized coefficients for the first function were as follows: Reward/Enjoyment (.68); Use of Human Resources (.46); Adjusting (.39); Critical Acceptance (.39); Generating Alternatives (.37); Memory Application (.35); Critical Use of Resources (.18); and Planning (-.04). Thus, Use of Human Resources contributes about two-thirds as much as Reward/Enjoyment in discriminating between age groups, and Reward/Enjoyment contributes twice as much as Adjusting, Critical Acceptance, and Generating Alternatives. Reward/Enjoyment also contributes four times as much as

Critical Use of Resources and twenty times as much as Planning in discriminating between age groups.

Two discriminant functions which were used to classify the cases. The first discriminant function was:

$$D = + .23 \text{ (Adjusting)} - .23 \text{ (Planning)} + .38 \text{ (Reward/Enjoyment)} + .20 \text{ (Memory Application)} + .23 \text{ (Generating Alternatives)} + .22 \text{ (Critical Acceptance)} + .10 \text{ (Critical Use of Resources)} + .27 \text{ (Use of Human Resources)} - 12.16.$$

The group centroids for the first function were as follows: .171 for the Under 20 age group; .068 for the Age 20-23 group, and -.264 for the Over 23 age group. The canonical correlation was .18 for the first function relating to age. When this is squared, it indicates that the groups explain only 3% of the variation in this discriminant function.

Nine variables in the structure matrix had sufficient coefficients to be included in the interpretation of the meaning of the first discriminant function related to age. They were as follows: Reward/Enjoyment (.47); Planning (-.41); Attention (-.40); Memory Application (.39); Critical Acceptance (.38); Monitoring (-.34); Use of Human Resources (.31); Generating Alternatives (.34); and Adjusting (.34). Because of the low percentage of variance explained by the discriminant function and the lack of accuracy in classification, this discriminant function was not named.

The standardized coefficients for the second function which discriminated between age groups were as follows: Critical Use of Resources (.69); Planning (.59); Generating

Alternatives (.55); Memory Application (.35); Adjusting (-.20); Critical Acceptance (.16); Reward/Enjoyment (.03); and Use of Human Resources (-.02). Thus, Critical Use of Resources, Planning, and Generating Alternatives contribute about twice as much as Memory Application, Adjusting, and Critical Acceptance. They contributed about 25 times as much in discriminating between age groups than Reward/Enjoyment and Use of Human Resources.

The second discriminant function which was used to classify the cases was as follows:

$$D = .37 \text{ (Planning)} - .12 \text{ (Adjusting)} + .19 \text{ (Reward/Enjoyment)} + .20 \text{ (Memory Application)} + .33 \text{ (Generating Alternatives)} + .92 \text{ (Critical Acceptance)} + .40 \text{ (Critical Use of Resources)} - .96 \text{ (Use of Human Resources)} - 9.97.$$

The group centroids for the second function were as follows: .092 for the Under 20 age group; -.142 for the Age 20-23 group, and .033 for the Over 23 age group. The canonical correlation was .0987 for the second function relating to age in this study. When this is squared, it indicates that the groups explain less than 1% of the variation in this discriminant function.

Four variables in the structure matrix had sufficient coefficients to be included in the interpretation of the meaning of the second discriminant function related to age. They were as follows: Critical Use of Resources (.58); Generating Alternatives (.45); Planning (.39); and Adjusting (.38). Because of the low percentage of variance explained

by the discriminant function and the lack of accuracy in classification, this discriminant function was not named.

The percentage of cases correctly classified was 41.29%. The classification correctly placed 170 (40.5%) in the Under 20 age group, 122 (34.1%) in the Age 20-23 group, and 180 (49.3%) in the Over 23 age group. Thus, the discriminant functions are a 7.96% improvement over chance in predicting group placement. Consequently, it demonstrates that age cannot be distinguished on the basis of learners' preference for learning strategies.

Thus, a discriminant analysis was calculated to investigate the research question that it was possible to use a variety of variables related to learning strategies to discriminate between age groups. Based on 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 function, it was determined that it is not possible to use learning strategies to discriminate between groups categorized by age.

Summary

In this study, discriminant analysis was used to analyze the relationship between learning strategies and various demographic and educational variables. Using the deductive approach of inquiry, groupings believed to have an influence upon how people used learning strategies were

imposed upon the data. However, learning strategies as measured by SKILLS were not useful in discriminating similar groups of learners in the Canadian two-year colleges. Likewise, only weak differences were found when the learners were grouped in the areas of gender, program, and age. Consistently, each of these analyses explained only about 10% of the variance that could be explained beyond mere chance.

CHAPTER 5

IDENTIFYING GROUPS OF LEARNERS

Cluster Analysis

Once the discriminant analysis had been conducted on the quantitative data gathered from the 1,143 participants during Phase 1 of this research project, Phase 2 was initiated to determine if groups of learners could be identified based on SKILLS learning strategies. Phase 2 involved the use of cluster analysis, one-way analysis of variance, and interviewing techniques to help describe the clusters. Cluster analysis is a "useful statistical procedure to discover structure in data that is not readily apparent by visual inspection or by appeal to other authority" (Aldenderfer & Blashfield, 1984, p. 16). With this inductive approach to rationalistic inquiry, "researchers function more in a sociological mode. Here the issue is how to tease sense out of the data. Rather than imposing sense upon the data, the goal is to have meaning and understanding emanate from the data itself (Conti, 1996, p. 67).

Cluster analysis is a multivariate statistical procedure that seeks to identify homogeneous groups or

clusters (Aldenderfer & Blashfield, 1984, Chapter 1; Norusis, 1988a, p. B-71). There are several methods for determining how cases will be combined into clusters. The Ward's method has been widely used in the social sciences and was chosen in this study because "it is designed to optimize the minimum variance within clusters and tends to create clusters of relatively equal size" (Aldenderfer & Blashfield, 1984, p. 43).

Because of the large capacity of computer memory required to conduct a cluster analysis of a large sample size, SPSS has developed a procedure called Quick Cluster that allows the researcher "to cluster a large number of cases efficiently without requiring substantial computer resources" (Norusis, 1988b, p. B-91). Several potential cluster solutions were considered for this study. Using the two-through-seven quick cluster procedure in SPSS-PC, the five cluster solution was determined to be the most appropriate for this data set based on the distribution of participants in each group.

The five clusters of adult learners were named Navigators, Monitors, Critical Thinkers, Engagers, and Networkers. The participants were distributed fairly equally among the clusters (see Table 8). The names for the clusters were derived from both a statistical profile of each group based on the 15 variables in SKILLS and from follow-up

analysis of qualitative interviews with participants from the various groups.

Table 8. Cluster Frequency Distribution.

Cluster Name	Frequency	Percent
Navigators	259	22.7
Engagers	236	20.7
Monitors	226	19.8
Critical Thinkers	223	19.5
Networkers	199	17.4

ANOVA of the Clusters

Analysis of variance (ANOVA) is a useful tool for determining which variables are related to each cluster and for determining how the variables are associated with the cluster (Conti, 1996, p. 70). Means for each of the 15 learning strategies in SKILLS were calculated for each of the five cluster groups. A one-way analysis of variance was conducted on each of these 15 variables to determine if there were significant differences among the five cluster groups (Hays, 1995; Strakal, 1995; Yabui, 1993). Significant differences existed in all of the 15 learning strategies (see Table 9). Therefore, all 15 variables were retained in the analysis to characterize and assist in naming the groups.

Table 9. ANOVA of Significantly Different Learning Strategies in Clusters.

Strategy	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Planning					
Between	4	671.50	167.88	63.17	.0001
Within	1138	3024.22	2.66		
Monitoring					
Between	4	329.95	82.49	36.84	.0001
Within	1138	2480.91	2.18		
Adjusting					
Between	4	414.88	103.72	40.18	.0001
Within	1138	2937.61	2.58		
Attention					
Between	4	1041.64	260.41	100.88	.0001
Within	1138	2937.62	2.58		
Reward					
Between	4	925.24	231.31	97.57	.0001
Within	1138	2697.98	2.37		
Confidence					
Between	4	1938.40	484.60	232.90	.0001
Within	1138	2367.88	2.08		
Organization					
Between	4	481.58	120.40	44.72	.0001
Within	1138	3063.48	2.69		
Use of External Aids					
Between	4	969.54	242.39	103.47	.0001
Within	1138	2665.97	2.34		
Memory Application					
Between	4	828.16	207.04	89.48	.0001
Within	1138	2633.19	2.31		
Testing Assumptions					
Between	4	263.96	65.99	26.63	.0001
Within	1138	2820.06	2.48		
Generating Alternatives					
Between	4	264.67	66.42	27.04	.0001
Within	1138	2795.26	2.46		
Conditional Acceptance					
Between	4	457.02	114.26	43.12	.0001
Within	1138	3015.62	2.65		
Identification of Res.					
Between	4	479.65	119.91	48.41	.0001
Within	1138	2818.83	2.48		
Critical Use of Res.					
Between	4	870.52	217.63	95.62	.0001
Within	1138	2590.02	2.28		
Use of Human Resources					
Between	4	363.93	90.98	35.73	.0001
Within	1138	2897.73	2.55		

A one-way analysis of variance was also conducted on each of the eight demographic variables to determine if there were significant differences among the five cluster groups (see Table 10). There existed a significant difference of each of the five demographic variables of program, age, college, and GPA. Therefore, these significant variables were retained to assist in analyzing and naming the groups. The one-way analysis also determined that there

Table 10. ANOVA of Demographic Variables among Clusters.

Variable	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>p</u>
<u>Variables with Significant Difference</u>					
College					
Between	4	185.70	46.43	17.48	.0001
Within	1138	2937.62	2.58		
Program					
Between	4	3.39	.85	3.73	.0051
Within	1118	253.06	.23		
GPA					
Between	4	9.14	2.28	3.04	.0165
Within	1138	854.06	.75		
Age					
Between	4	498.25	124.56	2.49	.0420
Within	1118	56035.35	50.12		
<u>Variables With No Significant Difference</u>					
English At Home					
Between	4	84.02	21.01	.13	.9721
Within	1125	184104.35	163.65		
Gender					
Between	4	.72	.18	.83	.5036
Within	1138	246.63	.22		
Ethnicity					
Between	4	1.48	.37	1.12	.3451
Within	1080	355.52	.33		

were no significant differences among the five clusters regarding the demographic variables of ethnicity, the amount of English spoken at home, and gender. Since these variables showed no significant differences, they were not considered characteristic of any of the clusters and were not useful in classifying and naming the five groups determined in the cluster analysis.

The means of the 15 learning strategies along with the three demographic variables of Age, GPA, and Program for each cluster 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 15 learning strategies and 3 demographic variables are displayed in Table 11.

The multivariate technique of cluster analysis produced a solution with five clear and distinct clusters of learners. Thus, this analysis, which investigated the research question related to clusters of learners existing in the data, demonstrated that it was possible to identify distinct clusters of learners in Canadian colleges based on student scores of the 15 learning strategies of SKILLS.

Table 11. Means of Cluster Groupings on Learning Strategies and Demographic Variables.

Variable	Nav.	Mon.	C.T.	Eng.	Net.
Planning	9.6	9.3	7.4	8.7	8.4
Monitoring	7.4	7.9	6.6	7.6	6.6
Adjusting	6.9	6.2	8.0	7.7	7.3
Attention	9.1	9.8	7.3	8.6	7.4
Reward	5.6	7.2	6.4	8.1	7.9
Confidence	5.9	7.7	6.0	9.0	8.6
Organization	8.9	7.4	7.5	7.3	8.6
External Aids	9.6	7.6	9.3	9.6	7.7
Application	6.6	6.4	8.4	7.1	8.4
Test Assumptions	8.3	9.3	9.5	8.3	9.0
Gen. Alternatives	7.8	7.0	8.5	7.9	7.6
Conditional Acceptance	7.1	6.3	8.3	7.4	7.3
Identify Resources	9.4	9.1	9.3	7.9	8.1
Use Resources	8.5	9.1	8.3	6.8	7.2
Human Resources	8.8	8.8	8.9	7.6	9.3
Age	24.1	24.6	22.9	24.1	23.0
GPA	3.0	2.9	2.8	2.7	2.8
Transfer	107	58	87	82	64
Certificate	147	162	134	149	129
Size of Group	259	266	223	236	199

Interview Data

Interviews were conducted with learners from each cluster to gather data to assist in naming and describing the groups. These interviews provided additional material to the quantitative analysis for a rich description of the clusters. These interviews were conducted both individually and in focus group settings with representative learners from the various clusters. Upon recommendation from Strakal (1995) "insights from the quantitative data analysis can be

used as a guide for planning the protocol for the interviewing sessions" (pp. 189-197). The qualitative data gathered through this process was combined with the quantitative data, and together this expanded data source provided a more comprehensive and accurate description of the clusters (Conti, 1996, p. 71).

The design for this stage of data gathering has evolved from a series of learning strategies studies in Montana (Conti & Fellenz, 1989; Conti & Kolody, 1995; Hays, 1995; Kolody & Conti, 1996; Lockwood, 1997; Strakal, 1995; Yabui, 1993). In these studies, "a triangulation process has been developed for interpreting cluster compositions. This process involves using the existing quantitative data and gathering additional qualitative data" (Conti, 1996, p. 70) through personal interviews and focus groups.

In this study, personal interviews and focus groups were conducted to add clarification to the differences between distinct groups of learners through insights of the participants. "In case study research of contemporary education, some and occasionally all of the data are collected through interviews" (Merriam, 1988, p. 71). Because not all participants were able to arrange their schedules to meet in focus groups and in order to ensure a broad representation of participants, data were also collected through individual interviews.

Participation in a focus group was determined by placement within a cluster. 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. The power of the interview often comes from the interaction within the group based on topics provided by the researcher (Morgan, 1988).

A total of 51 students participated in the interviewing process (see Table 12). There were nearly an equal division between those who participated in the individual interviews and the focus groups. Also, approximately equal numbers were included from each cluster.

Table 12. Participants of Qualitative Interviews.

Clusters	Focus Group Participants	Individual Interviewees
Navigators	7	5
Monitors	5	3
Critical Thinkers	5	4
Engagers	6	7
Networkers	5	4
Total	28	23

Thus, through quantitative and qualitative means, five distinct groups of learners were identified and described. The combination of these techniques allowed the research

questions which asked about the description of these groups to be answered. The following descriptions of the five groups of learners are the results of the cluster analysis, the analysis of variance conducted with each variable when the participants were grouped by clusters, and comments from learners within each cluster that was collected during focus groups and personal interviews.

Navigators

Navigators are focused learners who chart a course for learning and follow it. They are conscientious, results-oriented high achievers who rely heavily on the learning strategies of Planning, Memory Organization, Use of External Aids, and Identification of Resources. This was the largest group of the five types of learners (see Table 8), and this group also contained the largest percentage of university transfer students.

Planning involves knowing "how to elicit purpose from both themselves and the situations and how to organize and identify the steps essential to the learning process" (Yussen, 1985, p. 280). Because of the great importance of Planning to Navigators, schedules are important to them, and they reportedly become stressed if their schedules or plans are disrupted. Navigators like to be presented with the "big picture" first, so they know what is expected. Then they plan their learning schedule according to deadlines and the

final expected result. Group work is often difficult for Navigators because if they are teamed with members less focused than themselves, they have "a tendency to take over and dominate the group" to ensure that the schedule and plans are adhered to.

Group work is fine if you have a leader that keeps things on track. Again, I hate wasting time. I like things done yesterday, and if they can't be, I'll do them myself.

"For this reason, distance learning is the perfect course for me. I work at my own speed without any time-wasting." Navigators "get really impatient with inefficiency and have little tolerance for slackers, whiners, and time-wasters." Equally irritating to navigators are "hyper-social butterflies" and "people who won't take initiative." Navigators are said to be those who "don't suffer fools easily."

Memory Organization is also important to Navigators, which is described as structuring information so that the material can be better stored and retrieved from memory (Fellenz & Conti, 1989). Through this process, Navigators "restructure information from that form in which it was originally presented (Seamon, 1980). Navigators "summarize information and group it into subsets"; this is otherwise known as chunking. Another common memory technique used by Navigators is to "connect one piece of information to

another--kind of attach it so something we are already familiar with." As Norman (1982) suggests:

The best organizational strategies involve putting the material to be learned into frameworks that naturally guide the retrieval process. This comes from understanding the material to be acquired so well that it fits naturally into an existing framework of knowledge. As a result, the new material is understood, fits into previous knowledge, and is made retrievable with little effort. (Paul & Fellenz, 1993, p. 21)

Not only is structure important to the Navigator's memory process, but it is also important to their physical environment. A Navigator's slogan in life could be "a place for everything and everything in its place." These learners like to be in control of their surroundings and to work with others who value the same clean, organized setting. "Things are to be done a certain way and in a certain order to keep things running smoothly." During the focus group, one student made the following comments concerning classroom environment.

It really bothers me when a teacher doesn't keep strict control in the classroom. Background noises drive me crazy. I hate someone talking, typing, playing music, or opening a candy bar while I'm trying to listen. I guess this sounds kind of anal-retentive, but these things really bother me.

Another focus group participant joined in with the following:

We aren't all that hard-nosed--I think that you're on the extreme edge of maybe what we're like, but I can relate to what you're saying. I'm a little more tolerant of others, but I see the noise thing in the classroom as a sign of respect. I want the other students to be quiet as a sign of respect

for the instructor and for the other students in the classroom.

Navigators also rely heavily on the learning strategy of Using External Memory Aids.

Memory strategies can be categorized as either external or internal aids. External memory techniques rely on the interaction of the mental processes of the individual and the manipulation of the environment to insure recall (Counter & Fellenz, 1993, p. 23)

Although Navigators consider themselves to "have pretty good memories," they find useful external aids such as to-do lists, daily planners, and schedulers to reinforce their memory.

I'm always making lists and planning out what I'm going to do--sometimes two weeks in advance. Then when I get to cross things off my list, it makes me feel good--like I'm accomplishing things and that I'm doing them when I'm supposed to. I also make lists for other people in my house--you know, like schedules for cleaning and music lessons and things. Then I get upset when someone else doesn't follow my schedule. My husband calls me "Hitler." He thinks that this is a "control thing," but I just like things to be organized.

Not surprisingly, in graded situations this group of students has the highest grade point average.

Navigators also rely heavily on the learning strategy of Use of Resources, which is knowing how to locate and use the best information (Fellenz & Conti, 1989). "When I want to find out about something, I want the facts; not other people's opinions. So I go to the library or ask a professional." Navigators report feeling "pretty comfortable" in a library setting. "Once I learned the

system, I can get around in there pretty good, get what I need, and get out again."

Through personal interviews and focus groups, Navigators were asked to provide comments regarding teaching methods that best facilitated their learning. These learners indicated a preference for teachers who maintain a structured learning environment by providing schedules and deadlines, by outlining objectives and expectations, by concluding each session with a summarization of the main points, and by preparing the class for the subsequent lesson.

I don't like a teacher to waste time. I want to hear what is to be learned. If this can be taught in 15 minutes, do it rather than waste the whole class. Then I like a recap at the end of class, and I want to know what to prepare for the next class.

I don't like big changes. If a schedule is laid out, then stick to it. Don't change deadlines. If an assignment is due on a certain date, and then that date gets extended because slackers weren't organized enough to get it done, then don't cave into them. It isn't fair to the rest of us who worked hard and made sacrifices to get it done on time.

Since formal evaluation such as grades is important to Navigators, these learners also value prompt feedback. It helps them to "keep on track" and to know that they are not wasting their time doing a certain task incorrectly.

To assist in memory organization and retrieval, material which is presented and patterned in a logical sequence also enhances their learning process. Navigators

become easily frustrated and impatient with a casual approach to teaching and can perceive a relaxed, spontaneous atmosphere as an ill-designed time waster which is lacking in purpose.

It really drives me crazy when a teacher is unorganized. I took an English class once where the instructor had us read a book and do an assignment on one of the chapters. Then he forgot that he had assigned it, and we had to remind him to collect it. I couldn't believe it! I hate that. It took all of the meaning out of doing that exercise. Obviously it wasn't important to him! That's just incompetence.

Emotions have little to do with learning for Navigators. Unlike the Engagers, the Navigators are able to separate the message from the messenger. Although it is preferable to be involved in an atmosphere in which they are comfortable and which fosters their learning, they are able to rise above it and complete the learning task regardless of external factors.

Whether or not we like a subject or teacher has little bearing on [our] learning. We look at learning or an assignment simply as a job to do, and we then do it to the best of their ability. Sometimes people can assist us best by simply getting out of our way and letting us do our thing.

Monitors

The Monitors are a group of learners who are cognizant of their learning progress and closely monitor their learning. This group of learners has the highest mean age and uses the widest variety of learning strategies. Their

learning activities include metacognition, metamotivation, critical thinking, and resource management strategies, but they have little preference for memory strategies.

I've changed since I've come to college. I've learned to look back and see where I started from. I moved from Edmonton to down here to give college a shot. It took me applying twice to get accepted. My portfolio wasn't good enough the first time. But I take my education more seriously now than when I was in high school. This is costing me a lot of money. It's my money now. I've moved; I'd better get on track and get with it. A lot of it has to do with my parents as well. They've always been really supportive of my art, and I don't want to let them down. So, I make sure that every day counts. I don't skip classes, I do my studying in the library where it's quiet, and it's working. I know that as long as I keep on track, I'm going to do okay. I don't know. . . . Maybe I'm just growing up and becoming more responsible. . . . My parents would be so proud.

Similar to the Navigators, Monitors rely heavily on the learning strategy of Planning to analyze the purpose of the learning exercise prior to initiating the learning activity and to identify the steps essential for successfully completing the learning task. Monitors differ from Navigators, however, in that they more often incorporate monitoring in the execution of the learning task as they review plans, check to see if they are on task, and compare their progress to accepted standards or models.

Operationally, comprehension monitoring involves establishing learning goals, assessing the degree to which these goals are being met, and, if necessary, modifying the strategies being used to facilitate goal attainment. (Weinstein et al., 1988, p. 294).

During the focus group interviews, the learners were asked how they would tackle learning something new with which they had no prior experience or knowledge. All agreed that the following step-by-step answer was typical of their learning pattern. Not surprisingly, these steps encapsulate the essence of the Monitor.

The first thing that I would have to do is to find somebody with some experience. Then I would find out how they went about doing it [the learning task], what problems they came up with, and what techniques they used to approach this task. Then I'd begin it and see how it goes. If I needed extra help, I would then go into a library for information and look for books or records or something.

Monitors are cautious learners. Their motto in life would be "a stitch in time saves nine." These learners learn best by observation and although they had difficulty defining or even agreeing upon what their "comfort zone" is, they all agreed that they learn and perform better in it. It is important to a Monitor to see a procedure modeled before they try it.

Some people like to fiddle around with something and try to figure it out on their own. If they have trouble, as a last resort they'll go to someone and ask. Not me! I hate wasting time on that, I want to go to someone first, or see it done once, and then I have a clear idea what needs to be done. I hate experimenting.

These are the people who often sit quietly observing the situation while others are busy experimenting, and then they offer a practical and well-thought-out solution.

Flavell (1979) sees monitoring as useful to check or test the interaction among cognitive knowledge, tasks, goals, and strategies in relationship to one's own abilities and with respect to the learning enterprise. Some strategies that can be used in such monitoring include self-testing, comparing progress from previous learning situations, asking for feedback, checking new resources for information, and keeping track of diverse steps in learning. (Counter & Fellenz, 1993, p. 9)

These learners consider themselves practical and conservative in most every facet of their lives; especially in those areas of finance and personal relationships. Monitors are not risk takers. They like guarantees and stable environments with few surprises.

I like to know what to expect so I can prepare for the future and anticipate problems before they occur. Then I visualize how I would handle the situation. I guess you could say I'm a worry-wart.

Critical Thinking is a reflective thinking process utilizing higher order thinking skills, and Monitors make heavy use of the critical thinking strategy of Testing Assumptions. This is the ability to recognize and evaluate specifics and generalizations in relation to learning situations (Fellenz & Conti, 1989). They are slow to commit to an idea and want to "weigh out" or test the assumptions.

I don't like to be pressured into making a rash decision. I want to take my time and think through all the angles. Just because something worked for me before or it worked for someone else doesn't mean it's right for me in every situation.

Monitors also rely heavily on the Metamotivation learning strategy of Attention which involves the arousal of

interest in learners, the stimulation of an attitude of inquiry, and the maintenance of attention. This group of learners systematically and purposefully creates an environment that facilitates learning. This often will include a specific location for studying which is free from distractions "with all my pencils, erasers, and materials neatly in place." Monitors all agreed that studying at a particular and consistent time of day also helped them to stay focused on their learning.

The caution that seems pervasive throughout the Monitor's personality is also evident in their use of Resource Management learning strategies. Identifying Resources refers to "the learner's awareness of appropriate resources and willingness to use such sources" (Fellenz, 1993, p. 36). Critical Use of Resources involves "using appropriate rather than available resources while recognizing their limitations" (p. 36). Monitors concur that they often check several sources before making a decision and scrutinize the sources for applicability to their personal situation.

If I had to do something that I didn't know anything about like buying life insurance, I'd probably go to my dad. He's smart in that area. Or [I'd go] to someone that I think could give good advice.

Being product oriented, Monitors typically compare their work to that of others. However, when asked if grades

were the product that they used to monitor their learning, grades took second place to personal achievements.

I guess I am product oriented, but that doesn't necessarily mean grades. There's a lot of emphasis on grades in school, but they don't matter as much to me. I'm ready to graduate now. Getting an 'A'-- when I get out of college, what does that mean? What's more important is what I can do when I get out.

Teachers who provide visual models with schedules of expectations or outcomes, therefore, provide the required basis for comparison.

I like class discussions and hearing what other people think in comparison to what I think (compare--hmmm, there's that word again) but I do like to see something rather than just read about it.

This allows Monitors to measure their present level of learning in relationship to their final learning objective, to consider the standard simply as a starting point, and to challenge themselves to then exceed that standard. Thus, they appreciate an atmosphere that allows for differences of opinion and interpretation.

I have trouble following a really structured class where the teacher just goes through notes. It's so boring; my mind wanders. But I really learn a lot when the students get to be involved like in your Advertising class when you'd show us commercials and we'd critique them. Then, when it came time to create our own commercials, we knew what was important. That was great. We could never have learned that stuff from a book.

But when we do use a text in class, I want the teacher to follow along with the organization of the book--not jump around all over the place.

Monitors also enjoy tried-and-true learning activities with the opportunity to interact and compare options before making decisions. However, they have a strong dislike of brainstorming and experimenting in the classroom setting. As a final footnote, one Monitor added, "This is really interesting. I've never thought about my learning skills before. I never knew how much I compare things, but I sure do."

Critical Thinkers

Critical Thinkers rely on a reflective thinking process which utilizes higher order thinking skills (Brookfield, 1987). They test assumptions to evaluate the specifics and generalizability within a learning situation; they generate alternatives to create additional learning options; and they are open to conditional acceptance of learning outcomes while keeping an open mind to other learning possibilities.

I get frustrated with people who make blanket statements and stereotype people. You can't categorize people. They change in different situations.

Their critical thinking skills are sustained by the ongoing modification and revision of their learning plans in relationship to their evaluation of their own learning process.

I think I was a late bloomer in being able to hold knowledge and understand things. I go through lots of different ways of studying for an exam; it's not just one. Then I have to figure out which one

works best for that exam. I had to teach myself how to remember. Nobody ever taught me how to learn, so I think that's why I was such a late bloomer. I also find that at the start of a program, I'm a little slow to catch on because it takes me a while to decide what's going to work best, but usually by the end of the semester, I'm getting perfect grades.

When I'm reading the text, I need to have my lips moving and sound coming out. Otherwise I have a really tough time concentrating. If I don't consciously focus on only one thing, I find my mind wanders, and I can't remember what I just read.

Critical Thinkers make heavy use of the Memory strategies of Memory Application, using mental images or other memories to facilitate problem solving, and the Use of External Aids such as lists and appointment books. Group members agreed that they do not memorize material. Rather, visualization was a more common memory technique used by most participants of this group, and many identified themselves as either visual or kinaesthetic learners.

I highlight my text an awful lot and then re-read the chapter three or four times. Then I visualize the page during the exam. It stays in my mind better that way. I don't know of any other way to remember.

Unlike Monitors, Critical Thinkers thrive in a learning environment that promotes experimentation through practical experience and hands-on activities. Many agreed that the classroom was a difficult place for them to actually learn. Although the classroom was needed to set the direction for learning, the learners then require time alone to "think things through" and to experiment. Because they recognize

their need to sometimes learn at a different pace than others, group work can be difficult for Critical Thinkers unless they are the group leaders and can set the learning pace. Participants conveyed that it was often difficult for them to grasp abstract concepts until they had a practical application for the concept.

Sometimes in computer class when we're supposed to be working on something, I'll just do busy work to look occupied, but then I'll take the work home where I have the space to be creative and do it my way.

Although the group participants were divided when asked whether they preferred human or physical resources in their learning, all displayed an ability to know how to locate and use the best information for them.

In photography, there's a lot of numbers that you have to remember. It's not as easy as everyone thinks. There's so much information. I got the instructor to lecture about the chapter before we read it to help focus and to explain the important things about the chapter. That worked for me. I did well in that course.

Critical Thinkers are "bent on reinventing the world." Their motto in life would be "there's got to be a better way." They are easily bored with the mundane and are often identifiable by their attire. Their creativity is often evident in their appearance as they enjoy their individuality and are proud of their "quirky way of viewing the world."

I think I was born in the wrong century. I should have been wearing long funny dresses and bustles and high-buckle shoes.

In this study of college students, this group had the lowest mean age. These learners are vivacious and thrive on spontaneity and creativity. Critical Thinkers do not usually respond well to rigidity or didactic orders; they want the space to be able to do things in a way that makes sense to them. For this reason, critical thinkers are often misinterpreted as the "rebel rousers"--those who hate or refuse to conform. "We don't care if your opinion differs from ours, just don't try to change our minds."

If someone doesn't think the same way I do and they think I should do something their way, I usually don't say anything, but I think to myself that I'll let them go along in their own miserable way. I'm more enlightened. I find the better way myself.

Sometimes if someone insists on my doing something a certain way, I'll do a lousy job so next time they either won't ask me or they'll let me do it my way!

When in a situation where we're under the supervision of a control freak--this could be a teacher or a boss, we'll do it their way when they're watching, and then when they're not, we'll take it and do it our way.

Although curious, inventive, and intuitive, the Critical Thinker's ability to generate alternatives and consider various solutions can also tend to result in increased difficulty in making decisions.

I tend to drag it [the decision] out for as long as I possibly can and wait until the very last minute before I do it. For some reason it all pulls together. When I'm dragging it out, I'm thinking about a whole bunch of different things and even when I sleep, it comes into my dreams. I'm totally consumed with it until I make a

decision. I think about so many things all the time. It's a wonder I can get anywhere.

I have a problem with exams though too because I think too much about the question and all the different answers that could be right. I'm told that I analyze everything to death.

I have a hard time making my mind up too. When I go to a restaurant, it takes me half an hour just to decide what I want to eat.

Thus, Critical Thinkers do not generally do well on multiple-choice exams and are better assessed with open-ended questions and problem-solving activities.

When asked what teaching methods and techniques a teacher could use to help them learn, the responses varied.

We like deadlines. Tell us when something is due and then let us do it our own way.

We like someone who uses examples and doesn't lecture straight from the text.

Long boring lectures don't work for me. I liked how casual you were with us. You talked to us rather than have us write a lot of notes from the board or overhead. . . . You did things in order. . . . You led us from one thing to another and made it easy to follow.

When brainstorming for a name for this group, the researcher defined the term critical thinking as a higher order of thinking skills and that the term critical was not to be confused with the act of criticizing. Still the term sat uneasily with the group, and true to form, they generated other alternatives.

I still think that the term critical thinking sounds a little negative (it reminds me of my mother). I prefer the term creative thinking.

Engagers

The Engagers are passionate learners who love to learn, learn with feeling, and learn best when they are actively engaged in a meaningful manner with the learning task; "the key to learning is engagement--a relationship between the learner, the task or subject matter, the environment, and the teacher" (Kidd, 1973, p. 266). Engagers seek out learning activities that provide the greatest opportunity for this engagement; the interaction and collaboration are major motivators for entering into the learning task.

I get bored with things very quickly, and then I don't want to do them anymore. So, if I'm going to stick with something, it has to mean something. It has to make a difference. I guess I kind of feed off the feeling I get when I connect with someone. But if I don't connect, then there's no meaning, so what's the point?

Although competent in completing short-term learning activities, these hold no emotional value to the Engager who finds superficiality and details to be painfully tedious. Rather the Engager pursues long-term learning activities that will result in self-development and will aid in a permanent personal change and growth. Their motto would be "life's a journey, not a destination."

Although the Engagers were not aware of the term "transformational learning" coined by Mezirow (1990), they described this concept as part of their learning in their

constant pursuit of learning activities that enhanced understanding of themselves and their world around them.

Perspective transformation is the process of becoming critically aware of how and why our presuppositions have come to constrain the way we perceive, understand, and feel about our world; . . . and of making decisions or otherwise acting upon these new understandings. Critically reflecting upon our lives, becoming aware of "why we attach the meanings we do to reality, especially to our roles and relationships . . . may be the most significant distinguishing characteristics of adult learning." (Merriam & Caffarella, 1991, p. 260).

Besides the Engager's resolve to learn, other factors concerning attention also contribute to a successful learning experience. Because Engagers are aware of the importance of motivation in their learning, they will purposefully and systematically create a learning environment that is ergonomically and aesthetically pleasing to their individuality. Factors such as colour and style of furniture can all factor into the Engager's learning process. As all of the senses are involved in the Engager's learning, devices might also include a favourite beverage or auditory sounds that can be associated with pleasantness. If all of the senses are positively aroused and the physical learning conditions have been satisfied, then there are no distractions, so the Engager can then focus on and engage completely in the learning activity. However, if one of the senses is negatively affected, then this serves as a

distraction for the Engager, and learning is impeded.

Engagers are easily distracted by sensory factors.

I work best downstairs in my den between 10:00 p.m. and 2:00 a.m. The house is quiet, the kids are asleep, and I can concentrate without any distractions. I make myself a pot of tea and sometimes put on my favourite music. I'll make it [studying] enjoyable. I actually look forward to it.

Engagers also scored high in the metamotivational learning strategy of Reward/Enjoyment, which is anticipating or recognizing the value to oneself of learning specific material and having fun or experiencing satisfaction with the learning activity (Fellenz & Conti, 1989). In this strategy, the affective domain is the dominant factor in learning. Engagers monitor the value of the learning experience and the level of motivation on an economy of scale to determine if the expected reward is worth the effort. If the learning activity is not perceived or expected to be a worthwhile or enjoyable experience, Engagers will seek out another activity that they find more meaningful. If institutional needs or other reasons require the Engager to participate in a task that the learner views as unpleasant or even in a neutral vain, Engagers will again make a conscious decision to store this activity in either the short-term and long-term memory and decide the level of attention to be given the activity.

I think I can learn almost anything if I have to, but as soon as I don't need it anymore, it's gone. I think that's why I didn't do so great in high

school. I had to take courses that I had no interest in, and I just scraped by. It wasn't that I couldn't do it, I just didn't have the motivation or maybe the discipline to do it. But I do better in college because I've decided what program and courses I want to be in.

Because of the great emotional investment in their learning, Engagers take great pride in their work and often their self-worth is determined or validated by their accomplishments.

I really take it personally when I get a poor grade in an essay or something I've created. I have a tough time separating myself from my work. If I get a poor grade, then I feel like a failure. I think that's why I'm a perfectionist. My work is a reflection of me, and I want to be proud of what I do. So I try to make sure that everything I do is perfect. Maybe I'm a little too picky, but it really means a lot to me.

Personal growth, increase in self-esteem, helping others, and working as part of a team for a worthwhile project are also emotionally rewarding to an Engager and will motivate them to embark upon and to sustain a learning experience.

Confidence is another metamotivational learning strategy in which Engagers scored high. However, the group participants pointed out that their confidence is not dependent so much on the students believing that they can complete the learning task successfully as it is on whether they are confident that the learning task will keep them interested enough to complete the learning task.

Nobody likes a quitter, but if I don't like doing something, it's really painful. All I can think about is quitting. So rather than start something and have to quit because I hate it, I'm really

careful about what I choose to sign up for. I want to be confident that I'll enjoy it enough to finish it, and I want to get something out of it in the end.

When an Engager makes a decision to enter into a learning activity, it is usually well contemplated and a commitment is made to achieve the goal originally intended. If Engagers have begun a learning activity that they find rewarding or enjoyable, they will completely immerse themselves in the activity to be able to fully experience the joy or satisfaction of a job well done. If Engagers are lukewarm about a subject, they know that it is going to take much more effort to complete the task. However, the economy of scale enters in again. This extra amount of work and effort to stay on track will not pay off with any feelings of satisfaction, but instead there will only be a record of a job that they survived. This "getting by" attitude does not spark any great emotional appeal or evoke any positive feelings in the affective domain or provide any reward or enjoyment, so the learning task looks ominous and formidable. Therefore, it is often avoided. One of the very important factors in educational participation is the self-esteem of the individual. Those who evaluate themselves negatively are less likely to expect success (Rubenson, 1977) and less likely to experience congruence with the educational environment (Boshier, 1973).

Engagers' passion for learning is combined with cognitive processes. In addition to reflecting on the joy of learning, they review learning plans, check to see if they are on task, and compare their progress to accepted standards or models. When necessary, they adjust their learning plans in relationship to their evaluation of their own learning. Thus, they not only constantly interact with the learning task in the affective domain concerning their motivation for being involved in the learning task but also in the cognitive domain of monitoring and adjusting it to keep it a meaningful learning activity.

In formally evaluated situations, the Engagers have the lowest grade point average of all the groups. This may be a result of their focus on learning being on their internal needs rather than on external standards. However, like the Navigators, who had the highest grade point average, the Engagers also make use of external aids such as appointment books and lists to reinforce memory.

Although every learner uses metamotivation to some degree in their learning, the Engager's level of learning is directly dependent on the satisfaction of these strategies. Until these strategies have been satisfied, learning will be restricted.

Since the Engagers' learning is governed by emotional commitment and their ability to internalize the content which they must find personally valuable or rewarding, they

succeed best with teachers who focus on learning rather than on formal evaluation and who encourage involvement in projects based on individual interests. Engagers consider work as an extension of themselves and are motivated by feelings of satisfaction or pride. Therefore, they respond best to a teacher who displays a personal interest in them and with whom they can develop an emotional affinity. Since the environment is also a consideration in the Engager's level of learning, a teacher can enhance the emotional involvement with the content by promoting groupwork to provide greater opportunities for interaction.

Networkers

The Networkers are proficient at using human resources. This includes dialogues, discussions, and networking which is often with experts and professionals to integrate others into the social and political processes of learning. For this group,

Listening to people with different opinions or insights into issues is suggested as well as the use of discussion to think through or study problems. In some situations, the support provided by human resources may be as important as the information they contribute. (Fellenz, 1993, p. 37)

People are more important than things or processes.

Networkers are masters at small talk; they remember people's names and can easily talk about projects, family members,

and interests of the person with which they are in conversation.

Networkers are those who can easily make others feel at ease and can initiate and maintain meaningful conversations. Often they can elicit information that others cannot.

People always seem to be coming to me with their problems and their life stories even when I don't know them very well. I've been told I'm a good listener.

Networkers are extremely intuitive, have sophisticated interpersonal skills, and have an uncanny understanding of human nature and can easily "figure people out pretty quickly."

Back in high school, people always thought I would make a good investigative reporter because I could always get people to tell me their deep, dark secrets.

Networkers are wonderful motivators because of their understanding of human nature. If there is a problem, the networkers want to "talk it out to reach a solution rather than brood about it and arrive at a solution by themselves." These people like group decisions and show great respect for others' opinions, values, and ideas; however, sometimes this can be a fault:

People are important, and what they think is important. What they think of me is important to me. Maybe I'm too sensitive, but it matters to me what people think. I see others with thick skins where other people's opinions don't seem to bother them. I wish I could be more like that, but I'm not. I'm really easily hurt.

Networkers use several other learning strategies to support their concern for interacting with others. They structure information for mental processing so that the material can be better stored and retrieved, and they use mental images or other memories to facilitate problem solving. Like the Engagers, the Networkers also rely heavily on anticipating the value to oneself for learning or having fun with the learning activity. Yet, this can also work adversely:

Yeah, when I get hurt or embarrassed that's all I can think about so I'm not learning. I had a teacher put me down in high school once. I supposed I deserved it, but I never got over it and never really forgave him. I totally shut myself off from him, I wouldn't ask him any questions, and wouldn't make eye contact with him for the rest of the semester. That really made a difference in my learning. I just barely scraped by.

Networkers succeed best with teachers who promote interaction and discussion in the classroom. Not only do Networkers enjoy brainstorming and a trial-and-error method of discovery, but they prefer problem-solving and researching new ideas rather than learning already established material. The process of learning is more important to them than the output or the final grade. Since Networkers rely heavily on human resources and prefer expert advice to manuals, they value a teacher who shares experiences through storytelling and who makes learning fun but practical.

Discriminant Analysis on Clusters

Discriminant analysis was conducted on the five learning clusters as a confirmatory measure to gain insight into the process that separates the groups of learners. The set of discriminating variables used to predict placement in the five clusters consisted of the 15 learning strategies found in SKILLS. Here the discriminant analysis was used as a

tool for identifying the process that separates the clusters and therefore for helping to describe the clusters. By using the various clusters as the groups and by using the variables from the cluster analysis as the set of discriminating variables, an analysis can be generated which produces a structure matrix which describes the process that separates the various clusters into distinct groups and which yields a discriminant function that is a formula that can be used for predicting placement in the various clusters. (Conti, 1996, p. 71)

The pooled within-groups correlations are the correlations for the variables with the respondents placed in their clusters. The examination of the 105 coefficients in the pooled within-groups correlations in this analysis showed that all were at a sufficiently weak level to retain the variables in the analysis. Only 1 coefficient was at the .2 level, and the remaining 104 were all 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

programs. As a result of this Wilks' lambda stepwise procedure, all 15 variables were included in the discriminant function and with their Wilks' lambda values are as follows: Confidence--.10, External Memory Aids--.10, Memory Application--.09, Attention--.09, Organization--.09, Use of Resources--.09, Reward--.09, Planning--.09, Critical Acceptance--.09, Identification of Resources--.08, Adjusting--.08, Testing Assumptions--.08, Use of Human Resources--.08, Generating Alternatives--.08, and Monitoring--.08.

Four canonical discriminant functions were identified in the analysis and two functions were determined to be relevant descriptors of the discrimination process.

Function 1

The standardized coefficients for the first function which discriminated between clusters were as follows: Confidence (.66), Reward/Enjoyment (-.41), Identification of Resources (.34), Use of Resources (.34), Organization (.24), External Memory Aids (.23), Memory Application (-.17), Planning (.16), Attention (.15), Generating Alternatives (.11), Use of Human Resources (.07), Monitoring (.06), Testing Assumptions (-.05), Critical Acceptance (.03), and Adjusting (-.004). Thus, the two Metamotivation strategies of Confidence and Reward/Enjoyment contributed most to this function. The two Resource Management strategies of

Identification of Resources and Use of Resources contributed about half as much as Confidence. The other strategies made much weaker contributions to discriminating between the clusters.

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

$$D = .96 \text{ (Planning)} + .38 \text{ (Monitoring)} - .25 \text{ (Adjusting)} + .97 \text{ (Attention)} - .27 \text{ (Reward)} - .46 \text{ (Confidence)} + .15 \text{ (Organization)} + .15 \text{ (External Memory Aids)} - .11 \text{ (Application)} - .32 \text{ (Testing Assumptions)} + .70 \text{ (Generating Alternatives)} + .19 \text{ (Critical Acceptance)} + .21 \text{ (Identification of Resources)} + .23 \text{ (Use of Resources)} + .47 \text{ (Use of Human Resources)} - 2.82.$$

The group centroids for this first function for the clusters were as follows: Cluster 1 (1.79), Cluster 2 (.11), Cluster 3 (.66), Cluster 4 (-1.45) and Cluster 5 (-1.48). The canonical correlation was .79 for this function. When this is squared, it indicates that the groups explain 62% of the variation in the discriminant function.

Four variables in the structure matrix had sufficient coefficients to be included in the interpretation of the meaning of the first discriminant function. They were as follows: Confidence (-.67), Reward (-.45), Use of Resources (.35), and Identification of Resources (.31). The first discriminant function was named Locus of Control for Learning.

The process that discriminated the groups from each other in the first function was an internal versus external view of the process by the learner. In this function, the Metamotivational strategies of Confidence in learning and Reward/Enjoyment with learning were contrasted with the Resource Management strategy of Identification of the best learning sources. While some learners emphasized their own motivational factors for learning, others gained their security in learning by having the proper learning resources (Kolody & Conti, 1996).

Function 2

The standardized coefficients for the second function which discriminated between clusters were as follows: Attention (-.46), Memory Application (.44), Critical Acceptance (.40), Adjusting (.34), External Memory Aids (.27), Planning (-.25), Monitoring (-.23), Generating Alternatives (.21), Confidence (-.19), Use of Resources (-.13), Testing Assumptions (.12), Use of Human Resources (.10), Organization (.10), Identification of Resources (.08), and Reward (-.03). Thus, two Memory area learning strategies contributed most to determining the scores on the function. Critical Acceptance and Adjusting contributed almost as much with the other strategies contributing from half as much to very little to determining the scores.

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

$$D = .21 \text{ (Adjusting)} - .16 \text{ (Planning)} - .15 \text{ (Monitoring)} - .29 \text{ (Attention)} - .22 \text{ (Reward)} - .13 \text{ (Confidence)} + .59 \text{ (Organization)} + .18 \text{ (External Memory Aids)} + .29 \text{ (Memory Application)} + .79 \text{ (Testing Assumptions)} + .14 \text{ (Generating Alternatives)} + .24 \text{ (Critical Acceptance)} + .51 \text{ (Identification of Resources)} - .85 \text{ (Use of Resources)} + .63 \text{ (Use of Human Resources)} - 3.57.$$

The group centroids for this second function for the clusters were as follows: Cluster 1 (-.263), Cluster 2 (-1.73), Cluster 3 (1.77), Cluster 4 (-.168) and Cluster 5 (.520). The canonical correlation was .75 for this function. When this is squared, it indicates that the groups explain 56.1% of the variation in the discriminant function.

Four variables in the structure matrix had sufficient coefficients to be included in the interpretation of the meaning of the second discriminant function. They were as follows: Attention (-.49), Memory Application (.43), Planning (-.35), and Critical Acceptance (.33). The second discriminant function was named Structure for Learning.

The second function used to describe another process to discriminate the groups from each other paired Attention by focusing on the learning materials and Planning the best way to learn against the strategies of Memory Application by using techniques such as mental images and Conditional

Acceptance of learning outcomes. Thus, this discriminant function distinguishes between those with a preoccupation with what needs to be learned and how this is going to be accomplished and those who have mental flexibility with the learning process (Kolody & Conti, 1996).

Function 3

The standardized coefficients for the third function which discriminated between clusters were as follows: External Memory Aids (.69), Testing Assumptions (-.35), Use of Human Resources (-.35), Memory Application (-.32), Use of Resources (-.24), Generating Alternatives (.23), Attention (.20), Critical Acceptance (.17), Adjusting (.16), Organization (-.14), Monitoring (.13), Identification of Resources (-.10), Confidence (.06), Planning (.05), and Reward (-.02). Thus, External Memory Aids dominated in contributing to the scores for this function. While some other learning strategies contributed about half as much as External Memory Aids, most others made little contribution.

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

$$D = .33 (\text{Planning}) + .85 (\text{Monitoring}) + .99 (\text{Adjusting}) + .12 (\text{Attention}) - .10 (\text{Reward}) + .40 (\text{Confidence}) - .86 (\text{Organization}) + .45 (\text{External Memory Aids}) - .21 (\text{Memory Application}) - .22 (\text{Testing Assumptions}) + .14 (\text{Generating Alternatives}) + .10 (\text{Critical Acceptance}) - .62 (\text{Identification of Resources}) - .16 (\text{Use of Resources}) - .22 (\text{Use of Human Resources}) - .89.$$

The group centroids for this third function for the clusters were as follows: Cluster 1 (.416), Cluster 2 (-.692), Cluster 3 (-.234), Cluster 4 (1.243), and Cluster 5 (-.967). The canonical correlation was .6214 for this function. When this is squared, it indicates that the groups explain 38.6% of the variation in the discriminant function.

Four variables in the structure matrix had sufficient coefficients to be included in the interpretation of the meaning of the third discriminant function. They were as follows: External Memory Aids (.65), Use of Human Resources (.40), Use of Resources (.31), and Testing Assumptions (.30). Because of an eigenvalue (.63) of less than one and because the amount of variance accounted for by this function was much less than accounted for by the first two functions, this discriminant function was not named.

Function 4

The standardized coefficients for the fourth function which discriminated between clusters were as follows: Organization (.69), Planning (.48), Testing Assumptions (-.25), Use of Human Resources (.24), Monitoring (-.21), Attention (-.15), Identification of Resources (-.11), Reward (-.10), Generating Alternatives (-.08), Confidence (.04), Adjusting (-.04), Critical Acceptance (-.04), Memory Application (.02), and External Memory Aids (-.01). Thus, Organization was by far the most powerful learning strategy

in contributing to determining the scores for this function. While Planning also was an important element in determining the scores, the other learning strategies were far less influential.

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

$$D = .29 \text{ (Planning)} - .14 \text{ (Monitoring)} - .23 \text{ (Adjusting)} - .94 \text{ (Attention)} - .63 \text{ (Reward)} + .30 \text{ Confidence} + .42 \text{ (Organization)} - .51 \text{ (External Memory Aids)} + .13 \text{ (Memory Application)} - .16 \text{ Testing Assumptions} - .50 \text{ (Generating Alternatives)} - .22 \text{ (Critical Acceptance)} - .69 \text{ (Identification of Resources)} - .21 \text{ (Use of Resources)} + .15 \text{ (Use of Human Resources)} - .84.$$

The group centroids for this fourth function for the clusters were as follows: Cluster 1 (549), Cluster 2 (-.502), Cluster 3 (-.592), Cluster 4 (-.132) and Cluster 5 (.676). The canonical correlation was .47 for this function. When this is squared, it indicates that the groups explain 21.3% of the variation in the discriminant function.

Four variables in the structure matrix had sufficient coefficients to be included in the interpretation of the meaning of the fourth discriminant function. They were as follows: Organization (.68), Planning (.40), Use of Resources (-.36), and Testing Assumptions (-.33). Because of an eigenvalue (.27) of less than one and because the amount of variance accounted for by this function was much less

than accounted for by the first two functions, this discriminant function was not named.

The percentage of cases correctly classified was 95.45%. The classification correctly placed 249 (96.1%) in Cluster 1, 218 (96.5%) in Cluster 2, 211 (94.6%) in Cluster 3, 223 (94.5%) in Cluster 4, and 190 (95.5%) in Cluster 5. Thus, the discriminant function is a 75.45% improvement over chance in predicting group placement. Consequently, it demonstrates that clusters can be distinguished on the basis of learners' preference for learning strategies.

Thus, a discriminant analysis was calculated to investigate the final research question concerning what process differentiates one cluster from another. Because the discriminant analysis was being performed on clusters that had been produced by a cluster analysis, it was anticipated that the amount of variance accounted for by the functions and the correct classification rate would be high; the results from both of these were very high indicating that the discriminant functions were good and useful for describing the process that separates the clusters from each other. Thus, five distinct groups of learners exist and the processes that distinguish them from each other are Locus of Control for Learning and Structure for Learning.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

Summary

Educators have long searched for ways to address the individual differences that they know exist in learners. While various areas such as intelligence, cognition, teaching theories, and learning styles have been examined, none satisfactorily accounts for the various approaches learners take to accomplish their learning tasks. Consequently, adult educators have begun to examine the concept of learning strategies. Learning strategies are the techniques and skills that individuals use to accomplish a specific learning task. By using the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS), numerous researchers have found that various groups of learners can be distinguished by the learning strategies which they use. While most of these studies have been conducted in the United States, a need exists in the Canadian two-year colleges for knowledge concerning the learning patterns of the diverse students in the system.

Therefore, the purpose of this study was (a) to identify the learning strategies of adult learners at

two-year colleges in Alberta, Canada; (b) to investigate the relationship of these learning strategies to academic success, gender, age, and program of study; and (c) to explore patterns of learning of distinctive groups of learners that may exist. Once distinct groups of learners were identified, the reasons for these differences were then investigated by qualitative and quantitative means to describe these groups.

Building upon a learning strategies study initiated at Medicine Hat College, five Canadian two-year community colleges participated in this study. Demographic and learning strategies data using SKILLS were collected from a representative sample at each college to investigate if learning strategies could be used to discriminate between students when they were grouped on academic success and demographic variables. In addition, cluster analysis with follow-up interviews was used to identify and describe distinct groups of learners within this population.

Profiles of Learners

The sample included 1,143 learners who ranged in age from 17 to 71; 70.5% of the sample was female, and 29.5% was male. Using SKILLS, the possible range of scores for the learning strategies areas is 12 to 36. All the group means were near the middle of the range. Resource Management was the learning strategy area most preferred by the

participants with a mean of 25.48, and Metamotivation was the least common learning strategy area relied upon by the students with a mean of 22.92. The 15 individual learning strategies, which had a range of 4 to 12, also had little divergence. Again, the group means were all near the middle of the range. Testing Assumptions and Critical Use of Resources, both with means of 8.85, were the two learning strategies most commonly preferred by the participants. The Metamotivation learning strategy of Reward/Enjoyment with a mean of 7.04 was the strategy least relied upon by the students.

Discriminant Analysis

Discriminant analysis was used to examine the differences between groups of learners with respect to the simultaneous interaction of the 15 learning strategies in SKILLS. Learners were grouped according to gender, the type of program in which the learners were enrolled, age, and grade point level. These analyses failed to produced any powerful functions although weak differences were found.

Grades. Students were grouped according to the most successful learners as measured by grade point average and the least successful learners. The percentage of cases correctly classified by the discriminant function shows how accurate the discriminant function was in grouping the respondents. This discriminant function was 61.6% accurate

in classifying cases. This discriminant function is an 11.6% improvement over chance in predicting group placement. This small improvement over a chance placement was judged inadequate to discriminant between the least successful and most successful learners on the basis of their preference for learning strategies.

Gender. When the sample was grouped by gender, the percentage of cases correctly classified by the discriminant function was 60.28%. This discriminant function is a 10.3% improvement over chance in predicting group placement. This small improvement over a chance placement was judged inadequate to discriminant between female and male learners on the basis of learners' preference for learning strategies.

Program. Students were grouped according to being in either the University Transfer program or the Certificate/Diploma program. The percentage of cases correctly classified by the discriminant function was 55.14%. This discriminant function is a 5.14% improvement over chance in predicting group placement. This small improvement over a chance placement was judged inadequate to discriminant between the program of study on the basis of learners' preference for learning strategies.

Age. The learners were grouped into the three age categories of Under 20, Age 20-23, and Over 23. The percentage of cases correctly classified by the discriminant function was 41.29%. This discriminant function is an 8.29% improvement over chance in predicting group placement. This small improvement over a chance placement was judged inadequate to discriminant between the age categories on the basis of learners' preference for learning strategies.

Cluster Analysis

The multivariate technique of cluster analysis produced a solution with five clear and distinct clusters. Analysis of variance revealed that all 15 learning strategies were significantly related to this clustering. Individual interviews and focus group interviews were conducted to obtain qualitative data to further enhance the quantitative data in describing the clusters.

The profile for each group indicates a definite preference for specific learning strategies. Navigators are focused learners who chart a course for learning and follow it. Monitors are cognizant of their learning progress and closely monitor their learning. Critical Thinkers rely heavily on a variety of traditional critical thinking skills. Engagers are passionate learners who involve all five senses in their learning and learn best when they are actively engaged in a meaningful manner with the learning

task. Networkers make frequent use of human resources and integrate others into the social and political processes of learning.

A discriminant function was calculated to uncover the learning strategy process that distinguishes these five clusters from each other. This procedure revealed that the clusters differ from each other in the processes of Locus of Control for Learning and Structure for Learning. The percentage of cases correctly classified by the discriminant function in the cluster analysis was 95.45%. The classification correctly placed 249 (96.1%) in Cluster 1, 218 (96.5%) in Cluster 2, 211 (94.6%) in Cluster 3, 223 (94.5%) in Cluster 4, and 190 (95.5%) in Cluster 5. This discriminant function is a 75.45% improvement over chance in predicting group placement. Consequently, it demonstrates that clusters can be distinguished on the basis of learners' preference for learning strategies.

Conclusions

Five distinct groups of learners exist in both formal and informal venues of adult learning.

Learning strategies are not a useful tool for discriminating among various demographic groupings.

Two prominent conclusions have arisen from this study. Not only do these two discoveries address the differences that exist in adult learners, but they also identify the

pivotal relationship between content delivery and adult X learning.

The major conclusion of this study is that five distinct groups of learners exist in the general adult learning population for two-year college students in Alberta. Each of these groups have explicit preferences for learning strategies and each group utilizes a prominent learning strategy specific to that group. Navigators make heavy use of planning; the cautious Monitors prefer a model from which to work; Critical Thinkers score high in testing assumptions; Engagers function heavily in the affective domain and are strongly motivated by reward or enjoyment; and Networkers prefer to learn through human interaction over textbook or reference material.

It is significant to note that demographics have no effect on the learners' placement within a group. Age, program of study, gender, and grade point average were all examined, yet none accounted for any significant difference. This inability to associate any demographic characteristics with learning strategies indicates that the variance due to demographics is evenly distributed across the various learning strategies. Although this study examined the learning strategies of two-year college students in Alberta, these findings have been confirmed through additional studies that examined various diverse populations. Recent studies using SKILLS to measure learning strategies include

populations in the corporate, medical, military, and tribal settings. Learning strategies were examined for American Express financial planners (Conti, Kolody, & Schneider, 1997); for nursing students within the state of Montana (Lockwood, 1997); for United States Air Force personnel (Korinek, 1997); and for Native American tribal college students and community members (Bighorn, 1997). Each of these studies is congruent with the major conclusion of this study in that distinct groups of learners exist in both formal and informal settings based on the learning strategies utilized by the adult learner. Each study found distinct groups of learners, and these groups, which were elicited from smaller and more specific samples than used in this study, can be viewed as subsets of the five groups in this study. For example, Lockwood (1997) found four distinct groups of learners in a study that examined learning strategies of nursing students in the state of Montana. Using a similar design which involved quantitative analysis and data elicited from focus group interviews, Lockwood named her groups Intuitives, Reinforcers, Independents, and Retainers. Based on the results of this cluster analysis, Lockwood concluded that her groups were compatible with the five distinct learner groups found in this study (p. 210).

This typology of five types of learners can be useful for initially identifying groups of learners encountered in the instructional setting. While these characteristics apply

to the general adult learner and provide a conceptual basis for understanding the adult learner, the individuality of each learner must also be considered. Such labels can be beneficial to the selection of appropriate methods and techniques when they are used to focus understanding, discussion, and reflective thought about the learner; however, they can be detrimental if they are used to avoid critical thinking about the learner (Conti & Kolody, 1997).

Implications and Recommendations

Teaching

Each of the five distinct groups of learners found in this study has a preference for specific instructional methods, and they learn best when involved in a learning situation that best suits their preferred learning strategy. Adult educators can expect to have these five groups of approximate equal size in both formal and informal learning situations. Choice of teaching methods and content delivery should then be based on the diversity found within the class.

Each of the learning groups is equally prevalent in a general learning situation such as that with learners at a comprehensive two-year college. However, in groups such as nursing or financial planning, which have a narrower focus, only some of the groups may be present. Nevertheless, a variety of the groups will exist, and teachers must assess

how to best deal with the divergence. One approach could be taken when content dictates teaching methodology. Various subject areas are best taught using certain teaching strategies. The teacher must then recognize that a portion of the class may inherently use the learning strategy that matches the teaching method. This provides an opportunity for the educator to teach the other class members how to use this particular strategy that may be unnatural to them and thus to expand the learners' "toolkit" of strategies (Fellenz & Conti, 1993).

Practitioners could encourage learners to increase their use of learning strategies by introducing them to definitions and practices for each strategy, as well as to the benefits and practical applications for specific program areas.

Current 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 et al., 1988, p. 25)

Further understanding of learning strategies outside the natural realm of the individual learner could be enhanced through interaction and group work that involves students working with others who possess different learning preferences. Such activities could encourage learners to either practice the lifelong learning strategies they already possess or to develop new ones in areas of need (Smith, 1982).

Another approach to address the diversity within the classroom is to vary teaching strategies to meet the distinct needs of the groups. The practitioner must then be cognizant not only of these particular needs, but also of the student classification within the groups.

Following Schon's recommendation for the "reflective practitioner," educators should create knowledge about the learners within their organization. To assist in the process, practitioners could administer an instrument early in the learners' program that facilitates identification of the learning preferences specific to that population. Once groups of learners have been identified, then the educator can tailor learning activities and utilize teaching methods that address the learning preferences of the various groups within the classroom.

Data gathered from focus groups and personal interviews indicate that learning is enhanced when teaching strategies and learning environments are congruent with preferred learning strategies. As learners reflected upon the specific preferences for their group, they offered insightful recommendations for teachers.

Teaching Navigators. Structure and organization is crucial to the success of these learners. Teachers can enhance learning for this group by "painting the big picture" at the onset of the course and again for each

learning activity. This can be accomplished by communicating expected learning outcomes and by providing outlines, schedules, and deadlines. Learners can then utilize their most preferred learning strategy of planning to fashion their learning activities to reach their desired goals. Navigators also prefer that material be presented in well-organized and sequential units with frequent summaries to highlight areas of emphasis. As this group of learners is highly product-oriented, they also value prompt feedback on assignments and examinations.

Teaching Monitors. Similar to the Navigators, this group of learners require objectives, outlines, and deadlines in order to plan and control their learning schedules. Specific to their group, however, these learners are most successful and are able to best monitor their learning progress when visual models and standards are provided as a basis for comparison.

Teaching Critical Thinkers. Provision for individuality and creativity in completing assignments and projects is the key for successful learning for Critical Thinkers. As these learners instinctively generate alternatives, learning is enhanced with opportunities for hands-on learning and experimentation. Because learners in this group place little importance on memorization, they are best evaluated with open-ended questions and problem-solving activities.

Teaching Engagers. Since this group learns best when they are actively engaged in a meaningful manner with the subject matter, the environment, and the teacher, educators should provide Engagers with opportunities that encourage learning projects based on individual student interests. Teamwork and group projects that focus on process as well as product can also reinforce the learning strategy of reward/enjoyment required by these learners.

Teaching Networkers. Interaction is the key to learning for this group, so educators should provide an environment that allows for brainstorming, teamwork, and discussion of opposing or different viewpoints. As these learners make heavy use of human resources, teachers can enhance their learning by including guest speakers and media to present expertise in various subject areas. Networkers appreciate teachers who make learning fun but practical by sharing personal experiences and anecdotes that enhance material in the textbook and bring the material "to life."

To assist practitioners in expanding their current teaching methods to address the large divergence in the classroom, professional development activities should be provided to train colleagues in teaching methods that best facilitate the learning strategies contained in SKILLS. Innovative methods of content delivery using the various learning strategies could be collected to create an "ideas

bank" for each strategy and for different content areas. These ideas could come from educators at conferences and workshops and could be distributed with the contributor's name, number, and e-mail address for future contact, discussion, and interaction.

Students

The principles of adult learning are based upon student-centered, self-directed methodologies. Adult curriculum in any content area should encourage and provide assistance for learners to examine and reflect upon their personal preferences for learning. As students better understand their own learning strategies, the more empowered they are to enhance their personal learning (Knowles, 1968). Smith (1982) explored the concept of learning how to learn and concluded:

A central task of learning how to learn is developing awareness of oneself as a learner. . . . This requires that the learner be able to conceptualize his own learning process and be able to pay some attention to how he goes about learning . . . [and] thrust himself into managing the process. (Smith, 1982, p. 30)

Critical reflection upon one's learning preferences can provide the insight required to successfully adapt to various learning situations. Learners who are cognizant of their individual learning patterns can either select those situations that are congruent with their established strategies, or they can consciously develop additional

skills and strategies for learning. Examination of learning strategies and the five groups of learners found in this study also fosters understanding and tolerance of various learning patterns used by others. Developing individual learning strategies in both professional and personal learning situations can also enhance success in lifelong learning.

Research

Although fascinating, the intricacies of the human mind have caused much dissent in the field of education as discourse abounds on how to best teach the adult learner. Indeed, the very individuality of the learner is the root of the problem. Educators have searched unsuccessfully for an explanation of learner differences in areas of intelligence, learning style, and personality, yet all have proven inconclusive because each of these areas deals with an intrinsic factor over which the learner has little control. Learning strategies, however, are those techniques or specialized skills that a learner "elects to use in order to accomplish a learning task" (Fellenz & Conti, 1989, p. 7). Because learning strategies are controlled by the individual, they can then be identified and measured. This control provides an arena for rigorous examination of the resulting differences among the learners.

Using SKILLS to measure learning strategies of two-year college students in Alberta, research methodologies were combined in an innovative manner that resulted in multi-dimensional profiles and descriptions of the learners and their preferred learning patterns. After using deductive reasoning to impose sense on the data and finding no significant differences among the variables used in the study, inductive reasoning was used to "tease sense out of the data" (Conti, 1996). Cluster analysis was the inductive approach used from which five distinct groups of learners emerged. This analysis also provided a profile of each group in which learning strategies and demographic variables were measured. The key to the success of this study, however, was to conduct focus groups and personal interviews to further describe and name these groups of learners identified in the cluster analysis. The candid interviews not only addressed the preferred learning strategies of each group but also identified preferred teaching strategies for each group. This revelation provides a detailed description of the five distinct groups of learners as well as recommended teaching methods for adult educators to best enhance student learning.

This study has been a part of a major line of inquiry by the faculty and students in the Adult Education program at Montana State University. In order to obtain comprehensive insights into the role of learning strategies

in the adult learning process, numerous studies have adapted a similar design but have used different populations. As these studies have developed, the research design has been honed and a network of researchers has developed with insights and ideas about this learning process.

Consequently, the results of this study have been confirmed through subsequent studies with various populations (Bighorn, 1997; Conti & Kolody, 1995, 1996; Conti, Kolody, & Schneider, 1997; Korinek, 1997; Lockwood, 1997). To further test the generalizability of this study, further studies may be conducted using a similar design to determine if these five groups emerge in other studies with different groups of learners.

SKILLS has been shown to be an effective instrument to measure learning strategies of two-year college students. This effectiveness has been demonstrated in other studies using SKILLS. In this study, the original, generic form of SKILLS was used. However, when using SKILLS, researchers can create their own scenarios to fit the specific audience or group of learners with whom they are working (Lockwood, 1997; McKenna, 1991; Strakal, 1995). Indeed, if the original format of the instrument is not used, its conceptual framework can be used to direct the study (Uhland, 1995).

As the result of the team effort that has been used by faculty and students associated with the Center for Adult Learning Research and Adult Education program at Montana

State University, a comprehensive methodology has emerged for conducting research such as that associated with learning strategies. This methodology involves the use of multivariate techniques to collect both quantitative and qualitative data to thoroughly describe a phenomenon. When using SKILLS to measure learning strategies of a population, it is extremely effective to use discriminant and cluster analyses followed by focus groups of the clusters to better define and describe specific learning groups. Inquiry for these focus groups should include questions that are customized for the learning strategies of each cluster (Lockwood, 1997; Strakal, 1995).

Because of the fundamental necessity to identify the five groups of learners in a classroom, a need exists for a brief, valid, and reliable self-scoring instrument based on the learning strategies contained in SKILLS. The instrument would measure learning strategy preference and place the participant into one of the five clusters found in this study.

Epilogue

This study adds to the growing literature base on learning strategies and to the previous studies initiated at the Center for Adult Learning and Research at Montana State University. Congruent with other studies in which reflective practitioners are creating knowledge about their particular

organizations (Schon, 1987), SKILLS was an effective instrument for identifying adult learning strategies. Numerous differences were found among the learners even though strong patterns were not disclosed between the most and least successful groups of learners. However, the repeated failure to find differences using discriminant analysis suggests that imposing sense upon the data through preconceived groupings is not the best way to uncover differences in uses of learning strategies by different groups of learners. Instead, multivariate techniques such as cluster analysis which allow the data to expose its own patterns are more productive. Indeed, the findings from this study suggest that a general typology of learners exists which cuts across the demographic variables which researchers typically use to classify learners.

REFERENCES

- Adams, F. (1975). Unearthing seeds of fire: The idea of Highlander. Winston-Salem, NC: Blair.
- Aldenderfer, M., & Blashfield, R. (1984). Cluster analysis. Beverly Hills, CA: Sage Publications.
- Aldridge, O. (1984). Tom Paine's American ideology.
- Ausubel, D. P. (1968). Educational psychology: A cognitive view. New York: Holt, Rinehart & Winston.
- Bandura, A. (1977). Social learning theory. Englewood Cliffs, N.J.: Prentice-Hall.
- Bighorn, R. (1997). Learning strategies of Fort Peck Community College and community agencies learners. Unpublished doctoral dissertation, Montana State University, Bozeman.
- Borg, W., & Gall, M. (1983). Educational research (4th ed.). New York: Longman.
- Boshier, R. (1973). Educational participation and dropout: A theoretical model. Adult Education, 23, 255-282.
- Brookfield, S. D. (1987). Developing critical thinkers. San Francisco: Jossey-Bass.
- Brookfield, S. D. (Ed.) (1985). Self-directed learning: From theory to practice (New Directions for Continuing Education, Number 25). San Francisco, Jossey-Bass.
- Brookfield, S. D. (1986). Understanding and facilitating adult learning. San Francisco: Jossey-Bass.
- Brown, A. L. (1985). Knowing when, where, and how to remember: A problem of metacognition. In Glaser (Ed.), Advances in instructional psychology (Vol. 1) (pp. 77-165). Hillsdale, NJ: Erlbaum.
- Campbell, G. (1971). Community colleges in Canada. Toronto: McGraw-Hill.
- Cates, W. M. (1985). A practical guide to educational research. Englewood Cliffs, New Jersey: Prentice-Hall.
- Cervero, R. M. (1988). Effective continuing education for professionals. San Francisco, Jossey-Bass.
- Cohen, A. M., & Brower, F. B. (1987). The collegiate function of community colleges. San Francisco: Jossey-Bass.

- Conti, G. J. (1993). Using discriminant analysis in adult education. Proceedings of the 34th Annual Adult Education Research Conference. University Park, PA: University of Pennsylvania.
- Conti, G. J. (1996). Using cluster analysis in adult education. Proceedings of 37th Annual Adult Education Research Conference. Tampa, FL. University of South Florida.
- Conti, G. J., & Fellenz, R. A. (1991). Assessing adult learning strategies. Proceedings of the 32nd Annual Adult Education Research Conference. Norman, OK: University of Oklahoma.
- Conti, G. J., & Kolody, R. C. (1995). The use of learning strategies: An international perspective. Proceedings of the 36th Adult Education Research Conference (pp. 77-89). Edmonton, University of Alberta.
- Conti, G. J., & Kolody, R. C. (1997). Guidelines for selecting methods and techniques. In M. Galbraith (Ed.), Adult learning methods (2nd ed.). Malabar, FL: Kreiger.
- Conti, G. J., Kolody, R. C., & Schneider, R. (1997). Learning strategies in corporate America. Proceedings of 38th Annual Adult Education Research Conference, Stillwater, Oklahoma, Oklahoma State University.
- Counter, J., & Fellenz, R. A. (1993). Metacognition an learning strategies. In R. Fellenz & G. Conti (Eds.), Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS): Manual. Bozeman, MT: Center for Adult Learning Research.
- Cross, K. P. (1981). New frontiers for higher education: Business and the professions. In American Association for Higher Education (ed.), Partnerships with Business and the Professions. Washington, DC: American Association for Higher Education.
- Davenport, J. (1987). A way out of the andragogy morass. Paper presented at the Conference of Georgia Adult Education Association, Savannah, GA.
- Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. New York: Plenum Press.

- Dennison, J. D. (1995). Challenge and opportunity: Canada's community colleges at the crossroads. Vancouver, BC: University of British Columbia Press.
- Dennison, J. D., & Gallagher, P. (1986). Canada's community colleges: A critical analysis. Vancouver, BC: University of British Columbia Press.
- Dunn, R., & Dunn, K. (1978). Teaching students through their individual learning styles: A practical approach. Reston, VA: Reston Publishing.
- Farley, F. (1988). Biology and adult cognition. In R. A. Fellenz (ed.) Cognition and the adult learner. Bozeman, MT: Center for Adult Learning Research, Montana State University.
- Fellenz, R. A., & Conti, G. J. (1989). Learning and reality: Reflections on trends in adult learning. Columbus, OH. The Ohio State University. (ERIC Clearinghouse on Adult, Career, and Vocational Training, Information Series No. 336).
- Fellenz, R., & Conti, G. (1993). Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS): Manual. Bozeman, MT: Center for Adult Learning Research.
- Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of psychological inquiry. American Psychology, 34, 906-911.
- Freire, P. (1970). Pedagogy of the oppressed. New York: Seabury Press.
- Gagne, R. M. (1970). Principles of instructional design. New York: Holt, Rinehart, and Winston.
- Gay, L. R. (1996). Educational research: Competencies for analysis and application (5th ed). Columbus, OH: Merrill Publishing Company.
- Gleazer, E. J. Jr. (1980). The community college: values, vision, and vitality. Washington, DC: American Association of Community and Junior Colleges.
- Grubbs, J. C. (1981). A study of faculty members and students in selected midwestern schools of theology to determine whether their educational orientation is andragogical or pedagogical. Unpublished doctoral dissertation, Indiana University, DAI 42, 0055.

- Guba, E. G. (1978). Toward a methodology of naturalistic inquiry in education evaluation. Los Angeles: Center of Study for Evaluation, University of California.
- Hays, P. (1995). Learning strategies and the learning-disabled adult student. Unpublished doctoral dissertation, Montana State University, Bozeman.
- Hill, M. (1992). Learning strategies used in real life and achievement of adult Native American tribal college students. Unpublished doctoral dissertation, Montana State University, Bozeman.
- Houle, C. O. (1980). Continuing Learning in the professions. San Francisco: Jossey-Bass.
- Horton, M., with Kohl, J., & Kohl, H. (1990). The long haul. New York: Doubleday.
- Jarvis, P. (1983). Professional education. London: Croom Helm.
- Keefe, J. W. (1982). Learning style profile: Examiner's manual. Reston, VA. National Association of Secondary School Principals.
- Keller, J. M. (1987). Strategies for stimulating the motivation to learn. Performance & Instruction, 26(8), 1-7.
- Kerlinger, F. (1973). Foundations of behavioral research. New York: Holt, Rinehart, & Winston.
- Kidd, J. R. (1973). How adults learn. New York: Cambridge.
- Klecka, W. R. (1990). Discriminant analysis. Newbury Park: Sage Publications.
- Knowles, M. S. (1950). Informal adult education. New York: Associated Press.
- Knowles, M. S. (1968). Andragogy not pedagogy. Adult Leadership, 16(4), 350-352.
- Knowles, M. S. (1970). The modern practice of adult education: Andragogy versus pedagogy. New York: Association Press.
- Knox, A. B. (1977). Adult development and learning. San Francisco: Jossey-Bass.

- Kolody, R. C., & Conti, G. J. (1996). The use of learning strategies: Do distinctive groups of learners exist? Proceedings of the 37th Annual Adult Education Research Conference (pp. 199-204). Tampa, FL: University of South Florida.
- Korinek, D. (1997). An investigation of learning strategies utilized by Air Force officers. Unpublished doctoral dissertation, Montana State University, Bozeman.
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. Educational and Psychological Measurement, 30, 607-610.
- Lockwood, S. (1997). An investigation of learning strategies utilized by nursing students in Montana. Unpublished doctoral dissertation, Montana State University, Bozeman.
- Long, H. (1983). Adult learning: Research and practice. New York: Cambridge.
- Mayer, R. E. (1987). Learning strategies: An overview. In C. Weinstein, E. Goetz, & P. Alexander (Eds.). Learning and study strategies: Issues in assessment, instruction, and evaluation. San Diego: Academic Press.
- Maslow, A. H. (1954). Motivation and personality. New York: Harper & Row.
- McCombs, B. L. (1988). Motivational skills training: Combining metacognitive, cognitive, and affective learning strategies. In C. Weinstein, E. Goetz, & P. Alexander (Eds.), Learning and study strategies. New York: Academic Press.
- McKeachie, W. J. (Ed.) (1980). Learning, cognition, and college teaching (New Directions for Teaching and Learning, Number 2). San Francisco: Jossey-Bass.
- McKenna, R. J. (1991). The influences of personal and professional learning situations of real-life learning strategy utilization by school administrators in Wyoming. Unpublished doctoral dissertation, Montana State University, Bozeman.
- Merriam, S. B., & Caffarella, R. S. (1991). Learning in adulthood. San Francisco: Jossey-Bass.

- Mezirow, J. (1990). How critical reflection triggers transformative learning. In Mezirow and Associates, Fostering critical reflection in adulthood. San Francisco: Jossey-Bass.
- Miller, G. (1987). The magical number seven, plus or minus two: Some limits on our capacity for processing information. Psychology Review, 63, 81-97.
- Monroe, C. R. (1972). Profile of the community college. San Francisco: Jossey-Bass.
- Morgan, D. L. (1988). Focus groups as qualitative. Newbury Park, CA: Sage.
- Norman, D. (1982). Learning and memory. San Francisco: W. H. Freeman and Company.
- Norusis, M. J. (1988a). SPSS/PC+ V2.0 basic manual. Chicago: SPSS Inc.
- Norusis, M. J. (1988b). SPSS/PC+ advanced statistics V2.0. Chicago: SPSS Inc.
- Paul, L., & Fellenz, R. (1993). Memory. In R. Fellenz & G. Conti (Eds.), Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS): Manual. Bozeman, MT: Center for Adult Learning Research.
- Rogers, C. R. (1983). Freedom to learn for the '80s. Columbus: Merrill.
- Roscoe, J. T. (1975). Fundamental research statistics for the behavioral sciences (2nd ed.). New York: Holt, Rinehart & Winston.
- Rotter, J. B. (1954). Social learning and clinical psychology. Englewood Cliffs: N.J.: Prentice-Hall.
- Rubenson, K. (1977). Participation in Recurrent Education: A research review. Paper presented at a meeting of national delegates on Developments in Recurrent education. Paris: Organization for Economic Cooperation and Development.
- Schon, D. A. (1987). Educating the reflective practitioner. San Francisco: Jossey-Bass.
- Scribner, S. (1986). Thinking in action: Some characteristics of practical thought. In R. G. Sternberg & R. K. Wagner (Eds.), Practical

- intelligence: Nature and origins of competence in the everyday world. New York: Cambridge University Press.
- Seaman, D. F., & Fellenz, R. A. (1989). Effective strategies for teaching adults. Columbus, OH: Merrill Publishing Company.
- Shadden B. B., & Raiford, C. A. (1984). The communication education of older persons: Prior training and utilization of information sources. Education Gerontology, 10, 1-2, 83-97.
- Shirk, John C. (1983). Relevance attributed to urban public libraries by adult learners: A case study and content analysis of 81 interviews. Unpublished doctoral dissertation, Texas A&M University, College Station.
- Shuell, T. J. (1986). Cognitive conceptions of learning. Review of Educational Research, 56, 411-436.
- Smith, R. M. (1982). Learning how to learn. Chicago, Follett.
- Statistics Canada. (1995). Education in Canada. Catalogue #81-229-XPB.
- Sternberg, R. J. (1986). The triarchic mind. New York: Penguin Books.
- Strakal, D. (1995). The use of real-life learning strategies in personal and career development situations by students at Eastern Idaho Technical College. Unpublished doctoral dissertation, Montana State University, Bozeman.
- Tough, A. (1971). The adult's learning project. Toronto: The Ontario Institute for Studies in Education.
- Uhland, Roberta. (1995). Learning strategy behaviors demonstrated by low-literate adults engaged in self-directed learning. Unpublished doctoral dissertation, The Pennsylvania State University, College Park.
- Weinstein, C. E., Zimmerman, S. A., & Palmer, D. R. (1988). Assessing learning strategies: The design and development of LASSI. In C. Weinstein, E. Goetz, & P. Alexander (Eds.), Learning and study strategies: Issues in assessment, instruction, and evaluation. San Diego: Academic Press.
- Wingfield, A. & Byrnes, D. (1981). The psychology of human memory. New York: Academic Press.

Yabui, A. E. (1993). Reflective judgment and the adult learner's use of metacognitive learning strategies. Unpublished doctoral dissertation, Montana State University, Bozeman.

Yussen, S. R. (1985). The role of metacognition in contemporary theories of cognitive development. In D. L. Forrest-Pressley, G. E. MacKinnon, & T. G. Waller (Eds). Metacognition, cognition, and human performance. Orlando: Academic Press.

Zechmeister, E., & Nyberg, S. (1982). Human memory: An introduction to research and theory. Monterey, CA: Brooks/Cole.

MONTANA STATE UNIVERSITY LIBRARIES



3 1762 10301233 0