Factors affecting learning strategies in the professional workplace
by Clayton Mark Gehring

A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Education
Montana State University

Abstract:
The workplace is undergoing substantial and continuous change. The procedures required to perform common tasks are now being replaced with new methods requiring workers to regularly relearn significant parts of their job responsibilities. The purpose of this study was to determine if employee characteristics, such as gender and age, could be distinguished based upon their choice of learning strategies and to determine if clusters of learners exist in the workplace based on their choice of learning strategies.

Learning strategies and personal characteristics were collected from 262 employees in Great Falls, Montana, using the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS) and a data sheet. Quantitative analysis using discriminant and cluster analysis was performed on the data. In addition to the quantitative results, follow-up interviews were conducted with a sample of employees from each cluster to gather additional information.

Discriminant analysis revealed no differences in the using of learning strategies when employees were grouped on age, gender, post-secondary attendance, educational credential, and years in position: However, cluster analysis produced four clusters of learners based on their choice of learning strategies. These four clusters were named the Focusers, Indexers, Resourcers, and Reflective Planners.

The major conclusions are that learning strategies are not a useful tool for discriminating among employees grouped on various demographic data, distinct groups of learners exist among employees in workplace learning situations, no single set of training principles will work for all employees, and organizational training efforts need to teach the learning strategies identified as critical for the job and for the organization. Recommendations from the study are based on the needs of businesses to tap into the knowledge of how their employees learn. The recommendations are directed toward the employees' awareness of their learning strategies, workplace trainers recognizing and capitalizing on the learning strategies of the learners, and evaluation of the organization's environment to assure that it provides employees the necessary elements for successful learning.

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A thesis submitted in partial fulfillment
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of

Doctor of Education

MONTANA STATE UNIVERSITY-BOZEMAN
Bozeman, Montana

July 1997

APPROVAL

of a thesis submitted by

Clayton Mark Gehring

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

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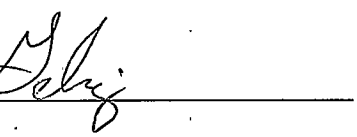
Signature 

Date 8-18-97

ACKNOWLEDGEMENTS

A sincere thank you to Dr. Gary Conti, Committee Chairperson at Montana State University--Bozeman, for his continued encouragement and guidance despite my slow going at times throughout this research project. I also want to thank committee members Dr. Robert Fellenz, Dr. Doug Herbster, Dr. Jana Noel, and Dr. Lyndon Marshall, for your support and helpful comments.

My appreciation also goes to those businesses in Great Falls, Montana, that participated in my data collection for without your cooperation this research project would not have been possible.

A thank you also goes to my fellow students in the doctorate program and my colleagues at MSU College of Technology—Great Falls for their encouragement and willingness to lend an ear when I needed someone to bounce ideas off, and for the ideas and thoughts they provided.

Finally, a big thank you to my wife, Amy, for her love, support, and encouragement throughout the many late nights and long weekends needed to complete this research project.

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CHAPTER 1

INTRODUCTION

The workplace is changing at an unbelievable rate due to several factors presenting never-ending challenges for today's workforce. The procedures required to perform common tasks are now being replaced with new methods requiring workers to relearn significant parts of their job responsibilities on a regular basis.

These changes take many forms. In the past, communication may have taken several days from sender to receiver. Today, however, communication can take place instantly; this may not only be interoffice but worldwide via computer networks and fax machines requiring the employee to learn how to use and utilize the new technology effectively. More employees are performing their work responsibilities at home and accessing their workplace via a computer and modem. This telecommuting may require the employees to develop new skills in organization of work, self-motivation, and problem solving.

Businesses are also beginning to downsize their workforce due to the increased ability of technology to perform human functions and increased worker productivity, thereby requiring fewer employees and causing each employee to assume more responsibilities. In 1993 IBM reduced its workforce by 85,000 employees, General Motors by 80,000 employees, and Sears Roebuck and Company by 50,000 employees (Cooper, 1994) to name just a few. Workforce reductions are impacting both large and small businesses across a variety of industries. Not only does this change impact the workers who were laid off, but it also affects those employees who were not, because they must now assume more responsibility and may fear that their job is in jeopardy of being eliminated.

Another critical factor affecting both the workplace and society is that the amount of information available to businesses continues to grow at astounding rates. Present estimates predict that at the current growth rates, information will double every four years (Barcomb cited in Johnson & Kallaus, 1992). In order for businesses to remain competitive and for employees to perform their jobs

effectively and make good decisions, they must have access to current information. This access is becoming more and more difficult as information becomes outdated so quickly. As a result, the sources of information an employee may have available for solving problems and learning new techniques are changing. Information might come in diverse forms such as written material or a CD-ROM computer disk or from a coworker or even a computer on the other side of the world.

The changes in the workplace and ever-growing sources of information have a drastic impact upon what average workers can do and are expected to do as part of their job responsibilities. These additional responsibilities present workers with the potential for many new and different problems and challenges than in the past and require them to continually learn.

Not only has the workplace changed, but the workforce has changed as well. Many of today's employees entered the workforce before technology became commonplace and before formal education was considered almost essential for employment. These employees have experienced phenomenal changes throughout their careers ranging from mechanical

typewriters, mimeograph machines, and rotary dial phones to desktop computers, fax machines, and voice mail. Most employees have developed their work skills and learned to cope with these ongoing changes through on-the-job experience and many years of practical experience. Some also cope with the constant change through networks of friends and coworkers who serve as resources. Others have developed effective skills at memorizing information very quickly while others rely on external aids to learn and remember.

Many employers today consider formal education an essential component of an employee's experiences. In 1992, the average manufacturer rejected five out of six applicants because they were undereducated (Gordon, Morgan, & Ponticell, 1994, p. 208). Employers recognize the value of an educated workforce and the cost of training those who are not. Through formal education, employees acquire knowledge and develop attitudes about today's working world as well as learn skills for dealing with future changes in the workplace. These formally educated employees enter the workforce with potentially different learning skills than their non-formally trained counterparts. These different

learning skills are a result of the difference between learning for real-life problems that are experienced by the non-formally educated employees and learning for academic problems that are experienced by formally educated employees (McKenna, 1991; Sternberg, 1990). The academic setting generally provides training with a strong theoretical background and limited practical experience that must be developed based upon their theoretical knowledge. The formally educated employees are also presented with well-structured problems which is common in academic settings but which is not so common in the business world. If they rely upon the learning strategies and skills promoted while in school to deal with the reality of the changing workplace, in some cases these strategies may not support them well. For instance, the academic environment tends to provide structure and frequent feedback which is not common in the workplace where problems tend to be vague, unstructured, and producing infrequent or no feedback (Sternberg, 1990). Much of what is learned in the academic environment does not matter very much in terms of the skills needed to succeed on the job (p. 14). The varied educational experiences of these

two groups may have a strong impact upon the learning strategies they choose to use on the job. When learning about new technologies or taking on new responsibilities these different approaches may become apparent.

Regardless of educational background and years of experience, all employees are presented with the realities of a changing workplace which brings many new problems, challenges, and opportunities requiring them to decide how they will react. A significant part of dealing with the changing workplace involves employees accepting the change and learning to understand and use new opportunities to their benefit. The reaction of employees to change may include many responses such as denial, avoidance, trial and error, assigning blame for the change, questioning usefulness, consulting written or electronic materials, thinking about previous experiences, consulting other employees, group problem solving, or a combination of several activities to deal with the problem.

How an individual responds to new learning challenges strongly depends upon the learning strategies they have found to be beneficial and successful in the past when

dealing with learning situations. Learning strategies are the techniques or skills that a person uses in order to accomplish a specific task (Conti & Fellenz, 1991). The learning strategies an individual uses may potentially be affected by several factors. In addition, the strategies an individual uses are constantly being developed and refined as they experience new learning situations (Fellenz & Conti, 1993).

Individuals' past experiences with handling problems and change may have a direct impact upon how they respond to work-related problems. Education provides experiences that have the potential to impact how an employee will respond to problems in the workplace. For instance, formal education may encourage individuals to use written material as a primary source for solving problems, whereas those without substantial formal education may be more apt to explore the situation with a group of knowledgeable coworkers.

Another effect upon learning strategy may be the result of several years of work experience in a career providing a strong network of resource people from which to draw support in managing change and learning about new technologies.

Those just entering a career may not have developed a network of resource people and therefore may be more inclined to rely upon other methods.

The perceived reward or benefit from dealing with the change may provide substantial motivation for a worker to feel compelled to continue grappling with the problem using a variety of techniques. If individuals do not see any benefit that will result from dealing with the change, they may simply avoid dealing with it. However, if avoiding the change may result in loss of employment, then financial security may be the motivation that will push the individuals into using a variety of learning techniques to assure they will understand and deal with the change. Several factors have a strong influence upon the motivation of adults such as respect, sympathy, anger, fear, and friendliness (Kidd, 1973).

Problem Statement

As the workplace changes, learning new skills and concepts is critical to the success of today's workers. Workers have a variety of methods and learning strategies

they can use to manage these changes. Some of the strategies may be useful for one individual but not for another. The strategies an employee chooses to use may be affected by several different factors such as longevity in workplace, age, or level of formal education. It is unknown at this time what impact these factors have upon an individual's choice of learning strategies in the workplace.

Purpose

The purpose of this study is to describe the learning strategies used by employees in the workplace and to describe the relationship that demographic and personal factors may have with an employee's choice of learning strategies in the professional business environment of industries such as education, insurance, newspaper publishing, medical, financial, and construction. Some of these factors include longevity in workplace, age, formal education, relevancy of formal education, motivating reason(s) for work, success in the workplace, and relationships with coworkers and supervisors.

Research Questions

To investigate the relationship between learning strategies used in the workplace and various demographic and personal characteristics, this study will examine the following questions.

What is the profile of learning strategies used by employees in the workplace?

Do learning strategies as measured by SKILLS discriminate between workers grouped on the following demographic and personal factors:

- Age
- Gender
- Years of education
- Relation of education to job skills/responsibilities
- Value of formal education versus on the job experience
- Years of employment in current job and career field
- Satisfaction with current job
- Motivation for working
- Opinions of the impact of technology on the workplace and society

Is it possible to identify clusters of employees based on the learning strategies they use?

Significance of the Study

Through a better understanding of how adults learn in the workplace there are potential benefits in both the workplace and the educational environment. In the workplace,

those responsible for managing and training employees will be able to recognize the differences in how their employees learn and provide a suitable environment for the employee to adapt to new responsibilities and procedures and be the most productive. The results of this study may provide human resource managers with ideas for resources and information that would benefit their employees learning on the job.

In the educational environment and specifically in the classroom, this information may help instructors become more aware of the environment and skills their students will need to develop in order to succeed in the current business workplace. Any opportunity where educators can get a better understanding of the real-world business environment has the potential to improve the experiences of students in that educational environment.

Definition of Terms

Critical Thinking: Reflective thinking focused on what to believe or do. Includes identifying and challenging assumptions, challenging the importance of context,

imagining and exploring alternatives, and reflective skepticism (Brookfield, 1987, p. 12).

Formal Learning: Learning experiences that are institutionally sponsored, classroom-based, and highly structured where the institution controls the objectives and the means of delivery (Marsick & Watkins, 1990, p. 12).

Incidental Learning: A subset of informal learning that is a by-product of some other activity such as accomplishing a task, personal interaction, or even a formal learning experience (Marsick & Watkins, 1990, p. 12).

Informal Learning: Learning experiences that are not typically classroom based or highly structured where the learner controls the objectives but the institution still controls the means of delivery (Marsick & Watkins, 1990, p. 12).

Learning Strategies: The techniques and skills that an individual elects to use in order to accomplish a specific learning task. Such strategies vary by individual and by learning objective. Often they are so customary to learners that they are given little

thought; at other times much deliberation occurs before a learning strategy is selected for a specific learning task (Fellenz & Conti, 1989, p. 1).

Memory: Storage, retention, and retrieval of knowledge. Memory strategies associated with adult real-life learning are rehearsal, organization, external aids, and memory application (Fellenz & Conti, 1993, p. 18).

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

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

Professional Workplace: Environment that includes a traditional office-based setting with predominantly white-collar occupations ranging from lower-level workers to mid and upper management. This type of workplace is typically found in almost all industries.

Resource Management: Identification of appropriate resources, the critical manner in which they are used,

and/or the use of human resources in learning situations or activities (Fellenz, 1993, p. 27).

SKILLS: Acronym for Self-Knowledge Inventory of Lifelong Learning Strategies. A learning strategies inventory with established validity and reliability which usually asks respondents to rate 15 learning strategies in 4 of 6 scenarios commonly found in everyday life and which call for a learning effort on the part of the respondent (Fellenz, 1993, p. 2).

Assumptions of the Study

This study assumed that the workplace scenarios developed for the SKILLS instrument reflect the type of learning situations experienced by those who participated in the study. The scenarios involved such things as a job promotion and learning a new computer software program which are typical experiences that one experiences within their work environment.

Delimitations of the Study

The study sample was restricted to businesses in the Great Falls, Montana, area that met the definition of a

professional workplace and that were interested and willing to participate in the study. The participating employees within these businesses were volunteers. The generalizability of the results of this study are limited to the population that participated due to the volunteer nature of both the business and the participating employees.

In addition, in recent years several studies have been done to provide further understanding about the learning strategies used by adults in real-life situations. This study is part of this team effort to investigate learning strategies among various populations. As a result, the design and statistical analysis of this study was tailored to match the team effort and provide results that may contribute to this growing body of knowledge. Previous studies investigated a variety of adult populations. Among others the population studied were learning disabled students (Hays, 1995), Native American tribal college students (Hill, 1992), school administrators (McKenna, 1991), Canadian college students (Kolody, 1997), and Air Force officers (Korinek,1997).

CHAPTER 2

REVIEW OF RELATED LITERATURE

Workplace Change

The often repeated phrases, "the only constant is change" and "the future isn't what it used to be" are a reality in many aspects of society, and the workplace is no exception. The workplace is not a stagnant structure. Many factors produce continual change throughout several facets of the workplace and the organization particularly since the post-industrial revolution. The American Management Association has determined that 84% of U.S. companies have at least one major business transformation taking place and almost half have three or more major change initiatives taking place in their organizations ("These Changing"…, 1995, p.o.1).

There are many factors in the business environment to which an organization must react if they are to be successful and competitive. Factors such as global competition, economics, downsizing, information growth, advances in information technology, and a contingent workforce have a major force upon organizations and their workplace. (Taylor, 1995, p. 20; Hutchcraft, 1994, p.o.1).

Information technology is moving to flatten hierarchies and empower workers (Sasseen, Neff, Hattangadi, & Sansoni, 1994, p. 92) as well as provide a significant resource for organizations in an era of continued growth in information. Of the 84% of businesses undergoing some form of change, over 80% of the changes involve information technology (Laabs, 1996, p.o.1). Frank Schrontz, former CEO of Boeing, stated "Clearly the world is changing, and we must change with it...by becoming more efficient and more productive. Information moves too quickly, and valued technologies are too perishable for Boeing, or any other company, to assume that its past is a guarantee of its future" (Tapscott, 1995, p. 61).

Information technology is also producing the concept of the virtual workplace where workers are not bound by the constraints of the organization's walls. Work becomes what you do, not where you go (Handy in Cohen, 1997, p.o.4). The virtual workplace needs only to provide access to the organization's information resources via remote communications. A virtual workplace will require substantial changes on the part of management in moving away from traditional mind-sets (Jenner, 1994, p.o.2). A large, hierarchical company with communications problems is probably not going to flourish in a virtual environment (Cohen, 1997, p.o. 2).

Virtual employees need to be proactive about learning, interacting, and communicating. Without the presence of coworkers down the hall, other methods of communications must take over (p.o. 2). The knowledge-based economy is the driving force behind the virtual workplace as many workers do not need to be physically present at the workplace to perform their jobs, they but merely need access to the technology and the information (Jenner, 1994, p.o. 4). Workers will float in and out of the office at periodic

times throughout the day and week, requiring a different concept in the use of space in the workplace. Space usage will move away from individual work areas toward group or team work areas, providing areas were the workers can convene and confer (p.o. 4). Virtual employees also have the benefit of working in an environment that is free of racism, sexism, and other judgment barriers. When people receive an email, they envision the sender being like them and they focus on the content of the message not on the sender of the message (Cohen, 1997, p.o. 3). The virtual workplace is also desirable because it is compatible with new family patterns and addresses worker concerns for independence and autonomy (Fay, McCune, & Begin, 1987, p. 22).

The growth of information is also having a substantial effect upon how organizations operate. Information growth during the post-industrial age is clearly a major force in our world. The information explosion has produced more information in the last 30 years than in the previous 5,000 (Pritchett, 1994, p. 20).

One of the most visible results of economic problems in the business world is downsizing, also referred to as re-

engineering. Long-term employment security is a thing of the past as downsizing of organizations is leaving fewer workers to do more work and performing the work better than it has been done before (Taylor, 1995, p. 20). In 1996, AT&T announced layoffs of 40,000 employees, reducing its workforce by over 10% (Nocera, 1996, p.o.2). Major companies are greatly reducing their workforce: IBM by 85,000, Boeing by 30,000, and McDonnell Douglas by 33,000 (Cooper, 1994, p.o. 1; Caudron, 1994, p.o. 3). Many more companies are feeling the same economic pressures as these major companies. A survey by the American Management Association showed that 25% of companies had plans to downsize within the next six months and many, 63%, that downsize one year, downsize again the following year (Reynolds, 1993, p. 1). The leading reason for downsizing is anticipated or actual downturn in business (Madrick, 1995, p.o. 1). Despite the fact the some businesses expect productivity to increase due to downsizing, one-third of businesses have seen productivity decline and another third saw productivity increase (p.o. 2). What is certain to decline as a result of downsizing is employee morale (p.o.

2), which may account for some of the lack of increased productivity. However, some companies that went overboard with downsizing are finally noticing significant productivity losses and are now desperate to "rightsize" by trying to keep and attract experienced workers to manage the company (Poole, 1995, p.o. 2). So many people were fired that company knowledge has left with them, and by hiring young people with little or no experience, they have no one in the company from which to learn (p.o. 2).

Increasingly companies are now hiring contingent, or temporary, workers to replace once permanent positions in order to cope with economic pressures (Cooper, 1994, p. 2). Contingent workers provide organizations with the greater flexibility, lower labor costs, as well as expertise from former jobs to innovate their operations (Caudron, 1994, p.o. 3). In addition, companies see contingent workers as a way to reduce recruitment and testing costs (p.o. 3). The Bureau of Labor Statistics claims that temporary employees produce the equivalent of two more hours of work per day than their permanent counterparts (p.o. 4).

In 1996, approximately 90% of businesses utilized temporary employees, and this sector is expected to be one of the top growth industries through 2005 ("Valuation of…", 1996, p.o. 1). Another survey, by International Society of Certified Employee Benefits Specialists, found that 72% of firms use contingent workers and of those, 60% have increased their use over the past five years (McNerney, 1996, p.o. 2) The number of temporary workers on a given day topped two million during 1996 ("Rising Temps", 1996, p.o. 1). Some projections even estimate that one third of the workforce will be individuals employed on an as-needed basis within ten years (Caudron, 1994, p.o. 2). McDonnell Douglas, which layed off 33,000 workers, now has a plan to have 10% of its workforce operating on an as-needed basis (p.o. 3).

Although the majority of contingent workers are in service and trade positions, the professional sector is catching up ("Temporary Staffing's…", 1996, p.o. 2). More and more contingent workers are found in virtually all levels of the organization (Cooper, 1994, p. 2). Companies can now call on interim managers, sometimes called "throw-

away" executives, to help in many situations (Oliver, 1994, p.o. 2). The area of information technology has also seen dramatic increases in demand for contingent workers. Alan Schonberg of Management Recruiters International reports that his company has seen more than a 270% increase in temporary staffing requests for information technology managers ("Temporary Staffing's Still…", 1994, p.o. 2). Much of this increase in demand for technology managers is due to technology opening up markets previously unavailable and to businesses now desiring to use technology as a means to access these new markets (p.o. 2).

There are definitely problems associated with hiring contingent workers. Contingent workers have less loyalty to the organization, may not fully understand the vision of the organization, and may become an unintended safety risk to themselves and their employees (Rousseau & Libuser, 1997, p.o. 1). In fact, some major companies have made a conscious decision to cut back in the use of contingent workers. Ford Motor Company analyzed it business operations and decided that it had too many contingent workers in its core operations. Ford is now implementing a plan to reduce its

contingent workers to 10 or 15% of its workforce (McNerney, 1996, p.o. 1). Several factors led to Ford's decision to reduce its use of contingent workers. Among them was concern for security of company information and strategy and concern for workforce harmony. Surprisingly, Ford also cited reasons that are normally given as benefits of using contingent workers such as lack of flexibility and cost. Executives felt that in their situation contingent workers had to be trained for specific skills, that it took too long for them to get up to speed, and that there was no cross-functional skills. When adding up all the agency fees, cost of turnover, and training, Ford felt they were spending more than if they hired permanent employees for some positions (p.o. 2). Jeffrey Schmidt of Tower Perrin sees contingent workers as a valuable resource. However, he asks, "Are we buying a short-term gain at the risk of long-term security?" (p.o. 2).

Organizations used to be able to take 10-15 years to fully implement changes, but they do not have that luxury any longer. They must move faster and develop technologies to accelerate that process (Steinberg, 1992, p.o. 1). Some

companies have realized this and are responding. Some products in the financial market only have a product life cycle of a few hours before the competition has caught up (Tapscott, 1995, p. 60). Sony introduced over 5,000 new products in 1995, IBM has reduced its product development time from 2,500 person days to an astounding three hours, and Miller Beer generates 90% of its revenue from products that did not exist two years ago (p. 60).

Change in organizations has become so prevalent that the field of management has developed the concept of "change management." Over 68% of U.S. companies undergoing some kind of major change have some form of change management in place (Romano, 1995, p.o. 1). Despite that, less than half of these companies' executives have confidence that their organizations are able to confront change successfully in areas critical to the future of their organization (Marbler, 1994, p.o. 1). Change management focuses on getting commitment and involvement from all levels of the organization by organizing, implementing, and controlling changes in the organization in order to produce sustained, measurable change in the performance of individuals and the

organization (Romano, 1995, p.o. 2). There are also those who feel that the phrase "change management" is an oxymoron because the idea of managing change in today's world of constant change does not seem reasonable (Clemmer, 1996, p.o. 1). The concept of managing change assumes that there is a logical, step-by-step process that change follows and that executives must simply manage their organization according to the predefined steps. To deal effectively with change, the focus cannot be on the change as some manageable force, but rather the organization must prepare to deal with tomorrow's changes today. Most resistance in organizations comes from failing to make preparations for the change (p.o. 2) and not educating their workforce ("Five Views", 1992, p.o. 3).

Growing foreign competition has forced U.S. companies to rethink their ways of doing business or go out of business (Cooper, 1994, p. 1). Government policies such as the North American Free Trade Agreement could fundamentally alter the U.S. businesses, placing a premium on highly skilled workers and a technologically proficient workplace ("HRD in the USA", 1993, p.o. 2). Seventy percent of U.S.

made goods compete at home with foreign-made goods, and since 1960 the U.S. share of world trade has dropped from 18% to 15% (Moebius cited in Merriam & Caffarella, 1991, p. 11).

These growing forces have produced many new needs within organizations and reinforced the demands for existing needs. It does appear that change is here to stay, and from a business perspective it does not appear to be slowing down as 79% of business leaders feel the pace of change in their organizations is "rapid" or "extremely rapid" (Marbler, 1994, p.o. 1) The employees within the workplace are undoubtedly feeling many emotions regarding change. According to the American Management Association, the most frequently felt emotion in the workplace is enthusiasm (63%), which is good news for businesses if they can tap that emotion to help implement needed change. However, second and third most felt emotions are frustration (51%) and stress (50%) (Romano, 1995, p.o. 3), which may be the result of frequent and ongoing change.

Daryl Conner, President of ODR, Inc., states that the single most important characteristic of a winning

organization is its capacity to bounce back from change, and be stronger than before ("Five Views", 1992, p.o. 1). In light of what the future holds, organizations will need to maintain this ability to bounce back for many years to come. All this change does not come without learning on the part of all involved in the organization. "It would be difficult to think of some way to live in a society changing as rapidly as ours without constantly learning new things" (Cross, 1981, p. 1), and certainly the workplace is a place where much learning occurs.

Workplace Learning

Without question, the workplace is a major force in changing the nature of adult education as it becomes a work-related phenomenon (Rachal cited in Merriam & Cunningham, 1989, p. 7). A significant amount of time and money is spent by business, industry, and government to provide work-related training for workers. Learning today is integrated into all key aspects of work ("The Coming of Age", 1994, p.o. 1). More money is spent on workplace learning than on all of public higher education (Carnevale, 1989, p. 27). A

report by the Learning Industry: Education for Adult Workers estimates that 60 billion dollars is spent yearly by companies for formal training which serves one-third of the nations workforce (Educating Adult Workers, 1991, p. 66). General Motors Corporation alone invests one billion dollars annually on workplace education (Houston, 1990, p.o. 1). It is estimated that 40 billion dollars for formal training and 180 billion dollars on informal and on-the-job training each year (Carnevale, 1984).

Types of Workplace Learning

Marsick and Watkins (1990) distinguish among three types of workplace learning: formal, informal, and incidental. Marsick and Watkins (p. 12), Mocker and Spear (1982), and Jarvis (1987) all developed definitions to identify each of these types of learning and their ideas have very common themes. Formal learning is viewed as institutionally sponsored, classroom-based, and highly structured where the institution controls the objectives and the means by which the learning will occur. Informal learning, on the other hand, is not typically classroom-based or highly structured. The learner has primary control

of the objectives of the learning, but the institution still controls the means of delivery. Incidental learning, a subset of informal learning, is defined as a by-product of some other activity such as accomplishing a task, interpersonal interaction, or even a formal learning situation. According to Watkins (1990), 90% of workplace learning is informal or incidental. Carnevale (1984) provides similar estimates of 83% informal and incidental learning and 17% formal learning.

A central feature of informal or incidental learning is learning from and through experience (Marsick & Watkins, 1990, p. 15). Marsick and Watkins believe that informal and incidental learning are needed most when individuals experience a situation as non-routine. Informal learning may occur when a person decides they need to know something and they take the steps to learn it, which may involve a mentor or other resource. Informal learning is self-motivated, self-directed, and purposeful. It is difficult for organizations to structure informal learning, although they can provide an environment in which it can be enhanced (Marsick & Watkins, 1990, p. 21).

As the amount of expenses seem to indicate, employees spend much more of their training time in informal training than they do in formal, employee-sponsored training. The U.S. Bureau of Labor Statistics reports that 70% of employees' training time is in informal learning activities (Benson, 1997, p.o. 1). Employees of U.S. companies indicate that 74% of their retraining had some type of employer involvement (Carnevale & Carnevale, 1994, p.o. 1) with 84% receiving some form of formal training and 96% involved in some type of informal training (Benson, 1997, p.o. 1). The Carnegie Foundation for the Advancement of Learning calls adult learning for the workplace the fastest growing sector of education ("Educating Adult", 1991, p. 66). In recent years the federal government has also become more involved with workplace learning through such programs as the School-to-Work Act of 1994 that includes workplace learning as a key strategy (Gittleman, 1994, p.o. 1) and the establishment of the Office of Work-Based Learning in the Department of Labor ("The Coming of…", 1994, p.o. 6).

Businesses benefit from investing in workforce education programs through increased worker productivity. A

study at the University of Pennsylvania reveals that companies who increased the educational level of their employees by one year experienced an 8.6% increase in productivity (Jones, 1996, p. 22). Another symbol of business acknowledgment of the need for workplace learning is the 400 businesses that have a separate building labeled as an education or training center and over 2,250 courses offered by 140 companies that award academic credit (Watkins, 1983, p. 1).

Workplace learning not only affects the business but also affects the individual as well. Workplace learning accounts for 85% of the variance in an individual's lifetime earnings. In addition, both large and small companies benefit from training although larger companies provide substantially more formal training (Carnevale, 1984). In terms of informal training, the Bureau of Labor Statistics found similar results regardless of company size (Benson, 1997, p. 1).

The technical solutions of the old workplace are not valid in today's workplace because the Information Age and the knowledge sector have transformed the workplace into an

entirely different structure requiring different skills and capacities of it workers. Workplace managers in the Information Age realize that success for their business depends on the ability of workers to generate and use knowledge in order to foster continual improvements (Sorohan, 1993, p.o. 2). "Technology is not only making learning mandatory, it is providing many of the mechanisms for it to occur" (Merriam & Caffarella, 1991, p. 16).

Teaching workers linear, step-by-step rules for every task does not work in an age of technological developments and competitive demands that require frequent change (Sorohan, 1993). Learned responses to situations will not serve employees well in the current workforce because of frequent change and non-routine situations (Marsick & Watkins, 1990, p. 21). Workers must understand a few fundamental principles, internalize them, and use them as their guide to adjust to the changing workplace. American businesses are realizing that their workers are not being used as effectively as they could be (Rose, 1996, p. 5). Businesses are finding fewer and fewer opportunities for routinization which is encouraging executives to rethink the

hierarchical structure so that it becomes more of a learning organization (Berryman & Bailey cited in Sorohan, 1993, p.o. 2). In addition, economic pressures to improve productivity are also forcing many organizations to adopt the learning organization strategies (Rose, 1996, p. 14). Reliance on past experience and past decisions, both good and bad, becomes critical to determining the best solution to future problems and challenges. An examination of top executives revealed that many decisions they make are not made through a step-wise process but rather by using "tacit knowledge" gained from experiences on the job (Kaplan, Drath, & Kofodimos cited in Marsicwk & Watkins, 1987, p. 22). A Honeywell study of managers revealed that 50% of the skills managers use came from the day-to-day work experience, 30% from interactions with others in the organization, and 20% from actual training (Marsick & Watkins, 1987, p. 22). Self-analysis of previous decisions was a critical factor in developing problem solving skills although in many occasions self-analysis was not an explicit activity but was performed routinely and continually within the routine of daily work. In a learning organization, problem solving skills are

critical at all levels as decision making is pushed farther down into the organizational structure. The tasks performed last week may be changed this week as new developments and demands are forced upon the workplace. Lower-level workers might be ready for this kind of autonomy in learning although they might not be accustomed to setting goals, identifying ways of learning, and monitoring their own progress (Ravid cited in Marsick & Watkins, 1987, p. 27).

Though it cannot always be readily observed, each organization has a climate of environmental factors that affect how people interact and how they learn (Smith, 1987, p. 40). Every workplace provides an environment that either facilitates or inhibits learning (Knowles, 1980, p. 66). A learning organization provides an environment of self-direction and collaboration to help workers develop successful workplace skills whereas an organizational environment built around higher-level control promotes routinization that is inflexible to new circumstances. How the workplace is set up and not the presence or absence of technology is what enhances or inhibits learning (Scribnel & Sach cited in Sorohan, 1993). A workplace environment that

encourages self-direction and collaboration helps employees develop conceptual understanding (p.o. 4). Some organizational structures are such that they cannot always change their structure; thus, they are locked into a hierarchical and central decision-making process even if they wish to change (Marsick & Watkins, 1987, p. 25).

The current paradigm of learning in the workplace falls short in many organizations because of the focus on the Behavioristic model of learning that requires observable results and where personal development is considered a secondary benefit of workplace learning (Marsick, 1987, p. 1). Training is done on an individual basis with little opportunity for individuals to assess their learning with their coworkers or in terms of the overall organization and with problem solving focusing on finding the best solution through a step-by-step, linear model that is used for all problems encountered. Most training in this type of organization involves classroom-based, formal training sessions that focus on very specific work-related skills designed to improve productivity and produce immediate results for the organization.

If businesses are to thrive and survive in the post-industrial era, they must reconsider the intangible factors within their organizations such as respect for human value and personal development, social interactions, service orientation, independent thinking, and creativity among all employees (Marsick, 1987, p. 11). Complex, hierarchical organizations must move toward flexibility and adaptability. Flexible policies by employers can contribute to increased employee productivity in response to change events (Knox, 1977, p. 576). Investment in training and dismantling the traditional hierarchical organizational structures will do more for employees' well-being and self-worth than government sponsored welfare programs ever did (Torrington, 1993, p.o. 3). The organization must be capable of monitoring and questioning the way in which it operates, fully involving the participants in the organization and constantly reflecting on and questioning what it and others are doing in order to appropriately identify and solve problems in order to maintain flexibility. Employees without a holistic view of the organization cannot be fully involved in this process.

Undoubtedly organizations have begun to realize employee training is necessary as training budgets have not been slashed during recent slow economic times. Management has begun to accept the need for training and retraining to a degree that was not previously recognized (Torrington, 1993, p.o. 2).

Learning Organizations

Business leaders frequently state that, "our employees are our greatest asset," but what efforts are made to develop and improve this asset? With the dawn of the Information Age, a new facet of workplace learning that has begun to receive considerable attention both in the U.S. and abroad is the concept of the "learning organization." A survey of top U.S. managers found that 70% felt a learning organization holds the most promise for sustaining business results, and 40% have appointed someone in charge of education in their companies ("Taking School…", 1996, p. 1). Learning organizations are "organizations where people continually expand their capacity to create the result they desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where

people are continually learning how to learn together" (Senge, 1990, p. 3). To survive and prosper in the Information Age, it is not so much about learning information but rather about learning how to learn, and developing critical capacities to discern and judge information (McGovern, 1991, p.o. 2). Learning organizations are those "that learn continuously and transform themselves... where learning is a continuous, strategically used process--integrated with and running parallel to work" (Watkins & Marsick, 1993, p. 8). A new sector of the economy that is creating the need for learning organizations, is the "knowledge sector" that is driven by the ever-growing knowledge base on the world (Perelman, 1984). The knowledge sector requires workers to view learning as the central focus of life's project where they constantly strive to work together to better understand and make sense of organizational reality. However, an organization of individuals who learn is not a learning organization. Learning must be captured, shared, and used by the organization so that all parts of the organization can benefit from the learning (Marsick & Watkins, 1996, p. 18).

Although no precise formula exists for creating learning organizations, there are several ideas of what characteristics learning organizations must possess. The first characteristic involves having employees at all levels understanding and seeing the entire organizational system and not focusing on individual parts (Birkner & Birkner, 1996, p.o. 2). Workers in a learning organization must have a holistic picture of the organization rather than a simple focus only on their own role within the organization. Through a broader understanding of the organization, employees are able to make better decisions that coincide with the direction of the organization.

There must also be a high degree of understanding of the current realities of the organization and of having a vision of the desired future of the organization. The gap between one's vision and reality is used to generate change (Birkner & Birkner, 1996, p.o. 2). This gap can be described as creative tension (Senge, 1994, p.o. 1). Creative tension comes from the organization clearly seeing where they want to be and developing an honest picture of their current reality. Closing this creative tension gap can be

accomplished in two ways: (a) By raising current reality to reflect the vision or (b) by lowering vision toward reality. Learning organizations must learn how to work toward moving reality closer to the vision. Without the ability to understand reality and create a vision, creative tension cannot happen (p.o. 2). There is a distinction between problem solving and creative tension (p.o. 2). Problem solving is attempting to get away from an aspect of current reality that is undesirable, whereas creative tension, the focus is on achieving something we want to create. Many organizations only change when problem are bad enough to force them to change (p.o. 3).

In order to generate a true reality and vision, individuals must also be aware both of their own biases and assumptions that they use to make decisions and determine their behavior and of those of others and the organization. Learners must have a capacity for continued critical reflection that involves examining the assumptions from which they evaluate their actions (Marsick, 1987, p. 9). This is "action learning" where teams of learners are given real business problems to solve as a means of providing real

learning (Sorohan, 1993, p.o. 2). They must peel back the layers of the organization's culture as part of the learning process (Marsick & Watkins, 1995, p. 19). It is critical that individuals, groups, and organizations change their culture, challenge previously held assumptions, and eliminate the "we have always done it that way" approach (Bencivenga, 1995, p.o. 2). A common element among learning organizations is a healthy disrespect for the status quo (Wishart, Elam & Robey, 1996, p.o. 3). In this critical reflection, workers dig beneath the surface to examine taken-for-granted assumptions, norms, and values (Watkins & Marsick, 1987, p. 5). Critical reflective learners in an organization may not automatically follow a leader but may first determine whether or not they see the problem and solution from the same perspective (Mezirow cited in Watkins & Marsick, 1987, p. 18).

A shared vision of the organization is another critical element to establishing a learning organization (Benivenga, 1995, p.o. 3). Shared vision involves developing and projecting a sense of mission that becomes owned by all. Developing a shared vision takes the time and commitment to

develop an environment that can support it (Birkner & Birkner, 1996, p.o. 2). If people are expected to work together in a coordinated way, they need to share a common image of the system of which they are a part (Senge, 1995, p.o. 3).

Team learning is shared by all designs for developing learning organizations and is at the heart of many learning organization discussions. The process of learning in teams to many organizations is natural because much learning in today's organizations takes place through interpersonal interactions on the job (Marsick & Watkins, 1996, p. 19). Human relations training supports this because

> One of the universal needs of adults is to learn how to take responsibility for their own learning through self-directed inquiry, how to learn collaboratively with the help of colleagues rather than to compete with them, and especially, how to learn by analyzing one's own experiences (Knowles, 1970, p. 45).

"Clearly, the social relations of work are not reorganized to accommodate training. Instead, training is embedded in the preexisting system" (Scriber & Sach cited in Sorohan, 1993, p.o. 4). Inquiry and dialogue are at the heart of team learning and are already a natural part of the climate in many organizations (Marsick & Watkins, 1996,

p. 2). Teams mutually create new knowledge through a continuous cycle of thinking and acting, using the new ideas to challenge current assumptions and testing the new assumptions which leads back to creating new knowledge (p. 19). Team learning involves dialogue among the employees of the organization in both formal and informal structures.

Much of the team learning takes place outside of a formal structure through routine interactions with coworkers (Marsick, 1987, p. 4). The real payoff for organizational learning may lie in the informal networks. However, the power of informal networks can be difficult to tap because they cannot be mandated into existence nor can they be controlled; they must evolve on their own (Senge, 1995, p.o. 2). Learning must take place in teams where they can join together to create mutual knowledge (Marsick & Watkins, 1995, p. 18) that is better than anything that could have been created individually (Peters, 1993, p.o. 2). Organizational learning is more than the sum of the learning of the individuals. Organizational learning involves enhancing the long term capacity of the organization to

respond to change in the environment (Marsick & Watkins, 1995, p. 20).

Creating a learning organization can be difficult in larger, older organizations because of the strongly embedded culture that has evolved over many years (Bencivenga, 1995, p.o. 3). Learning organizations require changes at all levels of the organization; this is especially so at the top of the organization (p.o. 4). The role of leaders of learning organizations differs dramatically from that of the traditional structure. These leaders need skills in the ability to build a shared vision, challenge old mental models, and foster system thinking (Senge, 1994, p.o. 1), and they must model and support learning at the individual, team, and organizational levels (Marsick & Watkins, 1995, p.o. 1).

Complex organizations must move away from hierarchical models and move toward systems that are able to learn from their own experience and modify their structure to reflect what they have learned (Morgan & Ramirez, 1983, p. 4). Ford Motor Company has developed "learning laboratories" that are part of their product development process and are focused

around their belief that it is possible to design core business processes that are continually developing a better theory of how they develop products (Senge, 1995, p.o. 1). The learning organization is effective because it brings to the surface important business assumptions and issues where they can be examined and modified (Wishart, Elam & Robey, 1996, p.o. 2).

The key to a successful learning organization is not just learning but remembering what was learned. How does an organization remember? The culture of the organization, its formal and informal structures, reflects what was learned and changed. These structures serve as the organization's memory. If the formal or informal structure within an organization is incapable of changing, the organization will not be able to learn (Peters, 1993, p. 4). Some organizations have literally begun to use computer databases to store and "remember" their organization's learning. Ernst and Young found that 90% of their employees learning was on-the-job through such means as self-study, coaching, and project teams, and they set out to provide an organizational environment that promoted and supported further informal

learning within their organization. One of their goals in this process was to record the learning within the organization, which was accomplished via a database of business problems and experiences that employees could search if they encountered a new challenge or problem (Sorohan, 1993, p. 8). Kathy Weldon, the director of education for Ernst and Young stated that "we're a world of experts," however given today's competitive realities, we must slow down enough to embrace the values of learning and reflecting.

Part of the challenge of creating a learning organization is creating a climate where it is all right not to know but where the resources are available for learning (Sorohan, 1993, p.o. 8). Organizational learning is the future, and its impact will ultimately force a paradigm shift in how management approaches many different issues of the organization (Birkner & Birkner, 1996, p.o. 2).

Adult Learning

Adult education is receiving more and more emphasis as the adult population continues to grow. The present and anticipated growth of lifelong learning in the United states can be attributed to three influences: demographic factors, social change, and technological change (Smith, 1982, p. 3).

Demographic changes in the population have prompted the attention of many areas of society including government, industry, and education (Cross, 1981). For the first time in society, adults outnumber youth, people are more educated, and there is more diversity among the population (Merriam & Caffarella, 1991, p. 6). By 1987, more Americans were over the age of 65 than under 25 years of age (Spear & Mocker cited in Merriam & Cunningham, 1984, p. 641). The United States has moved from a predominantly youth-centered society to being a predominantly adult-centered society and is rapidly becoming a predominantly older-adult-oriented society (Knowles, 1984, p. 422). Demographics alone will not shape the future growth of adult education but so will technological and social factors (Darkenwald & Merriam, 1982). "If deep-rooted technological and social changes

continue to transform modern societies through the end of the century, the future of adult education will surely be one of continued growth" (p. 213).

In a society that continues to change due to technology and other factors, adults continue to require learning. There is increasing recognition of the need for education throughout the life span. No longer will the learning from childhood provide the skills needed to function throughout a lifetime (Merriam & Caffarella, 1991, p. 5). People are living and working longer and require learning throughout life including into their older years. Society is recognizing this increased need through such things as tuition waivers for older citizens and programs such as elderhostel (p. 9). These programs may very well be having an effect as The National Center for Educational Statistics reported that adult participation in formal learning activities increased from 32% in 1991 to 40% in 1995 (Department of Education, 1995, p.o. 1). Although prior to that time, adult participation in educational programs also increased significantly by 79% between 1969 and 1984 (Hill in Imel, 1988, p.o. 1).

Many researchers have attempted to explain why adults participate in learning activities. Foremost of these was Cyris Houle (Darkenwald & Merriam, 1982, p. 133). Houle's study of why adult learners pursue continued education was published in his 1961 book, The Inquiring Mind, which laid the foundation for further research concerning motivational orientations of adult learners (Darkenwald & Merriam, 1982, p. 133). Most additional research attempted to test and refine Houle's basic findings and yielded similar results (Cross, 1981, p. 96). Houle identified and categorized adult motivations for learning as (a) goal-oriented individuals who view learning as a means to some other end, (b) activity-oriented individuals who participate in learning for the opportunity to meet people rather than to develop a skill or learn a subject matter, and (c) learner-oriented individuals who participate for learning for enjoyment and view learning as an end, in and of itself (Brockett & Hiemstra, 1991, p. 38). Most adult learners fit into the goal-oriented category, as they learn for very pragmatic reasons such as learning a job skill or dealing with a family problem (Cross, 1981, p. 207).

Research also has been conducted regarding who participates in adult learning activities. Johnstone and Rivera discovered that many adult learning activities are pragmatic, providing learners with skills they can apply immediately to everyday tasks and responsibilities (Department of Education, 1965, p. 3). In addition the National Center for Education Statistics (NCES) in the Department of Education reported from a 1984 study that 64% of adults pursue education for job-related reasons which is fairly consistent with the first study by the NCES in 1969 (Merriam & Caffarella, 1991, p. 66). Previous education has been shown to have a strong correlation with adult participation in future adult learning activities (Merriam & Caffarella, 1991, p. 73) and is further supported in the 1995 study of adult participation in educational activities by the NCES (National Center for Education Statistics, 1995, p.o. 1).

Malcolm Knowles (1984) contends that between 1960 and 1980 more knowledge has been gained about adult learners and their characteristics than in all of previous history (p. 6). One of the most long-standing efforts in adult

education has been to identify what is unique about adult learning in contrast to youth learning (Deshler & Hagin cited in Merriam & Cunningham, 1989, p. 155). Based on the newly discovered knowledge of these two decades and the need to better understand adult learning, Malcolm Knowles introduced the concept of andragogy to adult education field. Andragogy is the art and science of helping adults learn and is opposed to pedagogy, the practice of instructing children (Merriam & Caffarella, 1991, p. 249). The model of assumptions regarding adult learners developed by Knowles distinguishes adult education from childhood schooling (Knowles, 1980, p. 43; Merriam & Caffarella, 1991, p. 249). Knowles' five assumptions regarding the characteristics of adult learners have significant implications for the design, implementation, and evaluation of adult learning activities (Merriam & Caffarella, 1991, p. 249). The five assumptions of the andragogical model are:

1) Adults are self-directed learners. Through maturation, a person's self concept moves from dependency toward self-directing.
2) Adults enter into educational experiences with more and better quality experiences than youth. These experiences provide a rich resource for learning.

3) Adults become ready to learn when they experience a need to know something in order to perform more effectively in their lives.
4) Adults enter educational activities with a problem-centered orientation to learning. Learning is organized around practical problem situations, not subjects.
5) Adults are more likely to respond to internal factors such as self-esteem, recognition and better quality of life, than to external factors such as a salary increase (Knowles, 1984, p. 12).

The andragogical model is based on three premises about learning and teaching: (a) Adults can learn regardless of age, (b) earning is an internal process, and (c) there are superior conditions of learning and principles of teaching (Knowles, 1980, pp. 55-57). The pedagogical model of learning requires the teacher to determine (a) the content needs to be covered, (b) the organization of the content into manageable units, (c) the logical sequence to present these units, and (d) the most efficient means for transmitting this information to the learners (Knowles, 1984, p. 14). All of these design characteristics focus on the needs of the teacher with little regard for the learner. The andragogical model of learning, on the other hand, is much more learner-centered and focuses on (a) providing a climate of mutual respect, trust, and collaboration; (b)

planning the learning mutually with the learners; (c) learners diagnosing their own needs for learning; (d) learners formulating their own learning objectives; (e) learners designing their own learning plans; (f) helping learners carry out their learning plans; and (g) helping learners evaluate their own learning (p. 18). It is very apparent that the andragogical model involves much more student participation in the learning process throughout all phases of the learning process, which is the core principle of the concept.

There is growing evidence that the andragogical assumptions are more realistic than traditional methods of learning as the assumptions have been successfully adopted in a variety of settings at every level of education including elementary and secondary levels (Knowles, 1984, p. 6). Knowles has redefined his original view of andragogy as more of a spectrum of assumptions about learners regardless of age as opposed to opposite viewpoints of learners characteristics (Knowles, 1980, p. 43) and has received support from some in the field in this new view (Brockett & Hiemstra, 1991, p. 105).

Some experts in the field of adult education question whether the andragogical assumptions of Knowles really constitutes a theory (Brookfield, 1986, p. 98). Despite questions of the soundness and validity of andragogy, this concept has enormous and profound influence in the field of adult education practice (Brookfield in Merriam & Cunningham, 1989, pp. 201-202). At the very least, andragogy identifies some characteristics of adult learners that deserve attention and it has been successful in getting the attention of educators and sparking debate about adult learners (Cross, 1981, p. 227). An important result of the discussion and questions regarding andragogy has been the re-examining of the role of the educator in the teaching-learning transaction (Fellenz & Conti, 1989, p. 2).

As is apparent, Knowles assumptions about the adult learner have a strong focus on the ability of the learner to be self-directing. After Knowles introduced his concept of andragogy, Tough (1979) estimated that approximately 90% of the population participates in at least one self-directed learning activity a year (p. 172). Tough defines a learning activity as involving a series of learning sessions adding

up to at least seven hours (Tough, 1971, p. 250), and his model of self-directed learning became the basis for many studies that have verified the existence of self-directed learning (Merriam & Caffarella, 1991, p. 209). Other studies have reported significant participation in self-directed learning among adults (Penland, 1977). Collectively these studies make a strong case for the nature of adults as independent learners.

Self-directed learning is generally viewed as learning where learners organize their own learning, providing their own direction and evaluation (Merriam & Caffarella, 1991, p. 208). Additional efforts have been made to distinguish between self-directed learning as an internal personality characteristic of the learner and as an external process used by the learner during a learning activity (Brookfield, 1984 ; Fellenz, 1985). Self-directed learning refers to "both external factors that facilitate learners taking primary responsibility for planning, implementing, and evaluating learning, and internal factors or personality characteristics that predispose one toward accepting

responsibility for one's thoughts and actions as a learner" (Brockett & Hiemstra, 1991, p. 29).

Like Knowles, Tough assumed that adults have a wide range of abilities and experiences for planning and guiding their own learning. Based on this assumption he outlined ways in which adult educators could help self-directed learners, primarily focusing on assisting learners in locating and using a wide variety of resources for planning and carrying out their learning activities. Although the phrase self-directed learning implies learning in isolation, it is not an isolated process but often requires collaboration and support among learners, teachers, and peers (Merriam & Caffarella, 1991, p. 46). While most self-directed learners prefer to maintain complete control over the direction of their learning, this does not mean they work alone. In fact, self-planned learning often involves more human interaction than traditional classroom learning (Tough, 1979, p. 4).

Adults prefer self-directed learning as a method of learning for a number of reasons. One primary factor is their desire to have control over their learning in terms of

the pace and structure of the learning and the flexibility to change their learning strategies as needed (Penland, 1979, p. 174). Other factors include feeling more efficient in conducting their own learning, having the ability to locate and understand resources, and pride in conducting a learning experience on their own (Tough, 1979, pp. 93-94). These factors provide further support for the independence of adult learners as suggested by Knowles.

According to Tough (1979) and Knowles (1975), the self-directed learning process is composed of a series of fairly structured steps adults use in directing their own learning. Adults move from step to step to achieve their desired learning outcomes. In contrast, Spear and Mocker (1984) and Berger (1990) found that self-directed learners used multiple, somewhat unpredictable approaches as they went about learning. They found that learners did not seem to follow sequential steps but were affected by random events that altered their learning direction. Berger (1990) further found that some learners did not always even consciously begin the self-directed learning activity (Merriam & Caffarella, 1991, p. 49). Berger also discovered that adults

tend to prefer a trial-and-error approach with a preference for hands-on learning and used their successes and failures to guide the learning process. These conflicting findings likely indicate that self-directed learning probably occurs both by design and by chance, depending on the learner and the situation (Merriam and Caffarella, 1991, p. 49).

Closely tied and critical to the concept of self-directed learning is the idea of learning how to learn. Robert Smith (1982) has probably done more to define the concept of learning how to learn than any other researcher in the field of adult education. Smith defines learning how to learn as "possessing, or acquiring, the knowledge and skill to learn effectively in whatever learning situation one encounters" (1982, p. 19). Three interrelated components of the learning how to learn concept are needs, learning style, and training. Needs refers to the operational skills that are necessary for the learner to learn how to learn in a variety of situations such as basic skills in communication and awareness of personal strengths and weaknesses that help the learner plan and evaluate their learning. Learning style refers to an "individuals

characteristic way of processing information, feeling, and behaving in learning situations" (p. 24). Helping learners become aware of their preferred learning style is critical to the learning how to learn concept. The third element, training, refers to organized efforts to foster success in the learner in order to help the learner develop skills as a learner by helping them develop insights and experiences from which to analyze and make adjustments.

Learning how to learn is a concept with far-reaching implications for adults and those who help adults. Long heralded as desirable, learning how to learn has often proved to be both an intriguing and elusive concept (Smith, 1982, p. 9). The Highlander Folk School is an excellent example of people learning how to learn in order to take control of their lives. When Highlander has succeeded at this difficult task, the staff has been teachers who were able "to teach their own capacity to learn" (Adam, 1975, p. 209). Educators have a duty to teach adult learners to learn how to learn (Fellenz, 1982, p. 83)

The increasing interest with the learning how to learn concept coming from the following sources:

1. long overdue acceptance of education as a lifelong process
2. a shift from a preoccupation with teaching to a preoccupation with learning
3. proliferation of approaches and techniques for providing adult education
4. persistent interests in the notion of learning styles
5. increased research into self-planning learning (Smith, 1982, p. 18).

There exists no single conceptual framework, no single basic set of assumptions and principles, from which all educators view the field of adult education (Darkenwald & Merriam, 1982, p. 35). It is unlikely that there will ever be a single theory of adult education. Instead, there will be many theories useful in improving our understanding of adults as learners (Cross, 1981, p. 112; Darkenwald & Merriam, 1982, p. 35). Some feel that it is necessary and important to develop a theory of adult learning whereas others see it as futile as indicated by the contrasting views of Brookfield and Houle.

> There can be few intellectual quests, that for educators and trainers of adults, assume so much significance yet so little promise as the successful completion of a general theory of adult learning. (Brookfield, 1986, p. 25)

> Theory broad enough to cover the spectrum of learning situations in adult education is necessarily so broad

> that it offers little guidance to either researchers or practitioners. (Houle cited in Cross, 1981, p. 221)

The adult population is placing significant demands on all of society, and society is placing significant demands on adults, particularly in the aspect of the need for continuous learning throughout a lifetime. No amount of education during youth can prepare adults to meet the demands that will be made on them (Cross, 1981, p. 2) throughout their lifetime. Hence, adult learning will need to become an accepted norm in society and indeed may already have been achieved.

Learning Strategies

Learning is a part of life, from beginning to end. Many think of learning as primarily taking place in childhood, adolescent years, or during post-secondary education. However, much learning takes place by adults throughout their life. They are constantly involved in learning whether learning to operate a new gadget, learning a new procedure, or learning more about an illness. Learners approach learning tasks in different ways, and the techniques they

select to accomplish a task often have significant influence on the eventual success or failure of the learning activity (Fellenz & Conti, 1993, p. 3). One of the major characteristics of adult learning is that it is generally undertaken with the desire for immediate application in real-life situations (Conti & Fellenz, 1991, p. 64). "The methods that adults employ to learn a subject or skill vary greatly, presenting a sharp contrast to the relatively uniform techniques used in the schooling of children" (Darkenwald & Merriam, 1982, p. 128).

Much research has been done to try to explain how learners are different with a focus on such things as intelligence and learning styles, but it has failed to reveal information useful in the teaching-learning transaction. Learning strategies have recently begun to be researched and have been found to explain some of the differences between learners. Several researchers have investigated and contributed to the use of learning strategies (Mayer, 1988; McKeachie, 1988; Weinstein, 1988). Weinstein (1988) and McKeachie (1988) have focused mainly on learning strategies used in traditional higher educational

settings. However, Awhat is new with the current interest in learning strategies is that it can be based on an emerging cognitive theory of human learning and memory@ (Mayer, 1988, p. 21). Rather than focusing on skills used predominantly in academic settings such as note taking and test passing, learning strategies tend to focus on solving actual problems (Conti & Fellenz, 1991, p. 64) encountered in real life. This is important because there are many differences between learning for everyday problems and learning for academic situations (Sternberg, 1990).

Learning strategies are defined as "the techniques or skills that an individual elects to use in order to accomplish a learning task" (Fellenz & Conti, 1993, p. 1). Learning strategies are different from learning styles in that learning styles are "cognitive, affective, and physiological traits that serve as relatively stable indicators of how learners perceive, interact, and respond to the learning environment" (Keefe, 1982, p. 44). Learning strategies and learning styles are different and reveal different information about an individual. Learning strategies are not stable across all learning tasks. Unlike

learning styles, learning strategies are situational and contextual. Learning strategies are often so customary to the learner that they are given little thought. However on some occasions, a learner may deliberately select the desired learning strategy (Fellenz & Conti, 1993, p. 1). Additionally, the strategies an individual uses are constantly being developed and refined as they experience new learning situations (Fellenz & Conti, 1993).

Recognition of the importance of real-life learning and the significance of learning strategies led to interest in developing an instrument to assess an individuals learning strategies. Since no instrument existed to measure adult learning strategies, the Self-Knowledge Instrument for Lifelong Learning Skills (SKILLS) was developed to measure individual learning strategies (Conti & Fellenz, 1991). SKILLS is a valid and reliable instrument consisting of real-life learning scenarios with responses from each of the five areas of learning strategies. The five areas of learning strategies in SKILLS are metacognition, metamotivation, memory, critical thinking, and resource management (Conti & Fellenz, 1991, p. 65). Each of these

five areas consists of three individual learning strategies (Fellenz & Conti, 1989). SKILLS focuses on the role of learning strategies used in real-life learning situations by adults. "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).

Metacognition

Flavell (19769) was one of the first in the field of adult education to introduce the notion of metacognition and defined it as "one's knowledge concerning one's cognitive processes" (p. 232). The concept of metacognition was further developed and refined by Brown (1982) as knowledge and control over one's thinking and learning. Generally speaking, metacognition refers to "thinking about thinking" (Yussen, 1985, p. 253). Smith (1982) concluded that "a central task of learning how to learn is developing awareness of oneself as a learner" (p. 57). "Awareness of oneself as a learner" is a fundamental concept of metacognition.

Metacognition is further broken down into the three strategy areas of 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 is concerned with an individuals awareness of the best way for one to proceed with a learning task. Metacognitive planning strategies involve such things as planning specific tasks, overviewing the learning activity, focusing on the purpose of the learning, and awareness of one's learning style (Counter & Fellenz, 1993, p. 9).

Monitoring. During the process of learning, various things can happen to interfere with the attention or understanding of the learner, so monitoring becomes an important part of the learning process. Monitoring involves establishing goals for the learning activity, assessing progress toward the goals, and if necessary modifying learning strategies. To facilitate achievement of the goals (Weinstein, 1988, p. 294). Flavell (1979) also sees monitoring as useful to learners through checking their

cognitive knowledge, the learning tasks, goals, and strategies in relation to their own abilities and the learning activity. Monitoring strategies include self testing, comparing progress from previous learning, and checking other resources for information. The deeper the learner processes information being attended to, the more likely the information will be retained. Monitoring one's learning through asking questions about the material or relationship of the material to other material can be an effective way of encouraging deeper learning (Counter & Fellenz, 1993, p. 9).

Adjusting. Adjusting involves the learners modifying and revising their learning plans in response to the evaluation of the learning progress by the learners. For successful learning to occur, it often calls for modification of the learning process in response to changes in the learning situations. Metacognitive adjusting strategies include revising one's learning plan, changing learning strategies, restructuring the learning activity to satisfy one's knowledge level, and developing techniques to

help match the learning task to one's own personal learning characteristics (Fellenz & Conti, 1993, p. 10).

Metamotivation

Motivation is an obscure concept that has been described and defined from many different philosophical, psychological, and educational stances each of which has a different explanation for human behavior based on the researchers assumptions about people and the factors that influence their behaviors. Approaches to motivation range from the behaviorist which views people as passive and controlled by external factors to humanistic that describes the individual as internally motivated. Metamotivation deals with learner's being aware and understanding of how or why they are 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). Energization is a response to needs that are innate to the learner as well as to those that are acquired through interactions with the environment (Deci & Ryan, 1985, p. 3).

Much research has been done regarding motivation with a primary focus on what motivates people to participate in a learning activity. This is not the same focus from which metamotivation was derived. "Meta" in the term metamotivation identifies the construct specifically as motivation of the individual to learn and distinguishes it from factors relating to reasons for participation in educational programs (Fellenz & Conti, 1993, p. 10). The major strategies related to metamotivation are attention, reward/enjoyment, and confidence.

Attention. Attention is essential to deliberate, planned learning. Attention involves the learners abilities being focused on the material to be learned. Attention is the "arousal of interest in learners, the stimulation of an attitude or inquiry, and the maintenance of attention" (Keller cited in Fellenz & Conti, 1993, p. 15). An individual's desire to give attention to a learning experience is influenced by many factors such as curiosity, previous experience, or recognizing the need to learn. The amount of attention one gives to a learning activity is also affected by a number of different things (Fellenz, 1993,

p. 15). Kidd (1973) notes that a high attention level is crucial to successful learning (p. 266). Specific metamotivation attention strategies include setting a time and place for learning, resolving to study the material, and avoiding distractions.

Reward/Enjoyment. Reward and enjoyment are related factors that include anticipating or recognizing the value to oneself of learning specific material, having fun with the learning, or experiencing satisfaction with the learning activity (Fellenz & Conti, 1993, p. 16). The reward for learning can be a specific goal or a feeling of increased competence or control over an environment. 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). Learners typically find it difficult to participate in a learning activity when neither the process or outcome are enjoyable for the learner. Recognizing the learning as relevant or useful, focusing on the satisfaction of the learning, or taking

pride in the results of an activity are included as metamotivational reward/enjoyment strategies.

Confidence. Confidence in one's ability to learn is one of the essential elements in motivation (Keller, 1987). Self-efficacy as an essential element in motivation to learn (McCombs, 1988, p. 142). Learners expected achievement has been found to consistently correlate with actual achievement of adult students (Fellenz & Conti, 1993, p. 16). Those who evaluate themselves negatively are less likely to expect success (Rubenson, 1977). Learning strategies associated with metamotivation confidence are reminding oneself of past success in learning and reassurance of one's capability.

Memory

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). An immense amount of research has been done on human memory. However, much of this research involved such things as remembering lists of words or pairing nonsense syllables. "What we want to know, I think, is how people use their past experiences in meeting

the present and future. We would like to understand how this happens under natural conditions" (Neisser, 1982, p. 12). It is clear that memory and learning are closely tied concepts because "one who does not learn has nothing to remember, and without memory there is no evidence of memory" (Long, 1983, p. 58). Learning and memory are so closely tied that it can be defined as "the persistence of learning in a state than can be revealed at a later time" (Squire, 1987, p. 3).

In order to understand the effect of memory on real life learning, it is important to be aware of the role of the memory process, memory structures, and factors influencing memory. Memory processes are the mental activities that store and retrieve information and include acquisition, retention, and retrieval. All of these elements are critical for a learning experience to become useful to the learner because without acquisition there can be no retrieval, and without retention the memory is lost. Memory structures refer to how information is represented, how long it will last, and how memories are organized. Short-term memory, long-term memory, episodic memory, and semantic memory are important in the consideration of memory

structure. There are a number of factors that can influence how well one's memory retains what was learned such as emotional involvement with the material, relationship of the material to previous experience, the context of other events in which the learning occurred, and the events that followed the learning (Mezirow, 1991, p. 29). Events that are related meaningfully to what one already knows are remembered much longer than a list of nonsense syllables (Wingfield & Byrnes, 1981).

Memory strategies include metamemory, mnemonics, and imaging and can be categorized as either external or internal. "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" (Paul & Fellenz, 1993, p. 22). Learners can improve their learning efficiency and improve their memory performance by developing metamemory skills. Difficulties encountered in learning may not be due to the inability of the learner but rather may be the result of not using the appropriate memory strategy for the learning task (Wingfield & Byrnes, 1981). External strategies involve interaction and manipulation of

the environment to ensure recall, with such techniques as keeping a list or asking someone for a reminder of something. Internal strategies involve the individual's own thought processes such as repetition, mnemonics, organization of information into related categories, and visualization. The memory strategies associated with adult real-life learning and used in the SKILLS are organization, external aids, and memory application.

Organization. Organization refers to the manner in which the memory restructures information from that in which it was originally presented (Seamon, 1980). The most effective techniques involve organization of the information into frameworks that can improve future retrieval (Paul & Fellenz, 1993, p. 21). Semantic networks in the memory allow relevant pieces of information to be linked together. Organization learning strategies used in the SKILLS model include several activities used to process information so that material will be better stored, retained, and retrieved such as chunking, mnemonics, creating patterns, elaborating, and comparing.

External Aids. External aids rely on the learner manipulating the environment to reinforce memory and improve learning. The SKILLS instruments external aids strategies involve the learner controlling the environment in some manner to enhance recall. External aids include the use of appointment books, making lists of things to do, placing visual items on display, and asking others for a reminder to do something.

Memory Application. Thinking about how the learned information will be used can improve learning. If the information is meaningful to the learner through a relationship to previous learning or the learner's objectives or if the learning has some practical utility, then learning retention will be improved (Paul & Fellenz, 1993, p. 22). 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. Application can be used in a range of learning activities such as acquiring a new skill to developing new knowledge (Paul & Fellenz, 1993, p. 25).

Critical Thinking

Because of the extensive research regarding critical thinking, there are many definitions of this concept. Critical thinking is a popular topic today not only in the classroom but also to all interested in developing human potential. The renewed interest in critical thinking is characterized by application to real-life situations (Fellenz & Conti, 1989, p. 11). Whether from a philosophical, educational, or psychological viewpoint, most attempts at defining critical thinking have centered around processes that involve higher-order thinking skills (Fellenz, 1993, p. 29).

In the Information Age, society has placed more value on critical thinking skills. Constant change in many aspects of life and increasing complexity of the social structures produce many opportunities for critical thinking (Fellenz, 1993, p. 30). What is central to adult learning is using high-order thinking skills to examine prior learning in order to determine whether what is currently being learned seems appropriate (Mezirow, 1990, p. 5).

The SKILLS model of critical thinking strategies is based on four components that were outlined by Brookfield (1987) in Developing Critical Thinkers and that were developed from real-life situations. The four components are (a) identifying and challenging assumptions, (b) challenging the importance of concepts, (c) imagining and exploring alternatives, and (d) reflective skepticism. The Critical Thinking strategies used in the SKILLS instrument, based on these components, include Testing Assumptions, Generating Alternatives, and Conditional Acceptance of General Knowledge.

Testing Assumptions. Testing assumptions refers to identifying the assumptions of the learning and challenging them by examining their accuracy and asking questions. "The process of challenging assumptions presumes the ability to identify these assumptions and the willingness to examine them" (Fellenz, 1993, p. 31). Brookfield (1987) contends that "to challenge an assumption that until now has been accepted uncritically... is at the heart of critical thinking" (p. 90). Testing assumptions strategies used in the SKILLS instrument "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. Generating alternatives is essential to coming up with new ideas and new insights. Unlike well-structured, classroom-generated problems, real-life problems are complex and have many potential solutions, and exploring all alternatives is vital to coming up with the best potential solutions (Fellenz, 1993, p. 32). Brainstorming is probably the most widely known and most effective method of generating alternatives because of its uncritical acceptance of creative ideas. Specific generating alternative strategies used in the SKILLS instrument include brainstorming, ranking alternatives, and envisioning the future.

Conditional Acceptance. Conditional acceptance, also referred to as reflective skepticism, is not accepting anything only on authority and questioning absolutes and oversimplifications. Brookfield (1987) states that "considering and imagining leads to the development of a particularly critical cast of mind, especially where any

claims for universal truth or validity of ideas or practice are concerned" (pp. 20-21). As adults mature, they move from a state in which knowledge is perceived as absolute to the acceptance of multiple realities and an understanding that careful searching can sometimes lead to better answers. Conditional acceptance strategies used in the SKILLS instrument include questioning of simplistic answers, predicting consequences, and monitoring results.

Resource Management

Resource management strategies are those ways that a learner manages learning resources, identifies appropriate resources, critically assesses the resources, and uses use human resources (Yabui, 1993, p. 29). In the Information Age, the availability of different types of resources and the volume of information from resources is growing at a phenomenal rate. For many learners, locating effective resources is a critical factor in the completion of a successful learning activity. Gathering information from a variety of resources, checking the accuracy of information, and acting upon the information have a significant impact upon learning (Conti & Fellenz, 1991, p. 68).

Some may find the local library a great resource with its newspapers, magazines, and books although fewer than 25% of American adults use the library regularly (Shirk, 1983). Some adults may prefer other sources of information such as the television or computerized resources while others feel the best sources of information are their friends and neighbors. Where and how people seek out information provides important information about them as learners (Fellenz, 1993, p. 35).

Adults rely strongly on their past experience in determining their present behavior (Paul & Fellenz, 1993, p. 18) which could significantly affect their choice of learning strategies. Very few adults actually use resources such as television or radio, and only a small fraction prefer such methods (Darkenwald & Merriam, 1982, p. 128). Those who grew up without technology may not see the value of information contained on a computer or on the other side of the world. Conversely, those who grew up in the Information Age may not be inclined to turn to their neighbor as a potential source of information. Ingrained habits of thinking and behavior make it difficult for adults

to adjust to using new information resources (Fellenz, 1993, p. 36), leading to frustration and abandonment of the learning activity. With training on the proper use of modern resources and on not so modern resources, the learning activity has greater potential for success. Learning strategy areas in terms of Resource Management of the SKILLS instrument include identification of resources, critical use of resources, and human resources.

Identification of Resources. In general, adults are not well equipped to use information resources associated with technology (Shadden & Raiford, 1984). Shirk (1983) revealed that adults prefer to use their own books, neighbors, and friends more than any other resource despite the fact they found these resources to be somewhat lacking in effectiveness. Identifying appropriate resources for a learning activity includes both an awareness of appropriate and available resources and a willingness to use them.

Critical Use of Resources. Tough (1971) found that adults spend a lot of time, money, and effort in locating and using human and material resources that sometimes were not beneficial to the learner. In the age of information

growth, one problem adults typically encounter is information overload; in other words, finding more information than they know what to do with (Smith, 1982, p. 103). Additionally, there is a tendency to use patterns of thinking or behavior that have been successful in the past though they may not be useful at the present. In an age of rapid change, adults need to be able to identify the most current information, recognize potential bias coming from the source of the information, and realize that everything in print may not always be accurate (Fellenz, 1993, p. 36).

Use of Human Resources. People and the social environment have a significant impact on learning. Learning involves listening to people with different opinions, discussions with people from a variety of sources in order to examine an issue, and recognizing the importance of moral support from other people as an aid to successful learning (Fellenz, 1993, p. 37).

CHAPTER 3

METHODS AND PROCEDURES

Introduction

This case study investigated the relationship between the learning strategies used in workplace situations of employees in Great Falls, Montana, businesses and various demographic variables and attitudinal characteristics. A case study is "a bounded system which is an examination of a specific phenomenon such as a program, an event, a process, an institution, or a social group" (Merriam, 1988, p. 10).

The study utilized the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS) instrument to determine the learning strategies of the employees, and a separate data collection instrument was used to gather demographic and attitudinal information. The two multivariate statistical techniques of discriminant analysis and cluster analysis were utilized to evaluate the

relationship between learning strategies and selected demographic and attitudinal characteristics of those in the study and to identify groups of learners in the sample. After the clusters were identified by their learning strategy characteristics, personal interviews with learners from each cluster were conducted to discuss their learning patterns and preferences in order to further determine why and how the groups differ.

Sample

Great Falls is located in east-central Montana and is the second largest city in the state with a population of approximately 60,000. A variety of business industries are represented including medical, legal, educational, financial, insurance, construction, government, agricultural, and military.

The participants of the study were selected from 19 local businesses in Great Falls that were considered to be professional workplaces. Permission to conduct the survey was obtained from each of the businesses selected. From the original business contacted, permission was granted from all but two; therefore two alternate businesses were selected.

Businesses were selected based on the researchers judgment of those businesses that would be representative of the major professional business industries and those it was feasible to contact within Great Falls. After exlaining the nature of the study, other business professionals in the community also assisted in helping to identify appropriate business.

The participants within each business were volunteer participants and had the option to remain anonymous. A total of 262 participants completed the SKILLS instrument and the data collection sheet. When using a multivariate statistical technique, "the sample size should be several times (preferably 10 or more times) as large as the number of variables" (Roscoe, 1975, p. 184). As this study used a total of 20 variables, 15 variables from SKILLS and 5 demographic variables, a required sample size was 200. Using this guideline, a sample size of 262 satisfied the minimum sample size required.

Table 1. Number of Respondents from Each Participating Business.

Business	Number of Respondents	Percent of Total
Crop Growers Insurance	6	2.3
Charlie Russell Museum	2	0.8
City of Great Falls	27	10.3
DADCO, Inc.	20	7.7
Farm Credit Services	8	3.1
Flynn Insurance	34	13.0
Farmers Union Mutual Insurance	13	5.0
Great Falls Chamber of Commerce	3	1.1
Great Falls Clinic	12	4.6
Great Falls Gas	9	3.4
Great Falls Job Service	3	1.1
Great Falls Public Library	10	3.8
Great Falls Public Schools	14	5.4
Great Falls Tribune	28	10.7
Montana Power Company	10	3.8
MSU College of Technology	39	14.9
Sletten Construction	7	2.7
Transystems	4	1.5
University of Great Falls	12	4.6
Total	262	100.0

Instrument

The instrument used for determining learning strategies was a modified version of the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS). The original form of the SKILLS instrument consists of six scenarios which the participants may encounter in their real life (Conti & Fellenz, 1991). From these six scenarios, the

participant selects four which are most meaningful to them. Each scenario requires the participant to rate 15 possible responses to the scenario. The possible responses include learning strategies in the five areas of Metacognition, Metamotivation, Memory, Critical Thinking, and Resource Management. Three choices are available for each response: Definitely Would Use, Possibly Use, or Definitely Not Use. Each of the five areas and the three specific learning strategies are outlined in Table 2.

Table 2. Self-Knowledge Inventory of Lifelong Learning Strategies.

Metacognition

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

Strategies:

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

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

Adjusting--directing and improving one's learning processes.

Examples: Evaluate, seek feedback, change approach, decide when done.

Metamotivation

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

Strategies:

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

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

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

Memory

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

Strategies:

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

Using External Aids--using external aids to reinforce memory.

Examples: Write down or list, put or display, ask another to remind.

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

Critical Thinking

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

Strategies:

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

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

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

Resource Management

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

Strategies:

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

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

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

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

SKILLS has been tested and proven to be both a valid and reliable instrument (Conti & Fellenz, 1991). Validity of the instrument was established on the basis of construct and content validity. Construct validity assesses whether the instrument can be shown to measure hypothetical constructs which explain some aspect of human behavior (Borg & Gall, 1983). Construct validity was established through literature reviews and obtaining judgment from adult education and educational psychology professors. Content validity refers

to the sampling adequacy of the content of the instrument. Content validity was assessed for SKILLS on the basis of sampling validity and item validity. Content sampling validity was assessed in terms of the degree to which the items were representative of the learning strategies used by adults. Content item validity was assessed by determining whether adults responded in meaningful patterns to the items on the instrument. Both sampling and item validity were established (Conti & Fellenz, 1991).

Reliability refers to the stability of an individuals response over time and consistency within the instrument. SKILLS provides the participants with six scenarios composed of 15 similar types of responses. Each scenario provides responses similar to the other scenarios and can be used to establish reliability within the instrument. The reliability of SKILLS was established by comparing the results of participants' responses using a coefficient of equivalence (Conti & Fellenz, 1991).

The basic model for the six SKILLS scenarios focuses primarily upon personal life skills. Because this study focused on professional skills used in the workplace, three

scenarios were modified to develop situations that are directed to reflect the actual learning activities faced by the participants on their job. Modification of the basic SKILLS scenarios was done and recommended previously by Bighorn (1997), Korinek (1997), Lockwood (1997), McKenna (1991), Moretti (1995), and Strakal (1995). While the scenarios of the instrument may change, the validity and reliability are not affected as the basic structure of the instrument is held in tact (McKenna & Conti, 1994). One of the scenarios from the original set in the SKILLS was utilized in the study without change. When the scenarios are modified to reflect the actual situation of the participants, four scenarios are used instead of six (eg., Strakal (1995). Therefore, the participants were presented with these four scenarios (see Appendix A).

Additional demographic and personal information was gathered from the participants using a data sheet. This data sheet included gender, age, years of formal education, type of training, years of employment in current field, and reason(s) for current occupation. Information regarding satisfaction with current career, motivating reason(s) for

working, and opinions of the value of technology in the workplace were rated by the participant using a Likert scale (see Appendix B).

Procedures for Data Collection

Data were collected by administering SKILLS to a representative sample of employees within the selected businesses in the Great Falls, Montana, area. Permission to conduct the survey was obtained from appropriate individuals at each business. All employees were invited to participant on a volunteer basis and could remain anonymous if they chose. In providing their name participants received a copy of their individual SKILLS results.

Contact was made with each business either by phone or letter to explain the nature of the study and inquire about its interest in participating in the study as well as determine the most appropriate person with whom to coordinate the data collection process. Once the coordinator for a business was identified, a face-to-face discussion was conducted to further explain the study and answer any questions. Because of the unique nature of each business, it was left up to the coordinator to determine the most

appropriate procedure for distributing and collecting the completed surveys although the most common procedure was distribution and collection through an internal mail system.

To help standardize the completion of SKILLS, the instructions for completing SKILLS were included at the top of the answer sheet. The employees were informed that there were four workplace-related scenarios to be completed. They were then asked to rate the 15 responses provided for each scenario and record their responses on the SKILLS answer sheet.

Demographic and personal information was gathered from the employees at the same time as the completion of the SKILLS instrument. The demographic information solicited included gender, age, years of education, degree type, and years employed. Employees selected their motivating reasons for working from a list of choices. The list of choices were developed in consultation with an employee of the Great Falls Job Service who has knowledge and expertise in this area. Using a Likert, scale employees indicated their satisfaction with their current job, attitudes toward the value of technology, and attitudes toward the value of

formal education. Once completed, the SKILLS survey and data sheet were returned for inclusion in the study.

Statistical Analysis

Data collected from SKILLS and from the data sheets were entered into dBase III Plus, a data management software program used for data organization and analysis. The Statistical Package for Social Sciences (SPSS/PC+), a computer statistics program, was used to analyze the statistical data.

The data was evaluated using discriminant analysis and then cluster analysis. Discriminant analysis was used to investigate the relationship between learning strategies and the information gathered on the data sheet. Discriminant analysis is a statistical technique which allows the investigation of the differences between two or more groups in relationship to several variables simultaneously (Klecka, 1980, p. 7). Discriminant analysis is a process that 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). This

technique is useful when known and distinct groups exist (Gay, 1996) such as gender and age.

In addition, cluster analysis was used to determine if distinct groups existed based upon the participants' uses of particular SKILLS learning strategies. "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. Analysis of variance was conducted to determine which variables are related to each cluster and for determining how the variables were associated with the cluster. 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 (Bighorn, 1997; Hays, 1995; Kolody, 1997; Korinek, 1997; Lockwood, 1997; Yabui, 1993). Variables on

which the groups differed significantly were retained in the analysis to assist in naming the groups.

In addition to these statistical processes additional qualitative information was gathered regarding the employees in each cluster through personal interviews with individuals from each of the clusters. The qualitative data gathered through the interview process was combined with the quantitative data to provide a more comprehensive and accurate description of the clusters. As a result of past studies on learning strategies (Bighorn, 1997, Conti & Fellenz, 1989; Conti & Kolody, 1995; Hays, 1995; Kolody, 1997; Korinek, 1997; Lockwood, 1997; Kolody & Conti, 1996; Strakal, 1995; Yabui, 1993), a triangulation process has been developed for interpreting cluster compositions. Triangulation is testing one source against another to satisfy validity of interpretation (Guba, 1978). This process involves using the existing quantitative data and gathering additional qualitative data (Conti, 1996, p. 70) to further validate the quantitative data.

CHAPTER 4

QUANTITATIVE ANALYSIS

Both quantitative and qualitative approaches were used in this study to describe the learning strategies of the participants and to determine if learners differed in their use of learning strategies in the workplace and if distinct groups of learners could be identified based on SKILLS learning strategy scores. Using both types of approaches as a central process of scientific research is very effective (Gay, 1996) in helping to describe the complex nature of human beings.

Profile of the Participants

The sample for the study included representatives from 19 businesses in the Great Falls, Montana, area. Attempts were made to select a cross-section of business industries to assure a quality sample. The Self-Knowledge Inventory of Lifelong Learning Skills (SKILLS) was used to measure the

learning strategies of the participants in the study. The SKILLS instrument was comprised of four workplace-related scenarios that were completed by all participants. In addition, demographic and attitudinal information was gathered using a data sheet that was also completed by the participants in conjunction with the SKILLS instrument.

A total of 262 employees participated in the study. Ages ranged from 18 to 64, with a mean age of 40.7, and almost two-thirds of the participants were between 30-49 years of age (see Table 3). Females represented 75.6% (198) of the sample. This high representation of females may have been due to the fact that the sample was predominantly support-staff type positions, which in many business environments are more frequently filled by females. A total of 80.9% (212) attended a post-secondary institution, and 56.8% of the group completed a degree or certificate (see Table 4). The average number of years working in their current career was 17 which is not surprising based on the fact that the mean age of survey participants was 40. Although 17 years indicates relative stability in their career, the average number of years in their present

position was 6, indicating this sample changes positions somewhat frequently.

Table 3. Age Frequency of Participants.

Age Grouping	Frequency	Percent	Cumulative Percent
18-29	41	15.6	15.6
30-39	70	26.7	42.3
40-49	95	36.3	78.6
50-64	51	19.5	98.1
Age not provided	5	1.9	100.0

Table 4. Education and Degree Frequency.

Educational Level	Frequency	Percent	Cumulative Percent
No College	49	18.7	18.7
College (no degree)	58	22.1	40.8
Certificate	8	3.1	43.9
Associate Degree	22	8.4	52.3
Bachelor Degree	81	30.9	83.2
Masters Degree	41	15.7	98.9
Doctorate Degree	3	1.1	100.0

In scoring SKILLS, respondents receive three points for each learning strategy that they would Definitely Use, two points for each strategy they would Possibly Use, and one point for each strategy they would Not Likely Use. Within

each of the four scenarios, each learning strategy area is represented by three individual learning strategies. Therefore, the range of total possible scores for each individual learning strategy is 4 to 12 points, and the range of possible scores for each learning strategy area is 12 to 36 points.

The overall profile for the employees across all businesses revealed a divergent group of learners. Most scores clustered around the middle of the range which is 24 (see Table 5). Resource Management, however, was the most commonly used learning strategy area with a mean 2.7 points higher than the second most preferred strategy area. This score indicates a moderately strong preference for use of the Resource Management learning strategy areas although Resource Management also has the largest standard deviation and range. Metamotivation was the least commonly used learning strategy area by the employees and was over two points below midrange and over five points below Resource Management.

Table 5. Means of Learning Strategies Areas of SKILLS.

Learning Strategy Areas	Mean	SD	Range
Resource Management	27.20	3.45	12-35
Metacognition	24.50	2.92	15-32
Memory	23.19	2.88	16-32
Critical Thinking	22.65	2.65	16-31
Metamotivation	21.97	3.42	12-33

Each of the five learning strategy areas are comprised of three individual learning strategies, totaling 15 individual learning strategies. The distribution of scores, with a range of 4-12, revealed some moderately strong preferences for some strategies and weak uses for other strategies. Identification of Resources, which is a Resource Management learning strategy, and External Aids, which is a Memory learning strategy, were substantially more preferred. The Memory strategies of Organization, Memory Application, the Metamotivation learning strategies of Reward and Confidence, and the Critical Thinking learning strategy of Testing Assumptions were the least preferred by the participants.

The overall difference between the highest and lowest mean was 3.24. This represents 40.4% of the possible range of 8 points. Overall, this indicated some tendencies on the part of these learners in workplace situations (see Table 6).

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

Individual Learning Strategy	Mean	SD	Range
Identification of Resources	9.74	1.73	4-12
External Aids	9.63	1.72	4-12
Critical Use of Resources	8.95	1.78	4-12
Planning	8.92	1.68	4-12
Attention	8.77	1.72	4-12
Use of Human Resources	8.50	1.85	4-12
Generate Alternatives	8.39	1.66	4-12
Adjusting	7.94	1.82	4-12
Conditional Acceptance	7.66	1.80	4-12
Monitoring	7.63	1.42	4-11
Organization	6.84	1.83	4-12
Memory Application	6.72	1.74	4-11
Reward	6.71	1.61	4-12
Testing Assumptions	6.60	1.36	4-11
Confidence	6.50	1.99	4-12

Discriminant Analysis

Discriminant analysis is a statistical technique that investigates the difference between two or more groups in relationship to several variables simultaneously (Klecka, 1980, p. 7). Discriminant analysis analyzes the variables

holistically rather than singly. The purpose of this kind of technique is to examine the interaction of multiple variables (Conti, 1993). Discriminant analysis "requires the researcher to make meaningful decisions about the data and to impose sense upon it" (p. 90) such as separating groups by gender, age, or other known characteristic. Discriminant analysis can be used either to describe the difference between groups or to predict membership in a group. In this descriptive study, discriminant analysis was used to determine if learning strategies could be used to determine how groups differed. The participants were grouped according to gender, age, post-secondary attendance, educational credential, and years in current position.

Two criteria were used to evaluate whether it was possible to discriminate between those in the groups related to their learning strategies. The first criterion was that the discriminant function had to correctly classify at least one-half of the cases beyond the chance placement. The second criterion was that the discriminant function had to be describable using the structure coefficients with a value of .3 or greater (Conti, 1993; Kolody, 1997).

Discriminant analysis produces a discriminant function that is used to predict placement in the groups even though the accuracy of the discriminant function may not be statistically significant or accurate. The researcher has to have a criteria for determining if the function can be judged as useful. The first criterion requires the discriminant function to correctly classify a certain percentage of the cases beyond chance. "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 observed misclassification rate to that expected by chance alone" (Norusis, 1988, p. B-13). Chance refers to the probability of a person randomly being placed in the correct group. The probability of correct placement in a group, or classification rate, is equally spread across the groups and is expressed as a percentage. For this study, the criterion was that in order for the discriminant function to be judged useful, it had to correctly classify not only that equivalent to chance but also 50% of the additional chance remaining. For example, in a two-group analysis, there is a

50% chance of correctly placing a case without analyzing any characteristics of the case. In this example, to be considered useful the discriminant function would have to correctly classify 75% of the cases, which is the 50% due to chance plus an additional 25% which is half of the chance remaining. A three-group analysis would require a correct classification rate of 66%, or 33% plus 50% of the remaining 67%.

The second criterion used in the study involved examining the structure matrix produced in the discriminant analysis. The structure matrix shows the correlation between the individual discriminating variables and discriminant function (Klecka, 1990, p. 31). The discriminating variables must have a coefficient of at least .3 in order to discern any meaning from the function. This additional criteria is necessary because it is possible to get a discriminant function with a high placement rate but which correlates with so many variables that it is impossible to decipher the meaning of the function (Hill, 1992). This criterion requires that the discriminant function have clarity in order to be judged useful.

Gender

Discriminant analysis was used to determine if the learning strategies of the participants could be used to distinguish learners when grouped on gender. The set of discriminating variables used to predict placement in these groups were the 15 learning strategies from SKILLS. These variables were 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 Resources.

The pooled within-groups correlation matrix indicates the correlations for the variables with the participants placed in their appropriate group. The pooled within-groups correlation matrix of discriminating variables was examined to detect dependencies among the variables. In order for multiple variables to be included in an analysis, they should not be sharing variance; a high correlation indicates that variables are 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 the coefficient of Reward and Adjustment was above the .3, at .338, and when squared only indicates an 11.4% common variance between the two variables, which is relatively weak. Only 10 coefficients were at the .2 level, and the remaining 92 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 the most to the discrimination between genders because this method produced an optimal set of discriminating variables. Wilks's lambda was chosen as the method for selecting variables because it takes into consideration both differences between the groups as well as the cohesiveness within the groups. Because of its approach to variable selection, Wilks's lamba is commonly used in

discriminant analysis in education. As a result of this stepwise procedure, eight variables and their corresponding Wilks's lambda values were selected: External Aids (.93), Memory Application (.92), Testing Assumptions (.90), Use of Human Resources (.89), Reward/Enjoyment (.87), Adjusting (.87), and Organization (.86). The other seven 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 discriminant function can be determined. The standardized coefficients for this function which discriminated based on gender were External Aids (.62), Reward/Enjoyment (.36), Memory Application (-.36), Testing Assumptions (-.35), Generating Alternatives (-.27), Adjusting (.26), Organization (.23), and Use of Human Resources (-.26). Use of External Aids contributed substantially more than the other variables in the discriminant function.

The percentage of cases correctly classified shows how accurate the discriminant function was in placement of the cases in the appropriate group. This discriminant function was accurate in correctly classifying 67.8% of the cases. It correctly placed 65.1% (41) of the males and 68.7% (136) of the females. Although the discriminant function is a 17.8% improvement over chance in predicting group placement, it does not meet the required placement percentage criteria, which in this case is 75%. Consequently, it demonstrates that males and females cannot be distinguished on the basis of their preference for particular learning strategies in the workplace.

The discriminant function which was used to classify the cases is:

> D = .15 (Adjusting) + .22 (Reward/Enjoyment) + .12 (Organization) + .37 (External Aids) - .21 (Memory Application) - .26 (Testing Assumptions) - .17 (Generating Alternatives) - .14 (Use of Human Resources) - 1.33.

The group centroid for males was -.704 and .224 for the females. The canonical correlation is a measure of the degree of association between the discriminant scores and the groups. For this analysis, the canonical correlation was

.37 and when squared, this value indicates that the grouping only explained 13.7% of the variation in the discriminant function.

The structure matrix contains the discriminant function coefficients which show how closely each variable included in the discriminant function and the overall discriminant function are related. The variables with the highest coefficients have the strongest relationship to the discriminant function and are used to name the discriminant function. This structure matrix is critical to a descriptive study because it serves the purpose of 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. Generally, in order for a variable to be considered significant and to be included in the process of the naming the discriminant function, the coefficient must have a value of at least .3. Four variables had sufficient coefficients to be included in determining

the meaning of the discriminant function. They are External Aids (.67), Memory Application (-.40), Testing Assumptions (-.39), and Organization (.37). 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. Therefore, it was determined that it is not possible to use learning strategies to discriminate between groups categorized according to gender.

Age

Discriminant analysis was used to determine whether employees differed in their use of learning strategies when grouped by age. For the purpose of this analysis, the participants were placed into three groups. One group contained 49 individuals who were age 30 or below, the second group contained 118 individuals who were 31-50 years of age, and the third group contained 94 individuals and included those who were age 51 or higher. One individual did not provide age. The second group, totaling 118 cases, was not included in the analysis. These age groupings were used because they represent distinct age groups that have

differing types of life experiences and represent the best opportunity to reveal distinct learning differences. In addition, the two groups analyzed represent those individuals who are approximately one standard deviation above or below the mean age. By looking at groups that are distinctly different and by having a buffer zone between them, the chance of finding meaningful differences are increased (Yabui, 1993). 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 participants placed in their appropriate group. The examination of the 105 coefficients for this analysis revealed 90 coefficients below the .2 level, 13 coefficients at the .2 level, one at the .3 level, and one at the .4 level. The two variables, of Reward/Enjoyment and Adjusting correlated at .41. When this is squared, it reveals that there is a 16.8% association between the two variables. Since these variables were not highly correlated with the other variables and since 16.8% was judged a low common variance these variables were

retained in the analysis. Thus, the variables in this discriminant analysis were not significantly related to each other and are not sharing a common variance.

Stepwise selection was used to determine which variables added most to the discrimination between the two age groups. As a result of this Wilks's lambda stepwise procedure, 10 variables were included in the discriminant function. The discriminating variables and their corresponding Wilks's lambda values were Attention (.90), Reward/Enjoyment (.83), Monitoring (.80), Use of Human Resources (.77), Identification of Resources (.75), Adjusting (.75), Organization (.73), Planning (.73), External Aids (.72), and Memory Application (.71). The remaining five variables 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. 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).

The percentage of cases correctly classified was 71.33%. The classification correctly placed 69.4% (34) of the cases in the lower age group and 72.3% (68) of the cases in the upper age group. Thus, the discriminant function is a 22.3% improvement over chance in predicting group placement but below the criteria value, which indicates that age 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 = .15 (Planning) -.26 (Monitoring) + .23 (Adjusting) - .37 (Attention) + .44 (Reward/Enjoyment) +.15 (Organization) + .16 (External Aids) + .12 (Memory Application) - .12 (Identification of Resources) - .12 (Use of Human Resources)-2.30.

The group centroid for the youngest age group was .873 and -.455 for the oldest age group. The canonical correlation was .54, and when squared, this value indicates that the grouping only explained 29.2% 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 Attention (-.53), Reward/Enjoyment (.43), and Critical Use of Resources (-.33).

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. Therefore, it was determined that it is not possible to use learning strategies to discriminate between groups categorized according to high and low age.

Post-Secondary Enrollment

Discriminant analysis was used to determine whether employees differed in their use of learning strategies when grouped according to whether or not they had attended a post-secondary educational institution. The group of those that attended a post-secondary instituation contained 212 individuals, and the group of those that did not attend a post-secondary institution contained 43 individuals. There were seven individuals who did not provide this information.

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 participants placed in their appropriate group. The examination of the 105 coefficients for this analysis revealed 95 coefficients below the .2 level, nine coefficients at the .2 level, and one at the .3 level. Thus, the variables in this discriminant analysis were not significantly related to each other and are not sharing a common variance.

Stepwise selection was used to determine which variables added most to the discrimination between the two groups. As a result of this Wilks's lambda stepwise procedure, three variables were included in the discriminant function. The discriminating variables and their corresponding Wilks's lambda values were Critical Use of Resources (.99), Memory Application (.98), and Conditional Acceptance (.97). The remaining 12 variables 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. The standardized coefficients for this function which discriminated between those who attended post-secondary education and those who did not were Critical Use of Resources (.76), Memory Application (.59), and Conditional Acceptance (.55).

The percentage of cases correctly classified was 62.35%. The classification correctly placed 62.3% (132) of the cases for those that attended post-secondary education and 62.8% (27) for those that did not pursue post-secondary education. Although the discriminant function is a 12.3% improvement over chance in predicting group placement, this indicates that attendance at a post-secondary institution 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:

D = .33 (Memory Application) + .30 (Conditional Acceptance) + .43 (Critical Use of Resources) - 8.45.

The group centroid for those that attended post-secondary education was .074 and -.362 for those that did not attend post-secondary education. The canonical correlation was .16 and when squared, this value indicates that the grouping only explained 2.6% 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 Critical Use of Resources (.66), Conditional Acceptance (.46), and Memory Application (.42). 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. Therefore, it was determined that it is not possible to use learning strategies to discriminate between groups categorized on those who attended post-secondary education and those who did not attend post-secondary education.

Educational Credential

Discriminant analysis was used to determine whether employees differed in their use of learning strategies when

grouped according to the level of educational credential earned. Those who had not earned a degree or certificate were not considered in this analysis. The remaining participants were divided into three groups. The first group of 30 individuals consisted of those who had earned a certificate or associate degree, the second group consisted of those who had earned a bachelors degree, and the third group of 44 individuals consisted of those who had earned a masters or doctorate degree. The second group was not included in the analysis in order to provide a buffer zone and create two distinct groups from which to compare. 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 variable with the participants placed in their appropriate group. The examination of the 105 coefficients for this analysis revealed 74 coefficients at below the .2 level, 24 coefficients at the .2 level, and 7 at the .3 level. Thus, the variables in this discriminant

analysis were not significantly related to each other and are not sharing a common variance.

Stepwise selection was used to determine which variables added most to the discrimination between the two groups. As a result of this Wilks's lambda stepwise procedure, six variables were included in the discriminant function. The discriminating variables and their corresponding Wilks's lambda values were Use of Human Resources (.92), Memory Application (.87), Confidence (.83), External Aids (.79), Identification of Resources (.78), and Monitoring (.76). The remaining nine variables 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. The standardized coefficients for this function which discriminated between those who earned a certificate or associate degree and those who earned a masters or doctorate degree were Monitoring (.35), Confidence (.67), External Aids (.53), Memory

Application (-.47), Identification of Resources (.37), and Use of Human Resources (-.40).

The percentage of cases correctly classified was 68.9%. The classification correctly placed 70.0% (21) of the cases for those that earned a certificate or associate degree and 68.2% (30) for those that earned a masters or doctorate degree. Although the discriminant function is an 18.9% improvement over chance in predicting group placement, this indicates that level of degree earned cannot be sufficiently distinguished on the basis of learners' preference for workplace learning strategies.

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

D = .23 (Monitoring) + .33 (Confidence) + .29 (External Aids - .27 (Memory Application) + .20 (Identification of Resources) - .21 (Use of Human Resources) - 4.9

The group centroid for those that completed certificates or associate degrees was .674 and -.459 for those that completed masters or doctorate degrees. The canonical correlation was .49 and when squared, this value indicates that the grouping only explained 24% 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 Use of Human Resources (-.52), Confidence (.47), External Aids (.40), and Memory Application (.35). 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. Therefore, it was determined that it is not possible to use learning strategies to discriminate between groups categorized on those who earned certificates or associate degrees and those who earned masters and doctorates.

Years in Position

Discriminant analysis was used to determine whether employees differed in their use of learning strategies when grouped based on the number of years working in their current position. For the purpose of this analysis, the participants were placed in three groups. One group contained 100 individuals who had been in their current position 2 years or less, the second group contained 115 individuals who had been in their current position 3-10

years, and the third group contained 47 individuals who had been in their current position 11 or more years. The second group was not included in the analysis in order to provide a buffer zone and to create two distinct groups from which to compare. These two groupings were chosen because those with 2 years or less are still somewhat novices in their position and those with 11 or more years have become relative experts in their position and therefore may use different strategies for learning. 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 variable with the participants placed in their appropriate group. The examination of the 105 coefficients for this analysis revealed 95 coefficients at below the .2 level, nine coefficients at the .2 level, and one at the .3 level. The variables in this discriminant analysis were not significantly related to each other and are not sharing a common variance.

Stepwise selection was used to determine which variables added most to the discrimination between the two

groups. As a result of this Wilks's lambda stepwise procedure, four variables were included in the discriminant function. The discriminating variables and their corresponding Wilks's lambda values were Memory Application (.96), Adjusting (.94), Conditional Acceptance (.92), and External Aids (.91). The remaining 11 variables 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. The standardized coefficients for this function which discriminated between those in their current position for a relatively short time and those in their current position for a relatively long time were Adjusting (.45), External Aids (.34), Memory Application (.80), and Conditional Acceptance (.49).

The percentage of cases correctly classified was 60.5%. The classification correctly placed 59% (59) of the cases in the group with the fewest years in their current position and 63.8% (30) of the cases in the group with the most years in their current position. Thus, the discriminant function

is a 10.5% improvement over chance in predicting group placement. This analysis indicates that the number of years in the current position 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:

D = .24 (Adjusting) + .20 (External Aids) + .47 (Memory Application) + .27 (Conditional Acceptance) - 8.89.

The group centroid for the group with the fewest years was .215 and -.457 for the group with the most year. The canonical correlation was .3 and when squared, this value indicates that the grouping only explained 9% 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 Memory Application (.63), Adjusting (.45), and Conditional Acceptance (.44). 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. Therefore, it was

determined that it is not possible to use learning strategies to discriminate between groups categorized according to those with 0-2 years of experience in their current position and those with 11 or more years of experience in their current position.

CHAPTER 5

QUALITATIVE ANALYSIS

Cluster Analysis

Cluster analysis was performed on the 262 cases to determine if groups of learners could be identified based on the SKILLS learning strategies. 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). ACluster 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).

The Ward's method was used for determining how cases will be combined into clusters. The Ward's method is 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).

Several potential cluster solutions were considered for this study. In examining the structure of the cluster, the four cluster solution was determined to be the most appropriate for this data set based on the distribution of participants in each group and the unique characteristics of each group.

The four clusters of adult learners were named Focusers, Indexers, Resourcers, and Reflective Planners. The Indexers contained over 40% of the individuals while the Resourcers contained slightly more than 11% (see Table 7). The names for the clusters were derived from both a statistical profile of each group based on the most significant learning strategies for each cluster and from follow-up analysis of qualitative interviews with participants from the various clusters.

Table 7. Cluster Frequency Distribution.

Cluster Name	Frequency	Percent
Focusers	45	17.2
Indexers	108	41.2
Resourcers	29	11.1
Reflective Planners	80	30.5
Total	262	100.0

ANOVA of the Clusters

Analysis of variance (ANOVA) is a useful tool for determining which variables are related to each cluster and 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 four clusters. A one-way analysis of variance was conducted on each of these 15 variables to determine if there were significant differences among the four cluster groups (Bighorn, 1997; Hays, 1995; Kolody, 1997; Korinek; 1997; Lockwood, 1997; Strakal, 1995; Yabui, 1993). Significant differences existed in all of the 15 learning strategies (see Table 8).

Table 8. ANOVA of Learning Strategies by Cluster.

Strategy	*df*	*SS*	*MS*	*F*	*p*
Planning					
Between	3	66.82	22.27	8.58	.0001
Within	258	669.65	2.60		
Monitoring					
Between	3	47.66	15.82	8.59	.0001
Within	258	475.37	1.84		
Adjusting					
Between	3	54.85	18.29	5.82	.0007
Within	258	811.29	3.14		
Attention					
Between	3	54.15	18.05	6.46	.0003
Within	258	720.65	2.79		
Reward					
Between	3	67.57	22.52	9.51	.0001
Within	258	610.80	2.37		
Confidence					
Between	3	410.69	136.90	56.71	.0001
Within	258	622,81	2.41		
Organization					
Between	3	177.01	59.00	21.78	.0001
Within	258	698.93	2.71		
Use of External Aids					
Between	3	63.15	21.05	7.67	.0001
Within	258	707.68	2.74		
Memory Application					
Between	3	123.10	41.03	15.81	.0001
Within	258	669.56	2.60		
Testing Assumptions					
Between	3	30.25	10.08	5.73	.0008
Within	258	454.46	1.76		
Generating Alternatives					
Between	3	186.74	62.25	29.99	.0001
Within	258	535.55	2.08		

Table 8. ANOVA of Learning Strategies--continued.

Strategy	*df*	*SS*	*MS*	*F*	*p*
Conditional Acceptance					
Between	3	114.26	38.0	13.45	.0001
Within	258	730.82	2.83		
Identification of Resources					
Between	3	51.79	17.26	6.12	.0005
Within	258	728.08	2.82		
Critical Use of Resources					
Between	3	41.91	13.97	4.57	.0039
Within	258	788.44	3.06		
Use of Human Resources					
Between	3	208.47	69.49	26.33	.0001
Within	258	681.03	2.64		

Therefore, all 15 variables were retained in the analysis to characterize and assist in naming the groups.

A one-way analysis of variance was also conducted on each of the 19 demographic and attitudinal variables to determine if there were significant differences among the four cluster groups (see Table 9). The gender distribution for the four clusters for the 261 who identified their gender is shown in Table 10. There existed a significant difference only on gender. Therefore, only gender was retained in analyzing and naming the groups.

The one-way analysis of variance determined there was no significant differences among the four clusters regarding

the demographic variables of age, years of formal education, attendance at post-secondary institution, years in post-secondary education, completion of a degree/certificate, level of degree/certificate, position related to degree, years in position, years in career and the attitudinal variables of value of formal education versus on-the-job training for current job, whether technology makes job easier, whether technology is regular part of job, satisfaction with job, eagerness to learn, importance of formal education, fear of technology, confidence in ability to learn new technology, and benefit of technology to society (see Table 9). Since these 18 variables showed no significant differences, they were not considered characteristic of any of the clusters and were not useful in classifying and naming the four groups determined in the cluster analysis.

The means of the 15 learning strategies along with the one demographic variable for each cluster were used to help identify the important characteristics of each cluster (see Table 11). Following the one-way analysis of variance, Tukey

post hoc tests were also used to identify the groupings for each of the significant variables.

Table 9. ANOVA of Demographic Variables & Attitudinal Characteristics.

Strategy	*df*	*SS*	*MS*	*F*	*p*
Gender					
Between	3	2.03	0.68	3.79	.0109
Within	257	45.77	0.18		
Completion of Degree/Cert.					
Between	3	2.34	0.78	2.97	.0330
Within	206	54.16	0.26		
Confidence in Learning Tech.					
Between	3	2.28	0.76	2.11	.0994
Within	258	93.08	0.36		
Technology Makes Job Easier					
Between	3	3.57	1.19	2.04	.1091
Within	257	150.12	0.59		
Satisfaction with Job					
Between	3	2.87	0.96	1.96	.1206
Within	258	126.13	0.49		
Years Formal Education					
Between	3	94.65	31.55	1.90	.1298
Within	253	4197.57	16.59		
Position Related to Degree					
Between	3	1.11	0.37	1.70	.1678
Within	201	43.64	0.22		
Years in Career					
Between	3	3.29	1.10	1.64	.1807
Within	258	172.80	0.67		
Years of College					
Between	3	38.18	12.73	1.45	.2303
Within	199	1750.08	8.79		
Level of Degree					
Between	3	2.31	0.77	1.11	.3452
Within	151	104.17	0.69		
Fear of Technology					
Between	3	2.20	0.73	1.04	.3758
Within	257	181.66	0.71		

Table 9. ANOVA of Demographic Variables & Attitudinal Characteristics—continued.

Strategy	*df*	*SS*	*MS*	*F*	*p*
Benefit of Tech. to Society					
Between	3	1.56	0.52	1.06	.3663
Within	258	126.21	0.49		
Years in Position					
Between	3	1.66	0.55	0.97	.4080
Within	258	147.12	0.57		
Importance of Formal Educ.					
Between	3	1.38	0.46	0.49	.6910
Within	257	243.17	0.95		
Eagerness to Learn					
Between	3	0.68	0.23	0.41	.7479
Within	258	143.83	0.56		
Technology Regular Part of Job					
Between	3	0.51	0.17	0.39	.7612
Within	258	112.75	.044		
Attendance at Post-Sec. Inst.					
Between	3	0.15	0.05	0.35	.7861
Within	251	35.60	0.14		
Education -vs- On-The-Job Training					
Between	3	0.86	0.29	0.31	.8191
Within	256	237.64	0.93		
Age					
Between	3	0.32	0.11	0.29	.8295
Within	253	92.58	0.37		

Table 10. Gender Distribution by Cluster

	Focusers	Indexers	Resourcers	Reflective Planners
Gender				
Male	10(22%)	17(16%)	7(24%)	29(36%)
Female	35(78%)	91(84%)	22(76%)	50(63%)

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

Variable	Focusers	Indexers	Resourcers	Reflective Planners
Planning	9.0	8.4	9.8	9.3
Monitoring	7.2	7.5	7.1	8.2
Adjusting	7.0	8.2	8.3	8.0
Attention	9.4	8.8	7.7	8.8
Reward	7.4	6.4	5.7	7.1
Confidence	9.2	6.1	5.5	5.9
Organization	6.4	7.8	5.9	6.1
External Aids	9.5	10.1	9.9	9.0
Memory Application	7.0	5.9	7.3	7.4
Test Assumptions	7.1	6.3	6.2	6.9
Generate Alternatives	7.4	7.8	9.0	9.5
Conditional Acceptance	6.5	8.3	7.2	7.5
Identify Resources	9.7	10.2	10.0	9.1
Critical Use of Res.	8.5	9.3	9.4	8.6
Human Resources	8.6	8.5	10.8	7.6

The multivariate technique of cluster analysis produced a solution with four clear and distinct clusters of learners. Thus, this analysis, which sought to investigate the research question related to clusters of learners existing in the data, demonstrated that it was possible to identify distinct clusters of workplace learners in Great Falls, Montana, businesses based on employee learning strategy scores on SKILLS.

Cluster Interviews

To supplement the quantitative cluster analysis data used in this case study, focus group interviews were conducted with participants from each of the four learning groups identified by the cluster analysis. Researchers are finding that a combination of quantitative and qualitative analyses can add meaning to research findings, especially those that address a sociologic concept such as learning (Bighorn, 1997; Hays, 1995; Kolody, 1997; Korinek, 1997; Lockwood, 1997; Strakal, 1995, Yabui, 1993). Because the participants were from different companies, interviews were conducted on a personal basis. Permission was granted from each individual to record the interviews to allow a more thorough review of the discussion of the interview. A total of 18 participants were interviewed. The number of individuals interviewed from each cluster were selected in relative proportion with the number of individuals in each cluster. Therefore, the following number were interviewed from each group: Focusers—4, Indexers—6, Resourcers—3, and Reflective Planners—5.

Through quantitative and qualitative means, four distinct groups of learners were identified and described thus affirming that it is possible to identify clusters of employees based on their scores on SKILLS. The combination of these techniques allowed the research questions which asked about the description of these groups to be answered. The descriptions of the four 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 were collected during the personal interviews. Following is a description of the characteristics of each of the four clusters identified in this study which are the Focusers, the Indexers, the Resourcers, and the Reflective Planners.

Focusers

Focusers require a time to concentrate on their learning and they utilize many resources as well as their past experience in workplace learning activities. The learning strategies relied on most heavily by Focuers are Attention (9.4), External Aids (9.5), Identification of

Resources (9.7), and Confidence (9.2). This group showed a low preference for the learning strategies of Memory Organization (6.4) and Conditional Acceptance (6.5). Focusers are the only cluster that relied heavily on the strategies of Attention and Confidence.

Attention, a Metamotivation strategy, involves focusing one's learning abilities on the learn task. Focusers create an environment that facilitates learning by setting aside time to learn and seeking an environment that is free of interruption and distractions. An important aspect of attention is the dedication of time and a suitable environment to the learning task" (Fellenz & Conti, 1993, p. 15). This concept was addressed often by individuals from this group.

> I do better with a block of time, especially if it is uninterrupted. What I find difficult is starting and stopping [a learning activity] frequently. Although a block of time might be as short as 20 minutes.
>
> I do try to schedule learning in although sometimes it doesn't work.

During the learning process, Focusers frequently use external aids such as lists and notes to assist them in

learning, remembering, and organizing information. Learners in this group are typified by the statements from two of the participants.

> I write tons of notes. All kinds of lists, with steps, one right after the other.
>
> I am real big on notes and lists, outlining types of information. I have to write it down and gather my thoughts from there.

Time is a precious commodity in most people's work lives and the business world relies heavily upon keeping this scheduled and on track. Focusers use this scheduling as a technique for planning their learning activities and directing their learning. Other participants stressed the importance of writing things in a calendar and scheduling their learning to keep track of projects and learning activities.

> When I have a program coming up, I definitely have to set time aside. You can go look at my calendar right now, and I have scheduled when I need to start learning things [for the program]. If I don't write it down on my calendar, it isn't going to happen.
>
> It wasn't until my later years until I actually planned study time; start my paper four weeks ahead, do an outline this week, have the summary done by this week.

As with the Indexers and Resourcers, Focusers rely heavily on Identification of Resources which deals with having both an awareness of appropriate resources and a willingness to use these resources (Fellenz & Conti, 1993, p. 36). "I made calls to IBM, talked with technical support and just wasn't finding information. So, I found other resources that had additional information." For Focusers, the necessity of having resources available is so important that "not having the right resource can be a barrier to learning." To overcome this, Focusers, will "Ask someone who already has experience", which is also indicative of identification of proper resources.

Confidence is another Metamotivation strategy used by Focusers. Confidence refers to the learners' perception of their ability to perform in a learning situation which is a factor in successful learning (Fellenz & Conti, 1993, p. 16). Focusers show a strong tendency to rely on experience from other similar activities they have completed as a strategy for building confidence in learning.

> I think coming into any job you get you bring in experience from other places you have worked [that you use for dealing with new learning]. I did similar projects on my other jobs. We served this

> food, and it didn't work well so we try something different. Yes, I am very conscious of [previous experience].

Indexers

Indexers are effective at locating, using, and evaluating resources for their learning. They make significant use of the learning strategies of External Aids, Identification of Resources, and Critical Use of Resources. Although females outnumbered males in the sample by a 3.1 to 1 ratio, males were outnumbered by females in this cluster by a 5.4 to 1 ratio. Over 45% of the females in the study were placed into this cluster.

Similar to Focusers and Resourcers, Indexers rely on notes, lists, and calendars to help them learn. Indexers had the highest use of External Aids of the three clusters utilizing this strategy. These learners even make use of lists to keep track of their resources, thereby tying their use of external aids to their use of resources.

> I highlight key words in documents. I keep a list of resources on file cards and databases to locate resources on file.

Another example of combining the resource usage with taking notes was indicated by this statement.

> [In something that I am not familiar with] I am probably going to need someone to walk me through it, sit along with me. Then I tend to write down what they say. I take the notes and keep them in some semblance of order so I can use them again.

One interesting quirk related to their note-taking was the fact that although they often took notes during a learning activity, they did not often refer back to them.

> If I am going to a seminar, I listen. I typically take notes so that I can refer back to them if I need to. Although I find I don't often refer to the notes because I tend to remember a lot of it by listening and writing. When I put my notes away, I can pretty much recall the information.

> I take lots of notes, [but] I rarely go back to them. I think writing it down helps make it be part of my memory, but I rarely go back to them. The process of writing it down while it is being done helps solidify it a little bit.

The business environment poses many time demands on individuals in the workplace. Much activity in a business revolves around the day of the week or time of day. Indexers need to have a system for writing down and scheduling things for them to remember what they are supposed to be doing and where they are supposed to be.

> I keep two calendars in fact, one that I carry with me and one that I keep here [in my office].

Indexers are very aggressive in locating resources for learning and make a concerted effort to keep their resources organized. Having their resources organized is very critical to Indexers so they are able to quickly locate and find the appropriate resource to use for a particular learning task. One participant indicated that when she filed articles and other resources in her file cabinet, she created a computer database to keep track of the resources, sorting it at least three ways so she was able to retrieve the resources when needed. Other participants indicated an active effort to keep their resources organized.

> I first started to file everything by classes, but that was bad because too many of the topics overlapped, and then I was having problems finding them. Then I revamped my whole filing system and I just put down what it is [by topic]. Then when I need something I can just pull that folder out.

> My learning resources, I had them everywhere, and now I put them all together in a file here.

The amount and sources of information is growing very quickly. Knowing what resources are available and where to look for particular resources is essential to effective learning. Indexers are very active in locating the resources

they need, or might need, for their workplace learning situations.

> I scan almost everything that comes across my desk. I file under general categories and try to purge my files.
>
> First thing I would probably do [when learning something new] is scope out my other coworkers and see if they have experiences with this. And then see how did they learn it, how did they get their information to start out with, who did they talk to, [and] what did they read. Find out what other people know about it.
>
> Hopefully the resources I get will direct me to other resources. Then, I can build my own package of resources.

Indexers also critically assess for their use the resources they locate. Critical Use of Resources involves "using appropriate rather than available resources while recognizing their limitations" (Fellenz, 1993, p. 36). Indexers are aware that the author of a resource may have a bias, that resources become out of date, and that it takes active efforts to determine what is a useful resource. "I evaluate and keep only what applies. It took a while to learn that technique."

Indexers also realize the value of reviewing the resources they have for their timeliness. In an age of rapid

change, learners need to distinguish between recent and most recent information (Fellenz, 1993, p. 36).

> Once or twice a year I will take a look at what [resources] I have got and know just through my own personal use whether its something I need to keep. Plus a lot of the information I have is dated, so just by the nature of the date it is no longer useful to me.

Indexers understand that "learners need to recognize the potential bias in sources" (p. 36). Modern information systems allow anyone to produce information and distribute across the world where it is immediately available. To make critical decisions workers must have access to this information but also be skilled in evaluating information for its value and validity.

> Any information you get is of some value, but what you need to do is to evaluate the expertise of the person of who is giving you that information, and also know where they are coming from because they have different opinions depending on what they want you to understand. I caution myself, my kids, [to] listen to everyone but make sure you evaluate what they say and why they are saying it.

As the workplace and its workers experience frequent and ongoing change, having resources available to understand and deal effectively in the new environment is essential. Indexers use their skill in locating and organizing their

resources to help them deal with constant change in their environment.

> I probably am not as afraid of change as I was five years ago. It's because I have let myself realize and I am smart enough to move on with that change, and it is things like this [resource file] that give me the confidence to do that.

Resourcers

Resourcers utilize more strategies than any other cluster and also contained the fewest learners of the four clusters. They are similar to Indexers in their use of the learning strategies of External Aids, Identification of Resources, and Critical Use of Resources, but unlike Indexers they also make use of Planning and heavily rely upon Use of Human Resources. These strategies include all three strategies of the Resource Management strategy area as well as Metamotivation and Metacognition strategies.

Planning refers to knowing the best way for one to proceed with a specific learning activity and is based on an awareness of one's learning characteristics, insights into the learning task, and an understanding of the planning process (Fellenz, 1993, p. 9). Resourcers find it helpful to

get an overview of the learning activity before they proceed and do so by planning and overviewing.

> I might try to do some brief research beforehand just to get somewhat familiar with what I am going to learn, like terminology, or just to grasp the basic concepts. Even looking up words in dictionaries.

Knowing the purpose of the learning is important to Resourcers in terms of planning their learning. In addition, they have a preference to see the "big picture" and then proceed to determine the details of the learning activity. This "big picture" provides Resources with a direction and a blueprint to guide their learning so that they stay on track and moving toward their original goal.

> I usually make a plan of what I want to have happen, and then I seek the resources to fit into that plan.

> I want to see the end point first then determine how to get there. By knowing the end, I would have a better plan of how to get there.

Like Focusers and Indexers, Resourcers make use of lists and notes. These learners find writing it down helps in their understanding and provides them with something they can use to assist in improving their understanding.

> I need to do it in an interactive way, so generally I'll highlight, I take notes, do note

> cards. Like when I went to the ASCD conference, that helps me focus on what they are saying and then I can sort through that. I have something to manipulate afterward and to say these are my high interest areas. Then I will talk to people about that.

Another participant indicated that he would take a pad of paper to a workshop to a workshop and write things down to trigger ideas but that he would not write down exactly what was said. "I make a notation to myself, to try and trigger the idea."

Resourcers make significant use of locating resources, particularly human resources. Use of Human Resourcers refers to use of dialogue with people to seek different opinions or insights, to thinking through a problem and to gather support (Fellenz, 1993, p. 37). However, the type of resource they used depends on the type of learning activity. When studying a concept, some Resourcers will "go to a person", but when looking for facts they will, "go to a manual." However, this was not the consensus among all participants as some preferred to use people as the first resource for a learning task.

> I start with people if I have people [available]. It's not that I don't go to other resources. It's just that it isn't my first step.

Before beginning a learning task, Resources need to have someone provide them with some ideas and direction so they can begin their learning. They talk with others to find out what is expected of them and how they should proceed.

> [If it was new] I would find someone who knew how to do it. Sit down and talk with them and have them show me.

> Usually I talk to people and find out what the expectations are, see what was formally there, and pull together what has been done.

One of the Resourcers indicated that he preferred to go to people because he was not very good at comprehending when he read and found people provided understandable explanations.

Even when critically assessing resources, this group utilized the assistance of other people. One participant indicated, "I would gather the resources for the task and then I would cross check that [resource] with the people involved to determine if it is appropriate."

Reflective Planners

Reflective Planners have two primary learning strategies that they use to learn in the workplace. They use the Metacognitive strategy of Planning and the Critical Thinking strategy of Generating Alternatives. They are the

only group that utilize a Critical Thinking strategy as a primary method of learning. Males were disproportionately distributed in this group compared to the overall sample as over 45% of the males in the study were in this cluster. The ratio of females to males in this cluster is 1.7 to 1, despite the fact that the ratio of females to males in the overall sample is 3.1 to 1.

Reflective Planners felt it was important to develop a plan for their learning. Planners need to see where their learning is going and prefer to see the "big picture" before proceeding with a learning activity.

> Seeing the big picture is part of the planning process. I think you need to decide where you're going and what you need to get there. To me that's much more efficient.

When working in a group, Reflective Planners "get unhappy if someone wants to go off on a different track without a reconcensus" because this is outside of the plan that was developed and they need to know everyone is going in the same direction as they are going.

Some of the Reflective Planners did not need a great deal of detail in their plan but merely wanted a general picture of where they were headed. "I know where my target

is, I don't necessarily know exactly how I am going to get there." Other Reflective Planners need details of the learning right up front in order to develop their plan. A Reflective Planners is "a very detail-oriented person, so I will ask a lot of questions in the beginning. I need things laid out."

Although Reflective Planners need a plan of action they do not necessarily follow it step by step. They take the opportunity to explore other avenues, which begins to involve the strategy of developing alternatives.

> I kind of have a general idea in my mind of what I want to do, but then the more information I gather then that takes me on detours to get other information, but eventually I come back to where I was [in my plan].

In real-life environments, such as the workplace, problems have multiple solutions and exploration of alternatives is vital (Fellenz, 1993, p. 32). Reflective Planners recognize the value of considering other approaches to their problems and learning situations. In some respects, the process of generating alternatives may almost be an unconscious activity by the Reflective Planners. As Reflective Planners encounter situations that require new

ideas they often desire to set the activity aside for a while and think about it.

> If I can't get something done, I need to mull it over and come back to it and tackle it in a different method. For example, if it's a two week time from when I leave it on the desk until I come back to it, that doesn't mean my mind isn't thinking about it along the way.

> I find that I need a period of absorption. If I have the luxury of not working on it for a while, just let it percolate and then when you go back to it you see it a different way, you find mistakes, [and] you find connections that you didn't see the first time through.

However, for some Reflective Planners the process of developing other alternatives is a conscious activity that is pursued to improve the learning process.

> If given an assignment I will confer with a couple of other colleagues to see if there are other processes that we can go through that would eliminate some areas. I find that it makes the task a lot simpler and makes the end product a lot better. To me that's really helpful.

Taking time to develop an idea, think about it, and modify it allows Reflective Planners to create a better result. Having the necessary time to reflect on something is very desirable for these learners. Reflective Planners

require the time to learn in order for them to develop and modify their plan as indicated by one participant.

> I need time to review, rewrite it, and make a final product. If I am rushed in a project and can't take the time I need, that inhibits how well the final product turns out.

The clusters found in this study have some learning strategies uses that are similar to those found a learning strategies study conducted by Kolody (1997). Kolody identified a cluster named the Navigators that used the learning strategies of Planning, Memory Organization, Use of External Aids, and Identification of Resources. This cluster is similar to the strategies used by the Resources in this study although they did not rely on Memory Organization but used Critical Use of Resources and Human Resources. The Monitors in Kolody's study are most like the Focusers in this study. Both of these clusters use the strategies of Attention, Identification of Resources, and are high in Planning. The Resources in this study are also similar to Kolody's Networkers in that they both make significant use of human resources.

Because of the similarities of the four clusters found in this study to those in Kolody's study, it may be that

they are a subset of the five clusters Kolody identified. However, just as there are similarities there are some important unique characteristics of the clusters found in this study.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

Summary

Adult learning was once considered a separate issue from business operation and the workplace. However, workplace learning is no longer viewed as a side effect of work, but it is now seen as the means by which most people acquire their greatest amount of job-related knowledge and skill that will take themselves and the organization forward (Roth in Spikes, 1995, p. 84). Constant change within organizations due factors such as technology, competition, and organization structures has prompted the need for organizations to consider their role in the education of the adult workforce. Businesses are spending substantial amounts of money in efforts to produce more knowledgeable employees in hopes of providing some benefits to the overall organization and the individual. Approximately $50 billion is spent on formal training and $180 billion on informal

training by businesses each year (Rowden, 1996, p. 3). More money is spent on workplace learning than on all of public higher education (Carnevale, 1989, p. 27) which in itself indicates a recognition by business of the need and value of investment in their employees.

The concept of the "learning organization" is founded in the recognition and understanding of the value of integrating learning and work to support continuous change and improvement at the organizational, group, and individual levels. Organizations have begun to realize that their "competitive advantage now appears to evolve around its ability to acquire, use, and generate collective knowledge—in effect, to learn" (Rowden, 1996, p. 8). If an organization is going to learn, then so must its employees. "Individual learning is central to organizational learning" (Marsick & Newman, 1996, p. 97).

Just as organizations have unique characteristics, so do their employees. Individual employee differences have the potential to impact the successfulness of employee learning, which will ultimately impact the success of the organization to thrive, compete, and survive. One of the unique

characteristics of individual learning recently being examined by adult educators has been the concept of learning strategies. Learning strategies are "the techniques or skills that an individual elects to use in order to accomplish a specific learning task" (Fellenz & Conti, 1993, p. 3). What makes understanding learning strategies critical to improving workplace learning is the significant influence learning strategies have on the success of a learning activity. Learning strategies differ from learning styles in that learning style is a rather stable characteristic of an individual, whereas learning strategies are developed throughout life and vary by specific learning task (p. 4).

Therefore, the purpose of this case study was to identify the learning strategies of employees in businesses in Great Falls, Montana. This study further examined that relationship between these learning strategies and various demographic and attitudinal variables of the employees. Finally, the study determined whether groups of learners exist based on their preferences for particular learning strategies.

Learning strategies and demographic data were collected from 262 employees working in professional occupations in 19 businesses in Great Falls, Montana. Data was collected using the Self-Knowledge Inventory of Lifelong Learning Strategies (SKILLS), a data collection sheet, and follow-up interviews.

Profiles of Employees

The sample of employees ranged in age from 18 to 64 with a mean of 40.7. Females represented 75.6% of the sample. Over 80% of the sample had attended a post-secondary institution, slightly above 55% had completed a degree or certificate, and the average time spent working in the career was 17 years.

Employee responses on the SKILLS instrument were used to determine the learning profiles of the employees. The SKILLS instrument produced scores in the learning strategy areas of Metacognition, Metamotivation, Memory, Critical Thinking, and Resource Management and scores in each of the 15 individual learning strategies. Possible learning strategy area scores range from 12 to 36. Resource Management with a mean of 27.2, and Metacognition with a mean of 24.5 were the most preferred learning strategy

areas. The least relied upon learning strategy area was Metamotivation with a mean of 21.97. The scores for the 15 individual learning strategies, which had a range of 4 to 12, revealed high use of several strategies. The four most preferred strategies with their mean scores were Planning (9.92), Identification of Resources (9.74), Use of External Aids (9.63), and Critical Use of Resources (8.95). The four least used learning strategies with their mean scores were Memory Application (6.72), Reward (6.71), Testing Assumptions (6.60), and Confidence (6.50).

Discriminant Analysis

Discriminant analysis was used to determine if learning strategies could be used to determine how groups differed when grouped on gender, age, post-secondary attendance, level of education, and years in position. No discriminant function was powerful enough to be useful in discriminating between the groups based on learning strategy use. Therefore, it was determined that it was not possible to discriminate between those in various demographic groups using learning strategies as identified by the SKILLS instrument.

Gender. Employees were grouped by gender in order to evaluate if they differed in their use of learning strategies. The discriminant analysis produces a discriminant function that is used to predict placement in the groups based on their learning strategies. The percentage of cases correctly classified by the discriminant function shows how accurate the discriminant function was in grouping the participants and helps to reveal significant differences between the two groups. The percentage of cases correctly classified by the discriminant function was 67.8%. For this study, a placement rate of 50% better than chance was required for the variable in question to be considered significant. This placement rate is only 17.8% better than chance in predicting placement based on their learning strategy preferences and therefore was judged as not useful in discriminating between genders.

Age. The employees were grouped into three age categories of 30 or Below, Between 31-50, and 51 or Above. Only the first and third group were considered in the analysis in order to provide a buffer zone between the groups thereby producing two distinct groups for the

analysis. The discriminant function was able to correctly classify 71.3% of the cases and but was below the minimum level required to be considered useful in differentiating between age groupings for learning.

Post-Secondary Enrollment. Discriminant analysis was used to determine whether employees differed in their use of learning strategies when grouped according to whether or not they had attended a post-secondary educational institution. The discriminant function was able to classify only 62.35% of the cases and therefore was judged as not useful.

Educational Credential. Employees were placed into three groups according to the level of educational credential they had earned. Those who had not earned a degree or certificate were not considered in this analysis. The three groups were Certificate/Associate Degree, Bachelor Degree, and Masters/Doctorate. The Bachelor Degree group was not included in the analysis in order to provide a buffer zone and create two distinct groups from which to compare. The discriminant function was able to correctly classify 68.9% of the cases, which is only an 18.9% improvement over

chance. Therefore, their educational degree type was judged as not useful.

Years in Position. Employees were placed into three groups according to the number of years they had been working in their current position. The three groups were 2 or Less, Between 3-10, and 11 or Above. The second group, Between 3-10, was not included in the analysis in order to provide a buffer zone and create two distinct groups from which to compare. The discriminant function was able to correctly classify 60.54% of the cases, which is only 10.54% above chance, and was therefore judged as not useful.

Cluster Analysis

Cluster analysis was performed to determine if it was possible to identify distinct clusters of employees based on their learning strategies preferences as indicated by SKILLS. This process identified four clusters of learners. Analysis of variance revealed that all 15 learning strategies were significant in defining the clusters. Each cluster had distinct characteristics based on the learning strategies used by the group. With the exception of gender, the demographic and attitudinal variables of age, attendance

at a post-secondary institution, years in college, completion of a degree or certificate, and level of degree were not significant in distinguishing among the groups of learners. Individual interviews were conducted with members of each group to provide additional information regarding naming and describing the groups.

Based on the quantitative and qualitative data collected, the four clusters of learners were named the Focusers, Indexers, Resourcers, and Reflective Planners. The Focusers preferred the learning strategies of Attention, Use of External Aids, Identification of Resources, and Confidence. These learners need time to concentrate on their learning. They make use of notes and lists and rely upon locating appropriate resources as a primary tool for workplace learning activities. Indexers use the learning strategies of Use of External Aids, Identification of Resources, and Critical Use of Resources. Similar to Focusers, this group also uses lists to learn and remember. Finding, evaluating, and organizing resources are necessary for them to learn in the workplace. Resourcers are similar to Indexers in some respect. They use the learning

strategies of Use of External Aids, Identification of Resources, and Critical Use of Resources, but in addition they use Planning and Use of Human Resources. Reflective Planners need to have a plan for their learning activity and they are much more likely to use other people as a resource. Reflective Planners have a preference for the two learning strategies of Planning and Generating Alternatives. These learners not only need a plan but they need time to contemplate their learning in order to develop other ways to proceed with a learning project. This cluster contained almost 50% of the males in the study.

Conclusions

This study is part of a major research effort in the area of learning strategies. These studies have been conducted using the Self-Knowledge Inventory of Lifelong Learning Strategies to investigate the concept of learning strategies. Although the studies have diverse populations, they have utilized similar research design and data analysis techniques. The purpose of this coordinated effort was to generate knowledge related to the relatively new concept of

learning strategies as defined by SKILLS. The major conclusions of this study confirm and support the findings of SKILLS research with other populations. These conclusions provide further understanding of the ways in which adults learn and the unique characteristics between learners and the workplace.

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

Gender, age, post-secondary attendance, educational credential, and years employed in current position were examined, but none revealed any significant difference in the choice of learning strategies. This indicates that individuals in these demographic groupings were distributed relatively evenly across the various learning strategies and that one cannot use these factors alone to make judgements about an individuals learning strategy preferences.

> Distinct groups of learners exist among employees in workplace learning situations in Great Falls, Montana, based on their use of learning strategies.

The results of the cluster analysis reveal four distinct clusters of learners. Each cluster uses a set of learning strategies that are unique to them. The four

clusters are named the Focusers, the Indexers, the Resourcers, and the Reflective Planners. This result has been found in similar research studies with differeing populations.

> No single set of training principles will work for all workers.

Because of the diverse learning strategies used by the four clusters of learners, the training methods and processes must be structured in such as way that provides flexibility to meet the diverse learning approaches of these four clusters of learners in the workplace. The training methods that might be effective for Focusers may be ineffective for Indexers and may potentially produce significant struggle for employees as they try to learn.

> Organizational training efforts need to focus on teaching the learning strategies needed for particular job roles and for organization needs.

Organizations have diverse learning needs for the variety of jobs performed with their business, and employee learning strategies may not fit all the needs of these jobs. Job roles within an organization may demand employees utilize particular learning strategies if their job is to be performed efficiently and effectively.

In addition, learning organizations require their employees to think critically about their work and the organization in order to continue to produce continual improvement. In addition, learning organizations need employees who feel comfortable working with and learning with other people. Because employees have a moderate preference for these strategies, learning organizations must teach the strategies necessary for their employee to become effective in a learning organization. Organizations must identify where critical differences occur and provide learning strategy training.

These conclusions reached in this study are supported by the findings of other learning strategy research which was conducted with different populations of adults than this study (Bighorn, 1997; Hill, 1992; Kolody, 1997; Korinek, 1997; Lockwood, 1997; Strakal, 1995;). These subsequent studies also found unique clusters of adult learners based on analysis of learning strategies and discovered no significance with respect to the relationship between demographic variables and choice learning strategies.

Although much has been written about workplace learning and learning organizations, this study has discovered aspects of the workplace learning not previously known. The identification of four groups of learners in the workplace may significantly impact future research about workplace learning and training in the workplace. The fact that demographic variables are not useful in discriminating between learning strategies releases workplace trainers from trying to utilize these factors for guidance when developing and providing workplace training. If consideration is given to the conclusions and recommendations of this study by organizations as they develop workplace training programs, the potential impact of this study will have lasting and profitable effects for many organizations.

Recommendations

Through a better understanding of the four types of learners found in the workplace, organizations have the potential to improve the effectiveness of their training and more conducive workplace learning environments for their employees. However, caution should be taken to assure that

individual differences among learners are still considered. Although learners fit into a particular cluster, they may still have characteristics not typical of their cluster and using cluster labels as perfect representations of the learners "can be detrimental if they are used to avoid critical thinking about the learner" (Conti & Kolody, 1997). The following recommendations must be taken with an awareness of the need to continually examine and evaluate the success of employee learning in the workplace. The following recommendations are based on the conclusions reached in this study as well as the increased need for organizations to provide effective workplace learning.

a) Employee Awareness. Employees should be provided information regarding the four groups of learners and their own personal learning strategies to help them become more aware of their learning strategies as well as other potential learning strategies that they may find more helpful.

b) Workplace Trainer. Those involved in workplace education need to be aware of the four types of learners and trained in evaluating, recognizing, and capitalizing on the learning strategies of the learners.

c) Job Analysis. The organization should identify those learning strategies that are critical to particular jobs within the organization and

develop a plan for teaching those strategies to employees working in those jobs.

d) Organizational Needs. Organizations should identify the learning strategies that are critical to employees functioning effectively within the organization.

e) Organization Environment. Based on the characteristics of the four groups of learners and the learning needs of the organization, the environment and structure of the organization needs to be evaluated to assure that it provides employees the necessary elements for successful learning and the organization teaches employees the strategies necessary for a successful learning organization.

Employee Awareness

Employees should be provided information regarding the four groups of learners and their own personal learning strategies to help them become more aware of their learning strategies as well as other potential learning strategies that they may find more helpful.

One primary reason for this recommendation is because "most adults are not aware that they can take control of learning and increasingly become more self-directed as learners" (Smith, 1982, p. 21). Through an awareness of their own strategies for learning as well as other potential strategies, employees have the potential to improve their ability to learn. The better an adult understands their own

learning strategies, the more empowered they are to improve their personal learning.

In an age of continual change in the workplace, knowing how to learn is a major factor in the success of a workers learning experiences in the workplace. "Central to the task of learning how to learn is developing an awareness of oneself as a learner" (Smith, 1982, p. 57). A central concept of learning how to learn involves individuals focusing on their own learning process, conceptualizing how they learn, and paying attention to how they go about learning (Brundage & MacKeracher, 1980, p. 30).

Because learners frequently give little thought to their selection of learning strategies (Fellenz & Conti, 1993, p. 3) an awareness of their learning strategies may encourage learners to give some thought to their choice of learning strategies and whether other methods might be more effective. An individual's use of particular learning strategies is not permanent but are continually modified as they experience and deal with real-life situations (Fellenz & Conti, 1993). However, unless learners are aware of other methods of learning, they are likely to continue using the

same strategy over and over, or they may select a different strategy that is not the most appropriate. Only when given an awareness and understanding of all the potential "tools" from which to choose does the learner have the best opportunity to choose the most appropriate tool. As a colleague once told me in referring to the responsibility of educators to help individuals become aware of other methods for learning, "if the only tool a person has is a hammer, every problem looks like a nail." An individual's ability to learn how to learn is significantly impacted by their "adeptness and insight in the use of learning strategies" (Fellenz & Conti, 1993, p. 3).

Working in groups is becoming a more and more popular way for organizations to operate. In order for group work to be successful, it requires cooperation and respect among the members. Through an awareness of other types of learning strategies, employees may be more understanding, tolerant, and respectful of other methods to approaching a project. Rather than seeing someone else's approach as impeding progress, they may find by observing other learning strategies a method that they can use to apply and improve

their own learning, or they can better understand why coworkers approach a problem differently than they do. Without this awareness, many people might focus only on the negative aspect of the situation instead of on the potential positive aspects the situation presents. If organizations invest the time and energy into helping their employees become better learners, they stand to yield rich returns (Smith, 1982, p. 15).

Workplace Trainer

> Those involved in workplace education need to be aware of the four types of learners and be trained in evaluating, recognizing and capitalizing on the learning strategies of the learners.

Those responsible for workplace education have many diverse roles and responsibilities. They might be employees within the organization that provide training, they might be consultants who specialize in a variety of training programs, or they might be part of a formal educational institution that provides training for business. Regardless of how they are connected to workplace learning, a fundamental understanding of adult learning and the use of learning strategies is essential to provide the most effective education program possible. Workforce educators

"must look for expanded, innovative ways to develop educational programs built on a solid research base of knowledge about adult learning" (Spikes, 1995, p. 88).

Through an awareness of the strategies used by the four clusters of learners, workplace educators can make concerted efforts to provide access to the resources that Focusers, Indexers, and Resourcers need; provide the overview, plan, and details that Resources and Reflective Planners need; provide the time to learn and reflect that Focusers and Reflective Planners require. Through specific efforts to provide the training in a way that is congruent with the strategies used by the learners, the content of the instruction will likely be more effective as the learners will be in a more comfortable environment with the tools they feel are necessary for them to learn effectively rather than having to adapt to unfamiliar methods of learning. If workplace learning is to be effective, it must take place in a "way that takes maximum advantage of their [employees] unique learning styles and preferences, and must become the basis for workplace learning programs in the next decade" (Spikes, 1995, p. 88). In this process,

> Almost self-evident is the need for the educator of adults to have a working knowledge of the learning how to learn concept... and be able to identify situations in which the learning how to learn factor operates (Smith, 1982, pp. 28-29).

Through an awareness of learning strategies, the workplace educator also has the potential to direct the employees toward other potential learning strategies. However, only through an awareness of the available learning tools can the educator provide the most appropriate evaluation and recommendation. In addition, they are also more likely to respect the learning strategies of those they are instructing.

Given the significant amount of resources that organizations are directing toward formal training of their workforce, it would only make sense that some effort be made to identify the skills needed by those who provide the formal training. Today's creative and competitive organizations that value learning cannot afford to hire workplace learning specialists who do not have the skills and knowledge related to facilitating adult learning in a for-profit environment (Spikes, 1995, p. 60).

Job Analysis

> The organization should identify those learning strategies that are critical to particular jobs within the organization and develop a plan for teaching those strategies to employees working in those jobs.

Within most organizations there are a variety of jobs, each requiring different skills and in most organizations there are many employees each with a variety of skills. In some instances, employees may be using learning strategies that are not the best suited for job they perform and therefore they might not be performing their job as efficiently and effectively as they are capable.

The organization needs to conduct an analysis of each job within their business to identify those learning strategies that are the most preferred for each job. This information should be gathered both with involvement from the managers as well as the employees performing the particular job.

Once the desired learning strategies are determined then a program of learning needs to be developed to teach the employees the most effective learning strategies for their job. This program would involve training the workplace

educator in what learning strategies are and how to teach learning strategies. The major focus of such a program should involve training for the employees to teach them how to use the various learning strategies identified as the most effective for their particular job.

The benefits of this are both to the individual and to the organization. The individual benefits from being able to perform their job more effectively, hopefully with a better ability to learn how to handle their responsibilities, and may likely develop a better understanding of their job. By offering the employee a more complete understanding, both in the knowledge and skill requirements of their job, the effectiveness of the activity is improved (Billett, 1995). In addition, the employee also benefits by expanding their ability to learn in new ways, thereby adding to their toolkit which will not only benefit them on the job but may also be useful in other aspects of their life. The organization benefits by having employees that are more efficient and effective at performing their job thereby increasing their productivity. This increased productivity may provide a substantial cost savings to the organization.

In addition, by having their employees perform their job more efficiently, the organization may be able to find other places in the organization where the individual can contribute.

Organizational Needs.

> Organizations should identify the learning strategies that are critical to employees functioning effectively within the organization and develop a plan to teach these strategies to employees within the organization.

Just like people, organizations have needs. Some organizations have a high need for efficiency, others demand critical thinking, still others need strong relations with the public. The needs of the organization dictate many of the learning strategies that are critical for employees to possess and utilize. If the needs of the organization do not match the internal realities of the organization then the individual is impeded and the organization suffers (Swanson & Arnold, 1996, p. 16).

Improving ones ability to learn is a valuable asset and a benefit for any organization (p. 17). Developing an individuals ability to learn in a learning organization produces well-informed, critical-thinking individuals who

make decisions that help the organization prosper (Bierema, 1996, p. 22) and to think and act independently as the workplace changes (Rowden, 1996, p.6). Ultimately the overall need of the organization is survival, and maximizing the investment in their employees is critical to achieving this goal (Swanson & Arnold, 1996, p. 14). The cost of investing in an employee far outweighs the costs of hiring and retraining an employee. Unfulfilled employees are less productive and they often leave the organization (p. 25) taking the organization's investment with them. By teaching the learning strategies that are most effective for the organization, the individual will become more critical to the organization and will more likely find fulfillment in the organization as their skills, abilities, and influence expand.

An organizations competitive advantage revolves around its ability to acquire, use, and generate knowledge, in effect, to learn (Rowden, 1996, p. 8). Because the employees are the organization, the more effective they are at learning the more competitive and successful the organization becomes. Investing time in teaching effective

organizational learning strategies is a worthwhile investment for an organization.

Organization Environment

> Based on the characteristics of the four groups of learners, the environment and structure of organizations needs to be evaluated to assure that it provides employees the necessary elements for successful learning.

Organizations historically have not been designed to support mutual inquiry and learning (Marsick & Neaman, 1996, p. 102). Forces in organizations often conspire to mold individuals rather than liberate them to think freely because this has the potential to threaten the accepted norms of the organization (Welton, 1995). However, organizations have begun to realize that their ability to compete evolves around their ability to learn (Rowden, 1996, p. 8) and organizations learn only through the experience and actions of individuals (Watkins, 1996, p. 90). Therefore, it is critical that if organizations are to survive, they must provide an environment conducive and supportive of their employees ability to learn effectively.

There are conditions and characteristics within an organization that prohibit employees from participating

fully in learning situations (p. 101), and organizations must work to recognize these conditions and remove them. "Managers who determine what should be learned act as a funnel for what they think is in the organization's best interests, and therefore they limit what people are able to learn" (Marsick & Neaman, 1996, p. 101). If individuals are to become more effective workplace learners, they must be given opportunities to develop learning strategies and explore learning opportunities. This requires an organizational culture that supports the efforts of employees to learn in a way that is most effective for them. Organizations need to develop a mind-set that welcomes continuous learning on the part of individuals (Marsick & Neaman, 1996, p. 103). The ability of an organization to become a learning organization lies in its ability to truly change from fragmented bureaucracies to fluid connected networks (Bierema, 1996, p. 23) that provide for flow of knowledge throughout the organization.

Based on the four clusters of learners, organizations can provide Focusers with the time and place to focus on their learning, assure that they are aware of and have

access to various resources, and receive support from the organization to maintain their confidence. Organization should provide Indexers with access to resources and an opportunity to evaluate the worthiness of the resources. In addition, Indexers need mechanisms to keep their resources organized. Resourcers feel more comfortable when they have a plan and access to resources that they can evaluate and determine what they find useful for their learning. Resourcers also find other people particularly helpful in pursuing a learning activity. The organizational structure should be sure that Reflective Learners have a plan as well as time to contemplate on their learning and determine if there is a better approach. Individuals can become powerful learners within an organization and influence organizational learning, but only if conditions in the environment change to support them in this role (Marsick & Neaman, 1996, p. 103).

Further Research

Adults are unique individuals with characteristics that impact how they live out their lives. These characteristics affect what clothes they wear, what foods they like, and

most certainly how they learn. Adults learn in many different ways and through many different experiences. Through continued efforts to better understand adults as learners, educators can seek to create environments that are more conducive to learning.

One characteristic of adult learning that has recently begun to receive considerable attention is that of learning strategies. Since learning strategies are techniques or skills that a learner elects to use to accomplish a specific learning task, they can be controlled by the learner and are modified and fine-tuned as the learner encounters learning opportunities.

The Self-Knowledge for Lifelong Learning Strategies (SKILLS) instrument has proven to be a valid and reliable tool for determining the learning strategies of adult learners. Using this instrument to measure the learning strategies of employees in Great Falls, Montana, in workplace learning situations has revealed four distinct clusters of learners. Through a cluster analysis, which is a way of allowing the data to reveal its own characteristics, the learning strategies of each cluster were revealed.

Further, personal interviews with learners in each cluster provided valuable insight and clarification into the uniqueness of each cluster. Through this process of gathering quantitative and qualitative data, a more accurate picture of the characteristics of the learners is revealed.

The SKILLS instrument is a useful tool if the researcher wants to examine the learning strategies of a specific population. SKILLS can be modified to fit the characteristics of the group being studied by creating scenarios specific to the population while still maintaining the validity and reliability of the instrument. The effectiveness of SKILLS has been shown in several studies on different populations over the past several years (Bighorn, 1997; Hays, 1995; Kolody, 1997; Korinek, 1997; Lockwood, 1997; Yabui, 1993). Similar research with SKILLS and other instruments should consider employing the multivariate technique of cluster analysis followed by a qualitative analysis that included interviews with the learners from the clusters revealed by the cluster analysis.

Broad based research of the learning strategies of employees in a larger segment of the population is necessary

to further generalize the finding of this case study. Such efforts have been undertaken recently with financial planners for American Express (Conti, Kolody, & Schneider, 1997). Additional research is also needed in determining if similar groups of learners exist in population of workers in traditional blue-collar occupations.

Research involving an analysis of the learning strategies used by the most effective employees in various job roles of successful organizations could provide valuable information in developing training programs for similar job positions. By using this information, employees could be taught the learning strategies that have been found to be used by the most effective employees in their specific job.

The workplace is experiencing continuous change and requires continual learning. If businesses are to thrive and compete, they must provide their employees with the necessary tools to deal with these changes. Through continued efforts to understand adult learning in the workplace, businesses can work to create a more effective environment for learning, and as a result, create a more

solid business environment from which to operate and ultimately increase their chance for success.

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APPENDIXES

APPENDIX A

JOB REGULATIONS

Some of your fellow workers start talking about the new regulations that will affect everybody with your job or position. You hear that copies of the regulations are in a big manual in the library and in the courthouse. How likely are you to use the following learning strategies in finding out what the regulations are and what you need to do to keep your job?

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

1. Thinking through what is important to know about these new regulations in order to decide what needs to be learned
2. Setting aside an evening to visit the library to review the new regulations
3. Finding out if there is an 800 number where you can get answers to specific questions you have
4. Thinking through how the new regulations will actually change the way you do your job
5. Reminding yourself of the difficulties you may avoid by learning the new regulations
6. Deciding to look through the regulations themselves.
7. Comparing your understanding of the new regulations with commonly accepted practices on the job
8. Reminding yourself that you have always been able to keep up with new regulations for a job
9. Remembering the new regulations by organizing them according to the daily routine you follow at work
10. Checking with your supervisor and fellow workers to find out if they have similar ideas about the new regulations
11. Placing your list of key points in a convenient place so they will remind you of what you have to do
12. Thinking of various ways that you can use the new regulations to improve your job situation
13. Reflecting on past experiences at the courthouse or library so you can avoid wasting time
14. Asking yourself if there are any parts of the job regulations that still confuse you
15. Beginning to test some of the new procedures on the job to see if they are going to work for you

NEW SOFTWARE

You have recently been informed that your company will be implementing a new computer software program in a few weeks. You have been asked to learn about the new software in order to train and support your coworkers in using the new software . Your company has set up a training station for you to use to learn the software. How likely are you to use the following learning strategies in learning about the new software?

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

1. Reflecting on whether you learn best by trial and error, by following directions, or by having someone tell you how to do it.
2. Resolving to learn how to use the new software rather than worrying whether you can learn to do so.
3. Finding out if there are software manuals where you can get answers to specific questions.
4. Questioning the appropriateness and usefulness of the new software.
5. Thinking about the problems you could have in supporting your coworkers to help motivate you to learn the new software.
6. Setting up an appointment with a computer consultant to help you make sense of all the information you have.
7. Checking to see if what you are learning is actually helping you understand the software.
8. Reminding yourself that you have been able to learn new software before.
9. Developing visual images, such as a picturing a page in the manual, to help you remember.
10. Seeking support from others who have experienced a similar situation.
11. Making notes of any difficult procedures so you can refer to them when training the other employees.
12. Asking yourself whether there might be a better way of learning to use the new software.
13. Thinking about past experiences you have had when learning software so you can avoid those difficulties this time.
14. Deciding if you have learned enough information to answer your coworkers questions about the software.
15. Testing out in your mind different procedures to see if they make sense to you.

COMMUNITY LEADERS

Your supervisor has asked you to help recruit leaders from the community for a group that is going to investigate potential business opportunities in the region. You have volunteered to help study what good leaders are like and to recruit good leaders. How likely are you to use the following strategies in learning how to recruit leaders?

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

1. Asking yourself what specifically needs to be done in your community before identifying the most appropriate leaders
2. Reminding yourself to focus on learning about leadership rather than worrying about being able to talk people into volunteering
3. Calling the Chamber of Commerce in your town to see if they have a community leadership group or program from which you could get ideas
4. Reviewing your decisions to see if friendship for certain people has influenced the suggestions you have made
5. Thinking about how your efforts will help your community have good business opportunities
6. Examining closely the qualifications of those suggested as leaders by interviewing several people who have worked with them
7. Reflecting back to see if you are sticking with your learning plan
8. Feeling confident you will be able to convince those you identify as good leaders to volunteer their services
9. Making up a word or phrase to remind yourself of the things you want to ask potential leaders
10. Talking with community leaders to test out your opinions on the qualities of a good leader
11. Jotting down notes about major points you want to remember
12. Thinking of many different ways of recruiting good leaders
13. Recalling similar experiences you have had in selecting leaders so you can remember what worked best
14. Revising your learning plans if you are not finding suitable ways for recruiting good leaders
15. Thinking through what could be done if those who are selected turn out to be poor leaders

JOB PROMOTION

Your have recently accepted a new position within the company you work for. This new position requires somewhat different skills than your present position and you will need to spend some time learning the duties and responsibilities of the new position. How likely are you to use the following strategies in learning how to perform the duties of your new position?

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

1. Thinking through what is important to know about this new position in order to decide what needs to be learned.
2. Focusing on learning about the duties of the position instead of worrying about whether you can perform them.
3. Finding out if there is a procedures manual for the position where you can get answers to specific questions.
4. Thinking about the advantages and disadvantages of the new position.
5. Reminding yourself of the opportunities you may be afforded by learning the duties of this new position.
6. Analyzing carefully the materials you have collected about the position by talking to others in the company
7. Checking to see if what you are learning is actually helping you better understand the responsibilities of this new position.
8. Reminding yourself that you have always been able to keep up with new responsibilities before.
9. Developing a mental image of the situations that will require you to perform various duties in order to help you remember them.
10. Seeking support from others who have been promoted to a new position.
11. Making a list of the things you have trouble remembering in order to review them before you begin the new position..
12. Thinking about whether there might be a better way of preparing for the new responsibilities.
13. Recalling similar experiences you have had in learning new responsibilities so you can remember what worked best for you.
14. Asking yourself if there are any parts of the job that still confuse you.
15. Testing out in your mind different procedures to see if they are appropriate and make sense to you.

SKILLS
(Self Knowledge Inventory for Lifelong Learning Skills)
Directions and Answer Sheet

Directions: Attached are four workplace-related scenarios. From each of the four scenarios you are given a list of 15 potential learning strategies to handle the situation. Select the 5 learning strategies that you would Definitely Use, 5 learning strategies that you might Possibly Use, and 5 learning strategies that you would Not Likely Use. Enter the number for each of learning strategies in the proper box below.

I would like to receive a summary of the results of my survey? YES NO
I would be willing to be available for a 5- 10 minute interview? YES NO
Phone number _____ (if answered 'yes' to above)
(only about 30 out of all participants will be contacted for a 10-20 minute interview in order to confirm or dispute my conclusions)

Job Regulations	New Software	Community Leaders	Job Promotion
Definitely Use	Definitely Use	Definitely Use	Definitely Use
Possibly Use	Possibly Use	Possibly Use	Possibly Use
Not Likely Use	Not Likely Use	Not Likely Use	Not Likely Use

APPENDIX B

DATA SHEET

Please answer the questions on this Data Sheet and the accompanying SKILLS survey. This should take approximately 30-40 minutes to complete. Your name is requested in order to provide you with the results of the attached SKILLS survey and to identify individuals for potential follow-up interviews. Your participation is great appreciated.

1. Name: _____

2. Age: _____

3. Gender: Male _____ Female _____

4. Number of years of formal education including high school: _____

5a. Did you attend college/votech? Yes No (If you answered 'No skip to question 6)

Answer these questions only if you answered 'yes' to question 5a.

5b. Number of years you attended college: _____

5c. Did you complete a degree/certificate? Yes No

5d. What type of degree(s) (associate,bachelor,masters,etc.): _____

5e. Is your college education related to your current position? Yes No

6. How long have you been employed in your *current position*? _____

7. How long have you been working in your *current career field*? _____

8. What motivated you to accept the position you now hold: (Check all that apply)

- ☐ Meets my skills & abilities
- ☐ Advancement opportunities
- ☐ Importance of job
- ☐ Desirable employer
- ☐ Convenience (flex hrs/childcare)
- ☐ Size of company
- ☐ Interactions with co-workers/public
- ☐ Job benefits (insurance/vacation)
- ☐ Working conditions
- ☐ Helping others
- ☐ Challenge & creativity of job
- ☐ Independence of job
- ☐ Job security
- ☐ Adequate income
- ☐ Self respect/growth/enjoyment
- ☐ Respect/recognition from others
- ☐ Others _____

9. Indicate to what extent you agree or disagree with the following statements (A-I). For the following statements, *technology* is defined as computers, fax machines, word processors, voice mail, pagers, cellular phone and other related equipment. *Formal education* is defined as learning that is structured and led by an instructor/leader, such as in a course or training session.

A) *Formal education is more valuable than on-the-job experience for my current position.*

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

B) *Technology has made my current job easier.*

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

C) *I use technology as a regular part of my daily job responsibilities.*

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

D) *I am generally satisfied with my current job.*

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

E) *I am eager to learn how to use new technology in my current job.*

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

F) *The value of formal education is overstated for my current job.*

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

G) *I sometimes fear my job will be replaced by technology.*

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

H) *I have confidence in my ability to learn how to use new technology for my current job.*

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

I) *Technology is beneficial to society.*

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

Please complete the attached SKILLS survey. Your assistance is greatly appreciated. If you have any questions, please contact me at 771-4382 -- Clay Gehring.